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Supplemental Archaeological Assessment

Second Avenue Subway:
72nd and 86th Street Stations

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

May 2009

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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:	Second Avenue between East 69th and East 73rd and East 83rd and East 87th Streets
Minor Civil Division:	06101: Manhattan
County:	New York County
72nd Street Location Information:	
Survey Area Length:	Approximately 1300 feet (396.24 meters)
Survey Area Width:	Variable; between approximately 600 feet (182.88 meters) and 1200 feet (365.76 meters)
Number of Acres Surveyed:	Approximately 6
86th Street Location Information:	
Survey Area Length:	Approximately 1400 feet (426.72 meters)
Survey Area Width:	Variable; between approximately 600 feet (182.88 meters) and 1200 feet (365.76 meters)
Number of Acres Surveyed:	Approximately 6
USGS 7.5 Minute Quadrangle Map:	Central Park
Report Author:	Elizabeth D. Meade, RPA
Date of Report:	May 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 72nd and 86th Street Stations 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 New York City Transit, 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, a Phase 1A Archaeological Assessment of the Second Avenue Subway, as well as several addenda to the Phase 1A, were prepared by Historical Perspectives, Inc. (HPI) in 2003.

In the vicinity of the 72nd and 86th Street Stations, 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 (see Section B, below, for a discussion of archaeological analyses completed since the completion of the FEIS). No evaluation was conducted at that time for any of the station's entrances, ancillary facilities, or utility relocations on streets other than Second Avenue. Since that time, however, the designs for the 72nd and 86th Street Stations have advanced considerably and now include areas located outside the Area of Potential Effect (APE) analyzed in the FEIS. Some of these areas have subsequently been evaluated for their archaeological potential in accordance with the provisions of the PA, including analyses prepared as part of a Supplemental Environmental Assessment prepared in 2009 to assess the potential impacts of proposed station entrance modifications for the 72nd and 86th Street Stations (see Section B, below, for more details).

This Supplemental Archaeological Assessment of the 72nd and 86th Street Stations analyzes the archaeological sensitivity of any areas of planned construction that fall outside the previously evaluated archaeological APE. These locations include station entrances, ancillary facilities, and utility relocations. This includes the following (see Figure 2):

The APE for the 72nd Street Station for the purposes of this archaeological assessment includes the following:

- An entrance on the eastern side of Second Avenue between East 69th and East 70th Streets;
- An entrance and ancillary facility at the northwest corner of Second Avenue and East 72nd Street that extends southward beneath 72nd Street and the southwest corner of Second Avenue and 72nd Street;
- An ancillary facility at the northwest corner of Second Avenue and East 69th Street; and

- Utility relocations in East 69th and East 73rd Streets between First and Third Avenues, East 70th Street between First and Second Avenues, and East 72nd Street between Second and Third Avenues (including the sidewalks).

An entrance at the southeast corner of Second Avenue and East 72nd Street and the streetbed of East 72nd Street between First and Second Avenues were previously analyzed for archaeological sensitivity (see section B, below).

The APE for the 86th Street Station for the purposes of this assessment includes the following:

- An entrance on the eastern side of Second Avenue between East 83rd and East 84th Streets;
- An ancillary facility at the northwest corner of Second Avenue and East 83rd Street;
- An ancillary facility at the northwest corner of Second Avenue and East 86th Street; and
- Utility relocations in East 82nd Street between First and Second Avenues, East 83rd Street between First and Third Avenues, East 84th Street between First and Second Avenues, and East 86th and East 87th Streets between Second and Third Avenues (including the sidewalks).

An entrance at the southeast corner of Second Avenue and East 86th Street and the streetbed of East 86th Street between First and Second Avenues were previously analyzed for archaeological sensitivity (see section B, below).

B. PREVIOUSLY ANALYZED PORTIONS OF THE APE

The 72nd Street Station will be constructed within the streetbed of Second Avenue between East 68th and East 69th Streets to East 73rd Street. The box for the 86th Street Station will extend on Second Avenue between East 82nd Street and a point midway between East 86th and East 87th Streets. Both of these areas were analyzed in the 2003 Phase 1A and neither was identified as having sensitivity for either precontact or historic period archaeological resources. The Phase 1A states that there were areas which may at one time have possessed archaeological sensitivity (i.e. in the areas surrounding streams near East 75th and East 86th Streets, which would have been ideal locations for Native American habitation sites, and an area near the southwest corner of Second Avenue and East 84th Street, the location of the former Yelles Hopper estate). However, soil borings showed that there were no intact soil levels present in these areas and/or bedrock was very close to the surface. Therefore, there was a low probability of finding intact archaeological resources in any of these locations.

In December 2007, AKRF prepared two disturbance memoranda that analyzed the potential archaeological sensitivity of portions of the streetbeds of East 72nd and East 86th Streets between First and Second Avenues. Neither memorandum identified any areas of archaeological sensitivity for either area. SHPO concurred with the findings of the disturbance memo for the 72nd Street Station in comments dated January 1, 2008. After requesting more information regarding the 86th Street Station, SHPO also concurred with the findings of the 86th Street Station disturbance memorandum in comments dated June 20, 2008. LPC also concurred with the findings of the 86th Street Station disturbance memo in comments dated May 8, 2008.

Additional archaeological analysis was completed by AKRF for the *Supplemental Environmental Assessment to the Second Avenue Subway Final Environmental Impact Statement: 72nd and 86th Street Station Entrance Alternatives* (EA). The EA was prepared by AKRF in 2009 in accordance with the National Environmental Policy Act (NEPA) for the FTA as lead federal agency, to provide environmental analyses of proposed entrance modifications to the 72nd and 86th Street Stations. For that assessment, three alternative designs for Entrance 3 of the 72nd Street Station were analyzed. This analysis covered the entire streetbed of East 72nd Street between First and Second Avenues and the lot at 300 East 72nd Street (Block 1446, Lot 51) at the southeast corner of East 72nd Street and Second Avenue. The EA determined that as a result of numerous factors, (including the disturbance generated by the construction and maintenance of streets and utilities, excavation of basements, the late development of certain historic lots until after water and sewer networks were available, and the shallow nature of the bedrock in the area), none of the project alternatives for Entrance 3 of the 72nd Street Station would impact precontact or historic period archaeological resources.

Three design alternatives were also analyzed for Entrance 2 of the 86th Street Station, which included the entire streetbed of East 86th Street between First and Second Avenues as well as two properties at 1654 and 1656 Second Avenue (Block 1548, Lots 50 and 49, respectively). The EA determined that as a result of disturbance generated by the construction and maintenance of streets and utilities, excavation of basements, the late development of certain historic lots until after water and sewer networks were present in the area, and the shallow nature of the bedrock in

the area, none of the project alternatives for Entrance 2 of the 86th Street Station would impact precontact or historic period archaeological resources.

LPC concurred with the conclusions of the EA for 72nd and 86th Streets in comments dated February 18, 2009 and SHPO concurred with the EA in comments dated March 12, 2009.

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 and the 2009 AKRF EA. 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 location of the 72nd Street station was originally a flat meadow bordered on the southwest by a hill, the base of which entered the southern portion of Block 1424. A large stream surrounded by marshland ran to the north of this area, between East 73rd and East 74th Streets. In the vicinity of the 86th Street station, the Viele map shows that the APE was originally situated within a meadow bounded by large hills to the southeast and northwest. One large hill cut across the location of the 86th Street Station, travelling northeast-southwest from an area near the intersection of Second Avenue and East 88th Street and terminating at a larger hill near the intersection of Third Avenue and East 85th Street. Two streams ran in the vicinity of the station: one to the northeast that crossed through the eastern ends of Block 1532 and terminated in Block 1531 and the other to the southeast that began in Block 1546 and continued to the southeast until it drained into the East River.

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. 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 significantly since the mid-19th century. However, data from the 1885 Robinson and Pidgeon atlas shows that little landscape modification has taken place since the late 19th century. Therefore, it appears that most of the alterations took place between the 1850s and 1880s, around the time when the neighborhood surrounding the APE was leveled and streets were cut through in preparation for residential development (discussed in greater detail in Chapter 4). A summary of the street elevation changes as depicted on three maps (dating to 1850, 1885, and 2007) is presented in Table 1, below.

The most significant landscape modification appears to have occurred near the APE for the 72nd Street station. The elevation data presented in Hayward's 1850 map confirm the presence of the large hills that extended northeast-southwest across the 72nd Street Station APE on the 1811 Bridges (Figure 4), 1836 Colton (Figure 5), and 1851 Dripps maps. If the information on Hayward's map is accurate, this hill may have been cut down by more than 40 feet in certain portions of the 72nd Street Station APE. In the vicinity of the 86th Street Station, some filling appears to have occurred in the vicinity of the former streams, and some small hills may have been leveled, however, the changes are not nearly as drastic as those seen near 72nd Street Station APE.

Table 1
Street Elevation Changes Over Time

Intersection	1850 Hayward	1885 Robinson and Pidgeon	2007 Sanborn
East 69th Street & First Avenue	53.5	52	52
East 69th Street & Second Avenue	60.2	58.4	58.4
East 69th Street & Third Avenue	83.4	77	77
East 70th Street & First Avenue	49.11	50	50
East 70th Street & Second Avenue	85.7	54.1	54.1
East 71st Street & Second Avenue	98.3	51.1	51.1
East 72nd Street & First Avenue	47	42	42
East 72nd Street & Second Avenue	58.2	47.8	47.5
East 72nd Street & Third Avenue	68.4	68.4	68.4
East 73rd Street & First Avenue	78.5	34.6	34.6
East 73rd Street & Second Avenue	52.11	43.5	43.4
East 73rd Street & Third Avenue	57.4	58.3	58.3
East 82nd Street & First Avenue	41.4	46	45
East 82nd Street & Second Avenue	52.2	53	53
East 83rd Street & First Avenue	48.8	51	51
East 83rd Street & Second Avenue	53.5	56.2	56.2
East 83rd Street & Third Avenue	76.2	78.2	76.2

Table 1 (continued)
Street Elevation Changes Over Time

Intersection	1850 Hayward	1885 Robinson and Pidgeon	2007 Sanborn
East 84th Street & First Avenue	62.1	58.9	58.4
East 84th Street & Second Avenue	61.8	59.4	59.4
East 85th Street & Second Avenue	60.4	62.6	62.6
East 86th Street & First Avenue	46.4	45.8	45.8
East 86th Street & Second Avenue	59.1	59	59
East 86th Street & Third Avenue	75.2	75.2	75.2
East 87th Street & Second Avenue	57.1	53.5	53.1
East 87th Street & Third Avenue	78.5	78.6	78.5

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

HPI's 2003 Phase 1A archaeological assessment and subsequent supplemental soil borings analysis (HPI 2003b) included numerous soil borings located within the streetbed of Second Avenue in the vicinity of the 72nd and 86th Street Stations. In general, the borings showed that the majority of the Second Avenue streetbed is composed of a layer of fill of varying thickness that is located directly above bedrock or decomposing bedrock. While most of the borings showed that fill rested directly above bedrock, some included levels of sand, silt, or clay beneath the layer of fill. However, these soil levels were not consistently present throughout the Second Avenue streetbed. Based on the evidence gathered from the soil borings logs, HPI determined that the soil levels in the vicinity of the APE of the 72nd and 86th Street Stations were disturbed. Therefore, HPI did not identify any areas of archaeological sensitivity in either location.

Of the more than 70 soil borings completed in the vicinity of the 72nd and 86th Street Stations by MTA NYCT between 2002 and 2007 (see Appendix), all but seven show that bedrock is separated from the ground surface by a layer of fill measuring between 1.5 and 19 feet in thickness. Two borings in the vicinity of the 72nd Street Station included soil levels between fill and bedrock but only one of these was located within the APE. This boring was located on the southern side of East 72nd Street approximately 50 feet west of Second Avenue. This boring showed 6 feet of fill, then 2 feet of silty sand, 2 feet of clean sand, 5 feet of sandy gravel with silt, and finally decomposing bedrock beginning at 15 feet below the ground surface. Another boring located on the northern side of East 72nd Street approximately 30 west of Second Avenue showed only 3 feet of fill directly over decomposing bedrock.

In the vicinity of the 86th Street station, five soil borings included sediments other than fill between bedrock and the ground surface, although only one was located within the APE while three others were located within the streetbed of Second Avenue in the area previously analyzed in the 2003 Phase 1A study and the fourth was located in the streetbed of East 85th Street east of Second Avenue where no work is proposed for this station. The boring located within the APE was on the southern side of East 83rd Street approximately 45 feet east of Second Avenue. It identified 3.5 feet of fill over a level of silt and clay measuring 4.5 feet in thickness, then a 3-foot layer of silty sand, and finally decomposing bedrock at 11 feet below the streetbed. This boring was located within 10 to 40 feet of other borings which showed only a level of fill between bedrock and the ground surface.

This suggests that while isolated areas may contain small patches of natural soil levels, they are irregularly distributed throughout the APE.

A. PREVIOUS PRECONTACT ARCHAEOLOGICAL RESOURCES SENSITIVITY ASSESSMENTS

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 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 to the west of the project site. In addition, two Native American habitation sites, *Coneykeest* and *Konaande Kongh* were documented to the north of the 72nd and 86th Street APEs, although the latter site may have extended as far south as East 91st Street.

The Phase 1A 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. However, because of the lack of natural stratigraphy and the shallow depth of bedrock that was indicated by soil borings near the project site, the Phase 1A did not identify any areas of sensitivity within Second Avenue near the 72nd and 86th Street Station APE. Similarly, because of the disturbance of the ground surface, the 2007 disturbance memos and 2009 EA prepared by AKRF determined that the location of Entrance 3 of the 72nd Street Station (including Block 1446, Lot 51and the streetbed of East 72nd Street between First and Second Avenues) and Entrance 2 of the 86th Street Station (including Block 1548, Lots 49 and 50 and the streetbed of East 86th Street between First and Second Avenues) were not sensitive for precontact archaeological resources.

B. PRECONTACT SENSITIVITY OF SUPPLEMENTAL LOCATIONS

72ND STREET STATION

Historic maps including the 1811 Beers (Figure 4), 1836 Colton (figure 5), 1851 Dripps, and 1865 Viele map (Figure 3) all show the 72nd Street Station APE in the vicinity of streams and tall hills, however, these maps don't suggest that the APE was located on a level area. It is less likely that a Native American habitation site would have been constructed on a hillside rather than nearby level a hilltops.

Regardless of the potential presence of a Native American site within the 72nd Street Station APE, the documentary record shows that this area was disturbed during the late 19th century. Historic maps show that the hills that formerly occupied the site were leveled, possibly by more than 40 feet in some locations, after 1850 and before 1885. There is also evidence (described in greater detail in the following chapter) that in preparation for the residential development of the Upper East Side in the late 19th century, much of the area was graded and excavated.

Because precontact archaeological resources are usually found at relatively shallow depths (within several feet of the precontact living surface) the significant landscape modification that took place within the 72nd Street Station APE during the late 19th century would have disturbed Native American archaeological resources in this area. The construction of the APE's streetbeds, as well as the decades of grading, paving, and utility installation that have followed would also have generated disturbance in this area. All of the locations of the station's entrances and ancillary facilities are located within blocks and lots that are currently occupied by buildings with basements. The excavation of those basements would have resulted in the disturbance of any archaeological resources in those locations.

Soil borings confirm the extensive disturbance of this area, as all but one of the soil borings located within the 72nd Street Station APE indicate that levels of fill are located between the ground surface and the bedrock of all the streetbeds within the APE. Only one soil boring indicated the presence of soil levels other than fill. That boring was located on the southern side of East 72nd Street approximately 55 feet west of Second Avenue. An additional soil boring located across the street showed that only 3 feet of fill were present above the decomposing bedrock.

Utility plans show that the streetbed of East 72nd Street west of Second Avenue contains numerous utilities, including sewer, water, gas, electric and telecommunications lines. A gas line runs through the southern sidewalk of the street in the vicinity of the aforementioned soil boring. Even if precontact archaeological resources could have survived the leveling of the hills and the subsequent construction of East 72nd Street and the installation of utilities, they would be irregularly distributed and would not likely possess significant research value.

Therefore, it is unlikely that the construction of the 72nd Street Station will impact archaeological resources dating to the precontact period.

86TH STREET STATION

The location of the 86th Street Station would have been a more ideal location for a Native American habitation site than the 72nd Street Station portion of the APE. As seen on the 1865 Viele map (Figure 3), the 86th Street Station APE was on more level ground and near the heads of two small streams, one that drained out into the East River and the other that drained into the saltwater marshes to the north. These streams and the surrounding environment could have provided numerous resources which would have been exploited by Native Americans for food and supplies.

However, as with the 72nd Street Station, there has been substantial landscape modification within the 86th Street Station APE since the late 19th century. While the map elevation data presented in Table 1 suggests that much of the APE in this area has been filled in, resulting in an increase in elevation since 1850, soil borings indicate that much of the ground surface has been disturbed. With the exception of one, all of the soil borings completed within the APE identified only layers of fill between the original ground surface and bedrock, indicating that no natural soil levels remain in those areas. The remaining boring was located in the southern sidewalk of East 83rd Street, approximately 40 feet east of Second Avenue. In that location, 3.5 feet of fill were present over a 4.5-foot layer of silt and clay, 3 feet of silty sand, and then decomposing bedrock. Another boring located within the streetbed of East 83rd Street approximately 30 feet away showed 12 feet of fill above the bedrock with no natural soil levels present. Numerous utilities run beneath the streetbed of East 83rd Street including sewer, water, gas, electric, and telecommunications lines. Even if precontact archaeological resources could have survived the construction of East 83rd Street and the subsequent grading, paving, and installation of utilities, they would be irregularly distributed and would not likely possess significant research value.

In addition, all of the locations of the station's entrances and ancillary facilities are located within blocks and lots that are currently occupied by buildings with basements. The excavation of those basements would have resulted in the disturbance of any archaeological resources in those locations.

Therefore, it is unlikely that the construction of the 86th Street Station will impact archaeological resources dating to the precontact period.

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 locations of the 72nd and 86th Street stations were located in areas that were originally occupied or surrounded by tall hills and marsh-bordered streams that ran east to the East River. Early 19th century maps including the 1811 Bridges, 1820 Randel, and 1836 Colton maps (Figure 5), show that few structures were located in the vicinity of the two stations. The maps depict several historic roads that crossed through the area, connecting the isolated farmhouses and country estates with the main Post Road to Boston, which ran in the vicinity of modern Third Avenue near the APE.

By the mid-19th century, however, the population of New York began to move northward and neighborhoods began to develop throughout the area. 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). Therefore, it is likely that this neighborhood was outfitted with water and sewer lines before the majority of residential development occurred. AS seen on the 1865 Viele map, by that time sewers had been installed in several streets within and in the vicinity of the APE including Third Avenue between 69th and 87th Streets and 86th Street between Third Avenue and the East River. Second Avenue was lined with 4-story tenements that were intended to create a community more appealing to the working class than the crowded slums downtown (ibid). The growth of these neighborhoods was also due to the establishment of elevated train lines along Second and Third Avenues, which allowed individuals to work in Manhattan's downtown commercial center while living in residential districts uptown.

Dripps' maps of New York City published in 1851 and 1867 (Figure 6) depict the developing neighborhood of Yorkville, located in the vicinity of the 86th Street Station. The neighborhood surrounding the 72nd Street Station was less well-developed, especially east of Second Avenue. The 1867 map is the first to depict all of the side streets adjacent to the three stations as fully constructed, whereas previous maps had depicted some or all of the streets as proposed rather than built. Also by 1867, many of the tall hills that formerly marked the landscape in the area had been leveled and may have been used to fill in the adjacent streams and marshes in advance of the residential development of the Upper East Side.

While the 1867 Dripps map shows that some of the blocks adjacent to Second Avenue had been divided into individual lots, by the time of the publication of the 1879 Bromley atlas, all of the adjacent blocks had been lotted out and most had been developed with structures. The 1885 Robinson and Pidgeon atlas and the 1891 Bromley atlas (Figure 7) depict increased development throughout the Upper East Side. Bromley's atlas shows that by 1891, nearly all of the lots lining Second Avenue were occupied by structures and Sanborn maps dating to 1896, 1911, 1939, and 1951 show that the side streets were almost entirely developed by the early 20th century and have remained developed since that time.

B. LOCATIONS OF DISTURBANCE FOR THE 72TH STREET STATION APE

The APE for the 72nd Street Station remained undeveloped through the mid-19th century. Even after the streets in the area were constructed, by 1867 only one building had been constructed in the area, outside of the APE on the southern side of East 69th Street near the corner of Third Avenue. The lots adjacent to the APE were not substantially developed until the late 19th century.

As described above, portions of the 72nd Street Station APE were previously analyzed for archaeological sensitivity. The 2003 Phase 1A assessed the location of the main station "box" within the streetbed of Second Avenue between East 68th and East 73rd Streets and the 2007 disturbance memo and 2009 EA prepared by AKRF analyzed the location of Entrance 3 (including the streetbed of East 72nd Street between First and Second Avenues and Block 1446, Lot 51). Neither of those locations was determined to be sensitive for archaeological resources dating to the historic period.

ANCILLARY FACILITY 1:

Ancillary Facility 1 will be located at the northwest corner of East 69th Street and Second Avenue, within Block 1424, Lots 21, 22, and part of 7501. This area was undeveloped through the mid-19th century and no historic maps depict any structures on Block 1424 until the 1880s. The 1879 Bromley atlas shows that the block had been divided into lots, all of which were developed with brick or stone-fronted brick structures by 1885, when the Robinson-Pidgeon atlas was published. Eight historic lots were formerly located along the eastern side of Block 1424, fronting on Second Avenue, six of these are included in whole or in part in the location of Ancillary Facility 1. The 1885 atlas also depicts the presence of fire hydrants in the streetbed of East 69th Street, indicating that water lines (and sewers) were present.

The structures depicted within modern Lots 21 and 22 on the 1885 Robinson-Pidgeon atlas are still situated on the property. Current Sanborn maps indicate that both buildings are 5 stories tall and have basements. Lot 7501, which covers the remainder of this side of the block, is currently occupied by a 14- to 16-story structure with a basement. This structure was built in 1956.

Soil borings completed in the vicinity of Ancillary Facility 1 indicate the presence of 6 to 10 feet of fill located directly over bedrock or layers of decomposing bedrock. A single boring, located in the western sidewalk of Second Avenue in front of Lot 21 (outside of the APE), indicated the presence of 8 feet of fill over a layer of sand and gravel, although the boring was terminated at 10 feet below ground surface and no additional information was provided.

Because of the lack of development in this area until after water and sewer networks were available and the subsequent construction of 5- to 16-story buildings with basements over relatively shallow bedrock, it is not likely that archaeological resources dating to the historic period remain undisturbed within the location of Ancillary Facility 1.

ENTRANCE 1:

Entrance 1 of the 72nd Street Station will be located on the east side of Second Avenue between East 69th and East 70th Streets within Block 1444, Lots 49, 50, 51, and part of 7501. This area was undeveloped through the mid-19th century and no historic maps depict any structures in the location of Entrance 1 until the 1890s. The 1879 Bromley atlas shows that the block had been divided into lots, although none were depicted as developed until 1891, when an updated Bromley atlas (Figure 7a) was published. That map depicts eight historic lots along the western side of Block 1444 (fronting on Second Avenue), all of which were brick structures with stone fronts. Subsequent maps show that these buildings all were 5 stories tall and had basements.

The late 19th century structures first depicted on the 1891 Bromley atlas still stand on Lots 49, 50, and 51, within the location of Entrance 1. The remainder of the site of Entrance 1, covering a portion of Lot 7501, was redeveloped with a 14- to 18-story (with basement) residential building that was constructed in 1962.

Soil borings completed in the vicinity of Entrance 1 indicate the presence of 1.5 to 10 feet of fill located directly over bedrock or layers of decomposing bedrock. Because of the lack of development in this area until after water and sewer networks were available and the subsequent construction of 5- to 18-story buildings with basements over relatively shallow bedrock, it is not likely that archaeological resources dating to the historic period remain undisturbed in the location of Entrance 1.

ENTRANCE 2 AND ANCILLARY FACILITY 2:

Entrance 2 and Ancillary Facility 2 will require excavation in several locations, including a portion of Block 1426 Lot 25, a portion of East 72nd Street west of Second Avenue, and Block 1427, Lots 23 and 24 and a portion of Lot 28.

BLOCK 1426, LOT 25

Lot 25 of Block 1426 is currently occupied by a row of four 5-story structures without basements, although portions of the subway entrance to be constructed within this lot will be located in the bedrock level beneath the northern two structures (1361 and 1363 Second Avenue).

This area is depicted as vacant on historic maps through the late 19th century, although the 1862 Perris atlas depicts a small (approximately 10 by 20 feet) wood frame building in the southwestern corner of modern Lot 25, but not within the APE.

No other maps depict any structures within modern Lot 75 until the 1885 Robinson-Pidgeon atlas, which shows a 30-foot-square wood frame building in the northeastern corner of the lot, within the APE. However, the 1891 Bromley Atlas once again depicts modern Lot 25 as vacant. Maps continue to depict the lot as vacant through Bromley's atlas of 1899. While the Knox Presbyterian Church (now the Roman Catholic Church of Saint John the Martyr) was constructed to the west of Lot 25 (on modern Lot 27) circa 1887, historic maps do not suggest that it was associated with what was then vacant Lot 25 (*New York Times* 3/7/1887).

The buildings that currently occupy Lot 25 were constructed by 1907 and a Sanborn map from that year is the first to depict them. No maps suggest that the buildings themselves have basements, although Sanborn maps dating between 1951 and the present show that a rear addition to the structure at 1361 Second Avenue has a 1-story rear addition that has a basement.

A soil boring located within the southern curb of East 72nd Street west of Second Avenue indicated the presence of 6 feet of fill over 2 feet of silty sand, 2 feet of clean sand, 5 feet of sand, gravel, and silt, and then decomposing bedrock. Another boring located within the northern curb of East 72nd Street west of Second Avenue indicated that 3 feet of fill rested directly atop decomposing bedrock.

Although one soil boring suggests the presence of potentially intact soil levels in the vicinity of the location of modern Lot 25, the property was developed late in the 19th century, after water and sewer networks were available in adjacent streetbeds. Therefore, it is not likely that archaeological resources dating to the historic period are located in modern Lot 25.

BLOCK 1427, LOT 23

Although the 1879 Bromley atlas shows that modern Lot 23 was divided into four historic lots, the 1885 Robinson-Pidgeon atlas is the first to depict any structures on the property. The latter map depicts four stone structures on the lot (253 through 259 East 72nd Street). It appears that the structures that currently stand on Lot 23 are the same as those depicted on the 1885 map, although renovations some of the buildings in the first half of the 20th century have resulted in confusion regarding the number of floors within and the presence of basements below these buildings. Sanborn maps dating between 1896 and 1939 depict the structures at 253, 255, and 257 East 72nd Street as 4 stories with basements and the structure at 259 East 72nd Street as 5 stories with a basement, even though it was only 2 feet taller than the 4-story buildings to the west. However, maps dating after 1951 identify the structures at 253, 255, and 257 East 72nd Street as 5-story structures without basements even though photographs confirm that they are the same buildings (Sperr 1941). The historic photographs suggest that in the early 1940s, the lower floors of these buildings were renovated. It therefore appears that the alterations made to the ground floors of these buildings, formerly identified as basements, resulted in a change in the floor count as defined by the mapmakers.

As mentioned previously, a soil boring located in the northern curb of East 72nd Street indicates that the streetbed in this area is located over a 3-foot-thick layer of fill which sits directly on top of decomposing bedrock. Because of the late development of this area and the relatively shallow depth of the bedrock, it is not likely that archaeological resources dating to the historic period are located in modern Lot 23.

BLOCK 1427, LOT 24

The first historic map to depict any structures on Block 1427, Lot 24 is the 1885 Robinson-Pidgeon atlas, which depicts the 5-story (with basement) building that currently stands on the lot. Although a small open rear yard is currently situated behind this building, as with Lot 23, because of the late development of this area and the relatively shallow depth of the bedrock, it is not likely that archaeological resources dating to the historic period are located in the location of modern Lot 24.

BLOCK 1427, LOT 28

Like Lots 23 and 24, no structures were depicted on Lot 28 until the 1885 Robinson-Pidgeon map. In 1962, Lot 28 was redeveloped with a 21-story (with basement) residential tower. Because of the shallow depth of bedrock in this area, the construction of this building would have disturbed any natural soil levels within the lot. Therefore, it is not likely that archaeological resources dating to the historic period are located in modern Lot 28.

STREETBEDS TO BE AFFECTED BY UTILITY RELOCATION:

EAST 69TH STREET BETWEEN FIRST AND THIRD AVENUES

Early 19th century maps including the 1865 Viele (Figure 3), 1811 Bridges (figure 4), and 1836 Colton (Figure 5) maps all depict hills crossing the streetbed of East 69th Street between First and Third Avenues in various locations. No historic maps dating between the late 18th century and the present suggest that any structures ever entered the streetbed of East 69th Street in the vicinity of the APE. The street itself was not constructed until the 1860s and the 1867 Dripps map (Figure 6) is the first to depict any structures along (but not within) the streetbed in this area. In addition, soil borings taken within the streetbed of East 69th Street show that bedrock is very shallow in the vicinity of the APE and it is separated from the surface of the streetbed by a layer of fill between 2 and 10 feet thick. Finally, numerous utilities including water, sewer, gas, electric, and telecommunications lines run beneath the streetbed of East 69th Street east and west of Second Avenue.

Therefore, as a result of the disturbance relating to the construction, paving and grading, and the installation of utilities within the streetbed of East 69th Street between First and Third Avenues, it is not likely that intact archaeological resources dating to the historic period are present and will be impacted by the Second Avenue Subway project.

EAST 70TH STREET BETWEEN FIRST AND SECOND AVENUES

No historic maps dating between the late 18th century and the present suggest that any structures ever entered the streetbed of East 70th Street in the vicinity of the APE. The street itself was not constructed until the 1860s and the 1879 Bromley map is the first to depict any structures along (but not within) the streetbed. In addition, soil borings taken within the streetbed of East 70th Street show that bedrock is very shallow in the vicinity of the APE and it is separated from the ground surface by a layer of fill between that as thin as 1.5 feet in places. Finally, numerous utilities including water, sewer, gas, electric, and telecommunications lines run beneath the streetbed of East 70th Street both east and west of Second Avenue.

Therefore, as a result of disturbance relating to the construction, paving and grading, and the installation of utilities within the streetbed of East 70th Street between First and Second Avenues, it is not likely that intact archaeological resources dating to the historic period are present will be impacted by the Second Avenue Subway project.

EAST 72ND STREET BETWEEN SECOND AND THIRD AVENUES

Historic maps show that East 72nd Street between Second and Third Avenues has never been occupied by structures. A soil boring located on the northern side of the street indicated the presence of 3 feet of fill over a layer of decomposing bedrock while a boring on the southern side of the street suggested that presence of 6 feet of fill over a 2-foot layer of silty sand, then a 2-foot layer of clean sand, a 5-foot layer of sandy, gravel, and silt, and then decomposed bedrock. Several test pits completed within the streetbed of East 72nd Street west of Second Avenue identified numerous utilities beneath the road's surface. The tops of most of these utilities were located between 2 and 4 feet below the ground surface and therefore these utility lines extend to greater depths beneath East 72nd Street. Utility plans provided by MTA NYCT show that many more utility lines run through the APE in this area, including sewer, water, electric, gas, and telecommunications lines.

Because of the lack of development in this area as well as the amount of disturbance generated by the construction, paving, grading, and maintenance of the streetbed as well as the installation of utilities within it, utility relocations within the streetbed of East 72nd Street between Second and Third Avenues are not expected to impact any intact archaeological resources dating to the historic period.

EAST 73RD STREET BETWEEN FIRST AND THIRD AVENUES

Early 19th century maps including the 1811 Bridges (Figure 4), 1836 Colton (Figure 5), and 1865 Viele (Figure 3) maps depict East 73rd Street between First and Third Avenues as a hilly stretch of land bordered by a marshy stream to the north. No 19th century maps depict any buildings in the path of the streetbed and the street itself was not constructed until the 1860s (see Figure 6). Sanborn maps dating to 1911, 1939, and 1951 all depict a small (approximately 5 feet by 15 feet) 1-story structure that was constructed within the northern sidewalk of East 73rd Street adjacent to the structure at 1361 First Avenue. The small structure was likely commercial in nature and may have been constructed as part of a store located on the ground floor of the adjacent building.

In addition, Sanborn maps dating between 1896 and 1939 depict two steam boilers within the streetbed of East 73rd Street approximately 90 feet west of Second Avenue in front of a cigar factory formerly located at 232-234 East 73rd Street at the southwest corner of Second Avenue. An additional boiler was present in the streetbed of East 73rd Street in front of the Bohemian National Hall at 323 East 73rd Street, between First and Second Avenues. That boiler appears on Sanborn maps dating to 1911, 1939, and 1951. These boilers were likely entirely contained within the sidewalks.

Compared with other portions of the APE, the streetbed of East 73rd Street has experienced less disturbance as a result of utility installation, especially between First and Second Avenues. However, soil borings taken in various locations throughout the streetbed and vicinity show only levels of fill present between the ground surface and bedrock. Because of the lack of development in this area, utility relocations within the streetbed of East 72nd Street between Second and Third Avenues are not expected to impact any intact archaeological resources dating to the historic period.

C. LOCATIONS OF DISTURBANCE FOR THE 86TH STREET STATION APE

Unlike the APE for the 72nd Street Station, by the mid-19th century the neighborhood surrounding the APE for the 86th Street Station had become a well-developed community known as Yorkville. While the majority of this development originally centered on Third Avenue, by 1867, the neighborhood had spread to the east and structures were present on many of the lots adjacent to the APE (see Figure 6).

As described above, portions of the 86th Street Station APE were previously analyzed for archaeological sensitivity. The 2003 Phase 1A assessed the location of the station within the streetbed of Second Avenue between East 83rd and East 87th Streets and the 2007 disturbance memo and 2009 EA prepared by AKRF analyzed the location of Entrance 2 (including the streetbed of East 86th Street between First and Second Avenues, and Block 1548, Lots 49 and 50). Neither of those locations was determined to be sensitive for archaeological resources dating to the historic period.

ANCILLARY FACILITY 1:

Ancillary Facility 1 will be constructed at 1601 Second Avenue (Block 1529, Lot 21), at the northwest corner of East 83rd Street and Second Avenue. No structures are depicted in this area on historic maps dating to the first half of the 19th century, although structures associated with the Yelles Hopper estate were located near the center and northern portions of Block 1529 during this time. The Hopper estate extended into the streetbed of Second Avenue and was discussed in the 2003 Phase 1A. The 1A concluded that while the home was present on the site before sewer and water networks were available, soil borings show that the bedrock is so shallow in the vicinity of the Hopper home that it could have made digging shaft features (such as privies cisterns and wells) very difficult. In addition, soil borings showed that the soil levels are heavily disturbed and were likely disturbed after the Hopper home was demolished.

No structures related to the Hopper estate are depicted on maps in the vicinity of Lot 21. The first map to depict a structure in that lot is the 1879 Bromley atlas, which indicates that the lot was developed but does not depict the building's footprint. By the time this map was published, water (and likely sewer) lines were already present in both Second Avenue and East 83rd Street. At that time, Lot 21 was 25 feet longer than it is today. In the late 19th century, the former rear yards of Lot 21 and the lots to the north were separated and combined to create what is now Lot 121 to the west of Lot 21. The Bromley atlas of 1891 (Figure 7a) shows that a 4-story brick structure with a basement and a small open rear yard had been constructed on the lot. Sanborn maps show that by 1896 a small

addition had been added to the rear of the building leaving only an approximately 5-foot rear yard behind the structure. This structure continues to stand on the site to this day.

Because the structure at 1601 Second Avenue was constructed after or around the same time that water and sewer lines were available in the neighborhood, it is not likely that shaft features such as privies, cisterns, and wells would be present within the lot. Furthermore, soil borings show that bedrock is extremely shallow in this area, ranging from 4.5 to 8.5 feet below the ground surface, also suggesting that shaft features would not be present because they could not have been dug to the necessary depths. Any undisturbed soils on this lot would subsequently have been disturbed during the excavation of the basement that is situated beneath the existing structure at 1601 Second Avenue. Therefore, there is a low probability that the construction of the Ancillary Facility will impact archaeological resources on Lot 21.

ANCILLARY FACILITY 2:

Ancillary Facility 2 will be constructed along the eastern side of Lot 22 on Block 1532, on the western side of Second Avenue between East 86th and East 87th Streets. The 1865 Viele map (Figure 3) depicts a narrow hill and a small stream running across this area. No early 19th century maps depict any structures in this area, although the 1811 Bridges map (figure 4) and the 1820 Randel farm map both depict the home of W. Waldron immediately to the south of the block, within the streetbed of East 86th Street (discussed below). The 1836 Colton map (Figure 5) depicts a small structure within the location of Ancillary Facility 2, adjacent to an older road that ran northeast-southwest through the area, connecting many large homes to the northeast. The same structure appears on the 1851 Dripps map, which identifies the owner as "Quakenbos" (also spelled "Quackenbush"). The 1867 Dripps map (Figure 6) shows the area as vacant, although structures owned by the Quackenbos family were still present on the block.

By 1879, the block had been divided into lots and two structures were present along the western side of Second Avenue within Block 1532. However, by the publication of the 1885 Robinson-Pidgeon atlas, the lots were once again depicted as vacant. By 1891, the Bromley atlas (Figure 7b) shows that the entire side of Block 1532 fronting on Second Avenue had been developed with a row of 4-story brick residential structures. Subsequent maps indicate that all of these buildings had basements. These buildings stood on the lot until circa 1970, when a 30-story (with basement) structure known as the "Newbury Apartments" was constructed on the lot. Sanborn maps show that the plaza and garage adjacent to the building also have basements and that the building itself has two sub-basements. A soil boring sample was taken from the western curb of Second Avenue directly east of the Newbury Apartments, which showed that the streetbed in this area is underlain by approximately 12 feet of fill situated directly above bedrock.

The excavation of the basements and sub-basements of the existing structure on Lot 22 would likely have generated substantial disturbance well into the bedrock, as it is relatively shallow in this area. Therefore, there is little chance that archaeological resources associated with the early and mid-19th century structures that were formerly situated in the location of Ancillary Facility 2 could remain intact within the lot.

ENTRANCE 1:

Entrance 1 will be located on the eastern side of Second Avenue between East 83rd and East 84th Streets. The entrance will require excavation within Block 1546, Lots 1, 49, and 50 between the eastern building line of Second Avenue and a point approximately 40 feet east as well as a portion of the streetbed of East 84th Street between First and Second Avenues. Soil borings taken within Block 1546 indicate that the majority of the block is covered by fill that rests directly on top of the bedrock, which is located between 9 and 19 feet below the ground surface. The 1865 Viele map (Figure 3) shows that a small marsh-bordered stream formerly terminated in the southern end of the site of Entrance 1. Topographic information from historic maps suggests that several feet of fill has been added near the intersection of East 83rd Street and Second Avenue, reflecting the filling of this stream (see Table 1).

Block 1546, Lot 1

The 1867 Dripps map (Figure 6) is the first historic map to depict any structures within Lot 1, which was originally made up of six historic lots. Dripps' map shows that although those lots had been laid out, only three of them were developed with structures. Interestingly, none of those structures fronted directly on Second Avenue. Instead, they were erected in the rear of the historic lots. Therefore, the location of Entrance 1 is within the open front yards of

these structures. Two of these structures are depicted on the 1879 Bromley atlas, which shows that the third lot had been redeveloped. That map also depicts a building within one of the formerly vacant historic lots. This map is the first to indicate the presence of fire hydrants within Second Avenue in this area, suggesting that water pipes (and likely sewers) had been laid in Second Avenue by this time.

Additional development had occurred by the mid-1880s, as seen on the 1885 Robinson-Pidgeon atlas, which shows that a Methodist Episcopal Church had been constructed on one of the historic lots within modern Lot 1. By the publication of the 1891 Bromley atlas (Figure 7b), however, all of the lots fronting Second Avenue within Block 1847 had been redeveloped with brick structures that subsequent maps show were constructed with basements. The location of Entrance 1 will be located entirely within the footprints of these buildings and will not include any of the open rear yard areas that were located to the east.

These buildings stood on the site until circa 1977, when the building currently situated on the lot, the "Carmague House," was constructed. Sanborn maps show that this building is 30 stories and both the building and the adjacent plaza have a basement and a sub-cellar with below-ground parking facilities. The excavation necessary to construct the basement and sub-cellar in this lot would have generated significant disturbance to the original soil levels, especially given the fact that bedrock is relatively shallow (approximately 11 to 12 feet below grade) near the southern end of Block 1546. Therefore, the construction of Entrance 1 is not expected to impact any archaeological resources within Lot 1.

Block 1546, Lot 49

The first historic map to depict any structures within Lot 49, which is located at 1616 Second Avenue (at the southeast corner of East 84th Street and Second Avenue), is the 1885 Robinson-Pidgeon atlas. That map depicts the building as a stone structure with a small open rear yard but does not present any other information about it. Subsequent maps show that this building is the 5-story brick structure with a basement that continues to stand on the site to this day.

Because this lot was not developed until after water and sewer lines were available in the area, there is a low probability that historic period archaeological resources exist on Lot 49 which would be impacted by the construction of Entrance 1.

Block 1546, Lot 50

The first historic map to depict any structures within Lot 50, which is located at 1614 Second Avenue, is the 1879 Bromley atlas. That map shows that the lot was developed but does not depict the building's footprint. Subsequent maps show that the lot was developed with a 5-story brick structure with a basement, likely the same one that had been constructed by 1879. This structure continues to stand on the site to this day. Because this lot was not developed until after water and sewer lines were available in the area, there is a low probability that historic period archaeological resources exist on Lot 50 which would be impacted by the construction of Entrance 1.

East 84th Street between First and Second Avenues

The land now occupied by East 84th Street between First and Second Avenues is depicted on the 1865 Viele map (Figure 3) as a level meadow that was uninterrupted by hills or streams. As seen in Table 1, some grading has occurred in the vicinity of this streetbed since the mid-19th century and it appears that between 2 and 4 feet of earth may have been removed. The 1836 Colton map (Figure 5) shows that the street had not yet been constructed (although it had already been planned out) and a single structure had been erected along the southern side between First and Second Avenues, outside of the APE. The Dripps map of 1851 is the first to depict the street as constructed, although little development is seen along the street (outside of the APE) until Dripps' 1867 map (Figure 6). Fire hydrants indicating the presence of water lines are first depicted on the 1879 Bromley atlas and it is likely that sewer lines were available in the streetbed by that time as well.

The 1879 Bromley atlas depicts a portion of the structure at 312 East 84th Street, approximately 150 feet east of Second Avenue, as projecting out into the streetbed. The map does not depict the complete footprint of the building, although it shows that the portion that extended approximately 5 feet into the southern sidewalk of East 84th Street was approximately 15 feet wide. It is possible that the projection of the structure into the streetbed is a cartographic error, as the structure was built after East 84th Street was cut through the area and no other structures in the vicinity are depicted as entering the surrounding streetbeds. It is not likely that the city would have permitted any structure

to obstruct the active sidewalk. Even if the building did extend into the APE, it is not likely that shaft features were constructed in the streetbed at this time as the building does not appear on the lot until water and sewer lines were already available. In addition, multiple utility lines run under the streetbed in this area, including sewer, water, electric, gas, and telecommunications lines. Therefore, it is unlikely that any archaeological resources associated with the structure would have survived within the APE.

No other historic maps depict any structures within the path of the streetbed of East 84th Street between First and Second Avenues. Because of the lack of development in this area until after the installation of water and sewer lines as well as the amount of disturbance generated by the construction, paving, grading, and maintenance of the streetbed as well as the installation of utilities within it, utility relocations within the streetbed of East 84rd Street between First and Second Avenues are not expected to impact any intact archaeological resources dating to the historic period.

STREETBEDS TO BE AFFECTED BY UTILITY RELOCATION:

East 82nd Street between First and Second Avenues

As seen on the 1865 Viele map (Figure 3), a small marsh-bordered stream formerly ran through the streetbed of East 82nd Street in the vicinity of First Avenue. The stream was located at a lower elevation than the surrounding land and was filled in at some point after 1850 (see Table 1). East 82nd was constructed by 1867, and the Dripps map of that year (Figure 6) is the first to depict any development fronting the road. Water (and likely sewer) lines were present in the street by 1879, as seen on the Bromley atlas of that year.

No historic maps depict any structures within the path of the streetbed of East 82nd Street. Multiple utility lines run under the streetbed in this area, which include water, electric, gas, and telecommunications lines. Minimal work is proposed for this streetbed, including a single electric line to connect to an existing electrical vault within the street's southern curb. Because of the lack of development in this area, utility relocations within the streetbed of East 82nd Street between First and Second Avenues are not expected to impact any intact archaeological resources dating to the historic period.

East 83rd Street between First and Third Avenues

The 1865 Viele map (Figure 3) shows that the same stream that was present in the East 82nd Street portion of the APE also entered the streetbed of East 83rd Street near its intersection with Second Avenue. In addition, hills were present near the street's intersections with First and Third Avenues. As seen on Table 1, since the mid-19th century, some fill has been added to the streetbed east of Second Avenue (where the former stream was filled in) although the elevation of the land near Third Avenue has changed little since that time. The street was constructed by 1851, as seen on the Dripps map of that year. Fire hydrants indicating the presence of water lines are first depicted on the 1879 Bromley atlas and it is likely that sewer lines were available in the streetbed by that time as well.

No historic maps depict any structures within the path of the streetbed of East 83nd Street between First and Third Avenues. The 1811 Bridges map (Figure 4) shows that a portion of an historic road formerly entered the APE near the intersection of East 83rd Street and Third Avenue. This road is not depicted on any other maps. Multiple utility lines run under the streetbed in this area, which include sewer, water, electric, gas, and telecommunications lines. Because of the superficial nature of historic roads, it is likely that the original road surface was destroyed by the subsequent construction of East 83rd Street. As mentioned previously, one soil boring identified layers of fill, silty clay, and silty sand over the bedrock on the southern side of East 83rd Street east of Second Avenue while 4 other borings from various locations in the streetbed (both east and west of Second Avenue) show nothing but fill between the ground surface and bedrock.

Because of the lack of development in this area as well as the amount of disturbance generated by the construction, paving, grading, and maintenance of the streetbed as well as the installation of utilities within it, utility relocations within the streetbed of East 83rd Street between First and Third Avenues are not expected to impact any intact archaeological resources dating to the historic period.

East 86th Street between Second and Third Avenues

Viele's 1864 map (Figure 3) depicts a stream within the streetbed of East 86th Street near Second Avenue. The terminus of the stream was within Block 1532, between East 86th and East 87th Streets just west of Second Avenue.

The Viele map also shows that multiple hills were present in the area, several of which interrupted the streetbed of East 86th Street near Second and Third Avenues.

The 1811 Bridges map (Figure 4) depicts a structure belonging to "W. Waldron" in the path of East 86th Street just west of Second Avenue. The building was situated at the intersection of two historic roads, one that lead northwest to other Waldron properties, and another which led to the Hell Gate or Horn's Hook ferry, on the shore of the East River at the foot of East 86th Street. The Waldron family had been granted a large farm in the area, and the 1811 map shows numerous homes owned by various family members in the vicinity of East 86th Street and Second Avenue, this included the Hopper estate, as Yelles Hopper was married to one of Waldron's daughters (Stokes 1968). The structure that is located in the APE was later granted to Cornelia Waldron (Tuttle 1877) and is listed on numerous 19th century maps as the property of "the heirs of William Waldron."

The route of East 86th Street had been laid out by the Street Commissioners circa 1811, however, it was not until 1827 that the City's Common Council actually ordered it to be constructed. East 86th Street was built long before many of the other streets in the area in part to replace the narrow, winding road to the Hell Gate Ferry, which was nearly impassible in inclement weather (*Minutes of the Common Council 1784-1831* XVI: 433). The construction of the road was approved, despite the objection of David Waldron and his sisters, who did not want the new public road cutting through their properties (ibid).

During the road's construction, it was necessary to level the large hill that was formerly located near the intersection of East 86th Street and Third Avenue. This appears to have been the same hill depicted within the streetbed of East 86th Street within the APE near Third Avenue on Bridges' 1811 map as well as Viele's map depicting the original topography of Manhattan (Figures 3 and 4). In 1829, 20 to 25 convicts being held on nearby Blackwell's Island were sent to provide the labor (ibid: 135). The 1836 Colton map (Figure 5) reflects the leveling of the hill and the construction of East 86th Street between the East River and Eighth Avenue. However, the stream that ran to the east of the hill, near Second Avenue, is still depicted on the 1836 map, suggesting that the eastern end of the block may not have experienced as much landscape modification as the western portion at this time.

The 1836 map also shows that the construction of East 86th Street resulted in the removal of the former Waldron home. No subsequent maps depict any structures within the streetbed.[1] The 1865 Viele map is the first to depict sewers within the streetbed in this area and water lines were installed around the same time, as indicated by the presence of fire hydrants on the 1879 Bromley atlas. A steam boiler was depicted within the streetbed on the 1896 Sanborn maps at the northeast corner of Third Avenue and East 86th Street adjacent to a hotel at 1535 Third Avenue. Additional boilers were present in front of the "Yorkville Casino" (at 212 East 86th Street); one was depicted in 1911 and two more had been added by 1939. Again, these boilers appear to have bene entirely contained within the sidewalks. Current utility maps show the presence of multiple utility lines within the streetbed including sewer, water, electric, gas, and telecommunications lines.

Two soil borings taken near intersection of East 86th Street and Second Avenue show that there are no natural soils present in the area and that bedrock is very shallow. One of the borings, located at the southwest corner of East 86th Street and Second Avenue within 20 to 30 feet of the location of the former home, indicates the presence of 8 feet of fill directly over the bedrock. Another boring, originally included in the 2003 Phase 1A study, located on the western side of Second Avenue between East 86th and East 87th Streets, was aborted because of the shallow depth of the bedrock. As seen in Table 1, the elevations for this stretch of East 86th Street have changed very little since 1850. It is unclear when the fill was placed here although it is likely that it dates to circa 1829, around the time when the adjacent hill was leveled.

Despite the presence of a historic structure formerly located within this portion of the APE, the streetbed of East 86th Street between Second and Third Avenues has been greatly disturbed. Early 19th century landscape modification resulted in the removal of hills and the filling in of a stream that formerly ran near the APE. The elevations in the area have remained relatively unchanged since the mid-19th century, and therefore the late 19th and 20th century development in the area, including the paving and grading the streetbed as well as the installation of utilities, would have disturbed historic soil levels rather than fill placed at a later date. It is not likely that

[1] Current Sanborn maps show that a ticket booth for a movie theatre extends onto the southern sidewalk of East 86th Street but this structure does not have a basement.

archaeological resources relating to the former Waldron home could have survived within the APE after the construction of East 86th Street, the landscape modifications that took place in the first half of the 19th century, and utility installations during the late 19th and 20th centuries. Therefore, the proposed utility installations in the streetbed of East 86th Street between Second and Third Avenues are not expected to impact significant archaeological resources dating to the historic period.

East 87th Street between Second and Third Avenues

Early maps including the 1811 Bridges (Figure 4), 1836 Colton (Figure 5), and 1865 Viele (Figure 3) maps all show that the same stream that entered the APE at 86th Street also ran through the APE at 87th Street. This stream was surrounded by more elevated ground and likely ran through a ditch or ravine. Additional hills interrupted the streetbed near its intersections with Second and Third Avenues. The 1811 map also shows that one of the historic roads that also crossed East 86th Street within the APE traveled through East 87th Street as well, connecting the home of D. Waldron with the aforementioned William Waldron home.

East 87th Street is first depicted as fully constructed on the 1851 Dripps map, which also shows three structures constructed along, but not within, the streetbed. Dripps' 1867 map (Figure 6) shows that development had increased in the area, although most of it was clustered on the western side of the block, near Third Avenue. Water (and likely sewer) lines were present in the street by 1879, as seen on the Bromley atlas of that year.

No historic maps depict any structures within the path of the streetbed of East 87th Street between Second and Third Avenues. Multiple utility lines run under the streetbed in this area including water, electric, gas, and telecommunications lines. Because of the lack of development in this area, utility relocations within the streetbed of East 87th Street between Second and Third Avenues are not expected to impact any intact archaeological resources dating to the historic period.

Chapter 5: Conclusions and Recommendations

A. APE SENSITIVITY

As part of the background research for this 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 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. Historic maps suggest that portions of the 72nd Street and 86th Street Station APE may have at one time been attractive to Native Americans as locations for habitation sites or resource exploitation. However, there have been many episodes of landscape modification and disturbance to these areas associated with the transformation of the Upper East Side from a hilly, undeveloped wilderness into highly developed urban neighborhood. Soil borings show that nearly the entire APE is composed of fill located directly over bedrock and there are no intact soil levels present. Therefore, the APE for both the 72nd and 86th Street Stations is determined to have low sensitivity for precontact period archaeological resources.

HISTORIC SENSITIVITY ASSESSMENT

All of the proposed excavation within blocks adjacent to Second Avenue is located within areas that have already been disturbed by the excavation of buildings with basements. Some of these areas were occupied by historic structures during the late 19th and early 20th centuries. However, the locations of the entrances and ancillaries are all situated within the footprints of structures and none included any portions of former open rear yards. In addition, many areas were not developed for residential use until around the same time that historic atlases suggest water and sewer networks were installed. Therefore, it is not likely that any of these historic properties would have included shaft features such as privies, cisterns, or wells.

A search of historic maps shows that only two structures were ever situated completely or partially within the lines of the streetbeds that run east and west of Second Avenue between East 69th and East 73rd and East 82nd Street and East 87th Streets. A small portion of a late 19th century structure appears to have entered the southern sidewalk of East 84th Street between First and Second Avenues. However, this structure appears to have been constructed after the installation of water and sewer lines within East 84th Street and does not appear to have remained in that location for a substantial period of time. Therefore, it is not likely that archaeological resources associated with this structure remain within the APE at this location. In addition, a structure belonging to William Waldron and his heirs was formerly located within the streetbed of East 86th Street immediately west of Second Avenue. However, the documentary record and recent soil borings suggest that this area is highly disturbed and therefore it is not likely that archaeological resources related to the former structure remain intact in this area.

Because of the lack of development in the area until the late 19th century, the extent of the landscape alterations that are visible in the cartographic record and in soil borings, and the substantial disturbance generated by the construction, paving, and grading of the APE streetbeds as well as the installation of utilities within them, it is not likely that undisturbed archaeological resources dating to the historic period remain present within the APE for either the 72nd or 86th Street Stations. 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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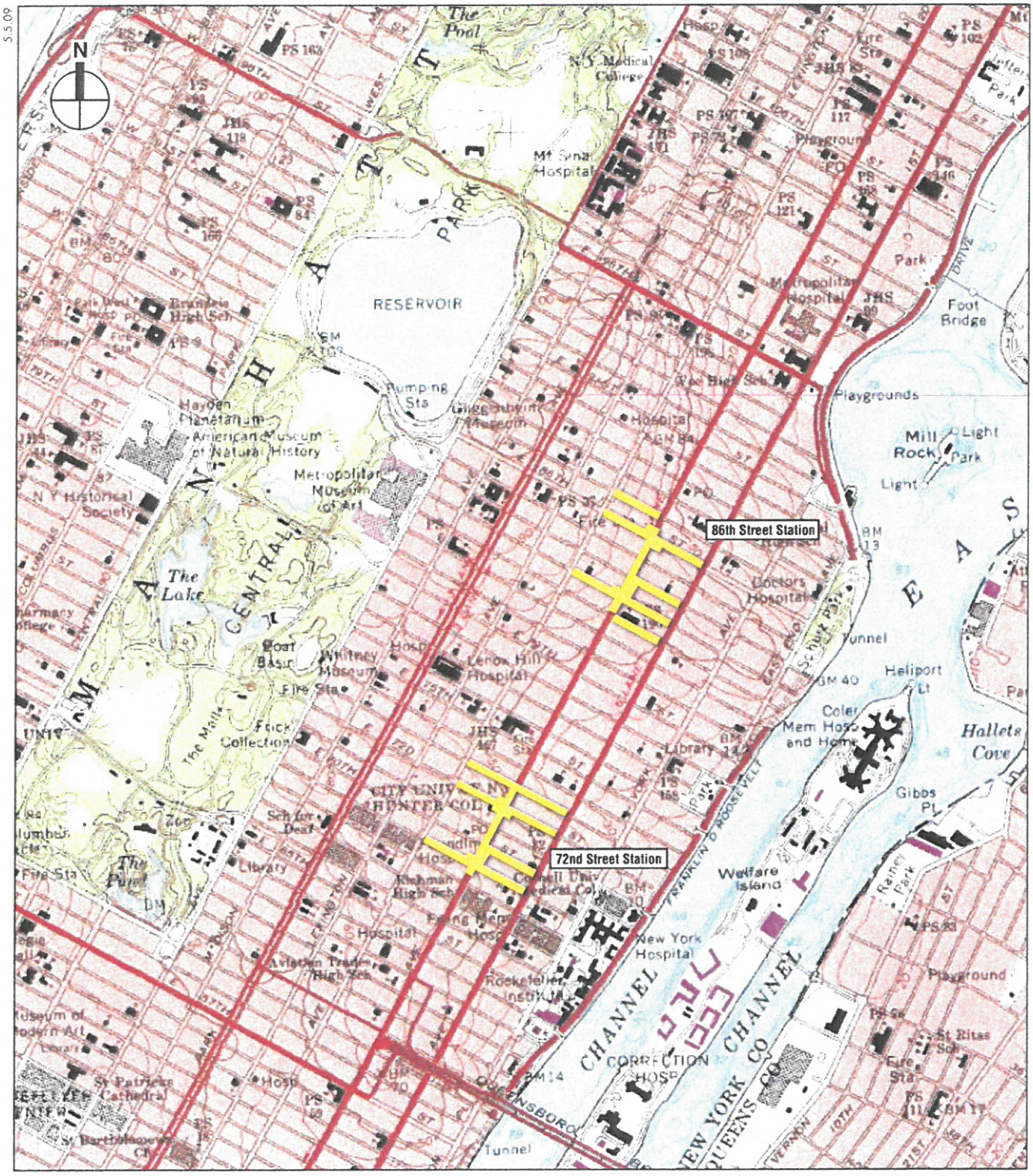
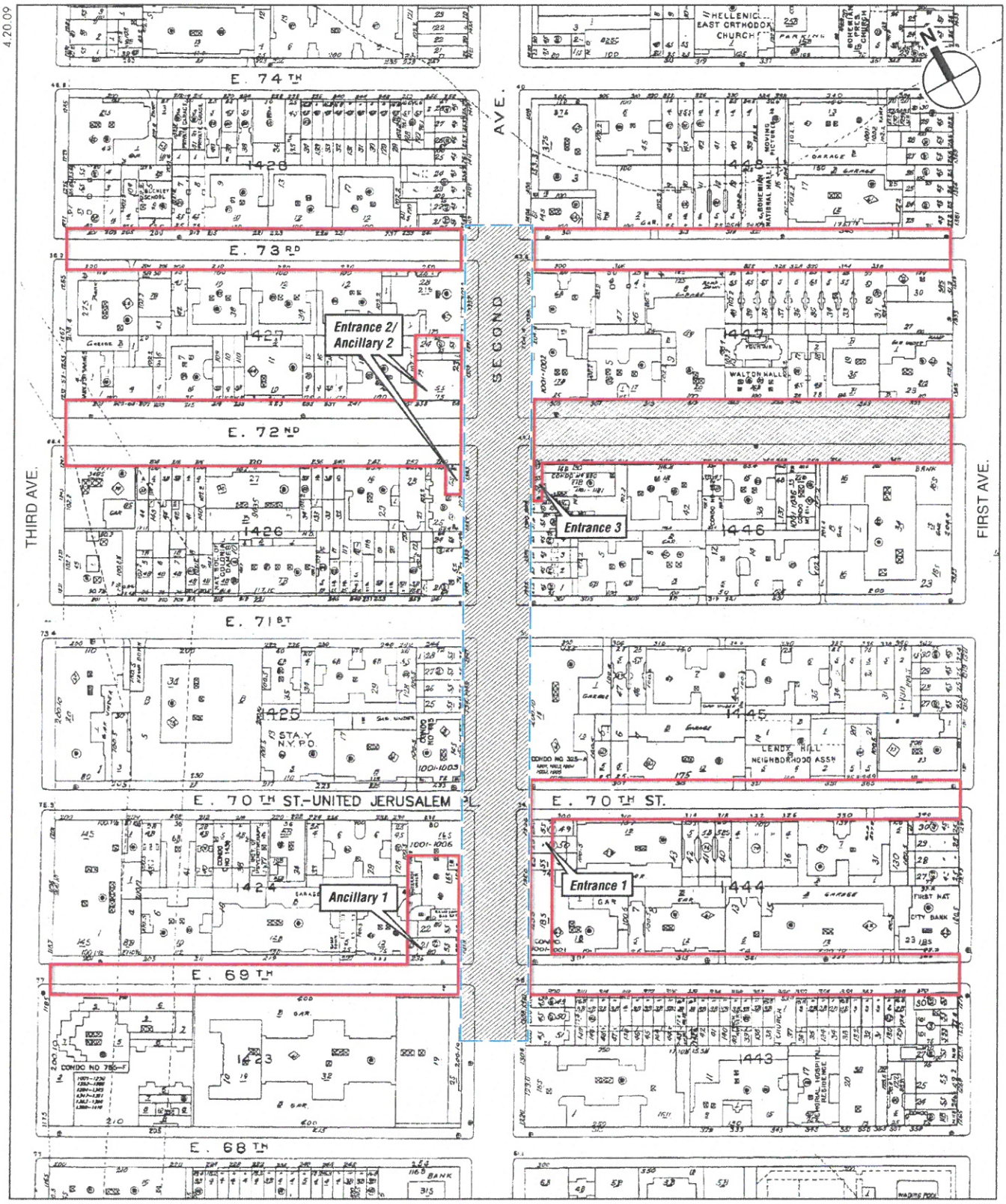


APE Location
USGS Map: Central Park Quadrangle
Figure 1

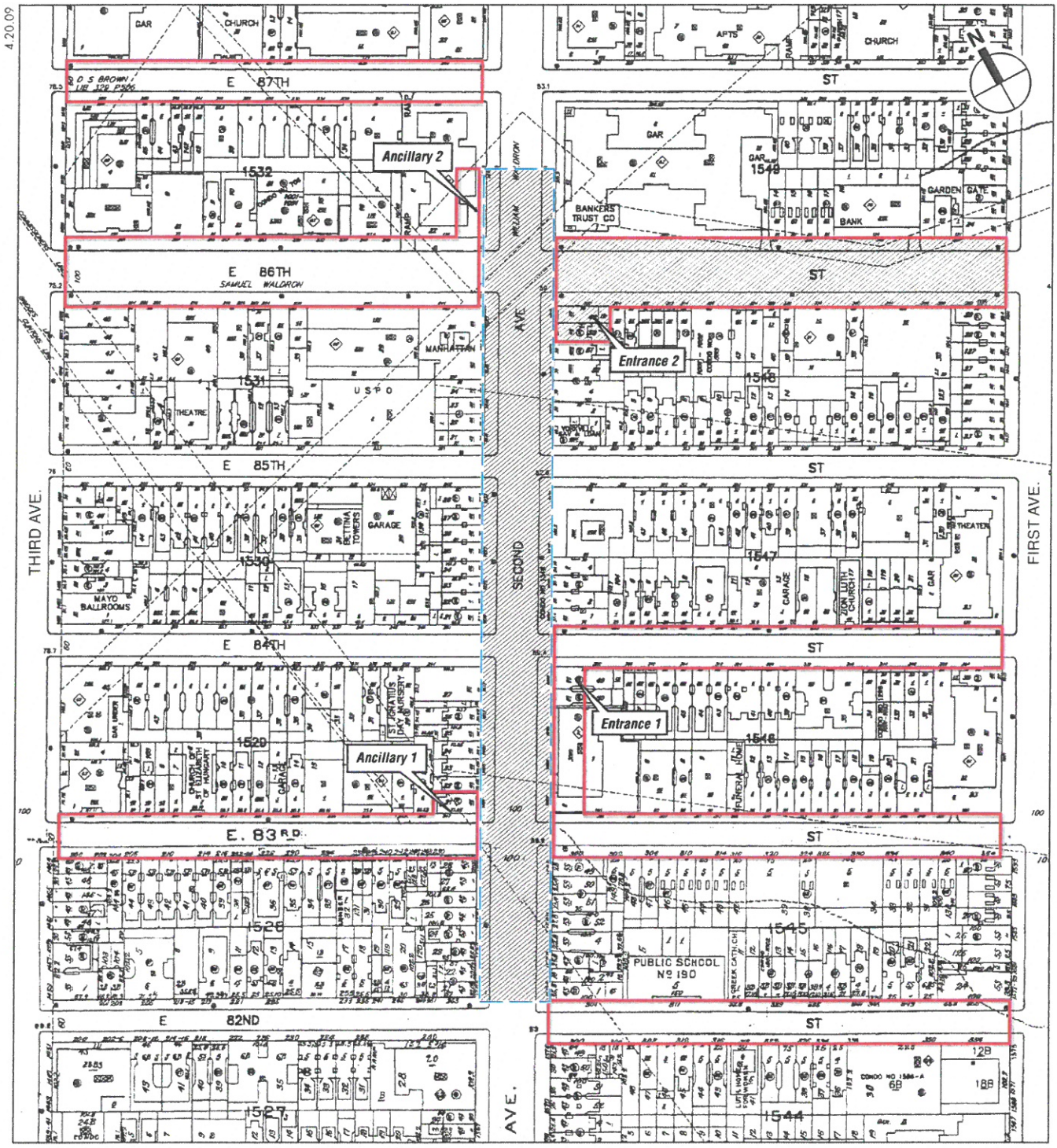


APE

Portion of APE Previously Analyzed for Archaeological Sensitivity

Station Box

APE Boundaries of the 72nd Street Station
Sanborn Map, 2007
Figure 2a

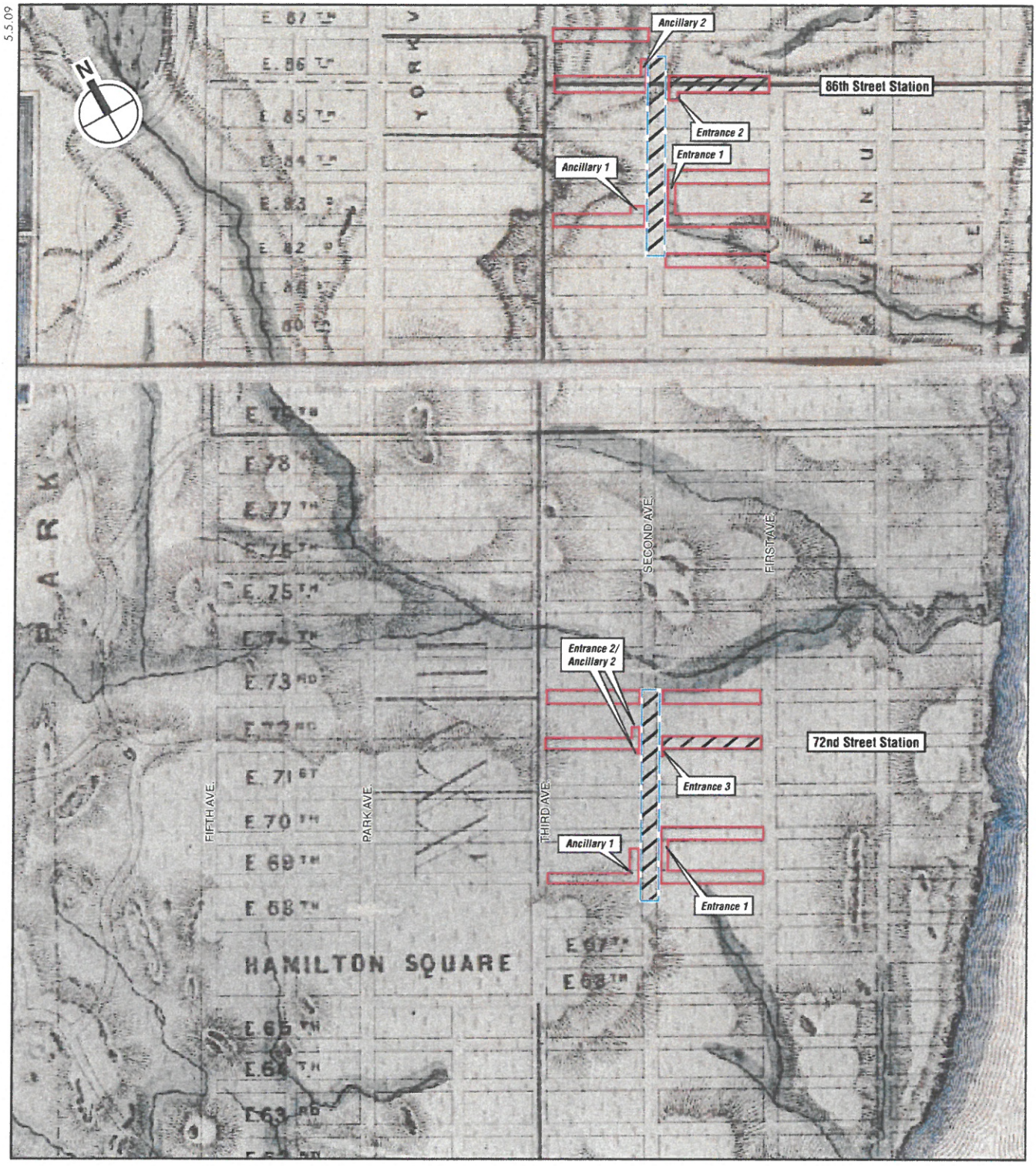


APE

Portion of APE Previously Analyzed for Archaeological Sensitivity

Station Box

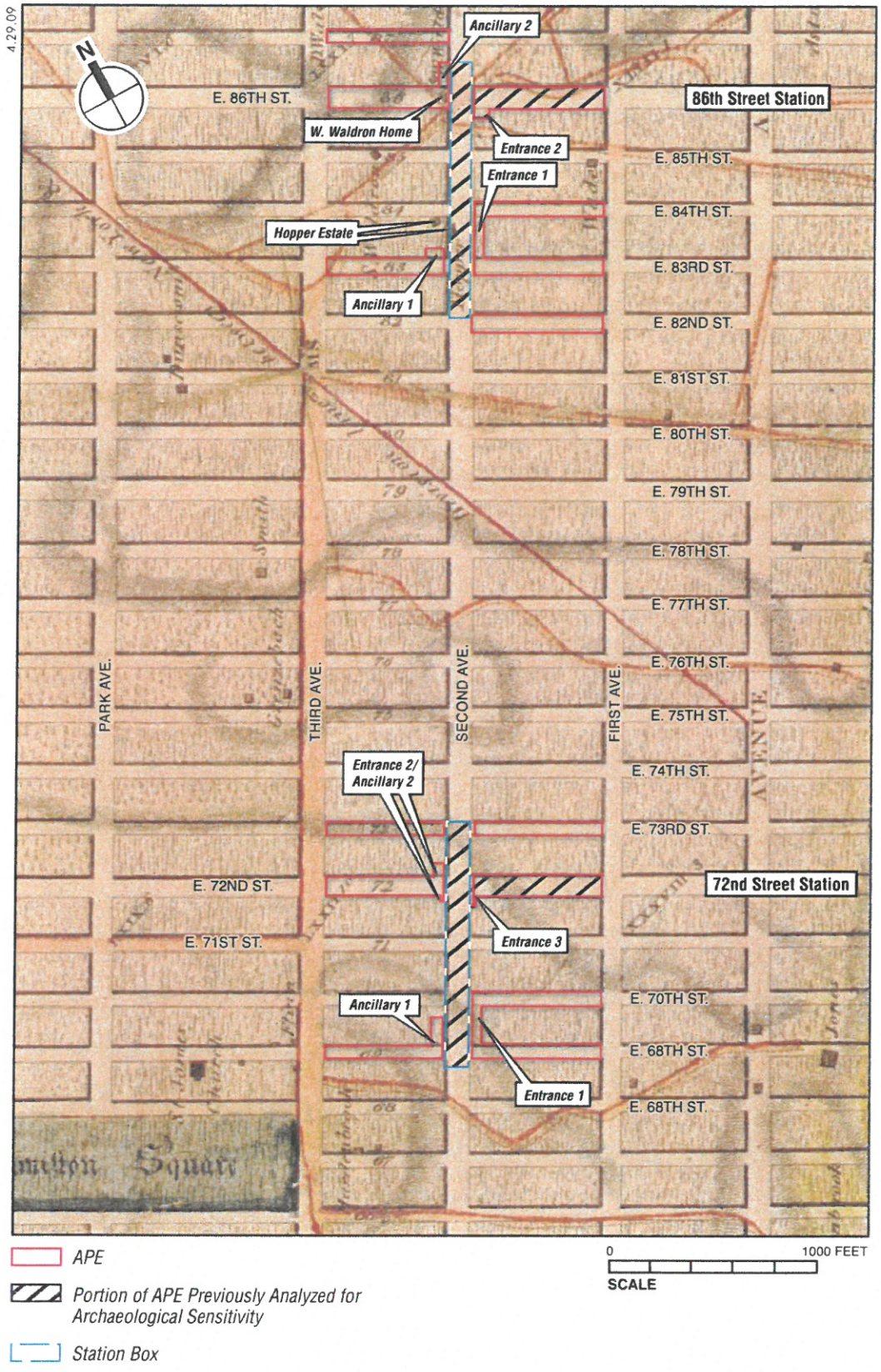
APE Boundaries of the 86th Street Station
Sanborn Map, 2007
Figure 2b



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

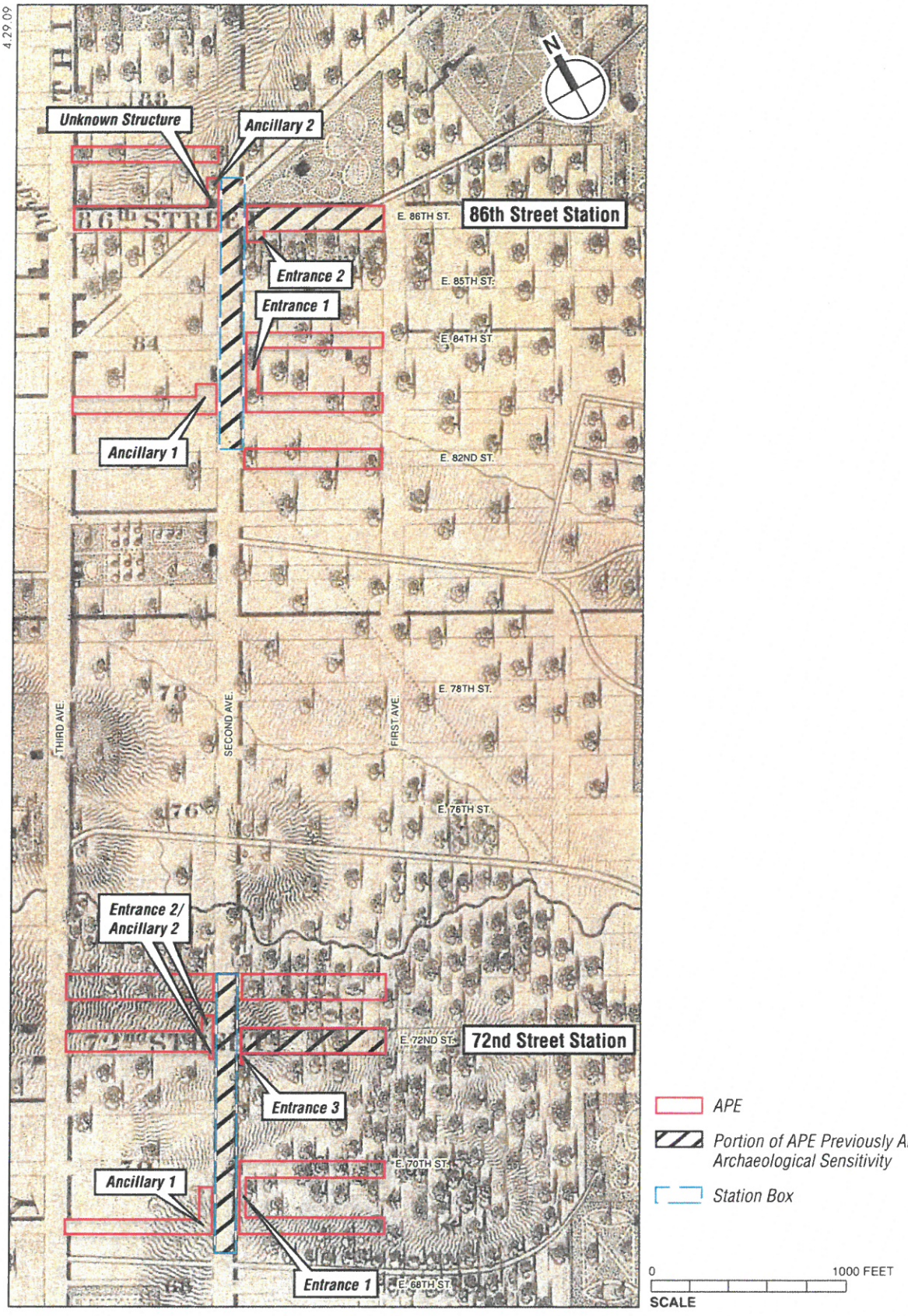
SECOND AVENUE SUBWAY • 72nd and 86th Street Stations

Figure 3

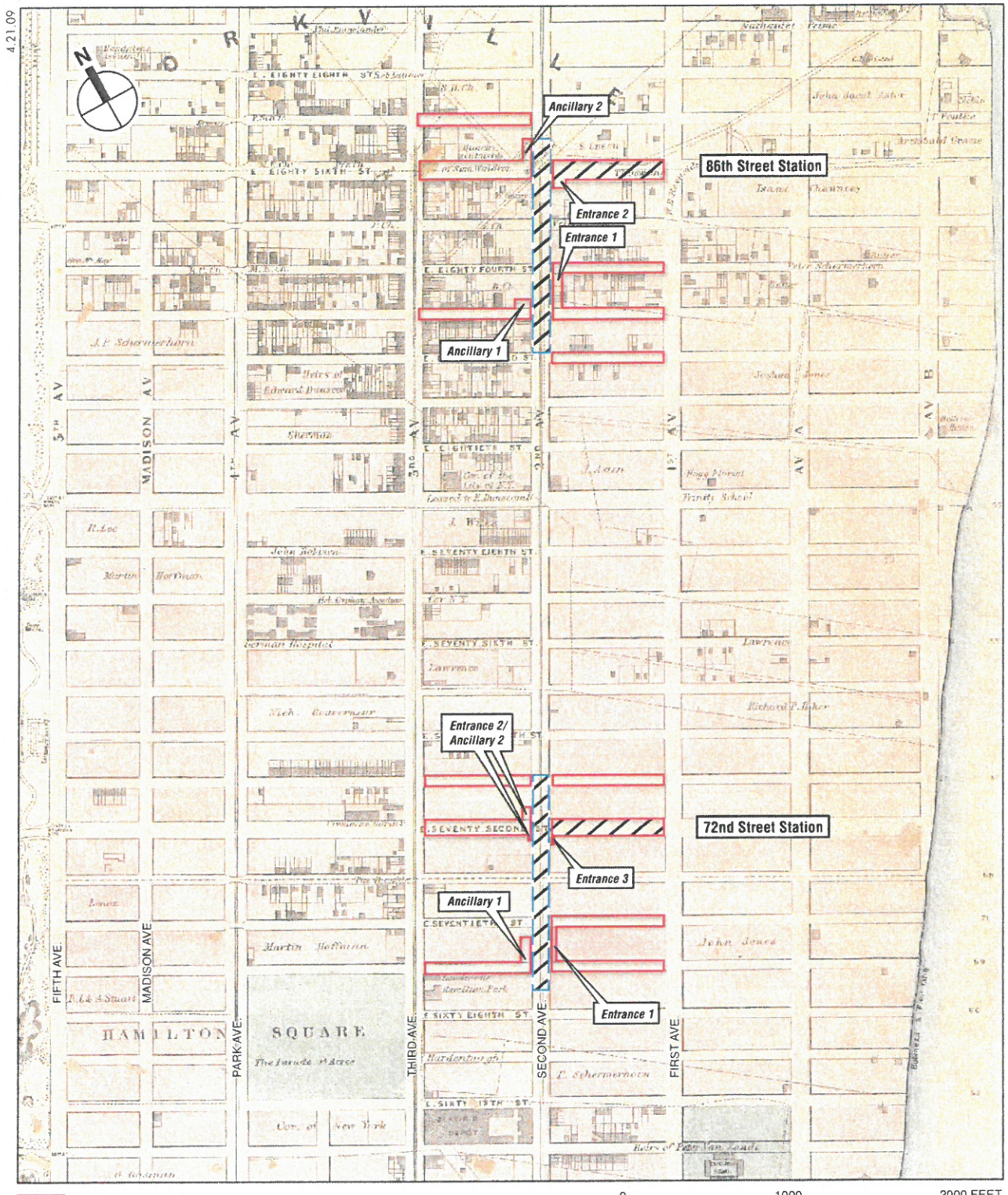


"The Commissioners' Plan."
W. Bridges, 1811

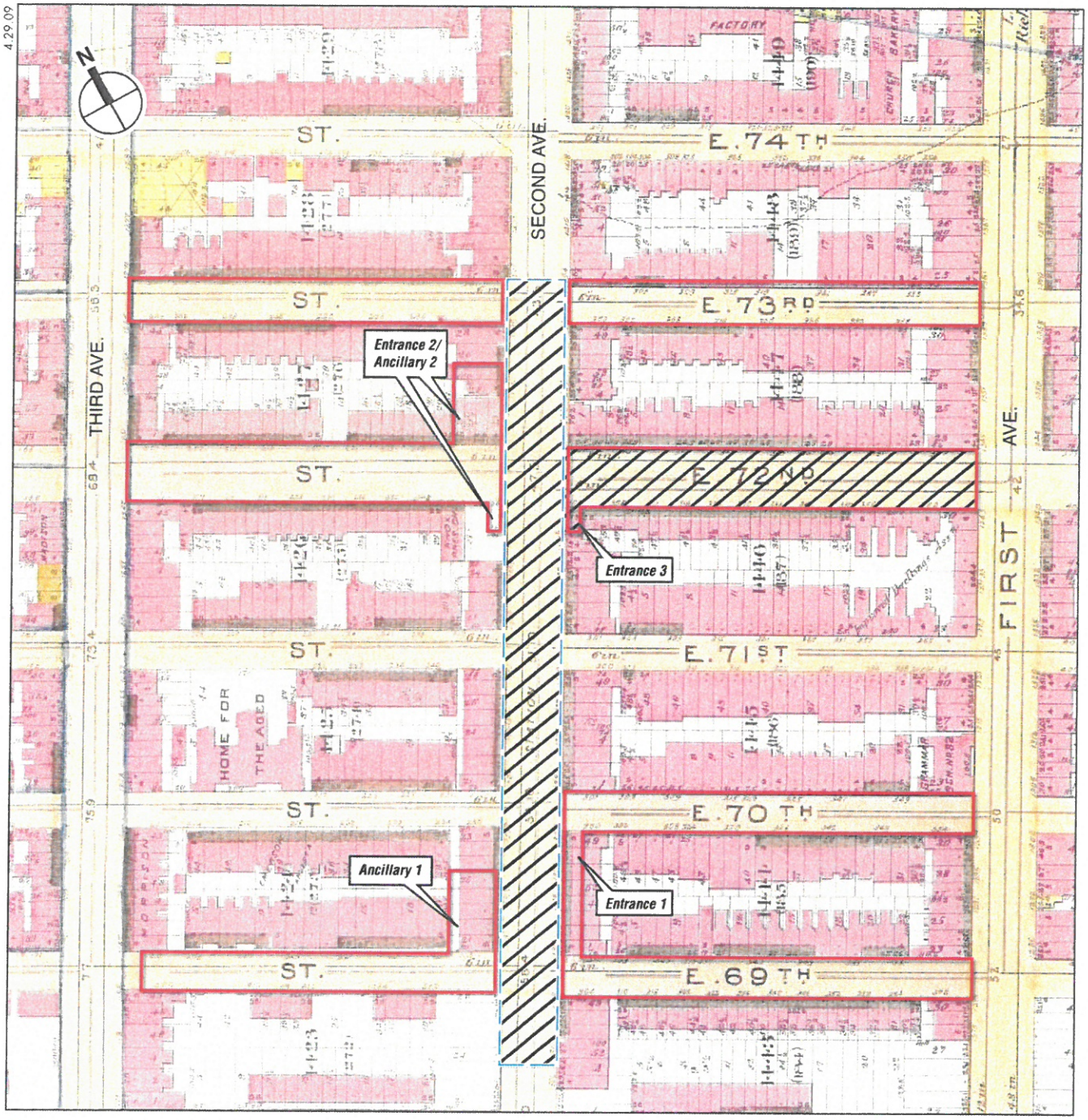
Figure 4



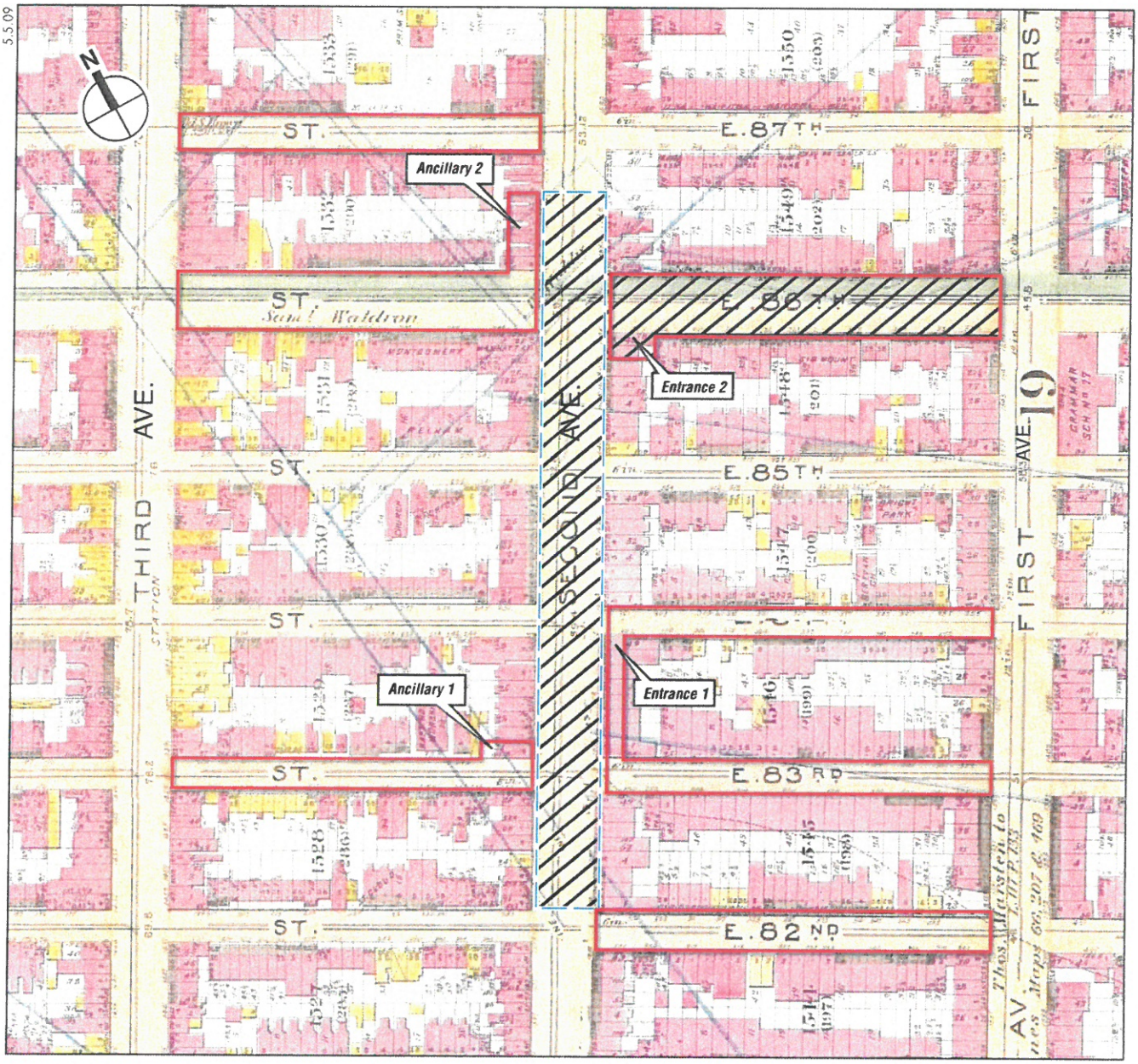
Topographical Map of the City and County of New York
J.H. Colton, 1836



Plan of New York City
M. Dripps, 1867
Figure 6



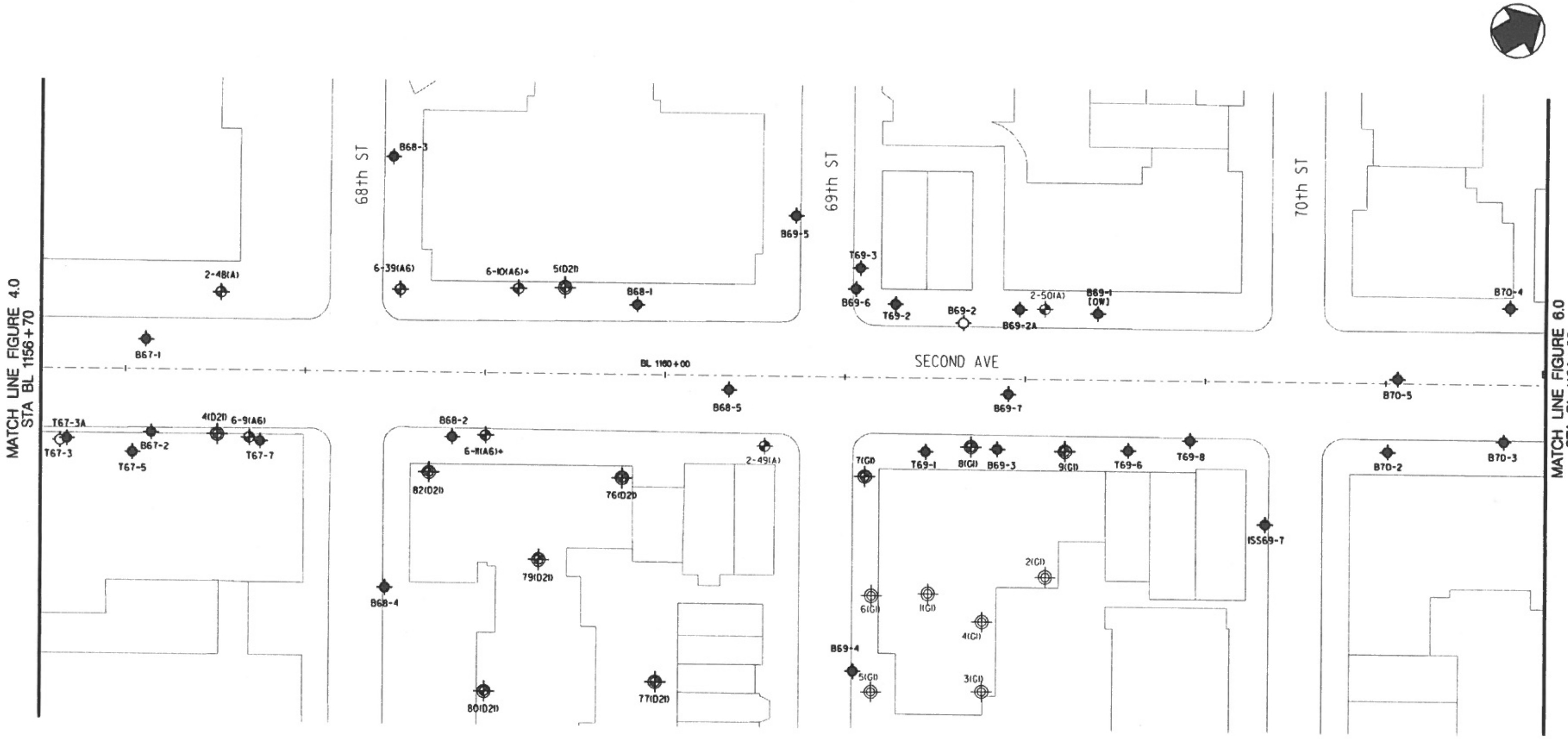
Atlas of the City of New York
showing 72nd Street Station
GW Bromley, 1891
Figure 7a



Atlas of the City of New York
showing 86th Street Station
GW Bromley, 1891
Figure 7b

Appendix A:
Soil Boring Logs for the 72nd Street Station
Provided by MTA NYCT

Note: only borings located within the APE have been included here.



LEGEND:

- 2ND AVE - DHA BORINGS (2002-2007)
- 2ND AVE BORINGS (1969-1974)
- BORINGS BY OTHERS
- 2ND AVE BORINGS (1969-1974)
- 2ND AVE - DHA BORINGS
- BORINGS BY OTHERS

NOTE:
SEE APPENDIX (A) FOR DHA BORING LOGS AND HISTORICAL GEOTECHNICAL INFORMATION 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-26007

DMJM HARRIS • ARUP
A Joint Venture

Second Avenue Subway

BORING LOCATION PLAN
STA ℄ 1156+70 TO
STA ℄ 1164+90
Figure 5.0

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

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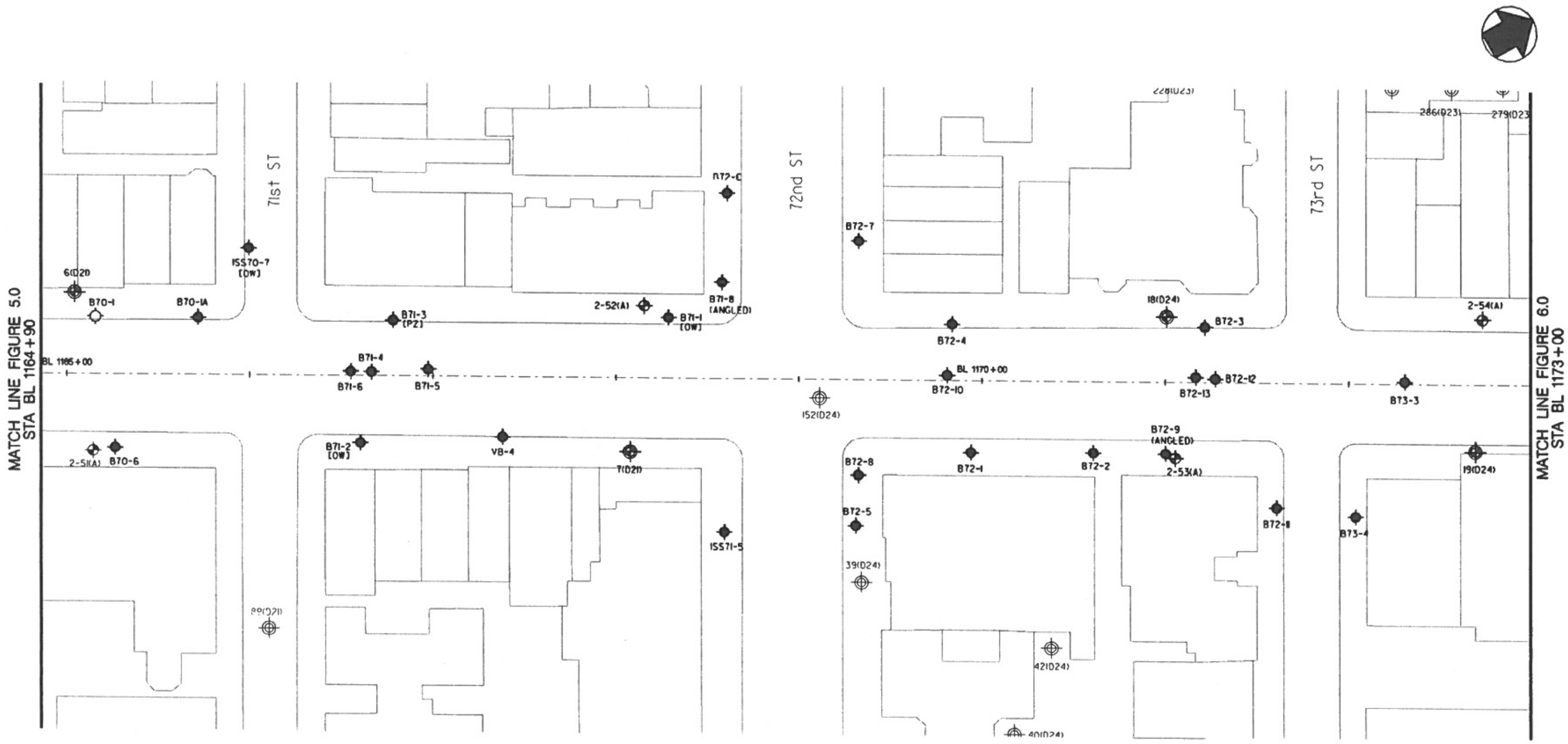

LEGEND:

- ◆ 2ND AVE - DHA BORINGS (2002-2007)
- ◆ 2ND AVE BORINGS (1969-1974)
- ◆ BORINGS BY OTHERS
- ⊕ 2ND AVE BORINGS (1969-1974)
- ◇ 2ND AVE - DHA BORINGS
- ⊕ BORINGS BY OTHERS
- [OW] OBSERVATION WELL
- [P2] VIBRATING WIRE PIEZOMETER

NOTE:
SEE APPENDIX (A) FOR DHA BORING LOGS AND HISTORICAL GEOTECHNICAL INFORMATION 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-26007

DMJM HARRIS • ARUP
A Joint Venture

Second Avenue Subway

BORING LOCATION PLAN
STA ℄ 1164+90 TO
STA ℄ 1173+00
Figure 6.0

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BORING LOG

Sheet: 4 of 4

DMJM HARRIS • ARUP
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SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-2A

BORING STATION: 1161+97.26	OFFSET: -73.69
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 158.91	NORTH: 218782.6283
DATUM : NYCT	EAST: 995409.3743
FINAL BORING DEPTH (FT) 92.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 3' to 17'	ENGINEER: R. Nunez / S. Mendes
CASING HAMMER: SPUN	DATE START: 8/25/04 DATE END: 8/26/04
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 9/21/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
		C10								82.1'-83.4': Cross-foliation joint/fracture, rough to smooth, vertical, slightly to moderately weathered, chloritized, clay filled (up to ½" thick).							1 7
95										82.1'-83.8': Fracture zone, rough to smooth, sub-horizontal to vertical, slightly to moderately weathered, chloritized to clay filled cross-foliation/foliation joints/fractures. 84.8'-85.2': Conjugate, cross-foliation joints/fractures, rough to smooth, sub-horizontal to vertical, moderately weathered, chloritized, clay coated. 85.5'-86.5': Fracture zone, rough to smooth, sub-horizontal to sub-vertical, slightly to moderately weathered, chloritized, epidote, crystallization cross-foliation/foliation joints/fractures; pitted texture. 87.7'-87.9': Slightly pitted texture. 87.1', 87.4' and 87.5': Foliation joints/fractures, smooth, horizontal to sub-horizontal, slightly weathered, chloritized, slickensided.			9				
100										C10: Similar to Schist in C6, except slightly convoluted foliation. 87.5'-88.8': Similar to brecciated Schist in C9.							
105										88.2'-88.8': Fracture zone, conjugate, rough to smooth, sub-vertical to moderately dipping, slightly weathered, chloritized, calcified, slickensided cross-foliation joints/fractures. 89.1', and 90.2': Cross-foliation joints/fractures, rough to smooth, moderately dipping, slightly weathered, chloritized. 91.3'-92.5': Cross-foliation joints/fractures, smooth, sub-vertical to vertical, slightly weathered, rough, undulating, chloritized, talcified, slickensided (up to ½" thick mylonite infill.							
110																	
115																	
120																	

GRANULAR SOILS	
BPF	DENSITY
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
>50	Very Dense

COHESIVE SOILS	
BPF	CONSISTENCY
<2	Very Soft
2-4	Soft
4-8	Med Stiff
8-15	Stiff
15-30	Very Stiff
>30	Hard

ROCK CORE CHARACTERISTICS

HARDNESS	
1	Very Soft
2	Medium
3	Med Hard
4	Hard
5	Very Hard

WEATHERING	
1	Complete
2	Severe
3	Moderate
4	Slight
5	Fresh

JOINT/FRACTURE CHARACTERISTICS

NO. PER FT
(1) 0
(2) 1-2
(3) 3-10
(4) 11-20

SPACING/THICKNESS	
<2"	Very close/Very Thin
2"-1'	Close/Thin
1'-3'	Mod Close/Mod Thick
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

5) 39'-44', 47'-50.5', and 52'-53.5': Core fractured also, incipient and healed fractures; no fractures per foot recorded.
6) Core barrel blocked.
7) RQD affected by sub-vertical joints/fractures between 81.0' and 83.5'.
8) Packer testing performed in bedrock in 10' intervals approximately between the depths of 30.9' and 89.8' after coring was completed.
9) Bottom of borehole at 92.5'; 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. B69-3

BORING STATION: 1161+85.19	OFFSET: 4.00
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 158.81	NORTH: 218734.4203
DATUM : NYCT	EAST: 995471.4794
FINAL BORING DEPTH (FT) 112.6	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb Safety Hammer
CASING SIZE: 3"
CASING HAMMER: N/A
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Co., Inc
FOREMAN: P. Lynch
ENGINEER: D. Persaud
DATE START: 04/02/04 DATE END: 04/06/04
REVIEWED BY: M.A. Ponti, Jr DATE: 05/13/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
Note 1				

DEPTH (FT)	CASING (BPF) OR CORING (MIN/FT)	SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PENREC: 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	3"									PAVEMENT THICKNESS: 6" Concrete Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1 S1A	6-6.5 6.5-6.8	11 30\3"	30/3"	9/9			0	Top 6": Brown, fine to coarse SAND, some Gravel, some Silt, trace Mica (SM / 11-65) Bot 3": Gray, Fragments of quartz-mica SCHIST, some slightly micaceous fine to coarse Sand, trace Silt (GP / 6-65).		DEC ROCK	4				
10	3 3 3 3.5	C1	10-17.6			7.6/7.6	100	100		Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, convoluted, horizontal to sub-vertical foliation, no apparent foliation joints/fractures; high quartz content; several very thin, very hard, Granofels zones; occasional 0.1' to 0.2' thick quartz veins.		ROCK	5				0 0 0 0
15	3.5 3.5 3.5 4									14.4'-16': Very hard, fresh, fine grained, gray, GRANOFELS, with no apparent foliation joints/fractures. 15.3'-15.9': Apparent healed cross-foliation joints/fractures.							0 0 0 0 0
20	4 4 5 5 4.5	C2	17.6-27.6			10.0/10.0	100	100		Similar to Schist in C1, except very thin to thin Granofels zones, rough to smooth, very widely spaced, horizontal to sub-horizontal, iron-oxide stained foliation joint/fracture.							1 0 0 0 0
25	5 5 5 4.5																0 0 0 0
30	4.5 4.5 4.5																0 0 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	
(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) Ground water level not recorded.
2) Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.
1 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) Top of rock at 7'.
5) Borehole reamed to 10' to facilitate flush installation of 3" diameter casing for ATV.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-3

BORING STATION: 1161+85.19	OFFSET: 4.00
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 158.81	NORTH: 218734.4203
DATUM : NYCT	EAST: 995471.4794
FINAL BORING DEPTH (FT) 112.6	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: D. Persaud
CASING HAMMER: N/A	DATE START: 04/02/04 DATE END: 04/06/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 05/13/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	4	C3	27.6-37.7			10.1/10.1	100	99		Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, convoluted, horizontal to sub-horizontal foliation, rough to smooth, closely to moderately closely spaced, horizontal to sub-horizontal foliation joints/fractures.							0
	4.5																2
	4.5																0
	4.5																3
	4.5									30.0'-30.7': Very hard, fresh, fine to coarse grained, white-gray, QUARTZ rich zone, with no apparent foliation, no apparent foliation joints/fractures.							0
	4																0
	4.5																0
40	3	C4	37.7-47.2			9.5/9.5	100	97		Similar to Schist in C1, except very closely to closely spaced, horizontal to sub-vertical, clay coated, chloritized foliation joints/fractures.							0
	3																0
	3																0
	2.5									38.2'-38.7', 39.2'-39.4 and 39.5-40.8': Very hard, fresh, fine to coarse grained, green, quartz-amphibole-garnet SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, no apparent foliation joints/fractures.							0
	2.5																0
	2.5																2
	2.5																1
	2.5									39.7'-40.3': Cross-foliation joints/fractures, rough to smooth, very closely spaced, sub-horizontal to sub-vertical.							0
45	2.5																0
	2.5									46'-47': Very hard Granofels zone.							0
	2.5																0
	2.5	C5	47.2-57.1			9.9/9.9	100	83		Similar to Schist in C1, except very closely to closely spaced cross-foliation joints/fractures.							0
	2.5																0
50	2.5																0
	2.5																0
	2.5																3
	2.5									52.8'-53.3', 53.6'-53.8': Cross-foliation joints/fractures, rough to smooth, very closely spaced, sub-vertical to vertical, slightly weathered.			6				8
	3																2
55	2.5																0
	2.5																0
	3																0
	3																0
	3																0
60	3																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	
(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 for core sample C5 affected by sub-vertical to vertical cross-foliation joint/fracture between 52.9'-53.3' and 53.6'-53.9'.
7) Bottom of borehole at 112.6'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-3

BORING STATION: 1161+85.19	OFFSET: 4.00
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 158.81	NORTH: 218734.4203
DATUM : NYCT	EAST: 995471.4794
FINAL BORING DEPTH (FT) 112.6	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: D. Persaud
CASING HAMMER: N/A	DATE START: 04/02/04 DATE END: 04/06/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 05/13/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	3	C6	57.1-67.2			10.1/10.1	100	99		Similar to Schist in C1, except rough to smooth, closely to very closely spaced, sub-horizontal to moderately dipping, slightly weathered, clay coated foliation joints/fractures. 61.3'-62.0', 63.0'-63.6': Similar to amphibole Schist in C4.							1
	3.5																1
	3.5																2
	3																0
	3																1
	3																0
	3																0
70	2.5	C7	67.2-77.3			10.1/10.1	100	100		Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, convoluted, moderately dipping to horizontal foliation, no apparent foliation joints/fractures; very thin to thin, very hard Granofels zones.							0
	2.5																0
	2.5																0
	3																0
	2.5																0
	2.5																0
	3																0
75	3																0
	3																0
	2.5																0
	2.5									Similar to Schist in C7.							0
	2.5																0
	2.5																0
80	3																0
	3																0
	3																0
	2.5	C8	77.3-87.4			10.1/10.1	100	100									0
	2.5																0
	2.5																0
85	2.5																0
	3																0
	2.5																0
	2.5																0
	3																0
90	2.5																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

6) RQD for core sample C5 affected by sub-vertical to vertical cross-foliation joint/fracture between 52.9'-53.3' and 53.6'-53.9'.
7) Bottom of borehole at 112.6'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-3

BORING STATION: 1161+85.19	OFFSET: 4.00
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 158.81	NORTH: 218734.4203
DATUM : NYCT	EAST: 995471.4794
FINAL BORING DEPTH (FT) 112.6	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: D. Persaud
CASING HAMMER: N/A	DATE START: 04/02/04 DATE END: 04/06/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 05/13/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
95	2.5	C9	87.4-97.1			9.7/9.7	100	100		Similar to Schist in C7.							0
	3																0
	2.5																0
	2.5																0
	2.5																0
	3																0
	3																0
100	2.5	C10	97.1-107.0			9.9/9.9	100	100		Similar to Schist in C7.							0
	3																0
	3																0
	2.5																0
	3																0
105	2.5																0
	3																0
	3																0
	2.5	C11	107.0-112.6			5.6/5.6	100	100		Similar to Schist in C7.							0
	2.5																0
110	3																0
	3																0
	3																0
	2.5																0
										Bottom of borehole at 112.6 feet.			7				0
115																	
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	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 for core sample C5 affected by sub-vertical to vertical cross-foliation joint/fracture between 52.9'-53.3' and 53.6'-53.9'.
7) Bottom of borehole at 112.6'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP — A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-4

BORING STATION: 1161+05.54	OFFSET: 127.39
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 158.53	NORTH: 218604.9473
DATUM : NYCT	EAST: 995540.8099
FINAL BORING DEPTH (FT) 92.4	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc
SAMPLER HAMMER: 140 lb. Donut	FOREMAN: J. Zambardi
CASING SIZE: 3"	ENGINEER: D. Persaud
CASING HAMMER: SPUN	DATE START: 9/08/04 DATE END: 9/13/04
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 9/24/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	3"									PAVEMENT THICKNESS: Not recorded Hand augered to a depth of 2 feet prior to start of boring.		FILL	2				
		S1	2-2	100/0"	100/0"	0/0				S1: No Recovery		DEC ROCK	3				
5													4				
	3.0											ROCK					2
	3.5																5
	3.0	C1	5.0-10.0			5.0/5.0	100	72		C1: Hard, slightly weathered, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to moderately dipping foliation, rough to smooth, very closely to closely spaced, horizontal to sub-horizontal, iron-oxide stained foliation joints/fractures; high mica content.							1
	3.5																0
	4.0																0
10																	
	4.0																7
	4.0	C2	10.0-12.7			2.7/2.7	100	78		C2: Similar to Schist in C1. 10.4' - 10.7': Cross-foliation joint/fracture, rough to smooth, sub-vertical to vertical, slightly weathered, iron-oxide stained foliation joints/fractures. 10.0' - 10.2': Fracture zone, rough to smooth, horizontal to sub-horizontal, slightly weathered. 11.3': Apparent healed foliation joint/fracture.							0
	4.5																0
	4.5																0
15																	
	5.0																0
	4.5																0
	4.5																0
	4.5	C3	12.7-22.8			10.1/10.1	100	73		C3: Similar to Schist in C1. 18.8'-22.8': Very hard, fresh, fine to coarse grained, dark green, quartz-mica-amphibole SCHIST, with very thin, slightly convoluted, crenulated, horizontal to sub-vertical foliation, rough to smooth, very closely spaced, horizontal to sub-horizontal, slightly weathered foliation joints/fractures. 18.8'-19.2': Moderately weathered, with 1/4" garnet augen. 19.2' -19.5': Cross-foliation joint/fracture, rough to smooth, closely spaced, sub-vertical, slightly weathered, iron-oxide stained.							3
	4.5																4
20																	
	5.0																0
	5.0																0
	5.0																0
	5.0																1
	4.5																0
25																	
	5.0									Similar to amphibole Schist in C3.							0
	5.5																0
	5.5									23.4'-32.6': Similar to Schist in C1, except occasional very thin quartzo-feldspathic zones.							0
	5.0	C4	22.8-32.6			9.8/9.8	100	100									0
	5.0																0
30																	
	5.0																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) Ground water level not recorded.
2) Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.
Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv).
4) 3" Casing spun to a depth of 5'.
5) Slow drilling at 57.5'.

BORING LOG

DMJM HARRIS • ARUP — A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-4

BORING STATION: 1161+05.54	OFFSET: 127.39
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 158.53	NORTH: 218604.9473
DATUM : NYCT	EAST: 995540.8099
FINAL BORING DEPTH (FT) 92.4	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc	
SAMPLER HAMMER: 140 lb. Donut	FOREMAN: J. Zambardi	
CASING SIZE: 3"	ENGINEER: D. Persaud	
CASING HAMMER: SPUN	DATE START: 9/08/04 DATE END: 9/13/04	
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 9/24/04	

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 ROD (%)	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
35	5.0									C5: Hard to very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, convoluted, sub-horizontal to moderately dipping foliation, rough, moderately to widely spaced, slightly weathered foliation joints/fractures; occasional very thin quartz veins. 40.0'-42.3': Very hard, fresh, fine to coarse grained, light gray to dark green-black, quartz-amphibole-mica SCHIST, with very thin, convoluted, sub-horizontal to moderately dipping foliation, no apparent foliation joints/fractures; occasional very thin quartz veins. 34.8'-35.3': Cross-foliation joint/fracture, rough to smooth, very widely spaced, sub-vertical, slightly weathered chloritized. 39.5'-39.8': Foliation joint/fracture, smooth undulating, sub-vertical.							0
	5.0																0
	5.0																0
	5.0																0
	5.5																3
	5.5																3
	6.0																0
	5.5	C5	32.6-42.3			9.7/9.7	100	95									0
	6.0																0
40	6.5																0
	6.0																0
	6.0																1
	6.0																1
	6.0																
	6.0																
45	6.5									Similar to quartz-mica-garnet Schist in C5, except horizontal to sub-vertical foliation, widely spaced joints/fractures; frequent very thin, quartz veins; high mica and garnet rich veins.							0
	6.0																1
	6.0	C6	42.3-52.1			9.8/9.8	100	100		43.5'-43.7': Quartzo-feldspatic zone.							0
	6.5																0
	7.0									46.9': Apparent healed foliation joint/fracture.							0
50	6.5																0
	6.5																0
	6.5																0
	7.0																0
	7.0																0
55	7.0	C7	52.1-57.3			5.2/5.2	100	88		Similar to quartz-mica-garnet Schist in C5.							0
	7.0																0
	7.0												5				2
	7.5																0
	8.0																0
60	8.0																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) Core barrel became blocked at a depth of 67.3'; drill rods removed and barrel cleared; coring bit replaced.
7) Core barrel became blocked at a depth of 87.2'; drill rods removed and barrel cleared.
8) Bottom of borehole at 92.4'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-4

BORING STATION: 1161+05.54	OFFSET: 127.39
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 158.53	NORTH: 218604.9473
DATUM : NYCT	EAST: 995540.8099
FINAL BORING DEPTH (FT) 92.4	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb. Donut
CASING SIZE: 3"
CASING HAMMER: SPUN
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling., Inc
FOREMAN: J. Zambardi
ENGINEER: D. Persaud
DATE START: 9/08/04 DATE END: 9/13/04
REVIEWED BY: C. Snee DATE: 9/24/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	8.0	C8	57.3-67.3			10.0/10.0	100	94		Hard to very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, convoluted, horizontal to sub-horizontal foliation, rough to smooth, very closely to widely spaced, horizontal to sub-horizontal, slightly weathered, chloritized foliation joints/fractures.							3
	8.5																0
	8.5																0
	8.0																0
	9.0									64.2'-64.5': Cross-foliation joints/fractures, rough to smooth, closely spaced, moderately dipping, slightly weathered, chloritized, mineralized.							4
	10.0																0
	10.0												6				0
70	5.0	C9	67.3-77.1			9.8/9.8	100	100		Similar to Schist in C8, except horizontal to sub-vertical foliation, very widely spaced foliation joints/fractures.							0
	5.0																0
	5.0																0
	5.0																0
	5.0																0
	5.0																0
	5.0																0
	5.5																1
75	5.0																0
	5.0																0
	5.0																0
	5.5	C10	77.1-87.2			10.1/10.1	100	100		Similar to Schist in C8, except highly convoluted, horizontal to vertical foliation, no apparent foliation joints/fractures.							0
	5.0																0
	4.5																0
80	5.0																0
	5.0																0
	5.0																0
	5.0																0
	5.0																0
	5.0																0
85	5.0																0
	5.5																0
	5.0												7				0
	5.0																0
	5.0																0
	5.0																0
90	5.0	C11	87.2-92.4			5.2/5.2	100	100		Similar to Schist in C10.							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

6) Core barrel became blocked at a depth of 67.3'; drill rods removed and barrel cleared; coring bit replaced.
7) Core barrel became blocked at a depth of 87.2'; drill rods removed and barrel cleared.
8) Bottom of borehole at 92.4'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS - ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-4

BORING STATION: 1161+05.54	OFFSET: 127.39
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 168.53	NORTH: 218604.9473
DATUM : NYCT	EAST: 995540.8099
FINAL BORING DEPTH (FT) 92.4	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc
SAMPLER HAMMER: 140 lb. Donut	FOREMAN: J. Zambardi
CASING SIZE: 3"	ENGINEER: D. Persaud
CASING HAMMER: SPUN	DATE START: 9/08/04 DATE END: 9/13/04
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 9/24/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	5.0																0
	5.0																0
	2.0												8				0
95										Bottom of boring at 92.4 feet							
100																	
105																	
110																	
115																	
120																	

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

6) Core barrel became blocked at a depth of 67.3'; drill rods removed and barrel cleared; coring bit replaced.
7) Core barrel became blocked at a depth of 87.2'; drill rods removed and barrel cleared.
8) Bottom of borehole at 92.4'; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 4

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-5

BORING STATION: 1160+72.77	OFFSET: -124.16
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 161.70	NORTH: 218698.2046
DATUM : NYCT	EAST: 995304.8956
FINAL BORING DEPTH (FT) 91.1	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 3" to 14'	ENGINEER: R. Nunez
CASING HAMMER: Spun	DATE START: 9/7/04 DATE END: 9/9/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 9/21/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
Note 1				

DEPTH (FT)	CASING (BPF) OR CORING (MIN/FT)	SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PENREC: 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	3"									PAVEMENT THICKNESS: Not recorded Hand augered to a depth of 6 feet prior to start of boring.		FILL	2 3				
5		S1	6-8	7 16 15 18	31	24/13				Dense, brown, fine to medium SAND, some Silt, little Gravel (SM / 11-65)							
		S2	8-9.7	14 22 45 100/2"	67	20/7				Very dense, brown-gray, fine to coarse SAND, some Rock Fragments, trace Silt, trace Mica (SM / 11-65)							
10		S3	10-12	10 14 17 33	31					Dense, gray-brown, slightly micaceous, fine to coarse SAND, little Silt, trace Rock Fragments (SM / 7-65)		DEC ROCK					
										C1: 14.4'-18': Very hard, fresh, fine to medium grained, light gray, GRANOFELS, with no apparent foliation, rough to smooth, very closely to closely spaced, sub-horizontal to sub-vertical, moderately weathered, strongly iron-oxide stained foliation joints/fractures.		ROCK	4				4
15	2									18.0'-22.1: Hard, fresh to slightly weathered, fine to coarse grained, light to medium gray, quartz-mica-garnet SCHIST, with sub-horizontal foliation, rough, very closely to moderately closely spaced, sub-horizontal to sub-vertical, slightly weathered, kaolinized, limonitic, chloritized, slightly iron-oxide stained foliation joints/fractures; occasional thin quartzitic zones; high quartz, mica, garnet content.							8
	2																8
	2	C1	14.4-22.1			7.7/7.3	94	36				SCHIST	4				13
	2																7
20	2												4				4
	2																4
	2																7
	2									17.4'-18.1': Fracture zone, smooth, very closely spaced, sub-vertical, strongly iron-oxide stained foliation/cross-foliation joints/fractures. 18.8'-19.2', 20.2'-20.6': Cross-foliation joints/fractures, rough, closely spaced, sub-vertical, kaolinized, slightly iron-oxide stained.							5
	3																2
25	3											PEGMATITE					0
	3																2
	3	C2	22.1-32.1			10/8.6	86	64		C2: Similar to Schist in C1. 23.9'-26.2': Very hard, fresh, fine to coarse grained, light pink, quartzo-feldspathic PEGMATITE, with no apparent foliation, rough, moderately closely spaced, sub-horizontal, slightly weathered joints/fractures.		GRANOFELS					1
																	2
30																	2

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) 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) RQD affected by sub-vertical joints/fractures (conjugate) between 15.3' and 18, 18.7 and 19.2', 20.3' and 20.6'.

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-5

BORING STATION: 1160+72.77 OFFSET: -124.16
PROJECT NO. CM1188 COORDINATES:
G. SURF EL. 161.70 NORTH: 218698.2046
DATUM : NYCT EAST: 995304.8956
FINAL BORING DEPTH (FT) 91.1

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb. Automatic
CASING SIZE: 3" to 14'
CASING HAMMER: Spun
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Co., Inc.
FOREMAN: P. Lynch
ENGINEER: R. Nunez
DATE START: 9/7/04 DATE END: 9/9/04
REVIEWED BY: M.A. Ponti, Jr DATE: 9/21/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
										26.2'-32.1': Similar to Granofels in C1, except high quartz content.							7
										22.1'-23.3': Fracture zone, rough, very closely spaced, sub-horizontal, slightly iron-oxide stained, slightly weathered, reactivated foliation joints/fractrures.							0
		C3	32.1-36.5			4.4/2.8	63	32		C3: Similar to Granofels in C1, except fine grained, slightly foliated.							0
35																	5
	3																5
	3																0
	3	C4	36.5-40.9			4.4/4.4	100	73		Similar to Schist in C1, except sub-vertical foliation.		SCHIST					0
	4									40.0'-40.6': Cross-foliation joint/fracture, rough, irregular, moderately closely to widely spaced, sub-vertical, slightly weathered.							3
40	6																2
	6																1
	8	C5	40.9-45			4.1/4.1	100	85		Similar to Granofels in C1, except high quartz content.		GRANOFELS					7
	12																0
	11																0
45																	
	5																0
	5																0
	4									Similar to Granofels in C1, except high quartz content.							1
	4	C6	45-52			7/7	100	94		50.4'-51.6': Mixed mica-Schist similar to C1 with quartzo-feldspathic veinlets; deeply pitted, vugular, texture parallel to core axis (1/8"-3/8" gashes).							0
50	5																0
	4																2
	5											SCHIST					2
																	6
																	9
																	1
55										Similar to Schist in C1.							1
		C7	52-62.1			10.1/10.1	100	73		52.4'-52.9', 53.3'-54.2', and 57.8'-58.2': Cross-foliation joints/fractures, rough, very closely to moderately closely spaced, sub-vertical, kaolinized, chloritized, slightly to moderately weathered.							6
																	3
																	8
60																	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								

5) Bottom of borehole at 91.1'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-5

BORING STATION: 1160+72.77	OFFSET: -124.16
PROJECT NO. CM1188	COORDINATES:
G. SURF EL: 161.70	NORTH: 218698.2046
DATUM : NYCT	EAST: 995304.8956
FINAL BORING DEPTH (FT) 91.1	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 3" to 14'	ENGINEER: R. Nunez
CASING HAMMER: Spun	DATE START: 9/7/04 DATE END: 9/9/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 9/21/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
																	0
																	0
																	0
	3																1
	4									Similar to Schist in C1.							1
65	4									65.7'-70.4': Hard to very hard, fresh, fine to medium grained, dark gray-green, amphibole-garnet SCHIST, with very thin, sub-horizontal foliation, rough to smooth, very closely to moderately closely spaced, sub-horizontal, slightly weathered foliation joints/fractures.							2
	3																3
	2	C8	62.1-72			9.9/9.9	100	80									7
	2									67.0'-67.2' and 67.9'-68.3': Cross-foliation joints/fractures, rough to smooth, irregular, truncated, closely to widely spaced, vertical, slightly weathered.							6
	2																2
	3																2
70	3																1
	3																0
																	2
										Similar to Schist in C1.		GRANOFELS					0
75										73.8'-75.9': Similar to Granofels in C1.							3
										75.9'-81.6': Similar to amphibole Schist in C8.		SCHIST					0
		C9	72-81.6			9.6/9.6	100	83									1
																	3
80																	4
																	0
	3																3
	2																3
	2																1
	3																3
85	3									Similar to amphibole Schist in C8.							0
	3																1
		C10	81.6-91.1			9.5/9.5	100	86		83.5'-85.1' and 98.4'-91.1': Similar to Schist in C1.							2
																	2
																	0
90																	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										

5) Bottom of borehole at 91.1'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-5

BORING STATION: 1160+72.77	OFFSET: -124.16
PROJECT NO. CM1188	COORDINATES: —
G. SURF EL. 161.70	NORTH: 218698.2046
DATUM : NYCT	EAST: 995304.8956
FINAL BORING DEPTH (FT) 91.1	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 3" to 14'	ENGINEER: R. Nunez
CASING HAMMER: Spun	DATE START: 9/7/04 DATE END: 9/9/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 9/21/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
													5				2
										Bottom of borehole at 91.1 feet.							

95
100
105
110
115
120

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

5) Bottom of borehole at 91.1'; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 4

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-6

BORING STATION: 1161+06.53	OFFSET: -48.70
PROJECT NO: CM1188	COORDINATES:
G. SURF EL. 160.28	NORTH: 218708.1254
DATUM : NYCT	EAST: 995356.2763
FINAL BORING DEPTH (FT) 109.6	

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: 06/30/05 DATE END: 07/06/05
REVIEWED BY: C. Snee DATE: 11/14/05

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
07/06/05	9:30	9.8	20	

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" Concrete Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1	6-8	9 11 11 16	22	24/24			-	Medium dense, brown, fine to medium SAND, some Gravel, some Silt, trace Rock Fragments, trace Mica (SM / 6-65)		DEC ROCK					
		S2	8-10	7 10 14 15	24	24/24			-	Medium dense, brown, fine to medium SAND, some Silt, trace micaceous Gravel, trace Rock Fragments, trace Mica (SM / 7-65)			4				
10		S3	10-12	8 7 6 8	13	24/0			-	No Recovery							
		S4	12-14	10 12 16 19	28	24/14			-	Medium dense, orange-brown, micaceous, fine to coarse SAND, some Silt, trace Rock Fragments, trace Clay pockets (SM / 7-65)							
15		S5	15-17	11 11 34 52	45	24/24			-	Dense, orange-brown micaceous, fine to medium SAND, little Silt, trace Rock Fragments (SM / 7-65)							
										Hard to very hard, fresh to slightly weathered, coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-vertical foliation, rough, with very closely to moderately closely spaced, horizontal to sub-vertical, slightly to moderately weathered, serecitized, mineralized, slightly iron-oxide stained foliation joints/fractures; high mica content.		ROCK					
20	3																
	3																
	3																
	3	C1	20-27.7			7.7/7.7	100	75	-	26.5'-28.8':Very hard, fresh, coarse grained, light gray-peach, PEGMATITE; occasional garnet content. 26.4' and 26.8': Conjugate, rough to smooth, sub-vertical, slightly weathered, chloritized, serecitized, calcified, mineralized foliation-cross-foliation joints/fractures.							2 3 4 2
25	3																0
	3																1
	3																2
	3																3
	2.5									27.3'-27.6': Cross-foliation joint/fracture, rough, sub-vertical, slightly weathered, slightly iron-oxide stained. 25.5': Healed horizontal cross-foliation							1
30	2.5																6

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).
4) Tip of spoon wet on sample S2.

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-6

BORING STATION: 1161+06.53	OFFSET: -48.70
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.28	NORTH: 218708.1254
DATUM : NYCT	EAST: 995356.2763
FINAL BORING DEPTH (FT) 109.6	

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: 06/30/05 DATE END: 07/06/05	
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
	2.5	C2	27.7-34.1			6.4/6.4	100	66	-	C2: 27.7'-28.8' and 33.7'-34.1': Similar to Pegmatite in C1. 28.8'-29.7' and 30.5'-33.7': Similar to Schist in C1; high garnet content. 29.7'-30.5': Hard, fresh, fine to coarse grained, light gray, altered quartz-mica-garnet SCHIST. 29.1'-29.5': Fracture zone, rough, irregular, very closely spaced, sub-horizontal to sub-vertical, slightly to moderately weathered, serecitized. 29.0'-30.3': Several healed sub-vertical to vertical; intercepting joints/fractures. 30.1' and 30.3': Cross-foliation joints/fractures, rough, very closely spaced, sub-vertical, slightly weathered, serecitized. 32.8'-33.4': Cross-foliation joint/fracture, irregular, sub-parallel, rough, very closely spaced, sub-vertical to vertical, slightly weathered, serecitized.			5
	2.5												
	2.5												
	7.5												
35	2.5	C3	34.1-40.6			6.5/6.5	100	7	-				
	2.5												
	2.5												
	2.5												
	2.5												
40	2.5												
	2.5	C4	40.6-45.2			4.6/4.6	100	84	-	C3: Similar to Schist in C1, except medium hard to hard, fresh to moderately weathered. 34.9'-35.6': Cross-foliation joint/fracture, rough, sub-vertical to vertical, slightly weathered, serecitized to clay coated. 36.0'-36.2':Moderately weathered Schist. 36.4'-37.1' and 37.6'-38.0': Cross-foliation joints/fractures, rough to smooth, very closely spaced, sub-vertical, slightly weathered, serecitized. 36.7'-38.3': Hard, fresh to slightly weathered, light gray, altered quartz-mica SCHIST. 38.0'-40.2': Fracture zone, rough, irregular, horizontal to vertical, slightly to highly weathered, serecitized, chloritized, clay coated foliation/cross-foliation joints/fractures. 34.9'-43.9': Several, very closely to closely spaced, sub-vertical to vertical joints/fractures.			
	3.5												
	3												
	3												
45	3												
	2.5												5
	3.5												
	3.5												
	3.5												
	4	C5	45.2-55.1			9.9/9.9	100	100	-	C4: Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, slightly convoluted, crenulated, horizontal to moderately dipping foliation, rough to smooth, with very closely to moderately closely spaced, horizontal to sub-horizontal, slightly weathered, serecitized foliation joints/fractures; occasional very thin quartzo-feldspathic zones.			
50	4												
	4												
	5												
	4												
	6												
55	7												
	6.5												
	7.5												
	7.5												
	5.5	C6	55.1-65.1			10/10	100	98	-	44.7'-45.2': Fracture zone, rough, very closely spaced, horizontal to vertical, slightly weathered, chloritized, serecitized, slightly iron-oxide stained foliation/cross-foliation			
60													

INSITU PROPERTIES

HARDNESS	WEATHERING	NUMBER OF FRACTURES PER FOOT	NUMBER
see below for values 1 2 3 4 5	see below for values 1 2 3 4 5	see below for values 1 2 3 4	
			4
			1
			5
			3
			6
			6
			11
			5
			10
			10
			3
			2
			3
			4
			1
			1
			1
			1
			1
			0
			0
			1
			1
			2
			1
			1
			0
			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										

5) Core barrel became blocked.
6) Changed bit.
7) RQD affected by vertical joint/fracture between 66.7'-67.9'.
8) Core barrel became blocked.
9) Bottom of borehole at 109.6'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-6

BORING STATION: 1161+06.53	OFFSET: -48.70
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.28	NORTH: 218708.1254
DATUM : NYCT	EAST: 995356.2763
FINAL BORING DEPTH (FT) 109.6	

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: 06/30/05 DATE END: 07/06/05
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	C6								C5:Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, slightly convoluted, crenulated, horizontal to moderately dipping foliation, rough to smooth, with very closely to moderately closely spaced, horizontal to sub-horizontal, slightly weathered, serecitized foliation joints/fractures; occasional very thin quartzo-feldspathic zones.			6				1
	4.5																2
	3.5																0
	3																0
65	3																2
	5									45.7'-48.0': Several healed sub-vertical to vertical joints/fractures.			7				2
	3.5	C7	65.1-67.9			2.7/2.7	100	41	-								3
	3.5																10
	3									C6:Similar to Schist in C5, except occasional very thin quartz veins.			8				1
	3																2
70	3	C8	67.9-71.5			3.6/3.6	100	82	-	C7 and C8: 65.1'-65.8': Very hard, fresh, quartz vein.							3
	4									65.8'-68.5' and 69.9-70.5': Very hard, fresh, fine to coarse grained, green-black, quartz-mica-amphibole SCHIST, with very thin, horizontal to moderately dipping foliation, rough to smooth, with closely to moderately closely spaced, slightly weathered, serecitized foliation joints/fractures; occasional very thin quartz veins.			8				2
	2.5																2
	2.5																4
	4.5	C9	71.5-76.0			4.5/4.5	100	69	-								3
75	4																2
	3									65.9'-66.3' and 66.7'-67.9': Cross-foliation joints/fractures, rough, very closely spaced, vertical, slightly weathered, chloritized, pyrite.			8				1
	3.5									65.9'-68.3': Several healed sub-vertical to vertical joints/fractures.							0
	3.5									69.4': Healed sub-vertical joint/fracture.							2
	3.5									68.5'-69.9' and 70.5'-71.5': Similar to quartz-mica Schist in C5.							1
	3.5																1
80	3.5	C10	76-84.6			8.6/8.6	100	94	-	C9:71.5'-73.3' and 74.2'-76.0': Similar to Schist in C5, except slightly weathered, serecitized, kaolinized, chloritized, mineralized, slightly iron-oxide stained.							0
	4									73.0' and 74.8': Foliation joint/fracture, slightly slickensided.							0
	4									74.2'-74.7': Cross-foliation joint/fracture, rough, moderately dipping, slightly weathered, slightly chloritized, slightly mineralized, partially healed.							0
	3.5									74.4'-75.8': Several healed sub-vertical to vertical joints/fractures.							3
85	3.5									74.4'-74.8': Cross-foliation joint/fracture, partially healed, rough to smooth, vertical, slightly weathered, calcified, talcified, kaolinized.							1
	3.5																1
	3.5																3
	3.5																3
	3.5																0
90	3.5	C11	84.6-94.6			10/10	100	83	-								

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								

5) Core barrel became blocked.
6) Changed bit.
7) RQD affected by vertical joint/fracture between 66.7'-67.9'.
8) Core barrel became blocked.
9) Bottom of borehole at 109.6'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM+HARRIS-ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-6

BORING STATION: 1161+06.53	OFFSET: -48.70
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.28	NORTH: 218708.1254
DATUM : NYCT	EAST: 995356.2763
FINAL BORING DEPTH (FT) 109.6	

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: 06/30/05 DATE END: 07/06/05
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
	3.5									73.6'-75.2': Healed vertical joint/fracture.							0
	3.5									C10:Similar to Schist in C5, except occasional very thin amphibole Schist zones.							2
	3.5									83.8'-84.6': Altered brecciated quartz-mica SCHIST.							0
	3.5									81.5'-82.5': Healed, calcite, sub-vertical to vertical joint/fracture.							3
95	4									81.6'-82.1' and 81.9'-82.5': Healed, sub-parallel, slightly mylonite, sub-vertical joints/fractures.							2
	5																0
	5									C11:Similar to Schist in C5, except occasional very thin quartz veins.							1
	6									84.6'-85.6': Healed vertical joint/fracture.							0
	6									85.6'-86.3': Two healed vertical joints/fractures (1 above and below-parallel).							0
	6	C12	94.6-104.4			9.8/9.8	100	100	-	86.8': Healed, mylonite, sub-horizontal foliation joint/fracture.							0
100	6									87.2'-88.3': Fracture zone, rough to smooth, very closely spaced, sub-vertical to vertical, slightly weathered, talcified, cross-foliation joints/fractures.							1
	5									94.0'-94.6': Fracture zone, rough to smooth, very closely spaced, slightly weathered, cross-foliation joints/fractures.							0
	5																0
	6																-
105	5																-
	5									C12: Similar to Schist in C5, except moderately closely spaced foliation joints/fractures; occasional very thin quartz veins.							0
	6	C13	104.4/109.6			5.2/5.2	100	98	-								1
	5									C13:Similar to Schist in C5, except occasional very thin quartz veins.							0
	5									108.3'-108.4': Clay gouge.							3
	5									108.6'-109.6': Healed vertical joint/fracture.			9				0
110										Bottom of borehole at 109.6 feet							
115																	
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										

5) Core barrel became blocked.
6) Changed bit.
7) RQD affected by vertical joint/fracture between 66.7'-67.9'.
8) Core barrel became blocked.
9) Bottom of borehole at 109.6'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 1

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B69-7

BORING STATION: 1161+91.43	OFFSET: 8.46
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 159.37	NORTH: 218754.622
DATUM : NYCT	EAST: 995447.4843
FINAL BORING DEPTH (FT) 19.6	

SAMPLER: N/A	BORING CO: Warren George, Inc.
SAMPLER HAMMER: N/A	FOREMAN: A. London
CASING SIZE: 4" to 9'	ENGINEER: J. Thampi
CASING HAMMER: 300 lb Donut	DATE START: 12/19/06 DATE END: 12/19/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0	4"									PAVEMENT THICKNESS: 4" Asphalt 6" Concrete			1				
													2				
													3				
5																	
													4				
10	5	C1	9.7-14.6			4.9/4.0	81	51		Hard to moderately hard, slightly to severely weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, horizontal to sub-horizontal foliation, rough, irregular, slightly iron-oxide stained, very closely to closely spaced, horizontal to sub-horizontal foliation joints/fractures. 12.3'-12.8' and 14.0': Cross-foliation joints/fractures: Rough, irregular, sub-vertical.			5				1
	5																1
	5																4
	5																>10
	5																10
15	6	C2	14.6-19.6			5.0/5.0	100	100		Hard to very hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica SCHIST, with thin to very thin, horizontal to sub-horizontal foliation,rough, close to moderately closely spaced, horizontal to sub-horizontal foliation joints/fractures. 16.6'-17.4': Cross-foliation joints/fractures: Tightly healed, sub-vertical.							0
	5																1
	3																0
	3																1
	5												6				0
20										Bottom of borehole at 19.6 feet.							
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		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) Ground water level not recorded.
Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.
Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv).

4) Drilled to top of rock; soil samples were not taken.
5) Core barrel dropped from approximately 12.7'-13.7'. Completely weathered zone.
6) Bottom of borehole at 19.6 feet. Borehole grouted upon completion.

BORING LOG

Sheet: 1 of 6

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 69-7

BORING STATION: 1163+34.04	OFFSET: 79.71
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.23	NORTH: 218843.2984
DATUM : NYCT	EAST: 995580.8315
FINAL BORING DEPTH (FT) 156.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 3" (Spun to 7')	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 06/03/05 DATE END: 06/08/05
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 11/14/05

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
06/07/05	10:05	12.7'	7'	20 Hrs. 5 Min.
06/08/05	10:05	8.2'	7'	20 Hrs. 5 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 ROD (%)	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"									PAVEMENT THICKNESS: 4" Concrete		FILL	1				
		S1	1.5-1.8	100/3"	100/3	3/3			-	Very dense, gray-black, fine to medium SAND, little Rock Fragments, little Silt (SM / 6-65)		DEC ROCK	2				
													3				
5	2.5											ROCK					
	2.5																0
	3	C1	5-10.3			5.3/5.3	100	96	-	Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, slightly convoluted, crenulated, horizontal to sub-horizontal foliation, rough, with closely to moderately closely spaced, horizontal to sub-horizontal, slightly weathered, slightly iron-oxide stained, pyrite foliation joints/fractures.			4				0
	3.5																2
	4																0
10	2																0
	2																0
	3																3
	3	C2	10.3-17.5			7.2/7.2	100	99	-	Similar to Schist in C1, except occasional very thin quartz veins; occasional very thin quartzo-feldspathic zones.							0
	3.5																0
15	3																0
	3.5																0
	3																1
	5																4
	12																1
20	2																3
	3																1
	2.5	C3	17.5-27.3			9.8/9.8	100	92	-	17.5'-19.4' and 26.0'-27.3': Similar to Schist in C1, except occasional very thin to thin quartzo-feldspathic zones. 19.4'-21.4': Very hard, fresh, coarse grained, quartz-feldspathic SCHIST (PEGMATITE). 21.4'-26.0': Very hard, fresh, fine grained, green-black, quartz-mica-amphibole SCHIST, with very thin, slightly convoluted, slightly crenulated, horizontal to sub-horizontal foliation, rough to smooth, very closely to moderately closely spaced, slightly weathered, chloritized foliation joints/fractures; occasional very thin to thin quartz veins. 18.2'-18.6': Fracture zone, rough to smooth, very closely spaced, horizontal to moderately dipping, slightly weathered, chloritized foliation/cross-foliation joints/fractures. 19.7': Healed moderately dipping joint/fracture. 19.9'-20.5': Cross-foliation joint/fracture, partially healed, rough, slightly weathered, sub-vertical.							1
	3																1
25	2.5																0
	3																2
	2.5																1
	3																7
	2.5																3
30	3																2

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).

4) Spun 3" casing to 7' to be able to place new core bit in 10' barrel.

BORING LOG

DMJM HARRIS - ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 69-7

BORING STATION: 1163+34.04	OFFSET: 79.71
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.23	NORTH: 218843.2984
DATUM : NYCT	EAST: 995580.8315
FINAL BORING DEPTH (FT) 156.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 3" (Spun to 7')	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 06/03/05 DATE END: 06/08/05
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
35	2.5	C4	27.3-36.9			9.6/9.6	100	76	-	22.7': Cross-foliation joints/fracture, partially healed, rough, moderately dipping to sub-vertical. 22.8'-23.3': Healed sub-vertical joints/fractures. 27.2': Cross-foliation joint/fracture, rough to smooth, moderately dipping, slightly weathered. C4: Similar to Schist in C1, except convoluted, horizontal to moderately dipping foliation. 34.1'-36.9':Similar to amphibole Schist in C3, except occasional thin quartz vein.							0
	2.5																0
	2.5																4
	2.5																0
	2.5																0
	2.5																0
	2.5																1
40	2.5	C5	36.9-46.9			10.0/10.0	100	96	-	C5: Similar to amphibole Schist in C3. 43.0'-46.9': Similar to Schist in C1, except very thin to thin quartzo-feldspathic zones and thin, moderately spaced, garnet rich zones.							0
	2																0
	2																1
	2																1
	2																1
	3																1
	3.5																
45	4																
	4																1
	4																1
	2.5	C6	46.9-57.0			10.1-10.1	100	100	-	Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to vertical foliation, no apparent joints/fractures; occasional very thin to thin amphibole Schist; occasional very thin quartzo-feldspathic zones and very thin, moderately spaced, garnet rich zones.							0
	2.5																0
50	2.5																0
	2.5																0
	2.5																0
	3																0
	3																0
55	3																0
	3																0
	3																0
	3																0
	3																1
60	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								

5) New core bit.
6) Bottom of borehole at 156.5'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 69-7

BORING STATION: 1163+34.04	OFFSET: 79.71
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.23	NORTH: 218843.2984
DATUM : NYCT	EAST: 995580.8315
FINAL BORING DEPTH (FT) 156.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 3" (Spun to 7')	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 06/03/05 DATE END: 06/08/05
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	3	C7	57.0-67.1			10.1/10.1	100	100	-	C7: Similar to Schist in C6, except rough, widely spaced, horizontal to moderately dipping, slightly weathered foliation joints/fractures, high quartz content.							0
	3																0
	2.5																0
	3																0
	2.5																0
	2.5																0
	2.5																0
70	2.5	C8	67.1-77.0			9.9/9.9	100	100	-	Similar to Schist in C6, except horizontal to sub-horizontal foliation, widely spaced, horizontal, slightly weathered foliation joints/fractures; no amphibole Schist zones. 67.5'-68.1': Healed vertical joint/fracture.							0
	2.5																0
	2.5																0
	2.5																1
	2.5																0
	2.5																0
	3																0
75	2.5																0
	3																0
	3																0
	3																1
	3																0
	3																0
80	2.5																1
	3																0
	3	C9	77.0-86.9			9.9/9.9	100	100	-	Similar to Schist in C6, except horizontal to moderately dipping foliation, rough, moderately closely to widely spaced, sub-horizontal, iron-oxide stained foliation joints/fractures; occasional very thin quartz veins; occasional very thin quartzo-feldspathic zones. 80.3'-80.8': Healed sub-vertical to vertical joint/fracture.			5				0
	2																0
	2.5																0
85	2.5																0
	2.5																0
	2.5																0
	2																0
	2																0
90	2																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	
(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

5) New core bit.
6) Bottom of borehole at 156.5'; acoustic televiewer survey performed; borehole grouted upon completion.

DMJM HARRIS - ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 69-7

BORING STATION: 1163+34.04	OFFSET: 79.71
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.23	NORTH: 218843.2984
DATUM : NYCT	EAST: 995580.8315
FINAL BORING DEPTH (FT) 156.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 3" (Spun to 7')	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 06/03/05 DATE END: 06/08/05
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																0
	2.5	C10	86.9-96.9			10.0/10.0	100	100	-	Similar to Schist in C6, except horizontal to moderately dipping foliation, occasional very thin quartzo-feldspathic zones. 92.6': Cross-foliation joint/fracture, rough, very widely spaced, moderately dipping, slightly weathered, mineralized. 93.3'-94.0':Healed sub-vertical to vertical joint/fracture.							0
	2																1
	2.5																0
	2																0
	2.5																0
	2.5																0
	2																0
	2																0
100	2.5																0
	2.5																0
	2.5	C11	96.9-106.8			9.9/9.9	100	100	-								0
	2																0
	2																
105	2.5																
	2.5																0
	2.5																0
	2.5									Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, rough, with widely spaced, horizontal, slightly weathered foliation joints/fractures; occasional very thin quartz veins.							0
	2.5																0
	2.5																0
110	2.5																0
	2.5																1
	2.5	C12	106.8-116.9			10.1/10.1	100	100	-								0
	2																0
	2.5																0
115	2.5																0
	2.5																0
	2.5																0
	2																0
	2.5																0
120	2																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									

5) New core bit.
6) Bottom of borehole at 156.5'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS - ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 69-7

BORING STATION: 1163+34.04	OFFSET: 79.71
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.23	NORTH: 218843.2984
DATUM : NYCT	EAST: 995580.8315
FINAL BORING DEPTH (FT) 156.5	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb (Automatic)
CASING SIZE: 3" (Spun to 7')
CASING HAMMER: N/A (Spun)
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Corp.
FOREMAN: Peter Lynch
ENGINEER: Sara Rocha
DATE START: 06/03/05 DATE END: 06/08/05
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	2.5	C13	116.9-126.8			9.9/9.9	100	100	-	Similar to Schist in C12, except no apparent joints/fractures. 122.0'-123.0': Very hard, fresh, coarse grained, light gray-white-peach, quartzo-feldspathic SCHIST(PEGMATITE).							0
	2.5																0
	2.5																0
	2.5																0
	2.5																0
	2																0
	2.5																0
130	2									Similar to Schist in C12, except slightly convoluted foliation, no apparent joints/fractures; pyrite; occasional very thin quartzo-feldspathic zones. 128.3'-128.8': Cross-foliation joint/fracture, rough, widely spaced, sub-vertical, slightly weathered, mineralized, pyrite.							0
	2																1
	2																0
	2																0
	2.5	C14	126.8-136.7			9.9/9.9	100	100	-								0
	2																0
	2																0
135	2.5																0
	2.5																0
	2									Similar to Schist in C12, except horizontal to moderately dipping foliation, closely to very widely spaced, sub-horizontal to moderately dipping foliation joints/fractures; occasional very thin to thin quartzo-feldspathic zone.							0
	2.5																0
	3																0
140	2.5																0
	3																0
	3	C15	136.7-146.9			10.2/10.2	100	100	-								0
	2.5																0
	2.5																0
	4																0
145	3																2
	2.5																0
	2.5																0
	3																0
150	3																0

GRANULAR SOILS	
BPF	DENSITY
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
>50	Very Dense

COHESIVE SOILS	
BPF	CONSISTENCY
<2	Very Soft
2-4	Soft
4-8	Med Stiff
8-15	Stiff
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	"-1'	Close/Thin	5-35	Sub-Horizontal
(3)	3-10	'-3'	Mod Close/Mod Thick	35-55	Mod Dipping
(4)	11-20	-10'	Wide/Thick	55-85	Sub-Vertical.
		10'	Very Wide/Very Thick	85-90	Vertical

5) New core bit.
6) Bottom of borehole at 156.5'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 69-7

BORING STATION: 1163+34.04	OFFSET: 79.71
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.23	NORTH: 218843.2984
DATUM : NYCT	EAST: 995580.8315
FINAL BORING DEPTH (FT): 156.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 3" (Spun to 7')	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 06/03/05 DATE END: 06/08/05
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
155	3	C16	146.9-156.5			9.6/9.6	100	93	-	Similar to Schist in C12, except horizontal to moderately dipping foliation, very closely to widely spaced, horizontal to moderately dipping foliation joints/fractures. 155.9'-156.5': Cross-foliation joint/fracture, rough to smooth, sub-vertical, chloritized, mineralized, slickensided, partially healed parts.			6				0
	3																0
	3																0
	3																0
	3																2
	2.5																0
	2.5																3
160																	
165																	
170																	
175																	
180																	

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									

5) New core bit.
6) Bottom of borehole at 156.5'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 6

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 71-5

BORING STATION: 1168+59.89	OFFSET: 83.89
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 152.10	NORTH: 219203.6171
DATUM : NYCT	EAST: 995682.5366
FINAL BORING DEPTH (FT) 155.1	

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: 05/19/05 DATE END: 05/24/05
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 11/14/05

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
5/23/05	10:05	12.7'	7'	20 Hrs. 20 Min.
5/24/05	1:45	18.3'	7'	20 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"									PAVEMENT THICKNESS: 6" Concrete; 6" Gravel sub-grade		FILL	1				
													2				
													3				
		S1	3-3.25	50/3"	50/3"	3/3			-	Very dense, dark gray-brown, fine to coarse SAND, some Rock Fragments, little Silt, trace Mica (SM / 6-65)		DEC ROCK					
5																	
												ROCK					
	2.5									Hard to very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, with very close to closely spaced, horizontal to sub-horizontal, slightly weathered, slightly to strongly iron-oxide stained to clay coated foliation joints/fractures; occasional very thin amphibole Schist zone; occasional thin quartz-feldspar zone.			4				3
	3																2
	2	C1	7-12.3			5.3/5.3	100	72	-								3
10	2.5																2
	3																3
	4									9', 10.4' and 11.5': Foliation joints/fractures surfaces are black.							2
	2.5																0
	2.5																0
15	2.5																0
	2.5																0
	2.5	C2	12.3-22.3			10/10	100	100	-	C2: Similar to Schist in C1, except no foliation joints/fractures; occasional very thin quartz veins.							0
	2.5																0
	2.5																0
20	2.5																0
	2.5																0
	2.5																0
	2									Similar to Schist in C1, except slightly weathered foliation joints/fractures.							1
	2																0
25	2																0
	2																0
	2	C3	22.3-31.7			9.4/9.4	100	100	-								0
	2																0
	2.5																0
30	2.5																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	
(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. Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.

Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv).

4) Slight water loss observed throughout the borehole.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 71-5

BORING STATION: 1168+59.89	OFFSET: 83.89
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 152.10	NORTH: 219203.6171
DATUM : NYCT	EAST: 995682.5366
FINAL BORING DEPTH (FT) 155.1	

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: 05/19/05 DATE END: 05/24/05
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
35	2.5									
	2.5									
	2.5									
	2.5									
	2.5									
	2.5									
	2.5	C4	31.7-40.9			9.2/9.2	100	100	-	Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, rough, widely spaced, horizontal, slightly weathered foliation joints/fractures; occasional very thin to thin quartz veins; pyrite content. 40.4': Healed sub-vertical joint/fracture.
	2.5									
	2.5									
40	2.5									
	2.5									
	2.5									Similar to Schist in C4, except occasional very thin to thin amphibole Schist; occasional very thin quartz-feldspar zones; pyrite content. 49.3'-50.1': Healed vertical joint/fracture.
	2.5									
	3									
45	2.5									
	2.5	C5	40.9-50.8			9.9/9.9	100	100	-	
	2.5									
	2.5									
	2.5									
50	2.5									
	2.5									
	2.5									
	2.5									
	2.5									Similar to Schist in C4, except slightly convoluted foliation; occasional very thin to thin amphibole Schist; occasional very thin quartz-feldspar zones. 50.9'-52.1' and 55'-55.8': Healed sub-vertical to vertical joints/fractures.
	2.5									
	2.5	C6	50.8-57.7			6.9/6.9	100	100	-	
55	2.5									
	2.5									
	2.5									
	2.5									
	2.5									
	2.5									
60	2.5									

STRATA SYMBOL | STRATIGRAPHY | NOTES

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	NUMBER
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			1
			0
			0
			0
			0
			0
			0
			2
			0
			0
			0
			0
			0
			1
			0
			0
			0
			0
			0
			0
			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	
(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

5) RQD affected by vertical joint/fracture between 104.8' and 106.3'.
6) Core barrel became blocked.
7) Bottom of borehole at 155.1'; acoustic televiewer survey performed; in-situ stress test performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 71-5

BORING STATION: 1168+59.89	OFFSET: 83.89
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 152.10	NORTH: 219203.6171
DATUM : NYCT	EAST: 995682.5366
FINAL BORING DEPTH (FT) 155.1	

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: 05/19/05 DATE END: 05/24/05
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	C7	57.7-67.2			9.5/9.5	100	96	-	Similar to Schist in C4, except slightly convoluted foliation, chloritized foliation joints/fractures; occasional very thin to thin quartz-feldspar zones.							0
	2.5																1
	2																3
	2.5									61.3': Cross-foliation joint/fracture, rough, sub-vertical, slightly weathered, mineralized.							2
	2.5									62.5'-63.1': Cross-foliation joints/fractures, sub-vertical to vertical, slightly weathered, chloritized to clay coated; partially healed.							0
	2.5																1
	2.5									61'-62.3': Healed vertical joint/fracture.							1
70	2.5	C8	67.2-76			8.8/8.8	100	94	-	Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, slightly convoluted, crenulated, horizontal to moderately dipping foliation, rough to smooth, very close to widely spaced, horizontal to sub-horizontal, slightly weathered, chloritized foliation joints/fractures; occasional very thin to thin quartz veins; pyrite content.							5
	2.5																1
	2.5																1
	3																0
	3									67.2'-67.6': Fracture zone, rough to smooth, very closely spaced, horizontal to sub-horizontal, slightly weathered, chloritized foliation, cross-foliation joints/fractures.							0
	2.5																0
	2.5																1
75	3									69.2': Cross-foliation joints/fracture, rough, sub-vertical, slightly weathered, chloritized, mineralized.							0
	2.5																0
	3	C9	76-82.6			6.6/6.6	100	100	-	69'-69.7', 70.7'-71.5', 71.3'-72.1' and 72'-72.6': Healed sub-vertical joints/fractures.							0
	3																0
	3																0
	3									C9: Similar to Schist in C4, except no apparent foliation joints/fractures; occasional very thin to thin quartz-feldspar zones.							0
80	3																0
	3.5																0
	3																0
	3									Similar to Schist in C8, except moderately to widely spaced, slightly weathered foliation joints/fractures.							0
	2.5																0
85	2.5																0
	2.5									87.0': Pyrite on foliation joint.							0
	2.5																1
	3	C10	82.6-91.8			9.2/9.2	100	100	-								0
	3																0
	3																1
90	3.5																

GRANULAR SOILS	
BPF	DENSITY
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
>50	Very Dense

COHESIVE SOILS	
BPF	CONSISTENCY
<2	Very Soft
2-4	Soft
4-8	Med Stiff
8-15	Stiff
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	"-1'	Close/Thin	5-35 Sub-Horizontal
(3) 3-10	'-3'	Mod Close/Mod Thick	35-55 Mod Dipping
(4) 11-20	'-10'	Wide/Thick	55-85 Sub-Vertical
	10'	Very Wide/Very Thick	85-90 Vertical

5) RQD affected by vertical joint/fracture between 104.8' and 106.3'.
') Core barrel became blocked.
Bottom of borehole at 155.1'; acoustic televiewer survey performed; in-situ stress test performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 71-5

BORING STATION: 1168+59.89	OFFSET: 83.89
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 152.10	NORTH: 219203.6171
DATUM : NYCT	EAST: 995682.5366
FINAL BORING DEPTH (FT) 155.1	

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: 05/19/05 DATE END: 05/24/05
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
	4																0
	2.5																1
	3	C11	91.8-101.9			10.1/10.1	100	100	-	Similar to Schist in C8, except convoluted foliation in parts, slightly crenulated, occasional very thin to thin quartz veins, pyrite content.							1
	3.5																0
95	3.5																0
	3.5																0
	3.5																1
	2.5																0
	3																0
100	3																0
	3																1
	3																0
	4.5	C12	101.9-107.6			5.7/5.7	100	74	-	Similar to Schist in C8, except convoluted foliation, crenulated, moderately to widely spaced foliation joints/fractures. 104.8'-106.3': Cross-foliation joint/fracture, rough, vertical, slightly weathered, chloritized, mineralized.			5				1
	3.5																10
105	2.5																4
	3.5																0
	3																0
	3									Similar to Schist in C8, except hard, convoluted, highly crenulated, very high mica content.							0
	3																0
110	3																2
	3																1
	3	C13	107.6-117.3			9.7/9.7	100	99	-								1
	3																0
	3																0
115	3																0
	3																1
	3																0
	3																0
	4																1
120	4																

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	'1"	Close/Thin	5-35 Sub-Horizontal
(3) 3-10	'3'	Mod Close/Mod Thick	35-55 Mod Dipping
(4) 11-20	'10'	Wide/Thick	55-85 Sub-Vertical
	'10'	Very Wide/Very Thick	85-90 Vertical

5) RQD affected by vertical joint/fracture between 104.8' and 106.3'.
6) Core barrel became blocked.
7) Bottom of borehole at 155.1'; acoustic televiewer survey performed; in-situ stress test performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS - ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 71-5

BORING STATION: 1168+59.89	OFFSET: 83.89
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 152.10	NORTH: 219203.6171
DATUM : NYCT	EAST: 995682.5366
FINAL BORING DEPTH (FT) 155.1	

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: 05/19/05 DATE END: 05/24/05
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	4	C14	117.3-127.1			9.8/9.8	100	91	-	Similar to Schist in C8, except highly crenulated in places. 121.0'-121.6': Fracture zone, rough to smooth, horizontal to moderately dipping, slightly weathered foliation, cross-foliation joints/fractures. 121.9'-122.2': Healed sub-vertical joint/fracture.							1
	3.5																5
	3.5																1
	3.5																1
	3.5																0
	3.5																0
	3																3
130	3	C15	127.1-132.5			5.4/5.4	100	100	-	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 foliation joints/fractures, high mica content.							0
	3.5																0
	3.5																1
	3.5																0
	3.5																0
	3.5																0
	3.5																0
135	3	C16	132.5-142.2			9.7/9.7	100	95	-	Similar to Schist in C15, except closely to widely spaced foliation joints/fractures; frequent quartz-feldspar zones. 136.5'-142.2': Closely spaced quartz-feldspar zones, very thin to moderately thick.							2
	3.5																2
	5																0
	4.5																0
	4.5																0
140	8																0
	5																0
	4												6				0
	3.5																0
	3.5																1
145	4	C17	142.2-146.9			4.7/4.7	100	98	-	Similar to Schist in C15, except closely spaced quartz-feldspar zones. 145'-146.9': Very hard, fresh, coarse grained, light gray-white-pink, quartzo-feldspathic SCHIST and PEGMATITE.							0
	6																0
	5.5																0
	7																0
	3.5																0
150	3.5																7

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

5) RQD affected by vertical joint/fracture between 104.8' and 106.3'.
6) Core barrel became blocked.
7) Bottom of borehole at 155.1'; acoustic televiewer survey performed; in-situ stress test performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS 71-5

BORING STATION: 1168+59.89	OFFSET: 83.89
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 152.10	NORTH: 219203.6171
DATUM : NYCT	EAST: 995682.5366
FINAL BORING DEPTH (FT) 155.1	

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: 05/19/05 DATE END: 05/24/05
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	C18	146.9-155.1			8.2/8.2	100	62	-	Similar to Pegmatite in C17, except frequent very thin mica-Schist zones; high mica and garnet content. 149.3'-150.5': Fracture zone, several, rough to smooth, very closely spaced, sub-vertical, slightly weathered, kaolinized, mineralized cross-foliation joints/fractures. 149.1'-149.6': Healed, serecitized joints/fractures.			7				4
	3																3
	3																3
	3																0
155	3																0
										Bottom of borehole at 155.1 feet							
160																	
165																	
170																	
175																	
180																	

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

5) RQD affected by vertical joint/fracture between 104.8' and 106.3'.
6) Core barrel became blocked.
7) Bottom of borehole at 155.1'; acoustic televiewer survey performed; in-situ stress test performed; borehole grouted upon completion.

ANGLE BORING LOG

Sheet: 1 of 8

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B71-8

BORING STATION: 1168+58.66	OFFSET: 87.98
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 150.67	NORTH: 219390.738
DATUM : NYCT	EAST: 995690.382
FINAL BORING DEPTH (FT) 229.4	

SAMPLER: NA	BORING CO: Warren George, Inc.
SAMPLER HAMMER: NA	FOREMAN: J. Harris
CASING SIZE: 3" to 35'	ENGINEER: G. Gutshteyn
CASING HAMMER: NA	DATE START: 10/02/2006 DATE END: 10/23/2006
ROCK CORE: NQ Wireline 30 degrees from horizontal	REVIEWED BY: C. Snee DATE: 03/06/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0	3"									PAVEMENT THICKNESS: 6" Concrete sidewalk			1				
										Excavate 6' x 10' x 2' feet trench to clear utilities for angle boring.			2				
													3				
5																	
10																	
15																	
20																	
25																	
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	0-35	Acute	
4-10	Loose	2-4	Soft	2	Medium	2	Severe	(2) 1-2	2"-1'	Close/Thin	35-55	Intermediate	
10-30	Medium Dense	4-8	Med Stiff	3	Med Hard	3	Moderate	(3) 3-10	1'-3'	Mod Close/Mod Thick	55-90	Obtuse	
30-50	Dense	8-15	Stiff	4	Hard	4	Slight	(4) 11-20	3'-10'	Wide/Thick			
>50	Very Dense	15-30	Very Stiff	5	Very Hard	5	Fresh		>10'	Very Wide/Very Thick		See GDR for definitions	
		>30	Hard										

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

ANGLE BORING LOG

DMJM+HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B71-8

BORING STATION: 1168+58.66	OFFSET: 87.98
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 150.67	NORTH: 219390.738
DATUM : NYCT	EAST: 995690.382
FINAL BORING DEPTH (FT) 229.4	

SAMPLER: NA	BORING CO: Warren George, Inc.
SAMPLER HAMMER: NA	FOREMAN: J. Harris
CASING SIZE: 3" to 35'	ENGINEER: G. Gutshteyn
CASING HAMMER: NA	DATE START: 10/02/2006 DATE END: 10/23/2006
ROCK CORE: NQ Wireline 30 degrees from horizontal	REVIEWED BY: C. Snee DATE: 03/06/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	3"																
	8																
	8																
	7	C1	35.5-41.5			6/6	100	87		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, acute to intermediate foliation, rough, closely to moderately closely spaced, acute to intermediate, fresh to slightly weathered foliation joint/fracture. 35.8'-36.0': Cross-foliation joint/fracture: Rough, intermediate, slightly weathered, slight iron-oxide staining.		ROCK					2
	6																2
40	7																0
	6																0
	6																0
	6																0
	6																0
	6																0
	6																
45	5.5	C2	41.5-49			7.5/7.5	100	97		Similar to SCHIST in C1. 46.3' and 49.0': Cross-foliation joints/fractures: Rough, planar, acute to intermediate, slightly weathered, with calcite and chlorite coating. 48.2': intermediate foliation fracture (possible slickensides).							2
	6																1
	6																1
	6																1
	4																1
50	4																1
	4																0
	4																0
	4																0
	4	C3	49-59			10/10	100	81		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin, convoluted, acute to intermediate foliation, rough, closely to moderately closely spaced, fresh to slightly weathered, some calcite, chloritic, acute to intermediate foliation joint/fracture. 49.1': Cross-foliation joint/fracture: Fracture zone: Rough, planar, intermediate 55.2'-55.5' and 57'-57.4': Smooth to rough, irregular, planar to stepped, moderately weathered, chlorite coated, very closely spaced.							0
55	4																0
	5																7
	4																0
	5																10
	5												4				10
60	5																2

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

4) 57.4-59.0: Lost 1.5' in initial run. Over drilled to retrieve core sample. Core damaged and does not represent bedrock conditions accurately.
5) Bottom of borehole at 229.4 feet. Borehole grouted upon completion.

ANGLE BORING LOG

Sheet: 3 of 8

DMJM HARRIS • ARUP — A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B71-8

BORING STATION: 1168+58.66	OFFSET: 87.98
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 150.67	NORTH: 219390.738
DATUM : NYCT	EAST: 995690.382
FINAL BORING DEPTH (FT) 229.4	

SAMPLER: NA	BORING CO: Warren George, Inc.
SAMPLER HAMMER: NA	FOREMAN: J. Harris
CASING SIZE: 3" to 35'	ENGINEER: G. Gutshteyn
CASING HAMMER: NA	DATE START: 10/02/2006 DATE END: 10/23/2006
ROCK CORE: NQ Wireline 30 degrees from horizontal	REVIEWED BY: C. Snee DATE: 03/06/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	5 5 5 6 5 6 6 6 6	C4	59-69			10/10	100	93		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, acute to intermediate foliation, rough, very closely to moderately closely spaced, slight iron-oxide staining, slightly chloritic, acute to intermediate foliation joints/fractures. 59.2', 63.0', 66.3'-66.5' and 67.6'-67.8': Cross-foliation joints/fractures: Rough, planar, slightly weathered, intermediate, slightly chloritic. 59.6', 61.3' and 67.6'-67.9': Cross-foliation joints/fractures: Rough, slightly weathered, slightly chloritic, acute, vuggy. 62.8-63.6 Thick band of quartzo-feldspathic SCHIST.						0 1 0 0 1 1 2 3 0
70	5 5 5 5 5 6 6 6	C5	69-79			10/10	100	90		Similar to SCHIST in C4. 72.1'-72.9': Cross-foliation joints/fractures: Rough, slightly weathered, slightly chloritic, obtuse. 74.4': Cross-foliation joints/fractures: Rough, slightly weathered, chlorite coated, acute.							1 1 0 3 1 2 1 1 5
80	5 5 5 5 5 5 5 5 5	C6	79-89			10/10	100	96		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, acute to intermediate foliation, rough, very closely to widely spaced, fresh, acute to intermediate foliation joints/fractures. 81.5-81.9: Cross-foliation joints/fractures: Smooth, slightly weathered, obtuse, with chlorite coating.							0 0 1 0 0 0 0 0 4
90	5																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								

4) 57.4-59.0: Lost 1.5' in initial run. Over drilled to retrieve core sample. Core damaged and does not represent bedrock conditions accurately.

Bottom of borehole at 229.4 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B71-8

BORING STATION: 1168+58.66	OFFSET: 87.98
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 150.67	NORTH: 219390.738
DATUM : NYCT	EAST: 995690.382
FINAL BORING DEPTH (FT) 229.4	

SAMPLER: NA	BORING CO: Warren George, Inc.
SAMPLER HAMMER: NA	FOREMAN: J. Harris
CASING SIZE: 3" to 35'	ENGINEER: G. Gutshteyn
CASING HAMMER: NA	DATE START: 10/02/2006 DATE END: 10/23/2006
ROCK CORE: NQ Wireline 30 degrees from horizontal	REVIEWED BY: C. Snee DATE: 03/06/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
95	5 5 5 5 5 5 5 5 5 5	C7	89-99			10/10	100	93		Similar to SCHIST in C6. 92.5'-92.9': Cross-foliation joints/fractures: Rough, fresh to slightly weathered, obtuse, with slight calcite coating. 92.5', 93.0', 98.0' and 98.3': Cross-foliation joints/fractures: Rough, irregular, acute to intermediate, with slight calcite coating. Occasional quartz band .05'-.3' thick.							0 1 2 2 1 2 1 1 1
100	4 4 4 4 4 4 4 4 4 4	C8	99-109			10/10	100	97		Similar to SCHIST in C6. 107.8': Cross-foliation joints/fractures: Rough, planar, acute. 99.1'-99.3': Thin band of quartz-mica-amphibole SCHIST. Occasional quartz band .05'-.2' thick.							0 2 0 2
105																	0 0 1 0
110	5 5 4 5 5 5 5 5 4 4	C9	109-119.1			10.1/10.1	100	100		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, acute to intermediate foliation, rough, closely to widely spaced, fresh, acute foliation joints/fractures.							0 0 0 0 0 0 0 0 2 0 0
115																	
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	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								

4) 57.4-59.0: Lost 1.5' in initial run. Over drilled to retrieve core sample. Core damaged and does not represent bedrock conditions accurately.
5) Bottom of borehole at 229.4 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B71-8

BORING STATION: 1168+58.66	OFFSET: 87.98
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 150.67	NORTH: 219390.738
DATUM : NYCT	EAST: 995690.382
FINAL BORING DEPTH (FT) 229.4	

SAMPLER: NA
SAMPLER HAMMER: NA
CASING SIZE: 3" to 35'
CASING HAMMER: NA
ROCK CORE: NQ Wireline 30 degrees from horizontal

BORING CO: Warren George, Inc.
FOREMAN: J. Harris
ENGINEER: G. Gutshteyn
DATE START: 10/02/2006 DATE END: 10/23/2006
REVIEWED BY: C. Snee DATE: 03/06/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
125	4 5 7 7 5 5 5 5 5	C10	119.1-129.2			10.1/10.1	100	100		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, slightly crenulated, intermediate foliation, rough, closely to widely spaced, fresh, intermediate foliation joints/fractures. 122.3'-124.3': Thick band of quartzo-feldspathic SCHIST. 125.2'-125.9': Thin band of quartz-mica-amphibole SCHIST. 125.3' and 126.1': Cross-foliation joints/fractures: Rough, planar, intermediate to obtuse, slickensided.							0 0 0 0 0 2 0 1 0 0
130	5 5 5 6 6	C11	129.2-139.2			10/10	100	96		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, acute to intermediate foliation, rough to slightly smooth, fresh to slightly weathered, closely to widely spaced, acute to intermediate foliation joints/fractures. 130.7'-132', 134'-134.8' and 135.4'-135.6': Thin bands of Amphibole rich SCHIST. 131.2'-131.35': Cross-foliation joints/fractures: Rough, slightly weathered, acute.							0 2 0 0 0 0 0 1 1 0
135	5 6 6 6 6																
140	5 5 5 5 6	C12	139.2-149.2			10/10	100	42		139.2'-142.5' and 148.9'-149.2': Similar to SCHIST in C11. 142.5'-148.9': Medium hard to very soft, moderately to severely weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, acute to intermediate foliation, smooth to rough, kaolinite and chlorite coated, very closely to closely spaced, severely weathered, acute to intermediate foliation joints/fractures (frequent cross foliation fractures in severely weathered zones).							0 1 1 10+ 10+ 10+ 10+ 5 10+ 10+ 2
145	6 6 5 6 6																
150	5																

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

4) 57.4-59.0: Lost 1.5' in initial run. Over drilled to retrieve core sample. Core damaged and does not represent bedrock conditions accurately.
Bottom of borehole at 229.4 feet. Borehole grouted upon completion.

ANGLE BORING LOG

Sheet: 6 of 8

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B71-8

BORING STATION: 1168+58.66	OFFSET: 87.98
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 150.67	NORTH: 219390.738
DATUM : NYCT	EAST: 995690.382
FINAL BORING DEPTH (FT) 229.4	

SAMPLER: NA	BORING CO: Warren George, Inc.
SAMPLER HAMMER: NA	FOREMAN: J. Harris
CASING SIZE: 3" to 35'	ENGINEER: G. Gutshteyn
CASING HAMMER: NA	DATE START: 10/02/2006 DATE END: 10/23/2006
ROCK CORE: NQ Wireline 30 degrees from horizontal	REVIEWED BY: C. Snee DATE: 03/06/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 OF FRACTURES PER FOOT: NUMBER
155	5	C13	149.2-159.2			10/10	100	87		Very hard to hard, fresh to slightly weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, slightly convoluted, slightly crenulated, acute to intermediate foliation, smooth to rough, very closely to widely spaced, slightly weathered, acute to intermediate foliation joints/fractures. 149.9', 150.2', 150.7', 155.9', 156.4', 157.2' and 157.85': Cross-foliation joints/fractures: Rough to smooth, fresh to slightly weathered, planar to irregular, acute to obtuse, with kaolinite coating at 149.9', 150.2' and 150.7'. FAULT ZONE							10+
	5																0
	5																0
	6																0
	6																0
	5																1
	6																1
	7																2
	6																1
160	14	C14	159.2-169.2			10/10	100	100		Very hard, fresh, fine to coarse grained, light gray quartzo-feldspathic-garnet-mica SCHIST (pegmatitic), with occasional thin, convoluted, crenulated, acute to intermediate foliation, rough, closely to widely spaced, fresh, acute to intermediate foliation joint/fractures. 165.8'-168.1': Cross-foliation joints/fractures: Frequent, healed, obtuse. 163.6'-165.4': Thick vein of coarse grained, light orange and white quartzo-feldspathic pegmatite.							0
	21																0
	24																0
	52																0
	59																2
165	70																
	11																0
	12																0
	10																0
	11																0
170	14	C15	169.2-179.2			10/10	100	97		169.2'-175.4': Similar to quartzo-feldspathic SCHIST in C14. 175.4'-179.2': Very hard, fresh, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, acute to intermediate foliation, rough, closely to moderately closely spaced, fresh, acute to intermediate foliation joints/fractures. 178.7': Cross-foliation joint/fracture: Rough, planar, acute.							0
	19																1
	57																0
	66																1
	60																1
175	47																0
	44																1
	22																1
	14																0
	12																1
180	11																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								

4) 57.4-59.0: Lost 1.5' in initial run. Over drilled to retrieve core sample. Core damaged and does not represent bedrock conditions accurately.
5) Bottom of borehole at 229.4 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B71-8

BORING STATION: 1168+58.66	OFFSET: 87.98
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 150.67	NORTH: 219390.738
DATUM : NYCT	EAST: 995690.382
FINAL BORING DEPTH (FT) 229.4	

SAMPLER: NA
SAMPLER HAMMER: NA
CASING SIZE: 3" to 35'
CASING HAMMER: NA
ROCK CORE: NQ Wireline 30 degrees from horizontal

BORING CO: Warren George, Inc.
FOREMAN: J. Harris
ENGINEER: G. Gutshteyn
DATE START: 10/02/2006 DATE END: 10/23/2006
REVIEWED BY: C. Snee DATE: 03/06/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	10									Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, intermediate foliation, (pinch and swell features throughout, very distorted foliation). 180.1', 183.4' and 188.7': Cross-foliation joints/fractures: Rough, planar, acute. 184.2' and 184.5': Cross-foliation joints/fractures: Rough, irregular, obtuse.							0
	12																0
	12																0
	11																1
	12	C16	179.2-189.3			10.1/10.1	100	96									3
185	12																0
	10																0
	12																0
	12																0
	12																1
190	18																0
	21																0
	16									Very hard, fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, intermediate foliation, rough, widely spaced, fresh, intermediate foliation joints/fractures. 194.3' and 199.0': Cross-foliation joints/fractures: Rough, planar, intermediate.							0
	13																0
	12																0
	14	C17	189.3-199.4			10.1/10.1	100	100									1
195	14																0
	14																0
	12																0
	14																1
200	18																0
	24																0
	16									Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, intermediate to obtuse foliation, rough, closely to moderately closely spaced, fresh, intermediate foliation joints/fractures. 206.0' and 206.6': Cross-foliation joints/fractures: Rough, planar, slightly weathered, acute to intermediate, with slight chlorite coating.							0
	18																0
	14																0
	16	C18	199.4-209.4			10/10	100	100									0
205	34																1
	14																1
	12																0
	12																0
210	14																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										

4) 57.4-59.0: Lost 1.5' in initial run. Over drilled to retrieve core sample. Core damaged and does not represent bedrock conditions accurately.
Bottom of borehole at 229.4 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B71-8

BORING STATION: 1168+58.66	OFFSET: 87.98
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 150.67	NORTH: 219390.738
DATUM : NYCT	EAST: 995690.382
FINAL BORING DEPTH (FT) 229.4	

SAMPLER: NA
SAMPLER HAMMER: NA
CASING SIZE: 3" to 35'
CASING HAMMER: NA
ROCK CORE: NQ Wireline 30 degrees from horizontal

BORING CO: Warren George, Inc.
FOREMAN: J. Harris
ENGINEER: G. Gutshteyn
DATE START: 10/02/2006 DATE END: 10/23/2006
REVIEWED BY: C. Snee DATE: 03/06/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	18																0
	27																1
	31																0
	34																0
	22	C19	209.4-219.4			10/10	100	100		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, severely convoluted, crenulated, acute to intermediate foliation. 221.5': Cross-foliation joints/fractures: Rough, irregular, fresh, acute.							0
215	27																0
	30																0
	31																0
	36																1
	24																1
220	41																0
	19																0
	16																
	14																
	14	C20	219.4-229.4			10/10	100	100		Very hard, fresh, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, acute to obtuse foliation, rough, moderately closely to widely spaced, fresh, acute to intermediate foliation joints/fractures. 220' and 223.9': Cross-foliation joints/fractures: Rough, planar, to slightly weathered, acute to acute, with slight chlorite coating.							0
225	18																0
	22																0
	18																0
	20												5				0
230										Bottom of the borehole at 229.4 feet							
235																	
240																	

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

4) 57.4-59.0: Lost 1.5' in initial run. Over drilled to retrieve core sample. Core damaged and does not represent bedrock conditions accurately.
5) Bottom of borehole at 229.4 feet. Borehole grouted upon completion.

BORING LOG

Sheet: 1 of 3

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-5

BORING STATION: 1169+31.45	OFFSET: 44.55
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 147.84	NORTH: 219367.5154
DATUM : NYCT	EAST: 995868.6411
FINAL BORING DEPTH (FT) 90.2	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc
SAMPLER HAMMER: 140 lb: Automatic	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: S. Mendes / R. Nunez
CASING HAMMER: SPUN	DATE START: 8/30/04 DATE END: 8/31/04
ROCK CORE: NQ Wireline	REVIEWED BY: C. Snee DATE: 9/21/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	3"			-						PAVEMENT THICKNESS: Not recorded		FILL	2 3 4				
		S1	2-4	5 8 10 15	27	24/15			0	Medium dense, brown to dark gray, slightly micaceous, fine to Medium SAND, some Rock Fragments, little Silt (SM / 6-65)		DEC ROCK					
5	4	C1	5-10			5/4.5	90	80		Hard to very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, very thin, crenulated, horizontal to sub-horizontal foliation, rough to smooth, very closely to moderately closely spaced, horizontal to sub-horizontal, slightly weathered, iron-oxide stained foliation joints/fractures.		ROCK					2
	4																1
	3																2
	3.5																1
	4																0
10	2.5	C2	10-18.2			8.2/8.2	100	94		5.8'-6.2': Very hard, fresh, fine to coarse grained, white-light gray, PEGMATITE, no apparent foliation joints/fractures.							1
	2.5																0
	2.5																2
	2.5																0
	3									C2: Similar to Schist in C1, except very thin Pegmatite zone.							0
15	3									16.5'-16.8': Cross-foliation joint/fracture, rough, uneven, widely spaced, sub-vertical, slightly weathered.							0
	2.5																3
	2																0
	2.5	C3	18.2-28.2			10/10	100	91		Similar to Schist in C1, except very thin quartz zones.							0
20	2																2
	2																0
	2																0
	2																1
	2																0
25	2									24.3'-24.7': Conjugate, cross-foliation joints/fractures, rough to smooth, sub-vertical, slightly weathered, iron-oxide stained, clay coated.							5
	2.5																0
	3																0
	4.5																0
	2.5																0
30	2.5																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.
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) Hand augered to a depth of 2 feet prior to start of boring.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-5

BORING STATION: 1169+31.45	OFFSET: 44.55
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 147.84	NORTH: 219367.5154
DATUM : NYCT	EAST: 995868.6411
FINAL BORING DEPTH (FT) 90.2	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: S. Mendes / R. Nunez
CASING HAMMER: SPUN	DATE START: 8/30/04 DATE END: 8/31/04
ROCK CORE: NQ Wireline	REVIEWED BY: C. Snee DATE: 9/21/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME

DEPTH (FT)	CASING (BPF) OR CORING (MIN/FT)	SAMPLE / CORE NO.	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PENREC: 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
35	2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5	C4	28.2-38.1			9.9/9.9	100	100		Very hard, fresh, fine to coarse grained, light to dark gray-dark green, quartz-mica-garnet SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, rough to smooth, widely spaced, horizontal to sub-horizontal, slightly weathered, iron-oxide stained, chloritized foliation joints/fractures; pyrite; occasional very thin to thin amphibole Schist zones. 29.5'and 34.2': Cross-foliation joints/fractures, rough to smooth, widely spaced, moderately dipping, slightly weathered, chloritized.			
40	2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5	C5	38.1-46.3			8.2/8.2	100	92		Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, slightly convoluted, horizontal to moderately dipping foliation, rough to smooth, moderately to widely spaced, horizontal to sub-horizontal, slightly weathered foliation joints/fractures. 40.1', 40.4' and 40.6': Cross-foliation joints/fractures, rough to smooth, irregular, very closely spaced, moderately dipping, slightly weathered, calcite, mineralized; pyrite. 41.8': Foliation joint/fracture, slickensided.			
45	3												
	2.5 2.5 2	C6	46.3-49.4			3.1/3.1	100	100		C6: Similar to Schist in C5, except no apparent foliation joints/fractures. C7: Similar to Schist in C5, except no apparent foliation joints/fractures; occasional very thin Pegmatite zones.			5
50	2.5 2.5	C7	49.4-50.9			1.5/1.5	100	-		50.4'-50.9': Fracture zone, quartz-mica-garnet Schist, with highly convoluted foliation, rough to smooth, very closely spaced, moderately dipping, slightly weathered, serecitized cross-foliation joints/fractures.			5
55	3 2.5 3 3 3.5 3.5 4 3.5	C8	50.9-59.3			8.4/8.4	100	90		C8: Similar to Schist in C5, except very closely to widely spaced; high muscovite mica content; occasional very thin quartz veins; occasional very thin quartzo-feldspathic zones. 52.4'-53.1': Very hard, fresh, fine grained, light gray GRANOFELS. 50.9'-60.7': Fracture zone, rough to smooth, very closely spaced, horizontal to sub-horizontal, slightly to moderately weathered foliation/cross-foliation joints/fractures.			5
60	4												

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)	NUMBER
			0
			0
			0
			0
			1
			0
			1
			1
			0
			0
			4
			0
			1
			0
			0
			0
			0
			0
			4
			7
			0
			0
			0
			0
			0
			1
			2
			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	
(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

5) Core barrel became blocked; core bit changed at a depth of 46.3'.
6) Bottom of borehole at 90.2'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-5

BORING STATION: 1169+31.45	OFFSET: 44.55
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 147.84	NORTH: 219367.5154
DATUM : NYCT	EAST: 995868.6411
FINAL BORING DEPTH (FT) 90.2	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb. Automatic
CASING SIZE: 3"
CASING HAMMER: SPUN
ROCK CORE: NQ Wireline

BORING CO: Jersey Boring and Drilling Co., Inc
FOREMAN: P. Lynch
ENGINEER: S. Mendes / R. Nunez
DATE START: 8/30/04 DATE END: 8/31/04
REVIEWED BY: C. Snee DATE: 9/21/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	4	C9	59.3-67.1			9.8/9.8	100	100		Similar to Schist in C5, except no apparent foliation joints/fractures; high quartz content.							0
	4.5																1
	4									62': Cross-foliation joint/fracture, rough to smooth, widely spaced, moderately dipping, slightly weathered.							0
	4.5																0
	4.5																0
	5																0
	5.5																0
70	5.5	C10	67.1-78.9			9.8/9.8	100	96		Hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, horizontal to sub-horizontal foliation, closely to widely spaced foliation joints/fractures.							0
	8																2
	5																0
	5																0
	5									67.4'-67.7': Very hard, quartzo-feldspathic zone.							0
	5									68.5'-69.9': Clay GOUGE, highly weathered zone, soil like material.							0
	5																0
75	5									76.6'-76.8': Cross-foliation joints/factures, rough, undulating, moderately dipping, mineralized with calcite, iron-oxide stained and pyrite.							0
	4																1
	4.5																0
	4.5																0
	4																0
80	5	C11	78.9-83.9			5/5	100	100		Hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, horizontal to moderated dipping foliation, widely spaced foliation joints/fractures.							0
	4.5																0
	4																0
	4.5																0
	4.5																0
85	4.5																1
	5									Similar to Schist in C11.							0
	5	C12	83.9-90.2			6.3/6.3	100	100		84.9': Cross-foliation joint.							0
	5																0
	5																0
90	5									Bottom of borehole at 90.2 feet			6				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	
(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

5) Core barrel became blocked; core bit changed at a depth of 46.3'.
6) Bottom of borehole at 90.2'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-6

BORING STATION: 1168+61.29	OFFSET: -137.02
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 151.11	NORTH: 219394.1462
DATUM : NYCT	EAST: 995675.8208
FINAL BORING DEPTH (FT) 92.9	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 2"	ENGINEER: R. Nunez
CASING HAMMER: SPUN	DATE START: 09/01/04 DATE END: 09/02/04
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 9/4/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 Hand augered to a depth of 6 feet prior to boring.		FILL	2 3				
5		S1	6-8	1 1 1 1	2	24/18				Very loose, brown, fine SAND and SILT, trace Clayey Silt layers, trace Mica (SM / 8-65)		SILTY SAND					
		S2	8-10	2 4 8 12	12	24/17				Medium dense, brown, fine to coarse SAND trace Silt, trace Gravel, trace Mica (SP-SM 7-65)		CLEAN SAND					
10		S3	10-12	5 6 6 5	12	24/17				Medium dense, gray-brown, fine to medium SAND and SILT, trace Gravel, trace Clay, trace Mica (SM / 7-65)		SAND/ GRAVEL/ SILT					
15		S4	15-17	5 9 9 7	18	24/18				Medium dense, gray, fine to medium SAND, some Silt, trace Clay pockets (SM / 7-65)		DEC ROCK					
20	3									20'-21': Hard, moderately to slightly weathered, poorly sub-horizontal foliated, quartz-mica-amphibole SCHIST, with sub-horizontal, smooth, planar foliation joints/fractures.		ROCK					10
	3.5									21'-21.5': Moderately to weathered, micaceous SCHIST, and quartz-mica-amphibole SCHIST contact zone.							5
	3																0
	3.5	C1	20-28			8/4.5	56	34		21'-28': Hard, moderately to slightly weathered, quartz-mica-garnet SCHIST, with sub-horizontal to moderately dipping foliation, rough, undulating, closely to moderately closely spaced, sub-horizontal to moderately dipping foliation joints/fractures; smooth, planar, widely spaced, moderately dipping to sub-vertical cross-foliation joints/fractures.							1
25	3.5																1
	3.5																0
	4																0
	3.5																0
	3.5									37': Cross-foliation joints/fractures: moderately dipping, slightly to moderately weathered, clay-coated; possibly healed.							0
30	3.5																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:
1) Ground water level not recorded.
2) Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.
Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv).

BORING LOG

Sheet: 2 of 4

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-6

BORING STATION: 1168+61.29	OFFSET: -137.02
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 151.11	NORTH: 219394.1462
DATUM : NYCT	EAST: 995675.8208
FINAL BORING DEPTH (FT) 92.9	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 2"	ENGINEER: R. Nunez
CASING HAMMER: SPUN	DATE START: 09/01/04 DATE END: 09/02/04
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 9/4/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	4	C2	28-37.2			9.2/9.2	100	75		Hard, fresh to slightly weathered, medium to coarse grained, gray, quartz-mica-garnet SCHIST, sub-horizontall foliation, weathered joints. 29'-30.0': Quartzo-feldspathic zone.							0
	4.5																0
	4.5																0
	4.5																1
	4.5																3
	3.5																8
	3																4
40	3	C3	37.2-47.2			10/10	100	89		Hard to very hard, fresh to slightly weathered to fresh, fine to coarse grained, quartz-mica-garnet SCHIST, moderately dipping foliation, smooth, closely widely spaced, slightly weathered joints/fractures. 38.1': Moderately weathered foliation joint/fracture, rough, undulating.							4
	4																2
	3																0
	3																2
	3																0
	3.5																0
45	3																2
	3																0
	3																0
	2	C4	47.2-52.2			5/5	100	100		Hard, fresh, fine grained, gray, quartz-mica-garnet SCHIST, moderately dipping foliation, closely spaced, no apparent joints/fractures.							0
	2																0
50	2																0
	2																0
	2																0
	2																0
	3									Hard, fresh, fine to coarse grained, quartz-garnet-mica SCHIST, sub-horizontal to moderately dipping, very widely spaced, rough, moderately dipping foliation joints/fractures.							1
55	3																0
	3																0
	3																0
	3	C5	52.2-62.4			10.4/10.4	100	100		61.2'-61.7': Hard, light gray, fresh, quartzo-felspathic zone, with faint, relic foliation.							0
	2																0
60	3																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	
(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

4) Lost water return 37.2'.
5) RQD affected by sub-vertical joint/fracture between 81'-81.7'.
6) Bottom of borehole at 92.9'; 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. B72-6

BORING STATION: 1168+61.29	OFFSET: -137.02
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 151.11	NORTH: 219394.1462
DATUM : NYCT	EAST: 995675.8208
FINAL BORING DEPTH (FT) 92.9	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 2"	ENGINEER: R. Nunez
CASING HAMMER: SPUN	DATE START: 09/01/04 DATE END: 09/02/04
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 9/4/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	3.5																1
	3.5																1
													4				0
	3.5																0
65	4									Similar to Schist in C5 except, gray, mica Schist, sub-vertical foliation, closely to widely spaced, slightly weathered joints/fractures.							0
	3.5																0
	3.5	C6	62.4-72.3			9.9/9.9	98	98		63.2': High quartz content.							2
	3.5																0
	3.5																1
70	3.5																0
	3.5																0
	3.5																0
	3.5																0
	3.5																0
	3.5																0
75	3.5									Similar to Schist in C6.							1
	3.5																0
	3.5	C7	72.3-82.3			10/10	100	92		81'-81.7': Cross-foliation joint/fracture: rough, undulating, sub-vertical, slightly clay-coated, chloritized, serecitized.							0
	3.5																0
	3.5																0
80	3.5																0
	4												5				6
	3.5																1
	4									Hard, fresh, fine to coarse grained, gray, mica-SCHIST, horizontal to moderately dipping foliation, closely to widely spaced foliation joints/fractures.							0
85	4																1
	4																0
	3.5																0
	4	C8	82.3-92.9			10.6/10.6	100	98		90'-90.3': High quartz content.							1
	4																1
90	4																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

4) Lost water return 37.2'.
5) RQD affected by sub-vertical joint/fracture between 81'-81.7'.
6) Bottom of borehole at 92.9'; 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. B72-6

BORING STATION: 1168+61.29	OFFSET: -137.02
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 151.11	NORTH: 219394.1462
DATUM : NYCT	EAST: 995675.8208
FINAL BORING DEPTH (FT) 92.9	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 2"	ENGINEER: R. Nunez
CASING HAMMER: SPUN	DATE START: 09/01/04 DATE END: 09/02/04
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 9/4/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	4																0
	4									Bottom of borehole at 92.9 feet			6				1
95																	
100																	
105																	
110																	
115																	
120																	

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

4) Lost water return 37.2'.
5) RQD affected by sub-vertical joint/fracture between 81'-81.7'.
6) Bottom of borehole at 92.9'; borehole left open for ATV to be performed at a future date.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL.	NORTH:
DATUM	EAST:
FINAL BORING DEPTH (FT) 107.0	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb (Automatic)
CASING SIZE: 3"
CASING HAMMER: N/A
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Corp.
FOREMAN: Peter Lynch
ENGINEER: Sara Rocha
DATE START: 05/17/05 DATE END: 05/18/05
REVIEWED BY: C. Snee DATE: 11/14/05

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
5/19/05	11:05	14.3'	7'	21 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
0	SPUN									PAVEMENT THICKNESS: 4" Concrete, 4" Gravel		FILL	1				
													2				
													3				
		S1	3.0-3.1	50/2"	50/2"	2/2			-	Very dense, brown slightly micaceous, fine to coarse SAND, little Silt, trace Rock Fragments (SM / 7-65)		DEC ROCK					
5												ROCK	4				
	3									Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, sub-horizontal to moderately dipping foliation, rough to smooth, with moderately closely spaced, sub-horizontal to moderately dipping, slightly weathered, iron-oxide stained, clay coated foliation joints/fractures. 10.6 - 11.0 Cross-foliation joint/fracture, rough to smooth, sub-vertical, slightly weathered, talcified, kaolinized joint/fractures.							2
	3																0
	3																1
10	3	C1	7.0-11.8			4.8/4.8	100	88	-								3
	3																1
	3																1
	3																1
	3									C2: Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, sub-horizontal foliation, rough to smooth, with moderately closely to widely spaced, sub-horizontal, slightly weathered, slightly iron-oxide stained foliation joints/fractures.							0
15	3																2
	2.5																0
	2.5	C2	11.8-21.8			10.0/10.0	100	95	-								0
	2.5																4
	2.5									13.6'; 15.0';18.5'-19.1': Cross-foliation joints/fractures, rough, irregular, moderately closely to widely spaced, moderately dipping to sub-vertical, slightly weathered.							3
20	3																0
	3																0
	3									Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, sub-horizontal to moderately dipping foliation, rough to smooth, with widely spaced, sub-horizontal to moderately dipping, slightly weathered foliation joints/fractures; occasional very thin quartz veins.							0
	2.5																0
	2.5																0
25	2.5																1
	2.5																0
	2.5	C3	21.8-31.5			9.7/9.7	100	100	-	31.4': Cross-foliation joint/fracture, rough, widely spaced, moderately dipping, slightly weathered. 30.5' - 31.5': Healed cross-foliation joints/fractures.							0
	2.5																0
	2.5																0
30	2.5																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	6	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).
4) Observed drilling fluid loss throughout borehole.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL.	NORTH:
DATUM	EAST:
FINAL BORING DEPTH (FT) 107.0	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb (Automatic)
CASING SIZE: 3"
CASING HAMMER: N/A
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Corp.
FOREMAN: Peter Lynch
ENGINEER: Sara Rocha
DATE START: 05/17/05 DATE END: 05/18/05
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
35	2.5	C4	31.5-37.8			6.3/6.3	100	100	-	Similar to Schist in C3 except with highly crenulated, horizontal to moderately dipping foliation. 36.4': Cross-foliation joint/fracture, sub-vertical, quartz healed joints/fractures.							1
	2.5																0
	2.5																0
	2.5																0
	2.5																0
	2.5																0
	2.5																1
	2.5																0
40	2.5	C5	37.8-47.6			9.8/9.8	100	94	-	Similar to Schist in C3 except with very closely to widely spaced, chlorite stained foliation joints/fractures, high mica content. 38.8' - 41.0': Light gray, poorly foliated. 46.8'; 47.1' - 47.4': Cross-foliation joints/fractures, rough to smooth, closely spaced, moderately dipping to sub-vertical, slightly weathered, chloritized, weakly healed, partially calcite coated.							2
	2.5																0
	2.5																2
	2.5																0
	2.5																0
45	2.5																0
	2.5																1
	2.5																2
	2.5																0
50	2.5																0
	2.5																2
	2.5																0
	2	C6	47.6-57.1			9.5/9.5	100	99	-	Similar to Schist in C3 except with very closely to widely spaced foliation joints/fractures; occasional thin granofels zones; pyrite; occasional very thin quartz veins. 47.7': Cross-foliation joint/fracture, rough, irregular, moderately dipping, slightly weathered, chloritized, pyrite.							0
	2																0
55	2												5				0
	2.5																0
	2.5																0
	2																0
	2																0
60	2.5																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								

5) No water return- slight water return at approximately 56'.
6) Core barrel blocked and jammed.
7) Bottom of borehole at 107.0'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL.	NORTH:
DATUM	EAST:
FINAL BORING DEPTH (FT) 107.0	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb (Automatic)
CASING SIZE: 3"
CASING HAMMER: N/A
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Corp.
FOREMAN: Peter Lynch
ENGINEER: Sara Rocha
DATE START: 05/17/05 DATE END: 05/18/05
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	C7	57.1-67.3			10.2/10.2	100	100	-	C7:Similar to Schist in C3.							0
	3									65.7' - 66.5': Very hard, fresh, fine to coarse grained, dark green-black, mica-amphibole SCHIST, with very thin, horizontal to sub-horizontal foliation, rough, horizontal, slightly weathered foliation joints/fractures; high garnet content; occasional very thin quartz veins.							0
	2.5																0
	2.5																0
	2.5																0
	3																1
	2.5																0
70	3	C8	67.3-77.5			10.2/10.2	100	100	-	Similar to Schist in C3 except with moderately closely to widely spaced foliation joints/fractures; occasional very thin quartz veins; occasional very thin phlogopyte (amphibole) zones; high garnet content; mica content; occasional feldspathic zones.							0
	2.5																0
	3																1
	3									70.5'; 71.2'; 72.5'; 77.0': Cross-foliation joints/fracture, rough to smooth, closely to widely spaced, moderately dipping to sub-vertical, slightly weathered, chloritized to mineralized.							1
	3																1
	3																0
75	3																1
	2.5																0
	2.5																2
	3									Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, horizontal to sub-vertical foliation, rough to smooth, with closely to widely spaced, sub-horizontal to sub-vertical, slightly weathered, chloritized, talcified foliation joints/fractures; occasional thin quartzo-feldspathic zones; occasional very thin amphibole schist zone.							0
	2.5																0
80	3																2
	3																0
	3	C9	77.5-85.9			8.4/8.4	100	95	-	82.5' - 84.0': High quartz content.							2
	2.5									85.0' ; 85.7': Cross-foliation joints/fractures, rough to smooth, horizontal to moderately dipping, slightly weathered.							1
	2.5																0
85	3																1
	4																4
	5	C10	85.9-87.7			1.8/1.8	100	78	-	Similar to Schist in C3 except with very closely to moderately closely spaced, chloritized, talcified foliation joints/fractures.			6				2
	4									86.5' - 86.8': Healed joints/fractures.							3
	3												6				1
	3	C11	87.7-91.3			3.6/3.6	100	64	-	C11:Similar to Schist in C3 except with chloritized, talcified foliation joints/fractures, high mica content.							0
90																	

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									

5) No water return- slight water return at approximately 56'.
5) Core barrel blocked and jammed.
Bottom of borehole at 107.0'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS + ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-7

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL.	NORTH:
DATUM	EAST:
FINAL BORING DEPTH (FT) 107.0	

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	DATE START: 05/17/05 DATE END: 05/18/05
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
	4									89.0': Cross-foliation joint/fracture, rough to smooth, irregular, moderately dipping, slightly weathered, quartz coated.							
	3									90.0' - 92.0': Fracture zone, rough to smooth, sub-horizontal to vertical, slightly to moderately weathered, chloritized, talcified, silicate, clay coated/mylonite; slightly slickensided, garnet rich foliation cross-foliation joints/fractures (Few healed joints/fractures within zone).			6				
	3	C12	91.3-93.8			2.5/2.5	100	76	-								10
	2.5																8
95	2.5																2
	2.5																0
	3									C12: Similar to Schist in C?. 91.8' - 92.4': Healed sub-vertical joints/fractures.							0
	2.5																3
	3	C13	93.8-101.7			7.9/7.9	100	100	-	C13: Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, horizontal to moderately dipping foliation, no apparent foliation joints/fractures.							0
100	3									96.6' - 100.0': Cross-foliation joints/fractures, rough to smooth, irregular, slightly weathered, chloritized, slightly iron-oxide stained, slightly slickensided.							0
	3																1
	3									94.5'-95'; 96.6'-97.3'; 99'-99.5'; 101.4'-101.7': Healed sub-vertical to vertical joints/fractures.							0
	3																0
	3																0
	2.5																0
105	2.5	C14	101.7-107.0			5.3/5.3	100	100	-	C14: Similar to Schist in C13. 102.5' - 103.6': Very hard, fresh, coarse grained, light gray to white, quartzo-feldspathic-garnet SCHIST.			7				0
	2.5																0
	2.5									Bottom of borehole at 107.0 feet							
110																	
115																	
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	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								

5) No water return- slight water return at approximately 56'.
6) Core barrel blocked and jammed.
7) Bottom of borehole at 107.0'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-8

BORING STATION: 1169+33.05	OFFSET: 52.14
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 148.15	NORTH: 219381.443
DATUM : NYCT	EAST: 995844.376
FINAL BORING DEPTH (FT) 106.0	

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

BORING CO: Jersey Boring and Drilling Corp.
FOREMAN: Peter Lynch
ENGINEER: Sara Rocha
DATE START: 06/20/05 DATE END: 06/22/05
REVIEWED BY: C. Snee DATE: 11/14/05

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
06/22/05	9:45	10.8	5	19 Hrs 45 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
	4" Spun									PAVEMENT THICKNESS: 6" Concrete		FILL	1				
		S1	2-2	50/0"	50/0	-			-	NO RECOVERY		DEC ROCK	2 3				
5	2.5											ROCK					
	2	C1	5-10.1			5.1/5.1	100	68	-	Hard to very hard, fresh to slightly weathered, coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, horizontal to moderately dipping foliation, rough to smooth, with very close to closely spaced, horizontal to moderately dipping, slightly weathered, slight to heavy iron-oxide stained, clay coated, kaolinized foliation joints/fractures.							5
	2																6
	2																3
	2																4
	2																1
10	2																6
	2									Similar to Schist in C1. 12.7': Cross-foliation joint/fracture, truncated, sub-vertical, slightly weathered, serecitized, chloritized.							2
	2																2
	2	C2	10.1-16.4			6.3/6.3	100	60	-	12.6'-13.3': Cross-foliation joints/fractures, some healed, sub-parrallel, rough to smooth, sub-vertical, slightly weathered, iron-oxide stained, serecitized.							4
	2									14.6'-15.1': Cross-foliation joints/fracture, rough, vertical, slightly weathered, iron-oxide stained, mylonite, slightly pitted.							6
15	2									16.2'-16.6': Very hard, fresh, fine grained, green-black, amphibole-mica SCHIST; occasional very thin garnet concentration.			4				1
	2.5																6
	2																2
	2	C3	16.4-21.8			5.4/5.4	100	87	-	C3: 16.6'-21.8': Similar to Schist in C1, except with very closely to moderately closely spaced foliation joints/fractures; occasional very thin quartz veins; occasional very thin garnet concentrations.							1
20	2																2
	2																1
	2																0
	2.5									19.1'-19.7': Cross-foliation joints/fractures, rough, sub-vertical, slightly to moderately weathered, irregular, serecitized. 16.4'-16.6': Fracture zone, rough to smooth, sub-horizontal to vertical, slightly weathered, cross foliation joints/fractures.							-
	3																-
25	3																0
	2																0
	3	C4	21.8-31.7			9.9/9.9	100	100	-	C4: Simlar to Schist in C1, except slightly crenulated, moderately closely to widely spaced, slightly weathered foliation joints/fractures; occasional very thin quartz veins; occasional very thin amphibole Schist zones.							0
	3																2
	2																0
30	2																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	
(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.
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) Core barrel became blocked; possible very thin Silt/Clay vein.

DMJM HARRIS - ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-8

BORING STATION: 1169+33.05	OFFSET: 52.14
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 148.15	NORTH: 219381.443
DATUM: NYCT	EAST: 995844.376
FINAL BORING DEPTH (FT) 106.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 4"	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 06/20/05 DATE END: 06/22/05
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
35	2									27.8'-30.6': Cross-foliation joints/fractures, rough, moderately closely spaced, moderately dipping to sub-vertical, slightly weathered. 30.3'-30.6': Healed sub-vertical joint/fracture.							1
	2																0
	3	C5	31.7-40.9			9.2/9.2	100	100	-	C5: Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, slightly crenulated, horizontal to moderately dipping foliation, rough to smooth, with moderately closely to widely spaced, sub-horizontal, slightly weathered foliation joints/fractures, occasional very thin quartz veins; occasional very thin amphibole Schist zones; occasional very high garnet concentrations. 34.4'-34.9': Cross-foliation joint/fracture, rough, sub-vertical, slightly weathered, chloritized, epidote, clay coated.							1
	2																1
	3.5																1
	3																1
	3																0
40	4																0
	4																0
	5.5																1
	3.5									C6: Similar to Schist in C5, except very closely to moderately closely spaced, foliation joints/fractures.							0
	4.5																2
	3.5	C6	40.9-46.7			5.8/5.8	100	93	-								3
45	2.5																
	3																1
	5									C7: Similar to Schist in C5, except no apparent joints/fractures; occasional thin, very hard, granofels zones. 47.4': Cross-foliation joint/fracture, rough to smooth, irregular, slightly weathered, epidote, talcified, slightly slickensided.							3
	4																1
	4	C7	46.7-51.9			5.2/5.2	100	100	-								0
50	3.5												5				0
	4																0
	4																0
	3									Similar to Schist in C5, except very closely to moderately closely spaced, slightly to moderately weathered foliation joints/fractures; occasional very thin to thin quartz veins; high phlogopyte content. 52.8'-53.8': Very hard, fresh, fine grained, light to medium gray, GRANOFELS. 52.7'-52.8': Hard, moderately weathered, medium to coarse grained, quartz-mica-garnet SCHIST.							4
	4.5																1
	3.5																0
55	3																0
	5	C8	51.9-61.2			9.3/9.3	100	95	-								1
	4.5																0
	3																1
60	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								

5) Changed bit.
6) Bottom of borehole at 106.0'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

BORING NO. B72-8

BORING STATION: 1169+33.05	OFFSET: 52.14
PROJECT NO. CM1188	COORDINATES:
G. SURF EL: 148.15	NORTH: 219381.443
DATUM : NYCT	EAST: 995844.376
FINAL BORING DEPTH (FT) 106.0	

SECOND AVENUE SUBWAY PROJECT

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 4"	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 06/20/05 DATE END: 06/22/05
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																0
	2.5																0
	5	C9	61.2-71.3			10.1/10.1	100	100	-	Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, rough to smooth, with widely spaced, horizontal to sub-horizontal, slightly weathered, pyrite, chloritized foliation joints/fractures; occasional very thin quartz veins. 62.3'-63.0' and 68.1'-70.0': Very hard, fresh, coarse grained, light gray, PEGMATITE; high garnet content.							0
65	3																0
	5																0
	3																0
	3																1
	4																0
	8																0
	9																0
70	3																1
	7	C10	71.3-81.4			10.1/10.1	100	100	-	Similar to Schist in C9, except very thin to thin quartz veins; pyrite. 71.3'-71.8': Similar to Pegmatite in C9.							1
	4.5																0
	2.5																0
75	2.5																0
	2																0
	2.5																0
	2.5																0
	2.5																0
	2																1
80	2																0
	2																0
	2	C11	81.4-86.2			4.8/4.8	100	100	-	Similar to Schist in C9, except crenulated, slightly convoluted foliation. 85.9'-86.3': Healed vertical joint/fracture.							0
	2																0
	2																1
	2																1
85	2.5																0
	2.5																0
	2.5																0
	3																0
90	3.5																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								

5) Changed bit.
Bottom of borehole at 106.0'; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 4 of 4

DMJM HARRIS • ARUP — A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-8

BORING STATION: 1169+33.05	OFFSET: 52.14
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 148.15	NORTH: 219381.443
DATUM : NYCT	EAST: 995844.376
FINAL BORING DEPTH (FT) 106.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 4"	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 06/20/05 DATE END: 06/22/05
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	5.5	C12	86.2-96.3			10.1/10.1	100	100	-	Similar to Schist in C9, except slightly convoluted, crenulated, horizontal to moderately dipping foliation, with closely to widely spaced foliation joints/fractures, high quartz content; occasional very thin to thin quartz veins 89.7'-90.0' and 90.6'-91.4': Very hard, fresh, fine grained, light gray, GRANOFELS.						0
	5																0
	4.5																0
	4.5																2
	4																0
	4																0
	4	C13	96.3-106.0			9.7/9.7	100	99	-	Similar to Schist in C9, except slightly convoluted, crenulated, horizontal to moderately dipping foliation. 101.0' Cross-foliation joint/fracture, rough, moderately dipping, slightly weathered. 102.2' Cross-foliation joint/fracture, rough, uneven, slighly weathered, chloritized, calcified.						0
	5																0
100	5																0
	5.5																0
	7																1
	3.5																2
	3.5																1
	3																
105	3																
	3												6				0
110																	
115																	
120																	

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

5) Changed bit.
6) Bottom of borehole at 106.0'; acoustic televiewer survey performed; borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS + ARUP — A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B72-9

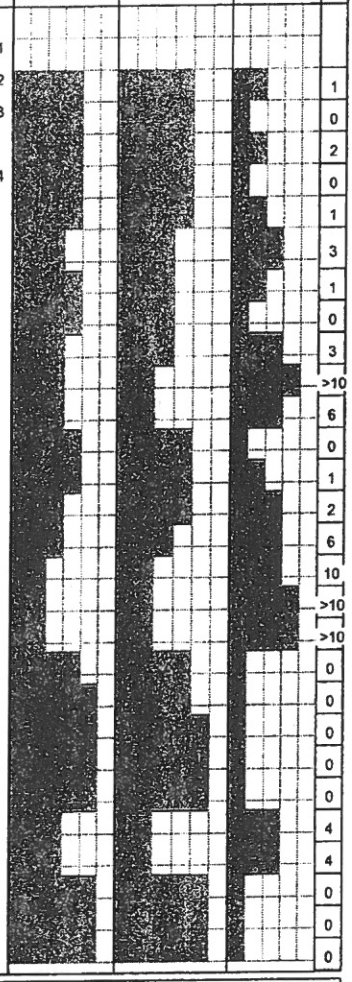
BORING STATION: 1171+00.87	OFFSET: 39.07
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 145.74	NORTH: 219536.687
DATUM : NYCT	EAST: 995915.231
FINAL BORING DEPTH (FT) 231.1	

SAMPLER: N/A	BORING CO: Warren George, Inc.
SAMPLER HAMMER: N/A	FOREMAN: J. Harris
CASING SIZE: 4"	ENGINEER: G. Gutshteyn
CASING HAMMER: N/A	DATE START: 10/25/06 DATE END: 11/10/06
ROCK CORE: NQ	REVIEWED BY: C.Snee DATE: 3/5/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
										PAVEMENT THICKNESS: 4" Concrete sidewalk Excavate test pit to 2 feet to clear utilities for angle boring. Exposed bedrock at that depth.			1				
	7											ROCK	2				1
	14									C1: 2'-8.3': Medium to medium hard, slightly to moderately weathered, fine to coarse grained, quartz-mica-garnet SCHIST, with very thin, obtuse foliation. Rough, very closely to moderately closely spaced, obtuse, slightly weathered, iron-oxide stained foliation joint/fracture.			3				0
5	16	C1	2-8.3			6.3/6.3	100	75									2
	14												4				0
	12									4.5': Cross foliation joint/fracture: Rough, very closely spaced, slightly weathered, acute, iron-oxide stained joint/fracture.							1
	24									7.0' and 7.6': Cross-foliation joints/fractures: Rough, obtuse.							3
	8									7.4': Cross-foliation joint/fracture: Rough, acute.							1
10	12																0
	11																3
	12									C2: Medium to medium hard, slightly to severely weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, intermediate to obtuse foliation, rough, closely to moderately closely spaced, intermediate to obtuse, slightly to moderately weathered iron-oxide stained foliation joints/fractures.							>10
	14	C2	8.3-17.3			9/8.8	98	50									6
	10																0
15	13									9.8'-10.8', 12.0'-13.2', 11.5', 15.2' and 15.7': Cross-foliation joints/fractures: Rough, moderately weathered, intermediate to obtuse, iron-oxide stained.							1
	12																2
	7																6
	6																10
	4																>10
20	6									C3: Medium to very hard, fresh to slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, intermediate to obtuse foliation, rough, closely to moderately closely spaced, slightly to moderately weathered, iron-oxide stained foliation joints/fractures.							>10
	7																0
	7	C3	17.3-27.3			10/8.8	88	53									0
	8									19.4' and 26.7': Cross-foliation joints/fractures: Rough, intermediate to obtuse, iron-oxide stained.							0
	8									19.8'-20.4': Cross-foliation joints/fractures: Moderately to severely weathered, very closely spaced, obtuse, iron-oxide stained.							0
25	5									22.6'-23.1': Cross-foliation joints/fractures: Healed, obtuse.							0
	5																4
	6																4
	7																0
	7																0
30	7																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	0-35	Acute	
4-10	Loose	2-4	Soft	2	Medium	2	Severe	(2) 1-2	2"-1'	Close/Thin	35-55	Intermediate	
10-30	Medium Dense	4-8	Med Stiff	3	Med Hard	3	Moderate	(3) 3-10	1'-3'	Mod Close/Mod Thick	55-90	Obtuse	
30-50	Dense	8-15	Stiff	4	Hard	4	Slight	(4) 11-20	3'-10'	Wide/Thick			
>50	Very Dense	15-30	Very Stiff	5	Very Hard	5	Fresh		>10'	Very Wide/Very Thick		See GDR for definitions	
		>30	Hard										

NOTES:

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

4) Core run time is not representative because coring started at a shallow depth without casing.

ANGLE BORING LOG

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B72-9

BORING STATION: 1171+00.87	OFFSET: 39.07
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 145.74	NORTH: 219536.687
DATUM : NYCT	EAST: 995915.231
FINAL BORING DEPTH (FT) 231.1	

SAMPLER: N/A	BORING CO: Warren George, Inc.	GROUND WATER READINGS	
SAMPLER HAMMER: N/A	FOREMAN: J. Harris	DATE / TIME / DEPTH / CASING / STAB. TIME	
CASING SIZE: 4"	ENGINEER: G. Gutshteyn		
CASING HAMMER: N/A	DATE START: 10/25/06 DATE END: 11/10/06		
ROCK CORE: NQ	REVIEWED BY: C.Snee DATE: 3/5/07		

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 ROD (%)	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
35	7 8 7 8 8 8 8	C4	27.3-37.3			10/10	100	100		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin, intermediate foliation. 27.9' and 28.8': Tightly healed, intermediate to obtuse fractures. 34.2-36.2': Foliation slightly crenulate and convoluted.							0 0 0 0 0 0 0 0
40	6 6 7 7 7 7 7	C5	37.3-47.3			10/10	100	93		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, intermediate to obtuse foliation, rough, closely to moderately closely spaced, fresh to slightly weathered, intermediate foliation joints/fractures. 38.2': Cross-foliation joint/fracture: Rough, slightly weathered, acute.							1 0 0 0 0 0 0
45	7 7 7																0 0
50	7 7 7 7 7 8 8	C6	47.3-57.3			10/10	100	87		Very hard, slightly weathered to fresh, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with thin to very thin, intermediate to obtuse foliation, rough to slightly smooth, closely to moderately closely spaced, intermediate to obtuse, iron-oxide stained, slightly chloritic foliation joints/fractures. 50.7'-51.3' and 56.8'-57.3': Fresh bands of dark greenish gray quartz-mica-amphibole SCHIST. 48.7', 51.7', 52.0', 53.2', 55.1', 56.8' and 57.0': Cross-foliation joints/fractures: Rough, very closely to moderately closely spaced, acute, iron-oxide stained.							1 0 1 0 0 2 2
55	7 8 8																1 1 0
60	6 6 7																3 1 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:
5) 95.7'-96.0': Very soft, severely weathered zone, slight clay buildup on outside of core.
6) No fractures, core came out in one piece.
7) Bottom of borehole at 231.1 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS • AKUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B72-9

BORING STATION: 1171+00.87	OFFSET: 39.07
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 145.74	NORTH: 219536.687
DATUM : NYCT	EAST: 995915.231
FINAL BORING DEPTH (FT) 231.1	

SAMPLER: N/A
SAMPLER HAMMER: N/A
CASING SIZE: 4"
CASING HAMMER: N/A
ROCK CORE: NQ

BORING CO: Warren George, Inc.
FOREMAN: J. Harris
ENGINEER: G. Gutshteyn
DATE START: 10/25/06 DATE END: 11/10/06
REVIEWED BY: C.Snee DATE: 3/5/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	7 7 7 8 7 8 8	C7	57.3-67.3			10/10	100	93		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin, slightly crenulated, acute foliation, rough, widely spaced, slightly weathered, acute foliation joints/fractures. 60.0' and 66.1': Cross-foliation joints/fractures: Rough, acute, iron-oxide stained. 60.5', 60.7', 62.5' and 63.3': Cross-foliation joints/fractures: Rough, slightly weathered, acute to intermediate. 66.3'-67.1': Cross-foliation joints/fractures: Rough, planar, obtuse, iron-oxide stained, chloritic.						2 0 2 0 0 1 1
70	6 7 7 7 8 7 8 8	C8	67.3-77.3			10/9.8	98	86		Very hard, fresh, fine to coarse grained, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, acute to intermediate foliation, rough, closely to widely spaced, slightly weathered, intermediate, iron-oxide stained, kaolinite on foliation joints/fractures. 68.7': Cross-foliation joint/fracture: intermediate. 69.0', 69.5' and 74.8': Cross-foliation joints/fractures: obtuse. 69.0'-69.7': Moderately to severely weathered zone, chloritic (1/8" to 1/16" thick). 77.1'-77.3': Zone of severely weathered rock. 0.05'-0.3' thick quartz bands.						0 4 3 0 0 0 0 1 2
75																	
80	5 4 4 4 5 5 5	C9	77.3-87.4			10.1/10.1	100	97		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, intermediate foliation, rough to smooth, closely to moderately closely spaced, slightly weathered, acute, iron-oxide stained foliation joints/fractures. 79.5': Cross-foliation joint/fracture: Smooth, slightly weathered, with 1/8" of kaolinite, obtuse. 84.2': Cross-foliation joint/fracture: Rough, slightly weathered, acute. 83.3'-84.0' and 86.5'-87.0': Healed, obtuse, chloritic.						0 0 1 2 2 0 0 1 0 0 1 0 0 1
85																	
90	5 4 4																

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS				JOINT/FRACTURE CHARACTERISTICS			
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS		WEATHERING		NO. PER FT	SPACING/THICKNESS		ANGLE ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	(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:
95.7'-96.0': Very soft, severely weathered zone, slight clay buildup on outside of core.
No fractures, core came out in one piece.
) Bottom of borehole at 231.1 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS - ARUP, A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B72-9

BORING STATION: 1171+00.87	OFFSET: 39.07
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 145.74	NORTH: 219536.687
DATUM : NYCT	EAST: 995915.231
FINAL BORING DEPTH (FT) 231.1	

SAMPLER: N/A	BORING CO: Warren George, Inc.
SAMPLER HAMMER: N/A	FOREMAN: J. Harris
CASING SIZE: 4"	ENGINEER: G. Gutshteyn
CASING HAMMER: N/A	DATE START: 10/25/06 DATE END: 11/10/06
ROCK CORE: NQ	REVIEWED BY: C.Snee DATE: 3/5/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
95	5 4 4 4 4 2 4	C10	87.4-97.4			10/9.6	96	86		Hard to very hard, slightly weathered to fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, intermediate to obtuse foliation, rough, moderately closely spaced, slightly weathered to fresh, intermediate to obtuse foliation joints/fractures. 87.5'-88.4' and 90.3'-91.2': Healed, obtuse joints. 93.2': Cross-foliation joint/fracture: Rough, fresh, acute. 94.9'-95.7': Cross-foliation joint/fracture: Smooth, moderately weathered, obtuse, kaolinite.			5				0 0 1 0 3 NA
100	3 3 4 4 4 4 3	C11	97.4-107.4			10/9.4	94	82		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, intermediate to obtuse foliation, smooth, widely spaced, slightly weathered, intermediate foliation joints/fractures. 97.4'-98.4': Medium hard to soft, severely weathered. 103.6': Cross-foliation joint/fracture: Rough, planar, obtuse.							0 5 0 0 0 0 0
105	3 4 3																0
110	4 4 4 5 4 5	C12	107.4-117.4			10/10	100	100		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, acute to intermediate foliation, rough, widely spaced, fresh, acute to intermediate foliation joints/fractures. 115.9' and 117.4': Cross-foliation joint/fracture: Rough, planar, acute to intermediate.							0 1 0 0 0 0 1
115	5 5 5 5																0
120	5 5 5																0 1 0 0 0 >10 >10

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) 95.7'-96.0': Very soft, severely weathered zone, slight clay buildup on outside of core.
6) No fractures, core came out in one piece.
7) Bottom of borehole at 231.1 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B72-9

BORING STATION: 1171+00.87	OFFSET: 39.07
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 145.74	NORTH: 219536.687
DATUM : NYCT	EAST: 995915.231
FINAL BORING DEPTH (FT) 231.1	

SAMPLER: N/A	BORING CO: Warren George, Inc.	
SAMPLER HAMMER: N/A	FOREMAN: J. Harris	
CASING SIZE: 4"	ENGINEER: G. Gutshteyn	
CASING HAMMER: N/A	DATE START: 10/25/06 DATE END: 11/10/06	
ROCK CORE: NQ	REVIEWED BY: C.Snee DATE: 3/5/07	

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
125	5	C13	117.4-127.4			10/10	100	87		C13: 117.4'-120.4': Hard to moderately hard, slightly to moderately weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, acute foliation, smooth, very closely to closely spaced, slightly to moderately weathered, acute to intermediate, chloritic foliation joints/fractures. 118.9'-119.9': Fracture zone: Medium hard, severely weathered, very closely spaced, smooth, irregular fractures, with sericite, chlorite, vugs, and slickensided. 119.0'-119.5': Brecciated. 119.9'-120.4': Tightly healed fractures, obtuse. 120.3, 120.4' and 121': Cross-foliation joints/fractures: Rough, fresh to slightly weathered, intermediate. 120.4'-127.4': Very hard, fresh, fine to coarse grained, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, acute to obtuse foliation, rough, widely spaced, fresh, intermediate foliation joints/fractures.							3
	5																0
	5																0
	5																1
	5																0
	6																0
	5																0
130	5	C14	127.4-137.4			10/10	100	97		C14: Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, slightly convoluted, crenulated, intermediate to obtuse foliation, rough to smooth, moderately closely to widely spaced, slightly weathered, intermediate to obtuse foliation joints/fractures, kaolinite. 133.4'-135.4': Isolated zone of hard, fresh, quartzo-feldspathic SCHIST. 131.2', 132.0' and 136.0': Cross-foliation joints/fractures: Rough, fresh, obtuse.							0
	5																0
	6																0
	5																1
	6																2
	6																1
135	6																0
	6																0
	6																0
	6																1
	6																1
	7																0
140	7																0
	8																1
	10	C15	137.4-147.5			10.1/10.1	100	100		C15: Very hard, fresh, fine to coarse grained, white to light gray, quartzo-feldspathic-garnet SCHIST, with occasional thin, intermediate foliation, rough to slightly smooth, moderately closely spaced, slightly weathered, intermediate, slightly chloritic foliation joints/fractures. 141.0' and 144.4': Cross-foliation joints/fractures: Rough, planar, intermediate.							1
	12																1
	12																0
145	14																0
	16																0
	15																0
	16																0
	22																0
150	18																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									

NOTES:
95.7'-96.0': Very soft, severely weathered zone, slight clay buildup on outside of core.
No fractures, core came out in one piece.
/) Bottom of borehole at 231.1 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS • AKRF Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B72-9

BORING STATION: 1171+00.87	OFFSET: 39.07
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 145.74	NORTH: 219536.687
DATUM : NYCT	EAST: 995915.231
FINAL BORING DEPTH (FT) 231.1	

SAMPLER: N/A	BORING CO: Warren George, Inc.	GROUND WATER READINGS	
SAMPLER HAMMER: N/A	FOREMAN: J. Harris	DATE / TIME / DEPTH / CASING / STAB. TIME	
CASING SIZE: 4"	ENGINEER: G. Gutshteyn		
CASING HAMMER: N/A	DATE START: 10/25/06 DATE END: 11/10/06		
ROCK CORE: NQ	REVIEWED BY: C.Snee DATE: 3/5/07		

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 ROD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION BURMISTER (USCS / NYC BLDG CODE) CLASSIFICATIONS	STRATA SYMBOL	STRATIGRAPHY	NOTES	INSITU PROPERTIES: HARDNESS (see below for values)	INSITU PROPERTIES: WEATHERING (see below for values)	NUMBER OF FRACTURES PER FOOT (see below for values)	NUMBER
155	24	C16	147.5-157.5			10/10	100	87		147.5'-151.2' and 152.9'-155.0': Similar to quartzo-feldspathic SCHIST in C15. 151.2'-157.5': Hard to very hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, acute to obtuse foliation, rough, very closely to closely spaced, slightly weathered, acute to obtuse, slightly chloritic foliation joints/fractures. 155.6', 156.2' and 157.7': Cross-foliation joints/fractures: intermediate. 155.9'-156.2': Fracture zone: Very closely spaced, 1/16" thick chlorite, vugs.							
	12																2
	10																2
	10																1
	11																0
	10																1
	12																3
160	8	C17	157.5-167.4			9.9/9.9	100	100		Very hard, fresh, fine to coarse grained, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, intermediate to obtuse foliation.			6				2
	10																0
	10																0
	12																0
	14																0
	16																0
165	16																0
	18																0
	16																0
	20																0
	14																0
	14																0
170	17	C18	167.4-177.4			10/10	100	100		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica SCHIST high quartz content, with few feldspar crystals throughout, thin to very thin, intermediate to obtuse foliation.							0
	22																0
	26																0
	30																0
	47																0
175	40																1
	32																0
	28																0
	15																0
	18																0
180	18																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) 95.7'-96.0': Very soft, severely weathered zone, slight clay buildup on outside of core.
6) No fractures, core came out in one piece.
7) Bottom of borehole at 231.1 feet. Borehole grouted upon completion.

ANGLE BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B72-9

BORING STATION: 1171+00.87	OFFSET: 39.07
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 145.74	NORTH: 219536.687
DATUM : NYCT	EAST: 995915.231
FINAL BORING DEPTH (FT) 231.1	

SAMPLER: N/A	BORING CO: Warren George, Inc.
SAMPLER HAMMER: N/A	FOREMAN: J. Harris
CASING SIZE: 4"	ENGINEER: G. Gutshteyn
CASING HAMMER: N/A	DATE START: 10/25/06 DATE END: 11/10/06
ROCK CORE: NQ	REVIEWED BY: C.Snee DATE: 3/5/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	21																1
	22	C19	177.4-187.2			9.8/9.8	100	97		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, intermediate to obtuse foliation, rough to slightly smooth, closely to moderately closely spaced, fresh to slightly weathered, obtuse, slightly chloritic foliation joints/fractures.							0
	20																1
	24																0
185	22																0
	18																0
	16																0
	8																0
	12																0
190	12																0
	15																0
	15	C20	187.2-197.3			10.1/10.1	100	100		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica SCHIST, with thin to very thin, convoluted, crenulated, intermediate to obtuse foliation, rough, slightly weathered, widely spaced, obtuse foliation joints/fractures.							1
	19																0
	27																0
195	36																0
	16																0
	12																0
	18																0
	22																0
200	40																0
	59																0
	70	C21	197.3-207.3			10/10	100	100		Very hard, fresh, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, obtuse foliation. 100.5'-102.3': Quartzo-feldspathic zone.							0
	22																0
	18																0
205	16																0
	14																0
	14																0
	13																0
	14																0
210	11																0

GRANULAR SOILS	
BPF	DENSITY
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
>50	Very Dense

COHESIVE SOILS	
BPF	CONSISTENCY
<2	Very Soft
2-4	Soft
4-8	Med Stiff
8-15	Stiff
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. 95.7-96.0': Very soft, severely weathered zone, slight clay buildup on outside of core. No fractures, core came out in one piece.
2. Bottom of borehole at 231.1 feet. Borehole grouted upon completion.

ANGLE BORING LOG

Sheet: 8 of 8

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

ANGLE BORING NO. B72-9

BORING STATION: 1171+00.87	OFFSET: 39.07
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 145.74	NORTH: 219536.687
DATUM : NYCT	EAST: 995915.231
FINAL BORING DEPTH (FT) 231.1	

SAMPLER: N/A	BORING CO: Warren George, Inc.
SAMPLER HAMMER: N/A	FOREMAN: J. Harris
CASING SIZE: 4"	ENGINEER: G. Gutshteyn
CASING HAMMER: N/A	DATE START: 10/25/06 DATE END: 11/10/06
ROCK CORE: NQ	REVIEWED BY: C.Snee DATE: 3/5/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
215	8	C22	207.3-217.4			10.1/10.1	100	100		C22: Similar to SCHIST in C21							0
	11																0
	12																0
	14																0
	18																0
	26																0
	20																0
220	12	C23	217.4-227.5			10.1/10.1	100	100		C23: Similar to SCHIST in C21							0
	16																0
	23																0
	18																0
	18																0
	20																0
225	16																0
	14																0
	18																0
	18																0
	12	C24	227.5-231.1			3.6/3.6	100	100		C24: Similar to SCHIST in C21							0
230	14																0
	18																0
	12												7				0
235										Bottom of the borehole at 231.1 feet							
240																	

GRANULAR SOILS	
BPF	DENSITY
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
>50	Very Dense

COHESIVE SOILS	
BPF	CONSISTENCY
<2	Very Soft
2-4	Soft
4-8	Med Stiff
8-15	Stiff
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) 95.7'-96.0': Very soft, severely weathered zone, slight clay buildup on outside of core.
6) No fractures, core came out in one piece.
7) Bottom of borehole at 231.1 feet. Borehole grouted upon completion.

BORING LOG

Sheet: 1 of 1

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-10

BORING STATION: 1169+81.66	OFFSET: -2.72
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 148.23	NORTH: 219451.2495
DATUM : NYCT	EAST: 995820.7104
FINAL BORING DEPTH (FT) 26	

SAMPLER: NA	BORING CO: Warren George, Inc.
SAMPLER HAMMER: NA	FOREMAN: A. London
CASING SIZE: 4" and 3"	ENGINEER: J. Thampi
CASING HAMMER: 300 lb Donut	DATE START: 12/15/06 DATE END: 12/15/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0	4"									PAVEMENT THICKNESS: 6" Asphalt 12" Concrete		FILL	1				
													2				
													3				
5										C1: Medium hard to hard, moderately to slightly weathered, fine to medium grained, light gray, quartz-mica SCHIST, feldspar rich, with very thin, poorly laminated horizontal to sub-horizontal foliation, rough, very closely to closely spaced horizontal to sub-horizontal foliation joints/fractures. 16.0'-16.8' : Cross-foliation joint/fracture: Vertical. 17.0'-17.3' and 17.4'-17.8': ¼" bands tightly healed joints. 17.6'-19.2' and 19.4'-21.0': Cross-foliation joints/fractures: Irregular, very closely to closely spaced, moderately dipping to sub-vertical. 18.2'-21.0': Medium hard to very hard, moderately weathered, fine to medium grained, gray mica SCHIST, rough, irregular, very closely spaced, sub-horizontal foliation joint/fracture. 19.2'-19.4': Slightly weathered quartz-feldspar mylontic vugs. 19.2'-19.4' and 20.0'-20.1': Chlorite, calcite.		DEC ROCK					
10																	
15													4				
	5											ROCK					1
	4	C1	16-21			5/4.8	98	32		C2: 21.0'-23.4': Similar to SCHIST in C1 (18.2'-21.0'). 23.4'-26.0': Medium hard to hard, moderately to slightly weathered, fine to medium grained, gray, mica SCHIST, quartz and feldspar rich, with very thin, poorly laminated foliation, very closely to closely spaced, horizontal to sub-horizontal foliation joints/fractures. 22.1'-22.8': Cross-foliation joint/fracture: Moderately dipping. 22.8' - 23.4': Light gray, dark green and white mylonite, chlorite, sericite. 22.8' and 23.4': Cross-foliation joint/fracture: 23.4'-24.0' and 25.4'-25.8': Iron oxide stained vertical joints. 24.6', 25.4' and 25.6': ¼" Chlorite filling at joints.						3
20	4																4
	4																>10
	5																>5
	5																3
	6	C2	21-26			5/5	100	33									3
25	6																>6
	7												5				3
																	>6
30										Bottom of borehole at 26.0 feet							

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

4) Drilled to top of rock; soil samples were not taken.
5) Bottom of borehole at 26.0 feet. Borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP, A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-11

BORING STATION: 1171+61.40	OFFSET: 68.23
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 143.95	NORTH: 219574.0779
DATUM : NYCT	EAST: 995969.882
FINAL BORING DEPTH (FT) 115.3	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: A. London
CASING SIZE: 4" to 6'	ENGINEER: J. Thampi
CASING HAMMER: 300 lb Donut	DATE START: 12/26/06 DATE END: 01/02/07
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 ROD (%)	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	4"									PAVEMENT THICKNESS: 6" Concrete Sidewalk Hand augered borehole to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1	6-8	5 6 4 15	10	10"				S1: Medium dense, brown, fine to coarse SAND, some Silt, trace Gravel, trace Clayey Silt pockets, occasional Brick and Asphalt Fragments (SM / 11-65)							
		S2	8-10	5 9 7 8	16	6"				S2: Medium dense, same as above (SM / 11-65)							
10		S3	10-12	1 1 1 2	2	20"				S3: Soft, brown, Clayey SILT, little fine SAND, trace Mica (ML / 11-65)							
15										C1: Medium hard, moderately to completely weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, sub-horizontal foliation, rough, very closely to closely spaced, moderately weathered, sub-horizontal, iron-oxide stained foliation joints/fractures. 21.1' and 21.55': Cross-foliation joints/fractures: Moderately dipping. 21.2', 21.4', and 21.9': Cross-foliation joints/fractures: Rough, planar, horizontal, iron-oxide stained. 21.8': Cross-foliation joints/fractures: Rough, irregular, vertical, iron-oxide stained.			4				
20	4 4 4 4 4	C1	19.1-24.1			5.0/3.4	68	24				ROCK	5				3 6 5 3 3
25	5 5 5	C2	24.1-27.6			3.5/3.0	85	25		C2: Medium to medium hard, moderately weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin, poorly laminated, sub-horizontal foliation, rough, very closely to closely spaced, horizontal to sub-horizontal, iron-oxide stained foliation joints/fractures. 25.7'-26.7': Cross-foliation joints/fractures: Rough, planar, sub-vertical, iron-oxide stained.							>5 3 >7
30	3 5 5	C3	27.6-32.6			5.0/5.0	100	64		C3: Similar to SCHIST in C2. except convoluted and crenulated foliation. 31.2'-31.4': Vugs.							2 4 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									

NOTES:

1) Ground water level not recorded.
Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.

2) 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) Drilled through obstrudction at 15.5'-17.5'.

5) Approximately 1.6 feet loss of recovery.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-11

BORING STATION: 1171+61.40	OFFSET: 68.23
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 143.95	NORTH: 219574.0779
DATUM : NYCT	EAST: 995969.882
FINAL BORING DEPTH (FT) 115.3	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: A. London
CASING SIZE: 4" to 6'	ENGINEER: J. Thampi
CASING HAMMER: 300 lb Donut	DATE START: 12/26/06 DATE END: 01/02/07
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	5 5 5 5 5	C4	32.6-37.2			4.6/4.3	93	32		C4: Similar to SCHIST in C3, except medium hard, severely weathered from 35.8' to 36.3'. 34.4' and 34.9': Iron-oxide stained. 35.0' and 35.8'-36.3': Cross-foliation joint/fracture: Rough, irregular, slightly weathered, sub-vertical, chlorite.							2 3 3 4 3 4
40	5 5 5 5 5	C5	37.2-41.9			4.7/4.7	100	91		C5: Hard, slightly weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, sub-horizontal foliation, rough, irregular, closely to moderately closely spaced, sub-horizontal foliation joints/fractures. Garnets ¼" in diameter throughout the entire run. 41.6': White/pink mineral coating.							>10 3 0 1 1 1 0
45	5 5 5 5 5	C6	41.9-46.9			5.0/5.0	100	82		C6: Similar to SCHIST in C5, except for moderately weathered, very closely spaced, horizontal to sub-horizontal foliation between 45.2'-45.5'.							- 6 0 3 0 1 1 2
50	5 5 5 5 5	C7	46.9-51.9			5.0/5.0	100	92		C7: Hard, slightly weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, irregular, very closely to moderately closely spaced, slightly weathered, horizontal to sub-horizontal foliation joints/fractures. 46.9'-47.1' and 47.2'-47.2': Cross-foliation joints/fractures: Rough, irregular, slightly weathered, moderately dipping to sub-vertical, chlorite coated.							1 3 0 1 3 2 0 0
55	8 8 8 6 7	C8	51.9-56.9			5.0/5.0	100	99		C8: 51.9'-54.9': Very hard, fresh, medium to coarse grained, light gray, quartzo-feldspathic SCHIST, with thin, horizontal foliation, rough, irregular, moderately closely spaced, horizontal foliation joints/fractures. 54.9'-56.9': Similar to SCHIST in C7, no fractures present. 55.1': Possible slickenside and pyrite coating.							
60	5 5 5	C9	56.9-61.9			5.0/5.0	100	98		C9: Hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica SCHIST, with thin, horizontal foliation, rough, very closely to widely spaced, slightly weathered, horizontal foliation joints/fractures.							

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:
6) Bottom of borehole at 115.3 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 3 of 4

DMJM HARRIS + ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-11

BORING STATION: 1171+61.40	OFFSET: 68.23
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 143.95	NORTH: 219574.0779
DATUM : NYCT	EAST: 995969.882
FINAL BORING DEPTH (FT) 115.3	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: A. London
CASING SIZE: 4" to 6'	ENGINEER: J. Thampi
CASING HAMMER: 300 lb Donut	DATE START: 12/26/06 DATE END: 01/02/07
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	5 5 5 5 5	C10	61.9-66.9			5.0/5.0	100	98		C10: Similar to SCHIST in C9, except horizontal to sub-horizontal foliation. 64.4' and 66.4': Cross-foliation joints/fractures: Rough, irregular, fresh, moderately dipping to sub-vertical. 64.5'-65.0': Cross-foliation joint/fracture: Healed, moderately dipping to vertical. 0.05'-0.2' thick quartz bands.							0 1 1 0 3 0 1
70	5 5 5 5 5	C11	66.9-71.9			5.0/5.0	100	74		C11: Similar to SCHIST in C10, except medium hard, moderately weathered, very closely spaced. 67.5'-68.2': Horizontal to sub-vertical fracture zone. C12: Similar to SCHIST in C9.							>10 5 0 0 1
75	5 5 5 5 5	C12	71.9-76.9			5.0/5.0	100	99		C13: Hard to very hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, irregular, widely spaced, horizontal to sub-horizontal foliation joints/fractures. 80.7'-80.9': Cross-foliation joint/fracture: Rough, irregular, fresh, moderately dipping.							1 0 0 1
80	6 5 6 6 5	C13	76.9-81.9			5.0/5.0	100	92		C14: Hard, slightly weathered, fine to coarse grained, gray, quartz-mica SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, irregular, very closely to moderately closely spaced, horizontal to sub-horizontal foliation joints/fractures. 83.7'-84.6': Cross-foliation joints/fracture: Healed, vertical to sub-vertical, with 1/16" calcite filling.							0 0 1 1 0
85	6 6 7 5 5	C14	81.9-86.9			5.0/5.0	100	95		C15: Hard, fresh to slightly weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, slightly to moderately weathered, closely to moderately closely spaced, horizontal foliation joints/fractures. 87.8', 88.2'-88.5', 89.2' and 89.6'-89.8': Cross-foliation joints/fractures: Rough to smooth, planar to irregular, slightly to moderately weathered, sub-horizontal to moderately dipping fractures. 89.7': Slickensides.							1 2 2 2 0 2
90	5 4 5	C15	86.9-91.9			5.0/5.0	100	65									2 2 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	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:

` Bottom of borehole at 115.3 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-11

BORING STATION: 1171+61.40	OFFSET: 68.23
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 143.95	NORTH: 219574.0779
DATUM : NYCT	EAST: 995969.882
FINAL BORING DEPTH (FT) 115.3	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb Safety hammer
CASING SIZE: 4" to 6'
CASING HAMMER: 300 lb Donut
ROCK CORE: NX

BORING CO: Warren George, Inc.
FOREMAN: A. London
ENGINEER: J. Thampi
DATE START: 12/26/06 DATE END: 01/02/07
REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
95	5									C16: 91.9'-94.7': Hard, fresh, fine to coarse grained, light gray, quartzo-feldspathic SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, fresh to slightly weathered, closely to moderately closely spaced, horizontal foliation joints/fractures. 92.6' and 93.2': Cross-foliation joints/fractures: Rough, irregular, fresh to slightly weathered, moderately dipping. 91.9'-93.6: Quartz rich. 94.7'-96.8': Similar to SCHIST in C15.							1
	5																1
	5	C16	91.9-96.8			4.9/4.9	100	89									2
	5																1
	6																0
	5																0
	4																0
	5																0
	5									C17: Hard, fresh to slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with thin, convoluted, slightly crenulated, horizontal foliation, rough, irregular, slightly weathered, moderately closely spaced, horizontal foliation joints/fractures. 98.0'-98.1': Quartz vein.							1
	4																1
100	4	C17	96.8-101.7			4.75/4.9	100	97									0
	5																1
	5																2
	5									C18: Similar to SCHIST in C17.							2
	6																
105	5	C18	101.7-106.7			5.0/5.0	100	89									0
	5																0
	4																3
	6									C19: Similar to SCHIST in C17.							0
	5	C19	106.7-110.3			3.6/3.6	100	87									0
110	6																1
	7																1
	6									C20: Similar to SCHIST in C18, except poorly laminated to unfoliated.							0
	6	C20	110.3-115.3			5.0/5.0	100	100									2
	6																2
115	6												6				
										Bottom of borehole at 115.3 feet							
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	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:
6) Bottom of borehole at 115.3 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 1

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-12

BORING STATION: 1171+27.95	OFFSET: -1.86
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 146.10	NORTH: 219578.8075
DATUM : NYCT	EAST: 995892.3824
FINAL BORING DEPTH (FT) 22.1	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: L. Muniz
CASING SIZE: 4" to 15'	ENGINEER: G. Gutshteyn
CASING HAMMER: 300 lb Donut	DATE START: 12/20/06 DATE END: 12/21/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0	4"									PAVEMENT THICKNESS: 8" Asphalt 4" Concrete 4" Asphalt 4" Concrete		FILL	1 2 3				
5		S1	5-7			24/10				Loose, brown, fine to coarse, SAND, little Gravel, trace Silt (SP / 11-65)			4				
10		S2	10-12			24/7				Medium dense, brown, fine to coarse SAND, some Gravel (Schist fragments), trace Silt (SP / 7-65)			4				
15		S3	15-17							Loose, brown, fine to coarse GRAVEL (Schist fragments), some fine to coarse Sand, trace Silt (GP / 6-65)			4				
20	4 4 5 5 5	C1	17.1-22.1			5/5	100	97		Very hard, fresh, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, slightly convoluted, sub-horizontal foliation, rough, fresh, closely to moderately closely spaced, sub-horizontal foliation joints/fractures. 17.4': Cross-foliation joint/fracture: Rough, curved, moderately dipping.		ROCK	5				2 0 0 1 0
25										Bottom of borehole at 22.1 feet							
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) Ground water level not recorded.
Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.
Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv).

4) Took unconventional split spoon soil samples.

5) Bottom of borehole at 22.1 feet. Borehole grouted upon completion.

BORING LOG

Sheet: 1 of 1

DMJM HARRIS • AKUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B72-13

BORING STATION: 1171+17.27	OFFSET: -2.72
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 146.26	NORTH: 219569.8684
DATUM: NYCT	EAST: 995886.438
FINAL BORING DEPTH (FT) 13.5	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb Safety Hammer
CASING SIZE: 4" to 5'
CASING HAMMER: 300 lb Donut
ROCK CORE: NX

BORING CO: Warren George, Inc.
FOREMAN: L. Muniz
ENGINEER: G. Gutshteyn
DATE START: 12/21/06 DATE END: 12/21/06
REVIEWED BY: C. Snee DATE: 3/2/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0										PAVEMENT THICKNESS: 4" Asphalt 4" Concrete 4" Asphalt 4" Concrete		FILL	1 2 3				
5										Medium hard to hard, moderately weathered to fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to closely spaced, slightly to moderately weathered, horizontal to sub-horizontal, iron-oxide stained foliation joints/fractures. 8.4'-9.1', 10.6'-10.9, 11.5'-11.9' and 12.4'-12.7: Cross-foliation joints/fractures: Rough, slightly to moderately weathered, very closely to closely spaced, moderately dipping to sub-vertical, iron-oxide stained.		ROCK	4				
10		C1	8.4-13.5			5.1/5.1	100	51					5				>20 0 6 4 3
										Bottom of borehole at 13.5 feet							
15																	
20																	
25																	
30																	

GRANULAR SOILS	
BPF	DENSITY
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
>50	Very Dense

COHESIVE SOILS	
BPF	CONSISTENCY
<2	Very Soft
2-4	Soft
4-8	Med Stiff
8-15	Stiff
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) Ground water level not recorded.
Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.
2) 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) Drilled to top of rock; soil samples were not taken.
5) Bottom of borehole at 13.5 feet. Borehole grouted upon completion.

BORING LOG

Sheet: 1 of 1

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-3

BORING STATION: 1172+31.30	OFFSET: -1.09
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 144.07	NORTH: 219668.7842
DATUM : NYCT	EAST: 995943.117
FINAL BORING DEPTH (FT) 25.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: A. London
CASING SIZE: 4"	ENGINEER: J. Thampi
CASING HAMMER: 300 lb Donut	DATE START: 12/22/06 DATE END: 12/22/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0	4"									PAVEMENT THICKNESS: 6" Asphalt 15" Concrete		FILL	1				
													2				
													3				
5																	
10																	
15										Medium hard to hard, slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet-feldspar SCHIST, with very thin to thin, slightly convoluted, slightly crenulated, horizontal to sub-horizontal foliation, rough, closely to moderately closely spaced, fresh to slightly weathered, sub-horizontal, iron-oxide stained foliation joints/fractures. 16.5', 18.5' and 19.5': Quartz/feldspar bands.			4				
		C1	16-20.9			4.9/4.9	100	82				ROCK					4
20																	3
																	4
																	2
																	1
		C2	20.9-25.5			4.6/4.6	100	82		Similar to SCHIST in C1, except highly convoluted and crenulated, horizontal to sub-horizontal foliation. 20.9'-21.3': Completely weathered and fractured. 22.3', 23.7'-23.8' and 23.9'-24.15': Quartz/feldspar bands. 23.0': Iron-oxide stained.			5				>10
25																	2
																	2
																	1
										Bottom of the borehole at 25.5 feet							
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) Ground water level not recorded.
Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.
Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv).

4) Drilled to top of rock; soil samples were not taken.

5) Bottom of borehole at 25.5 feet. Borehole grouted upon completion.

BORING LOG

Sheet: 1 of 4

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: L. Muniz
CASING SIZE: 4" to 27'	ENGINEER: G. Gutshteyn
CASING HAMMER: 300 lb Donut	DATE START: 12/27/06 DATE END: 01/03/07
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0	4"									PAVEMENT THICKNESS: 6" Concrete Sidewalk		FILL	1				
										Hand augered to a depth of 6 feet prior to boring.			2				
													3				
5		S1	6-8	4 7 14 15	21	24/14				Medium dense, brown, fine to coarse SAND, little Silt, little Gravel (SM / 11-65)							
		S2	8-10	11 7 9 9	16	24/15				Medium dense, brown, fine to medium SAND, some Silt, trace Gravel, trace Clayey Silt pockets (SM / 7-65)							
10		S3	10-12	2 3 4 6	7	24/7				Loose, brown, fine to medium SAND, and Gravel, little Silt (SM / 11-65) (cobble in tip)			5				
												CLAYEY SILT					
15		S4	15-17	3 7 16 44	23	24/9				Very stiff, brown, Clayey SILT, trace fine Sand (ML / 10-65) (decomposed SCHIST in tip)							
20		S5	20-22	4 4 8 25	12	24/10				Medium dense, GRAVEL, some fine to coarse Sand, little Clayey Silt (GM / 6-65)							
												DEC ROCK					
25		S6	25-26.8	10 17 28 100/4"	45	22/8				Dense, gray, micaceous fine to medium SAND, little Silt, trace Rock Fragments (SM / 7-65)		ROCK				2	
	4															>10	
	4															5	
30	4																

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

*) Ground water level not recorded.

Stratification lines represent approximate boundaries between soil and rock types, transition may be gradual.

Field Test Data - Total organic vapors levels are referenced to a benzene standard measured in the head space of sealed soil sample jars using an organic vapor meter equipped with a photoionization detector (PID) and a 10.6eV lamp. Results are in parts per million by volume (ppmv).

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

		GROUND WATER READINGS				
SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.	DATE	TIME	DEPTH	CASING	STAB. TIME
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: L. Muniz					
CASING SIZE: 4" to 27'	ENGINEER: G. Gutshteyn					
CASING HAMMER: 300 lb Donut	DATE START: 12/27/06 DATE END: 01/03/07					
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07					

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
35	4	C1	27.1-37.1			10.0/9.7	97	40		C1: Medium hard to hard, slightly to severely weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, horizontal to moderately dipping foliation, rough to smooth, very closely to closely spaced, slightly to moderately weathered, horizontal to moderately dipping, iron-oxide stained, kaolinite filled foliation joints/fractures. 28.7'-28.9', 35.8'-36.1' and 36.7'-36.9': Cross-foliation joints/fractures: Rough, slightly weathered, moderately dipping. 31.9'-32.2': Cross-foliation joint/fracture: Rough, moderately dipping with kaolinite deposits. 34.3'-34.9': Healed vertical joint. 34.6'-35.3': Cross-foliation joint/fracture: Slightly to moderately weathered, sub-vertical, with kaolinite deposits. 36.0'-36.4' and 36.7'-37.1': Very soft rock, severely weathered, kaolinite. C2: Very hard, slightly weathered, fine to coarse grained, orange and white, quartzo-feldspathic PEGMATITE, with fresh to slightly weathered, rough, irregular fractures. C3: Hard, fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, horizontal to sub-horizontal foliation joints/fractures. 40.7'-41.0' and 45.8'-45.9': Cross-foliation joints/fractures: Smooth, slightly weathered, sub-horizontal to moderately dipping, iron-oxide stained, kaolinite coated. C4: Hard to very hard, slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, fresh to slightly weathered, horizontal to sub-horizontal, kaolinite coated foliation joints/fractures. 50.1'-50.2': Cross-foliation joint/fracture: Smooth, sub-vertical, kaolinite coated. 53.2'-53.8' and 54.8'-55.3': Rough to smooth, slightly to moderately weathered, sub-horizontal to moderately dipping, very closely fractured zones. 53.6'-53.8': Cross-foliation joint/fracture: Rough, slightly weathered, vertical. 54.7'-54.8': Very soft rock.			4				1
	4																5
	4																1
	5																3
	5																5
	5																9
	4																3
	21	C2	37.1-39.1			2.0/2.0	100	45				PEGMATITE					2
	46																4
40	NA											ROCK					N
	9																2
	5																1
	5																0
	5	C3	40.2-48.2			8.0/8.0	100	88									
45	5																2
	5																0
	5																1
	4																2
	4																3
50	4																2
	4																0
	4																0
	4	C4	48.2-58.2			10.0/10.0	100	77									0
	4																8
55	5																7
	4																2
	5																2
	5																1
	4																0
60	4																4

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS				JOINT/FRACTURE CHARACTERISTICS			
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS		WEATHERING		NO. PER FT	SPACING/THICKNESS		ANGLE ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	(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:
4) 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out.
5) Pinch and swell features in C10.
6) Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS + ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: L. Muniz
CASING SIZE: 4" to 27'	ENGINEER: G. Gutshteyn
CASING HAMMER: 300 lb Donut	DATE START: 12/27/06 DATE END: 01/03/07
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	4 4 4 4 5 5 5 5	C5	58.2-68.2			10.0/10.0	100	89		Hard to very hard, fresh to slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, slightly crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, fresh, horizontal to sub-horizontal foliation joints/fractures. 59.6'-59.9': Smooth, horizontal to sub-horizontal fractures, possible slickensides. 62.8'-68.3': Cross-foliation joint/fracture: Rough, slightly weathered, moderately dipping, calcite coated.							2 0 1 0 1 0 0 1
70	4 5 5 5 5 5 5 5	C6	68.2-78.3			10.1/10.1	100	77		Similar to SCHIST in C5. 68.6', 68.8', 69.0', 70.0', 70.8', 73.8', 75.4', 76.0' and 76.3': Cross-foliation joints/fractures: Smooth, very closely to closely spaced, slightly to moderately weathered, moderately dipping to sub-vertical, with kaolinite deposits. 73.8' and 76.3': Cross-foliation joints/fractures: Rough, planar, calcite coated. 76.5'-77.0' and 76.9'-77.5': Tightly healed, sub-vertical to vertical, calcite filled. 76.3'-76.4': Very closely spaced fractures, kaolinite coated.							3 1 2 0 0 3 1 4 1 0
80	4 4 5 4 4 5 5 5	C7	78.3-88.3			10.0/10.0	100	88		Similar to SCHIST in C5. 80.8'-81.0': Cross-foliation joint/fractures: Rough, slightly weathered, very closely spaced, moderately dipping.							2 0 5 5 2 1 0 0 0 1
85	5 5 5 5																2
90	4 5																2

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) 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out. Pinch and swell features in C10.

2) Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: L. Muniz
CASING SIZE: 4" to 27'	ENGINEER: G. Gutshteyn
CASING HAMMER: 300 lb Donut	DATE START: 12/27/06 DATE END: 01/03/07
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	4	C1	27.1-37.1			10.0/9.7	97	40		C1: Medium hard to hard, slightly to severely weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, horizontal to moderately dipping foliation, rough to smooth, very closely to closely spaced, slightly to moderately weathered, horizontal to moderately dipping, iron-oxide stained, kaolinite filled foliation joints/fractures. 28.7'-28.9', 35.8'-36.1' and 36.7'-36.9': Cross-foliation joints/fractures: Rough, slightly weathered, moderately dipping. 31.9'-32.2': Cross-foliation joint/fracture: Rough, moderately dipping with kaolinite deposits. 34.3'-34.9': Healed vertical joint. 34.6'-35.3': Cross-foliation joint/fracture: Slightly to moderately weathered, sub-vertical, with kaolinite deposits. 36.0'-36.4' and 36.7'-37.1': Very soft rock, severely weathered, kaolinite.							
	4																1
	4																5
	4																1
	5																3
	5																5
	5																9
	4																3
	21	C2	37.1-39.1			2.0/2.0	100	45				PEGMATITE					2
	46																4
40	NA											ROCK	4				N
	9									C2: Very hard, slightly weathered, fine to coarse grained, orange and white, quartzo-feldspathic PEGMATITE, with fresh to slightly weathered, rough, irregular fractures.							2
	5																1
	5																0
	5	C3	40.2-48.2			8.0/8.0	100	88		C3: Hard, fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, horizontal to sub-horizontal foliation joints/fractures. 40.7'-41.0' and 45.8'-45.9': Cross-foliation joints/fractures: Smooth, slightly weathered, sub-horizontal to moderately dipping, iron-oxide stained, kaolinite coated.							
45	5																2
	5																0
	5																1
	5																2
	4																3
50	4																2
	4																0
	4																0
	4																8
	4	C4	48.2-58.2			10.0/10.0	100	77		C4: Hard to very hard, slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, fresh to slightly weathered, horizontal to sub-horizontal, kaolinite coated foliation joints/fractures. 50.1'-50.2': Cross-foliation joint/fracture: Smooth, sub-vertical, kaolinite coated. 53.2'-53.8' and 54.8'-55.3': Rough to smooth, slightly to moderately weathered, sub-horizontal to moderately dipping, very closely fractured zones. 53.6'-53.8': Cross-foliation joint/fracture: Rough, slightly weathered, vertical. 54.7'-54.8': Very soft rock.							7
55	4																2
	5																2
	5																1
	4																0
60	4																4

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS				JOINT/FRACTURE CHARACTERISTICS			
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS		WEATHERING		NO. PER FT	SPACING/THICKNESS		ANGLE ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	(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:
4) 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out.
5) Pinch and swell features in C10.
6) Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

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CASING SIZE: 4" to 27"	ENGINEER: G. Gutshteyn
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GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 ROD (%)	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	4	C5	58.2-68.2			10.0/10.0	100	89		Hard to very hard, fresh to slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, slightly crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, fresh, horizontal to sub-horizontal foliation joints/fractures. 59.6'-59.9': Smooth, horizontal to sub-horizontal fractures, possible slickensides. 62.8'-68.3': Cross-foliation joint/fracture: Rough, slightly weathered, moderately dipping, calcite coated.							2
	4																0
	4																1
	4																0
	5																1
	5																0
	5																0
	5																1
70	4	C6	68.2-78.3			10.1/10.1	100	77		Similar to SCHIST in C5. 68.6', 68.8', 69.0', 70.0', 70.8', 73.8', 75.4', 76.0' and 76.3': Cross-foliation joints/fractures: Smooth, very closely to closely spaced, slightly to moderately weathered, moderately dipping to sub-vertical, with kaolinite deposits. 73.8' and 76.3': Cross-foliation joints/fractures: Rough, planar, calcite coated. 76.5'-77.0' and 76.9'-77.5': Tightly healed, sub-vertical to vertical, calcite filled. 76.3'-76.4': Very closely spaced fractures, kaolinite coated.							3
	5																1
	5																2
	5																0
	5																0
75	5																3
	5																1
	5																4
	5																1
	5																0
	4																2
80	4																0
	5									Similar to SCHIST in C5. 80.8'-81.0': Cross-foliation joint/fractures: Rough, slightly weathered, very closely spaced, moderately dipping.							5
	4																5
	4																2
	5	C7	78.3-88.3			10.0/10.0	100	88									1
85	5																0
	5																0
	5																0
	5																1
	4																2
90	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								

NOTES:

1. 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out. Pinch and swell features in C10.
2. Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

BORING NO. B73-4

JM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: L. Muniz
CASING SIZE: 4" to 27'	ENGINEER: G. Gutshteyn
CASING HAMMER: 300 lb Donut	DATE START: 12/27/06 DATE END: 01/03/07
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	4	C1	27.1-37.1			10.0/9.7	97	40		C1: Medium hard to hard, slightly to severely weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, horizontal to moderately dipping foliation, rough to smooth, very closely to closely spaced, slightly to moderately weathered, horizontal to moderately dipping, iron-oxide stained, kaolinite filled foliation joints/fractures. 28.7'-28.9', 35.8'-36.1' and 36.7'-36.9': Cross-foliation joints/fractures: Rough, slightly weathered, moderately dipping. 31.9'-32.2': Cross-foliation joint/fracture: Rough, moderately dipping with kaolinite deposits. 34.3'-34.9': Healed vertical joint. 34.6'-35.3': Cross-foliation joint/fracture: Slightly to moderately weathered, sub-vertical, with kaolinite deposits. 36.0'-36.4' and 36.7'-37.1': Very soft rock, severely weathered, kaolinite.							
	4																1
	4																5
	4																1
	5																3
	5																5
	5																9
	4																3
	21	C2	37.1-39.1			2.0/2.0	100	45		C2: Very hard, slightly weathered, fine to coarse grained, orange and white, quartzo-feldspathic PEGMATITE, with fresh to slightly weathered, rough, irregular fractures.		PEGMATITE					2
	46																4
40	NA											ROCK	4				N
	9	C3	40.2-48.2			8.0/8.0	100	88		C3: Hard, fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, horizontal to sub-horizontal foliation joints/fractures. 40.7'-41.0' and 45.8'-45.9': Cross-foliation joints/fractures: Smooth, slightly weathered, sub-horizontal to moderately dipping, iron-oxide stained, kaolinite coated.							2
	5																0
	5																1
	5																2
45	5																3
	5																2
	5																0
	5																0
	4																8
	4																7
50	4																2
	4																2
	4																1
	4																0
	4	C4	48.2-58.2			10.0/10.0	100	77		C4: Hard to very hard, slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, fresh to slightly weathered, horizontal to sub-horizontal, kaolinite coated foliation joints/fractures. 50.1'-50.2': Cross-foliation joint/fracture: Smooth, sub-vertical, kaolinite coated. 53.2'-53.8' and 54.8'-55.3': Rough to smooth, slightly to moderately weathered, sub-horizontal to moderately dipping, very closely fractured zones. 53.6'-53.8': Cross-foliation joint/fracture: Rough, slightly weathered, vertical. 54.7'-54.8': Very soft rock.							4
55	4																0
	5																8
	4																7
	5																2
	5																2
	4																1
60	4																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									

NOTES:
4) 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out.
5) Pinch and swell features in C10.
6) Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb Safety hammer
CASING SIZE: 4" to 27'
CASING HAMMER: 300 lb Donut
ROCK CORE: NX

BORING CO: Warren George, Inc.
FOREMAN: L. Muniz
ENGINEER: G. Gulshteyn
DATE START: 12/27/06 DATE END: 01/03/07
REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	4 4 4 4 5 5 5 5	C5	58.2-68.2			10.0/10.0	100	89		Hard to very hard, fresh to slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, slightly crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, fresh, horizontal to sub-horizontal foliation joints/fractures. 59.6'-59.9': Smooth, horizontal to sub-horizontal fractures, possible slickensides. 62.8'-68.3': Cross-foliation joint/fracture: Rough, slightly weathered, moderately dipping, calcite coated.						2 0 1 0 1 0 0 1
70	4 5 5 5 5 5 5 5	C6	68.2-78.3			10.1/10.1	100	77		Similar to SCHIST in C5. 68.6', 68.8', 69.0', 70.0', 70.8', 73.8', 75.4', 76.0' and 76.3': Cross-foliation joints/fractures: Smooth, very closely to closely spaced, slightly to moderately weathered, moderately dipping to sub-vertical, with kaolinite deposits. 73.8' and 76.3': Cross-foliation joints/fractures: Rough, planar, calcite coated. 76.5'-77.0' and 76.9'-77.5': Tightly healed, sub-vertical to vertical, calcite filled. 76.3'-76.4': Very closely spaced fractures, kaolinite coated.						3 1 2 0 0 3 1 4 1 0
80	4 4 5 4 4 5 5 5	C7	78.3-88.3			10.0/10.0	100	88		Similar to SCHIST in C5. 80.8'-81.0': Cross-foliation joint/fractures: Rough, slightly weathered, very closely spaced, moderately dipping.						2 0 5 5 2 1 0 0
85	5 5 5 5																0 0 1 2
90	4 5																2

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. 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out. Pinch and swell features in C10.
2. Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb Safety hammer	FOREMAN: L. Muniz
CASING SIZE: 4" to 27'	ENGINEER: G. Gutshteyn
CASING HAMMER: 300 lb Donut	DATE START: 12/27/06 DATE END: 01/03/07
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	4	C1	27.1-37.1			10.0/9.7	97	40		C1: Medium hard to hard, slightly to severely weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, horizontal to moderately dipping foliation, rough to smooth, very closely to closely spaced, slightly to moderately weathered, horizontal to moderately dipping, iron-oxide stained, kaolinite filled foliation joints/fractures. 28.7'-28.9', 35.8'-36.1' and 36.7'-36.9': Cross-foliation joints/fractures: Rough, slightly weathered, moderately dipping. 31.9'-32.2': Cross-foliation joint/fracture: Rough, moderately dipping with kaolinite deposits. 34.3'-34.9': Healed vertical joint. 34.6'-35.3': Cross-foliation joint/fracture: Slightly to moderately weathered, sub-vertical, with kaolinite deposits. 36.0'-36.4' and 36.7'-37.1': Very soft rock, severely weathered, kaolinite.							
	4																1
	4																5
	4																1
	5																3
	5																5
	5																9
	4																3
	21	C2	37.1-39.1			2.0/2.0	100	45		C2: Very hard, slightly weathered, fine to coarse grained, orange and white, quartzo-feldspathic PEGMATITE, with fresh to slightly weathered, rough, irregular fractures.		PEGMATITE					2
	46																4
40	NA											ROCK	4				N
	9	C3	40.2-48.2			8.0/8.0	100	88		C3: Hard, fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, horizontal to sub-horizontal foliation joints/fractures. 40.7'-41.0' and 45.8'-45.9': Cross-foliation joints/fractures: Smooth, slightly weathered, sub-horizontal to moderately dipping, iron-oxide stained, kaolinite coated.							2
	5																0
	5																1
	5																2
45	5																3
	5																2
	5																0
	4																0
50	4																8
	4																7
	4																2
	4	C4	48.2-58.2			10.0/10.0	100	77		C4: Hard to very hard, slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, fresh to slightly weathered, horizontal to sub-horizontal, kaolinite coated foliation joints/fractures. 50.1'-50.2': Cross-foliation joint/fracture: Smooth, sub-vertical, kaolinite coated. 53.2'-53.8' and 54.8'-55.3': Rough to smooth, slightly to moderately weathered, sub-horizontal to moderately dipping, very closely fractured zones. 53.6'-53.8': Cross-foliation joint/fracture: Rough, slightly weathered, vertical. 54.7'-54.8': Very soft rock.							2
55	4																2
	5																1
	5																0
	4																4
60	4																

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS				JOINT/FRACTURE CHARACTERISTICS			
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS		WEATHERING		NO. PER FT	SPACING/THICKNESS		ANGLE	ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	(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:
4) 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out.
5) Pinch and swell features in C10.
6) Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb Safety hammer
CASING SIZE: 4" to 27'
CASING HAMMER: 300 lb Donut
ROCK CORE: NX

BORING CO: Warren George, Inc.
FOREMAN: L. Muniz
ENGINEER: G. Gutshteyn
DATE START: 12/27/06 DATE END: 01/03/07
REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	4 4 4 4 5 5 5 5	C5	58.2-68.2			10.0/10.0	100	89		Hard to very hard, fresh to slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin, convoluted, slightly crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, fresh, horizontal to sub-horizontal foliation joints/fractures. 59.6'-59.9': Smooth, horizontal to sub-horizontal fractures, possible slickensides. 62.8'-68.3': Cross-foliation joint/fracture: Rough, slightly weathered, moderately dipping, calcite coated.						2 0 1 0 1 0 0 1
70	4 5 5 5 5 5 5 5	C6	68.2-78.3			10.1/10.1	100	77		Similar to SCHIST in C5. 68.6', 68.8', 69.0', 70.0', 70.8', 73.8', 75.4', 76.0' and 76.3': Cross-foliation joints/fractures: Smooth, very closely to closely spaced, slightly to moderately weathered, moderately dipping to sub-vertical, with kaolinite deposits. 73.8' and 76.3': Cross-foliation joints/fractures: Rough, planar, calcite coated. 76.5'-77.0' and 76.9'-77.5': Tightly healed, sub-vertical to vertical, calcite filled. 76.3'-76.4': Very closely spaced fractures, kaolinite coated.						3 1 2 0 0 3 1 4 1 0
80	4 4 5 4 4 5 5 5 5 5	C7	78.3-88.3			10.0/10.0	100	88		Similar to SCHIST in C5. 80.8'-81.0': Cross-foliation joint/fractures: Rough, slightly weathered, very closely spaced, moderately dipping.						2 0 5 5 2 1 0 0 0 1
85	5 5 5 5 4 5															2 2	
90																	

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. 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out. Pinch and swell features in C10.
2. Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 4 of 4

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B73-4

BORING STATION: 1172+04.46	OFFSET: 72.36
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 142.91	NORTH: 219609.5098
DATUM : NYCT	EAST: 995994.7921
FINAL BORING DEPTH (FT) 115.6	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb Safety hammer
CASING SIZE: 4" to 27'
CASING HAMMER: 300 lb Donut
ROCK CORE: NX

BORING CO: Warren George, Inc.
FOREMAN: L. Muniz
ENGINEER: G. Gutshteyn
DATE START: 12/27/06 DATE END: 01/03/07
REVIEWED BY: C. Snee DATE: 3/16/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
95	5	C8	88.3-98.2			9.9/9.9	100	90		Very hard, fresh, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to closely spaced, fresh, horizontal to sub-horizontal foliation joints/fractures. 90.2', 90.5' and 92.9': Cross-foliation joints/fractures: Rough, fresh, sub-horizontal to moderately dipping.							2
	4																0
	5																2
	5																0
	5																0
	5																0
	4																0
	4																0
100	4	C9	98.2-108.1			9.9/9.9	100	100		Very hard, fresh, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with thin, severely convoluted and crenulated, horizontal foliation (no foliation fractures). 98.2'-108.1': High quartz feldspar content. 99.6': Cross-foliation joint/fracture: Rough, fresh, moderately dipping. 106.4'-108.1': Poorly laminated.							1
	5																0
	8																0
	18																0
	26																
105	24																0
	19																0
	22																0
	27																0
	20																0
110	47																4
	60																0
	18	C10	108.1-115.6			7.5/7.5	100	96		Similar to SCHIST in C9. 109.1'-109.7': Rough, very closely to closely spaced, horizontal to sub-horizontal foliation joints/fractures. 109.6'-111.4': Thick quartz band.			5				0
	9																0
	9																0
115	8																0
	5									Bottom of borehole at 115.6 feet			6				0
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	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								

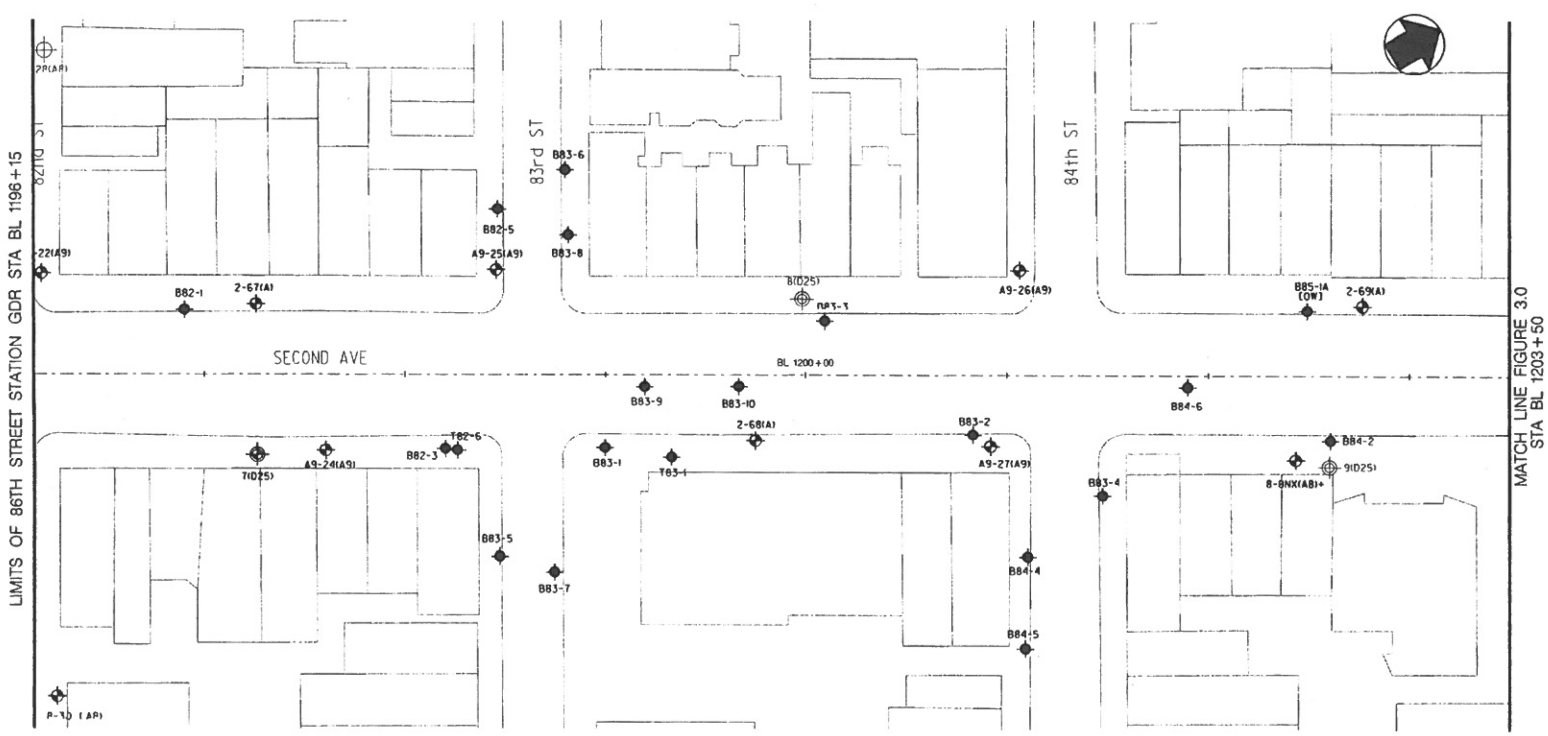
NOTES:
4) 39.1'-40.2': Roller bit got stuck due to borehole collapse. Spun 3" diameter casing and cleaned out.
5) Pinch and swell features in C10.
6) Bottom of borehole at 115.6 feet; acoustic televiewer survey performed; borehole grouted upon completion.

Appendix B:
Soil Boring Logs for the 86th Street Station
Provided by MTA NYCT

Note: only borings located within the APE have been included here.

Appendix B:
Soil Boring Logs for the 86th Street Station
Provided by MTA NYCT

Note: only borings located within the APE have been included here.



LEGEND:

- 2ND AVE - DHA BORINGS (2002-2007)
- 2ND AVE BORINGS (1969-1974)
- BORINGS BY OTHERS
- 2ND AVE BORINGS (1969-1974)
- 2ND AVE - DHA BORINGS
- BORINGS BY OTHERS
- [OW] OBSERVATION WELL

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

SCALE IN FEET
30' 0 30' 60'

MTA CAPITAL CONSTRUCTION NEW YORK CITY TRANSIT

SECOND AVENUE SUBWAY

DMJM HARRIS • ARUP

BOROUGH OF MANHATTAN

GEOTECHNICAL DATA REPORT
86TH STREET STATION

BORING LOCATION PLAN
STA BL 1196+15 TO
STA BL 1203+50
Figure 2.0

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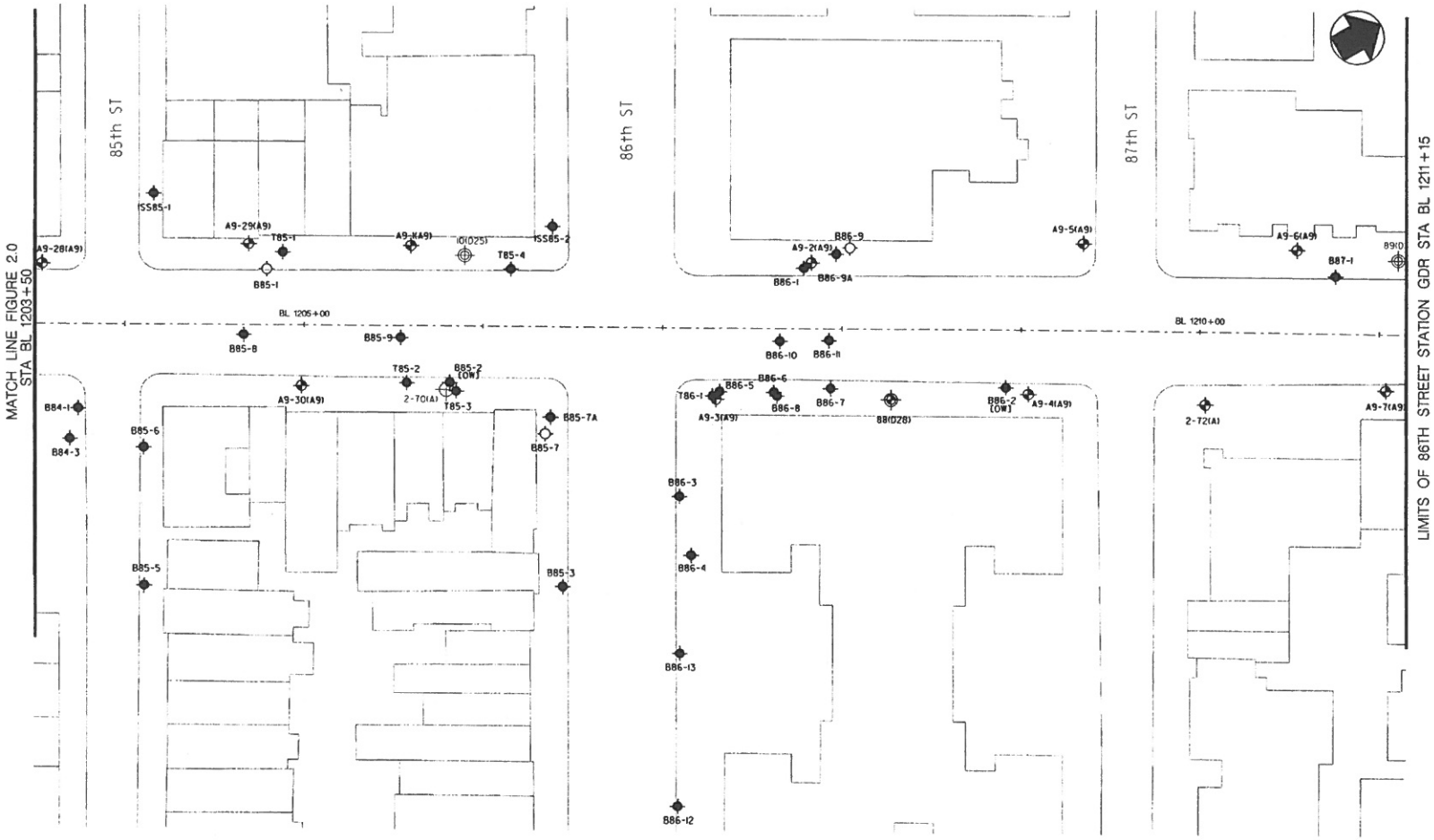

LEGEND:

- 2ND AVE - DHA BORINGS (2002-2007)
- 2ND AVE BORINGS (1969-1974)
- BORINGS BY OTHERS
- 2ND AVE BORINGS (1969-1974)
- 2ND AVE - DHA BORINGS
- BORINGS BY OTHERS
- (OW) OBSERVATION WELL

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

SCALE IN FEET
30' 0 30' 60'

MTA CAPITAL CONSTRUCTION
NEW YORK CITY TRANSIT

SECOND AVENUE SUBWAY

DMJM HARRIS • ARUP A Joint Venture

BOROUGH OF MANHATTAN

GEOTECHNICAL DATA REPORT
86TH STREET STATION

BORING LOCATION PLAN
STA BL 1203+50 TO
STA BL 1211+15
Figure 3.0

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BORING LOG

Sheet: 1 of 1

DMJM HARRIS • AECOM

SECOND AVENUE SUBWAY PROJECT

BORING NO. B82-5

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 159.05	NORTH: 221994.6969
DATUM	EAST: 997141.5075
FINAL BORING DEPTH (FT) 22.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.
SAMPLER HAMMER: 140 lb. Automatic	FOREMAN: P. Lynch
CASING SIZE: 3" to 7"	ENGINEER: D. Persaud
CASING HAMMER: Spun	DATE START: 8/17/04 DATE END: 8/17/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 9/24/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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				
													3				
		S1	2-2.1	50\1"	50/1"	1/1				Very dense, brownish-gray, fine to coarse SAND, some Rock Fragments, trace Silt (SP-SM / 7-65)		DEC ROCK	4				
5																	
		S2	5-6.2	7 10 100\2"	110/8"	14/6				Very dense, olive to greenish-yellow, fine to coarse SAND, trace Silt, trace Gravel, trace Rock Fragments (SP-SM / 7-65)							
												ROCK	5				9
		C1	7-12			5/3.3	66	10		C1: Hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, sub-horizontal to vertical foliation, rough to smooth, very closely to closely spaced, moderately dipping to vertical, slightly weathered, strongly iron-oxide stained foliation joints/fractures; high quartz content. 7.2', 7.8', 8.0', 8.3', 8.8' and 9.8': Cross-foliation joints/fractures, rough to smooth, very closely to closely spaced, sub-horizontal to moderately dipping, slightly weathered, strongly iron-oxide stained. 10.0'-12.0': Fracture zone			6				3
10													7				7
																	N
																	N
																	N
																	N
		C2	12-17			5/3.1	62	7		C2: Similar to Schist in C1, except sub-horizontal to moderately dipping foliation, sub-horizontal to moderately dipping foliation joints/fractures; occasional very thin quartz veins. 14.4'-14.9': Cross-foliation joint/fracture, rough, irregular, sub-vertical to vertical, slightly weathered, strongly iron-oxide stained. 14.9'-15.2' abd 15.6'-15.8': Fracture zone, rough to smooth, very closely spaced, slightly weathered, iron-oxide stained foliation/cross-foliation joints/fractures.							5
15																	7
																	4
																	0
		C3	17-22			5/5	100	54		C3: Similar to Schist in C2, except high quartz content. 19': Cross-foliation joint/fracture, rough, moderately closely spaced, moderately dipping, slightly weathered, iron-oxide stained. 21.3'-21.9': Cross-foliation joint/fracture, rough, irregular, sub-vertical to vertical, iron-oxide stained; truncates at 21.9'							3
20																	3
																	5
													8				7
													9				
25										Bottom of borehole at 22 feet							
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) 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) Hand augered to a depth of 2 feet prior to start of boring.
5) RQD affected by sub-vertical to vertical foliation joint/fracture between 7.3' and 7.8'.
6) "N" denotes no data available.
7) Contiguous and consecutive pieces of rock core retrieved from core C1 and C2 indicate possible core loss between 10.0' and 14.0'
8) RQD affected by sub-vertical to vertical joint/fracture between 21.3' and 21.9'.
9) Bottom of borehole at 22'; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 1

DMJM HARRIS • SELLS

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-4

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 160.60	NORTH: 222188.4731
DATUM : NYCT	EAST: 997411.9480
FINAL BORING DEPTH (FT) 29.4	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling., Inc
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: D. Persaud
CASING HAMMER: SPUN	DATE START: 8/16/04 DATE END: 8/16/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 9/24/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 ROD (%)	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 5 feet prior to start of boring.			3				
5		S1	5-7	5 7 7 12	14	24/16				Medium dense, green-brown SILT, trace fine to medium Sand, trace Gravel, trace Clay (ML / 11-65)							
		S2	7-9	4 11 9 26	20	24/16				Medium dense, brown, fine to medium SAND, little Silt, trace Gravel, trace Rock Fragments, trace Clay pockets (SM / 11-65)							
10		S3	9-11	6 7 19 20	26	24/10				Medium dense, brown, fine to medium SAND, some Silt, trace Gravel, trace Rock Fragments, trace Clay pockets, trace Mica (SP / 7-65)							
												DEC ROCK					
15		S4	15-16.3	10 35 100/4"	135/10"	16/16				Very dense, green-brown, fine to medium SAND, little Silt, trace Rock Fragments, trace Mica (SM / 7-65)							
		S5	20-20	100/0"	100/0"	0/0				No Recovery							
20	6.0											ROCK	4				0
	5.5																0
	6.0	C1	20-24.6			4.6/4.6	100	100		Hard to very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal, no apparent foliation joints/fractures; occasional very thin, very hard, quartzo-feldspathic seams; high quartz, garnet content.							0
	5.5																0
	6.0																0
25	6.5																1
	7.0	C2	24.6-29.4			4.8/4.8	100	100		Similar to Schist in C1, except horizontal to sub-vertical foliation; high quartz, garnet, and mica content.							1
	7.0																2
	7.5																1
	3.0									Bottom of borehole at 29.4 feet			5				1
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) 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) Driving shoe broken during sampling at 20' below ground surface.
5) Bottom of borehole at 29.4'; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP
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SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-5

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.33	NORTH: 221911.3967
DATUM: NYCT	EAST: 997293.1904
FINAL BORING DEPTH (FT) 55.9	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring & Drilling Corp.	
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: P. Lynch	
CASING SIZE: 3"	ENGINEER: D. Persaud	
CASING HAMMER: Spun	DATE START: 11/19/04 DATE END: 11/19/04	
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 11/22/04	

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
	SPU									PAVEMENT THICKNESS: Not recorded		FILL	2				
													3				
		S1	2.3-3.3	14 7	7	12/6				Medium dense, brown, fine to coarse SAND, some Rock Fragments, little Silt, trace Gravel, trace Mica (SM / 11-65)			4				
													5				
5												SILT/ CLAY					
		S2	5-7	2 2 4 5	6	24/15				Medium stiff, gray-brown, Clayey SILT, little fine Sand (ML /10-65)							
		S3	7-8	5 7	21	24/18				Top 12": Green-brown, Clayey SILT, little fine Sand (ML / 10-65)							
		S3A	8-9	14 16						Bot 6": Brown, fine SAND, little Silt, trace Mica (SM/8-65)		SILTY SAND					
		S4	9-9.7	8 7	15	24/18				Top 8": Brown, fine SAND, some Silt, trace Mica (SM / 8-65)							
10		S4A	9.7-11	8 7						Bottom 16": Brown, fine to medium SAND, some Silt, trace Gravel, trace Mica (SM / 7-65)							
		S5	11-13	6 7 11 19	18	24/21				S5: Medium dense, brown-green, slightly micaceous, fine to medium SAND, some Silt, trace Rock Fragments (SM / 7-65)		DEC ROCK					
15		S6	15-16.8	9 11 14 100/3"	25	21/18				Medium dense, brown-white, micaceous, fine to coarse SAND, some Rock Fragments, little Silt (SM / 6-65)							
20		S7	20-21.5	33 43 100/6"	143	18/12				Very dense, gray, micaceous, fine to coarse SAND and ROCK FRAGMENTS, little Silt (SM / 6-65)							
25		S8	25-25.3	100/3"	100/3"	3/3				Very dense, gray, micaceous, fine to coarse SAND, some Rock Fragments, little Silt (SM / 6-65)							
	2.5																
	3.0	C1	27-31.5			4.5/4.5	100	33		C1: Hard to very hard, fresh to severely weathered, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-vertical foliation, rough to smooth, closely		ROCK	6				3
30	2.5																3
																	4

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS				JOINT/FRACTURE CHARACTERISTICS			
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS		WEATHERING		NO. PER FT	SPACING/THICKNESS		ANGLE	ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	(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) Hand Augered to a depth of 2.3 feet prior to start of boring.
5) Split spoon hit an obstruction and deflected at 3.25 feet.
6) Apparent top of rock at 27.0 feet.

BORING LOG | Sheet: 2 of 2

DMJM HARRIS • ARUP
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SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-5

BORING STATION:	OFFSET
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.33	NORTH: 221911.3967
DATUM: NYCT	EAST: 997293.1904
FINAL BORING DEPTH (FT) 55.9	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring & Drilling Corp.
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: D. Persaud
CASING HAMMER: Spun	DATE START: 11/19/04 DATE END: 11/19/04
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 11/22/04

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
	3.0									to moderately closely spaced, slightly weathered, clay coated, chloritized foliation joints/fractures. 27.8', 28.3', and 28.5': Cross-foliation joints/fractures, rough to smooth, closely to moderately closely spaced, sub-horizontal to sub-vertical, slightly weathered, clay coated. 29.9'-31.5': Fracture zone, rough to smooth, very closely spaced, moderately to severely weathered, clay coated foliation/cross-foliation joints/fractures.							9
	3.0																10
	3.5																5
	4.0	C2	31.5-36.0			4.5/4.5	100	58									2
35	4.5																6
	4.0																5
										C2: Similar to Schist in C1. 32.1',32.3',32.8',33.8'-34.3',34.7', and 35.3'-35.7': Cross-foliation joints/fractures, rough to smooth, very closely to moderately closely spaced, sub-horizontal to sub-vertical, slightly weathered, clay coated, chloritized. 36.2'-36.8': Cross foliation joint/fracture, healed, very closely spaced, moderately dipping to sub-vertical.							1
	5.5																3
	5.0	C3	36.0-40.7			4.7/4.7	100	77									3
40	5.0																1
	5.5																1
	6.0																0
	5.5									C3: Similar to Schist in C1, except high mica content. 37.0'-37.1', 37.6', 37.9', 38.5', 39.9', and 40.5'-40.7': Cross-foliation joints/fractures, rough to smooth, closely to moderately closely spaced, sub-horizontal to moderately dipping, slightly weathered, clay coated. 37.1'-37.4': Cross-foliation joints/fractures, healed, closely spaced, sub-vertical.							3
	5.5	C4	40.7-45.7			5.0/5.0	100	85									2
45	5.0																1
	6.0																4
	5.5																1
	5.5																3
	5.5	C5	45.7-50.9			5.2/5.2	100	92		C4: Similar to Schist in C1, except high garnet, mica content. 42.4', 42.8', 43.5', 45.0', and 45.3':Cross-foliation joints/fractures, rough to smooth, very closely to moderately closely spaced, sub-horizontal to moderately dipping, slightly weathered, clay coated, talcified.							2
	5.5																0
50	5.0																4
	5.0																0
	5.0																0
	5.0	C6	50.9-55.9			5.0/5.0	100	96		C5: Similar to Schist in C1. 46.4', 48.3', and 50.2'-50.5': Cross-foliation joints/fractures, rough to smooth, very closely to moderately closely spaced, sub-horizontal to sub-vertical, slightly weathered, clay coated, chloritized.							2
55	5.0																2
	5.0									C6: Similar to Schist in C1.			7				2
										53.2'-53.8': Cross-foliation joint/fracture, healed, sub-vertical. 53.8' and 54.7': Cross-foliation joints/fractures, rough to smooth, moderately closely spaced, sub-horizontal, slightly weathered. 55.5'-55.6': Cross-foliation joint/fracture, severely weathered.							
60																	

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								

7) Bottom of borehole at 55.9'; borehole grouted upon completion.

BORING LOG

Sheet 1 of 2

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-6

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 159.88	NORTH: 222033.6706
DATUM : NYCT	EAST: 997140.7459
FINAL BORING DEPTH (FT) 31.2	

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

BORING CO: Jersey Boring and Drilling Corp.
FOREMAN: Peter Lynch
ENGINEER: Sara Rocha
DATE START: 6/13/05 DATE END: 6/13/05
REVIEWED BY: DA Snee TE: 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
	4" Spun									PAVEMENT THICKNESS.		FILL	1				
													2				
													3				
5		S1	4.5-5.0	32/6"	32/6"	6/6			-	Dense, brown-orange-black-white, fine to medium SAND, some Silt, trace Rock Fragments, trace Mica (SM / 7-65)		DEC ROCK	4				
		S2	7-7.2	100\2"	100/2	2/2			-	Very dense, brown-orange, fine to medium SAND, some Silt, little Gravel, trace Mica, Rock Fragments (SM / 6-65)							
10	5	C1	8-12.4			4.4/4.4	100	59	-	C1: Very hard, fresh, coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, sub-horizontal to moderately dipping foliation, rough, with very close to closely spaced, sub-honzontal to moderately dipping, slightly weathered, heavily iron-oxide stained, clay coated.		ROCK					4
	3																2
	3.5																1
	3.5																3
	2.5	C2	12.4-18.6			6.2/6.2	100	37	-	11.0'-11.3': Cross-foliation joint/fracture, rough, sub-vertical, heavily iron-oxide stained, clay coated.							5
15	3.5									C2. Similar to Schist in C1 16.3'-18.6':Very hard, fresh, medium to coarse grained, light gray, poorly foliated, quartz-mica-garnet SCHIST (Healed Breccia to 18.9') 12.9', 13.6', 14.7', 15.8' and 16.3': Cross-foliation joints/fracture, rough, moderately dipping, slightly weathered, iron-oxide stained. 16.3'-18.6': Fracture zone, rough, very closely spaced, slightly weathered, heavily iron-oxide stained, cross-foliation joints/fractures.							4
	3																3
	2.5																4
	2.5																8
	5	C3	18.6-25.0			6.4/6.4	100	58	-	C3:18.6'-21.3': Very hard, fresh, coarse grained, light brown-gray, quartz-mica-garnet SCHIST, with very thin, folded, highly convoluted, highly crenulated, with frequent concentrations of quartz and mica, rough, with very close to closely spaced, slightly weathered, iron-oxide stained, some pyrite foliation, cross foliation joints/fractures, high garnet content.							10
20	3																5
	4																1
	3																1
	3.5																2
	3.5																6
	4.5																4
25	3																10
	3																1
	2																1
	2.5	C4	25.0-31.2			6.2/6.2	100	97	-	21.3'-24.8': Very hard, fresh, coarse grained, light gray, PEGMATITE, with rough, with very closely spaced, sub-horizontal to vertical, slightly weathered, chlorite, limonite, serecite, iron-oxide stained, cross foliation joints/fractures, frequent quartz rich zones and quartz-mica-garnet Schist zones; high garnet							1
30	2																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)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) Hammer weight bouncing at 4.8'. Removed spoon at 5.0' to check on type of hard surface.
5) Core barrel became blocked

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-6

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 159.88	NORTH: 222033.6706
DATUM : NYCT	EAST: 997140.7459
FINAL BORING DEPTH (FT) 31.2	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.
SAMPLER HAMMER: 140 lb. (Automatic)	FOREMAN: Peter Lynch
CASING SIZE: 4"	ENGINEER: Sara Rocha
CASING HAMMER: N/A (Spun)	DATE START: 6/13/05 DATE END: 6/13/05
ROCK CORE: NQ	REVIEWED BY: DA Snee TE: 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
	2									content; healed fractures throughout.			6				1
35										21.7'-22.0': Garnet rich zone. 25.0'-26.2': Similar to Schist in C1, except closely spaced foliation joints/fractures.							
40																	
45																	
50																	
55																	
60																	

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									

6) Bottom of borehole at 31.2'; observation well installed to a depth of approximately 15'.

BORING LOG

Sheet: 1 of 4

DMJM HARRIS • AKRF

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-7

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 155.27	NORTH: 221931.6230
DATUM : NYCT	EAST: 997313.3864
FINAL BORING DEPTH (FT) 116.2	

SAMPLER: 2" O.D. split spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: A. Depue
CASING SIZE: 4" to 22'	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 09/15/06 DATE END: 09/20/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/29/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
09/21/06	7:30	12.9	21.0	16 hrs

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"									PAVEMENT THICKNESS: 4" Concrete Sidewalk Hand augured to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1	6-8	21 50 60 77	110	20/24			0	Very dense, gray to dark brown, fine to medium SAND, some Clayey Silt, trace Gravel, trace Clayey Silt pockets (SM / 11-65)							
		S2	8-10	18 38 41 34	79	15/24			0	Very dense, gray-brown, fine to medium SAND, little Silt, trace Gravel (SM / 7-65)							
10		S3	10-12	27 26 13 14	39	18/24			0	Top 12": Very dense, gray-brown, fine to medium SAND, little Silt, trace Gravel (SM / 7-65) Bottom 6": Medium dense, brown, micaceous fine to medium SAND, some Silt, trace Rock Fragments (decomposed SCHIST) (SM / 7-65)		DEC ROCK					
15		S4	15-17	26 36 41 42	77	16/24			0	Very dense, gray, slightly micaceous fine to coarse SAND, some Clayey Silt, little Rock Fragments (decomposed Schist) (SM / 6-65)							
20		S5	20-22	28 37 81 56	118	18/24			0	Very dense, light to dark gray, fine to medium SAND, some Clayey Silt, trace Mica (decomposed Schist) (SM / 7-65)			4 5				
	4 5	C1	22.2-27.2			4.6/5.0	91	61		Medium hard, light to dark gray, medium to coarse grained, quartz-mica-garnet SCHIST, with thin, crenulated, sub-horizontal foliation, rough, fresh to slightly weathered, planar to undulating, very closely to closely spaced, sub-horizontal foliation joints/fractures. 22.6' - 22.8' and 22.3' - 22.8': Very close fracture spacing. 22.7, 24.7', and 24.8': Cross-foliation joints/fractures: Rough, planar to undulating, fresh to slightly weathered, closely to very closely spaced, sub-vertical. 22.2' - 27.2': Iron-oxide staining.		ROCK	6				3
25	5 6 6 6 6																4 8 1 0 0 3
30	7																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) 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) Set 4" diameter casing to 20 feet.
5) Spun 4" diameter casing from 20 feet to 22 feet.
6) Harder drilling at 22 feet.

BORING LOG

DMJM HARRIS • AKRF, A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-7

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 155.27	NORTH: 221931.6230
DATUM : NYCT	EAST: 997313.3864
FINAL BORING DEPTH (FT) 116.2	

SAMPLER: 2" O.D. split spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: A. Depue
CASING SIZE: 4" to 22'	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 09/15/06 DATE END: 09/20/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/29/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	6	C2	27.2-37.2			9.9/10.0	99	80		Hard to very hard, dark to light gray and light green, fine to coarse grained, quartz-mica-garnet SCHIST, with thin, poorly laminated, convoluted, sub-horizontal foliation, rough, closely to moderately closely spaced, sub-horizontal foliations with pyrite. 32.7' - 34.5': Tightly healed vertical joints with 1/16" to 1/8" light orange calcite. 32.6' - 33.9': ¼" to ½" vugs and incipient fractures. 28.1', 28.7', 32.6', 32.9', 33.3', and 34.5': Cross-foliation joints/fractures: Planar, rough, sub-horizontal to moderately dipping.						0
	6																2
	6																2
	6																2
	6																10
	6																3
	6																1
40	6	C3	37.2-46.2			8.9/9.0	99	85		Hard to very hard, fresh to slightly weathered, dark gray, fine to coarse grained, quartz-mica-garnet SCHIST, with thin, slightly convoluted, sub-horizontal to moderately dipping foliation, rough, planar, very closely to moderately closely spaced foliation joints/fractures with pyrite. 42.7' - 43.0' and 43.2' - 44.0': Cross-foliation joint: Curved, undulating, moderately dipping to vertical. 38.5', 38.7', 39.6', and 42.2': ½" to ¼" light gray quartz veins.						0
	6																2
	5																2
	6																4
	6																2
	7																0
	5																2
45	7																0
	6																1
	6	C4	46.2-56.2			9.9/10.0	99	93		46.2' - 51.1': Hard, fresh to slightly weathered, dark gray, fine to coarse grained, quartz-mica SCHIST, with poorly laminated, horizontal to sub-horizontal foliations, smooth, planar, closely to moderately closely spaced, horizontal to sub-horizontal foliation joints/fractures, except very closely spaced from 49.05' to 49.7'. 51.1' - 56.2': Very hard, fresh to slightly weathered, dark to light gray, fine to coarse grained, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, moderately dipping foliation, rough, planar to undulating, moderately closely spaced foliation joints/fractures with pyrite. 52.9' and 53.0': Cross-foliation joints/fractures: Rough, planar, irregular and curved, sub-vertical to vertical, with pyrite content. 52.0' - 53.5': Quartz-mica-feldspar rich veins ½" to 1" thick.						1
	6																1
	6																1
50	6																3
	6																3
	8																0
	8																1
	8																1
	6																2
55	8																0
																	0
	6																1
	6																2
	6																2
60	6																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								

(7) Bottom of borehole at 116.2 feet; acoustic televiewer survey performed; in-situ stress testing performed at a depth interval from 96'-103'; borehole grouted upon completion.

BORING LOG

Sheet: 3 of 4

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-7

BORING STATION:	OFFSET: .
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 155.27	NORTH: 221931.6230
DATUM : NYCT	EAST: 997313.3864
FINAL BORING DEPTH (FT) 116.2	

SAMPLER: 2" O.D. split spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: A. Depue
CASING SIZE: 4" to 22'	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 09/15/06 DATE END: 09/20/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/29/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	6	C5	56.2-66.2			10.0/10.0	100	93		56.2' - 65.0': Similar to SCHIST in C4 (as 51.1'-56.2'), except convoluted, crenulated, moderately dipping to sub-vertical foliation from 56.5' to 57.0'. 57.7', 58.4', and 60.5': Cross-foliation joints/fractures: Rough, planar, irregular, moderately dipping, with 1/16" olive green calcite minerals. 65.0' - 66.2': Similar to SCHIST in C4 (from 46.2' to 51.1')							1
	6																0
	8																0
	8																1
	6																2
	8																0
70	5	C6	66.2-76.2			9.9/10.0	99	89		66.2' - 68.6': Similar to SCHIST in C4 (as from 46.2' - 51.1') 67.5' – 67.8', 67.1' – 67.2', and 72.4': Light green blue quartz and feldspar vein with ½" pink garnets 0.05'-0.2' thick. 68.6' - 76.2': Similar to SCHIST in C4 (from 51.1' - 56.2') 66.5' and 66.7': Cross-foliation joints/fractures: Curved, planar, smooth, sub-vertical, with calcite coating.							2
	6																1
	8																2
	10																0
	10																0
	6																1
	6																2
	6																1
75	6																2
	6																2
	6	C7	76.2-86.2			9.8/10.0	98	95		76.2' - 86.2': Hard to very hard, fresh, dark to light gray, fine to coarse grained, quartz-mica-garnet SCHIST, with thin to moderately thick, convoluted, horizontal to sub-horizontal foliation, rough, closely to widely spaced, sub-horizontal foliation joints/fractures with closely spaced white and light gray quartz-feldspar-mica rich veins 1" to 3" thick.							3
	6																2
	7																1
80	7																1
	7																1
	7																2
	8																1
	7																0
85	7																0
	7																0
	8																0
	7																1
	8																0
90	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								

(7) Bottom of borehole at 116.2 feet; acoustic televiewer survey performed; in-situ stress testing performed at a depth interval from 96'-103'; borehole grouted upon completion.

BORING LOG

Sheet: 4 of 4

DMJM HARRIS • AKRF
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-7

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 155.27	NORTH: 221931.6230
DATUM : NYCT	EAST: 997313.3864
FINAL BORING DEPTH (FT) 116.2	

SAMPLER: 2" O.D. split spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: A. Depue
CASING SIZE: 4" to 22'	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 09/15/06 DATE END: 09/20/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/29/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
95	8	C8	86.2-96.2			10.0/10.0	100	100		Very hard, fresh, light to dark gray, fine to coarse grained, quartz-mica-garnet SCHIST, with thin, convoluted, horizontal to sub-horizontal foliation, rough, widely spaced, sub-horizontal foliation joints/fractures.							0
	8																0
	8																0
	8																1
	8																0
	8																0
	8									Similar to SCHIST in C8, except convoluted, crenulated foliation and closely to widely spaced joints/fractures. 105.3' and 104.9': Cross-foliation joints/fractures: Sub-vertical, white quartz mineralization on joints.							0
	8																1
	8																0
100	8																0
	8																0
	7	C9	96.2-106.2			10.0/10.0	100	96									0
	7																0
	7																1
	7																1
105	7																2
	7																0
	8																0
	8									Similar to SCHIST in C8, except convoluted, crenulated foliation and closely to moderately spaced joints/fractures. 108.8' and 115.9': Cross-foliation joints/fractures: Rough, planar, undulating, moderately dipping to sub-vertical, with orange non-softening coating minerals.							1
	8																1
110	8																1
	8	C10	106.2-116.2			10.0/10.0	100	95									2
	8																1
	8																0
	8																0
115	8												7				1
										Bottom of borehole at 116.2 feet							
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	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								

(7) Bottom of borehole at 116.2 feet; acoustic televiewer survey performed; in-situ stress testing performed at a depth interval from 96'-103'; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 4

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-8

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 158.91	NORTH: 222019.241
DATUM : NYCT	EAST: 997169.878
FINAL BORING DEPTH (FT) 114.0	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb. Safety Hammer
CASING SIZE: 4" to 9' and 3" to 15'
CASING HAMMER: 300 lb. Donut
ROCK CORE: NX

BORING CO: Warren George, Inc.
FOREMAN: J. Harris
ENGINEER: C. Burzynski
DATE START: 07/27/06 DATE END: 08/01/06
REVIEWED BY: C. Snee DATE: 01/29/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
7/31/06	7:15	12.7'	11.0'	24 hrs
3/1/06	7:30	8.0'	11.0'	24 hrs

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 ROD (%)	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"									PAVEMENT THICKNESS: 4" Concrete sidewalk Hand augered to a depth of 6 feet prior to boring.		FILL	1				
5		S1	6-7.4	5 42 100/5"	142/1"	12/17				S1: Very dense, orange brown, fine to coarse SAND, little Silt, little Gravel, micaceous (SM / 11-65)			2				
		S2	8-8.6	100/1"	100/1"	6/7				S2: Very dense, brown, fine to coarse SAND, some Silt, trace Rock Fragments, micaceous, (SM / 7-65)			3				
												DEC ROCK	4				
10	4	C1	10-14			4.0/3.7	94	62		C1 Medium hard, slightly weathered, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, sub-horizontal foliation, rough, very closely to closely spaced, iron-oxide stained sub-horizontal foliation joints/fractures. 10.4', 10.7', 11.7'-12.2' and 13.2': Cross-foliation joints/fractures: Rough, irregular, iron-oxide stained, sub-vertical. 13.1' - 13.4': Clay gouge with gravel size rock fragments 1/3" thick.		ROCK					3
	4																4
	5																2
	5																3
15	5	C2	14-19			5.0/3.3	66	8		C2: Similar to SCHIST in C1, except medium hard, sub-horizontal to moderately dipping foliation joints/fractures. 14.0' - 14.3' and 15.4' - 15.8': Cross-foliation joints/fractures: Very closely spaced.							5
	5																>10
	6												5				5
	6																N
	6																5
20	6	C3	19-24			5.0/4.8	95	42		C3: Similar to SCHIST in C1, except medium hard to hard, rough, sub-horizontal foliation joints/fractures. 19.0'-21.3': Cross-foliation joints/fractures: Rough, slightly weathered, iron-oxide stained, sub-vertical. 23.3' - 23.7': Cross foliation joint/fracture: Rough, slightly weathered, iron-oxide stained, sub-vertical, with orange brown calcite coating.							7
	6																7
	5																1
	6																2
	6																4
25	6	C4	24-29			5.0/4.9	98	27		C4: Hard, slightly weathered, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with thin, horizontal to sub-horizontal foliation, rough, planar, iron-oxide stained, horizontal to sub-horizontal joints/fractures. 24.1', 24.2', 26.2', 27.3' and 28.1': Cross-foliation joints/fractures: Rough, slightly weathered, iron-oxide stained sub-vertical. 24.2' - 24.4': Orange brown secondary mineral along joint: rutile 1/4" long and 1/8" thick radial.							5
	6																3
	6																4
	6																2
	6																4
30	5																3

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) 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) Decomposed bedrock Schist from approximately 8.5'.
5) Core barrel blocked up at 17.5 feet continued run to 19.0 feet.

BORING LOG

DMJM HARRIS • ARUP A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-8

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 158.91	NORTH: 222019.241
DATUM : NYCT	EAST: 997169.878
FINAL BORING DEPTH (FT) 114.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: J. Harris
CASING SIZE: 4" to 9' and 3" to 15'	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 07/27/06 DATE END: 08/01/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/29/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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																
	6	C5	29-34			5/5	100	40		C5: Medium to medium hard, slightly weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin to moderately thick, convoluted, sub-horizontal foliation, rough, planar, closely spaced, calcite coated, sub-horizontal foliation joints/fractures. 33.5' - 33.8': Cross-foliation joint/fracture: Rough, planar, very closely spaced, sub-horizontal to sub-vertical. 33.0': Slickensided joints.							5
	6																4
	6																2
	6																8
35	6																3
	6	C6	34-39			5/5	100	22		C6: Similar to SCHIST in C5, except rough to smooth, very closely spaced joints/fractures from 34.2'-34.3', 36.8'-37.0', and 38.6'-38.9' 37.6': Vugs 1/8" and ¼" deep. 36.5' - 38.0': Multiple-incipient fractures. 39.0': Slickensides. 38.6': Cross-foliation joint/fracture: Sub-vertical.							5
	6																4
	6																4
	6																7
40	6																3
	6	C7	39-44			5/4.9	98	32		C7: Similar to SCHIST in C5, except medium to medium hard, convoluted, sub-horizontal foliation, very closely to closely spaced foliation joints/fractures. Incipient fractures: 40.2' - 40.5', 40.9' - 41.0', 41.9' - 42.0' and 43.0' - 43.2'.							4
	5																6
	5																5
	5																3
45	5																5
	5																3
	5	C8	44-49			5/4.8	95	20		C8: Medium hard, slightly weathered, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with thin, convoluted, sub-horizontal foliation, rough, planar to irregular, sub-horizontal foliation joints/fractures. 44.0' - 45.2': Green gray mylonitic SCHIST. 44.2' - 44.4': Vugs 1/8" wide to 1/4" deep. 45.6', 46.8, and 47.7' - 48.5': Orange-white non-softening secondary minerals. 47.9' - 48.3': Cross-foliation joint/fracture: Rough, slightly weathered, sub-vertical.							5
	5																6
	5																10
50	5																2
	6	C9	49-54			5/4.9	98	83		C9: Medium hard, slightly weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with thin to moderately thick horizontal to sub-horizontal foliation, rough, very closely to closely spaced, sub-horizontal foliation joints/fractures with light orange minerals ¼" to ½" thick. Light orange secondary mineral 1/3" thick along incipient fractures from 50.8' with vugs at 52.9'.							2
	6																2
	6																2
	6																3
55	6																4
	6	C10	54-59			5/5	100	42									4
	6																3
	6																4
	6																10
60	6																4

GRANULAR SOILS		COHESIVE SOILS		ROCK CORE CHARACTERISTICS				JOINT/FRACTURE CHARACTERISTICS			
BPF	DENSITY	BPF	CONSISTENCY	HARDNESS		WEATHERING		NO. PER FT	SPACING/THICKNESS		ANGLE ATTITUDE
0-4	Very Loose	<2	Very Soft	1	Very Soft	1	Complete	(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:
6) Bottom of borehole at 114 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • AKRF
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-8

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 158.91	NORTH: 222019.241
DATUM : NYCT	EAST: 997169.878
FINAL BORING DEPTH (FT) 114.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: J. Harris
CASING SIZE: 4" to 9' and 3" to 15'	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 07/27/06 DATE END: 08/01/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/29/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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)	INSITU PROPERTIES: WEATHERING (see below for values)	NUMBER OF FRACTURES PER FOOT (see below for values)	NUMBER
	6																
	6	C11	59-64			5/5	100	30		C10: Medium hard, slightly weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with thin, convoluted, sub-horizontal foliation, rough, very closely to closely spaced, sub-horizontal foliation joints/fractures. 57.9' - 58.7': Cross-foliation joints/fractures: Vertical to sub-vertical. 55.8': Small vugs ¼" wide by ¼" deep.				1 2 3 4 5	1 2 3 4 5	1 2 3 4	3
	6																7
	6																>10
	6																>10
65	6																5
	6	C12	64-69			5/5	100	58		C11: Similar to SCHIST in C10, except moderately weathered from 62.0' - 62.4'. 61.5' - 63.9': Cross-foliation joints/fractures: Sub-vertical. 62.5' to 63.9': Very soft to hard, SCHIST, coarse grained, light orange, white to gray Pegmatite.							3
	6																5
	6																1
	6																2
70	6																3
	6																2
	6	C13	69-74			5/5	100	77		C12: Medium hard, slightly weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin to moderately thick, sub-horizontal foliation, rough to smooth, planar to irregular, sub-horizontal foliation joints/fractures. 64.0' - 64.6' and 65.1' - 65.5': Cross-foliation joints/fractures: Rough to smooth, planar to irregular, sub-vertical, partly coated with mylonite, and non-softening clay minerals. 64.9': Slickensides. 66.2': 2" long ¼" deep vugs.		PEGMATITE					6
	6																2
	6											ROCK					1
75	6											PEGMATITE					3
	6											ROCK					5
	6	C14	74-79			5/5	100	57		C13: Medium hard, slightly weathered, fine to coarse grained, dark green to dark gray, quartz-mica-garnet SCHIST, unfoliated from 71.5' - 73' and convoluted sub-horizontal foliation from 73' - 74', rough, planar to irregular, curved, sub-horizontal foliation joints/fractures. 71.5' - 73.0': Light orange and light gray, medium to coarse grained PEGMATITE. 73.3': Cross-foliation joint/fracture: Irregular, curved, moderately dipping. 69.2', 71.5', 72' and 72.8': Vugs 1" wide.							2
	6																4
	6																1
80	6																1
	6	C15	79-84			5/5	100	100									0
	6																0
	6																0
	6																1
85	6																2
	6																0
	6	C16	84-89			5/5	100	97		C14:: Similar to SCHIST in C13, except light orange to light gray, PEGMATITE, with abundant ¼" to 1/3" light gray platey, mica minerals from 74.4' to 75.7', 74.9' - 75.2': Very closely fractured. 77.4' - 77.7': Vertical discontinuous joint.							0
	6																1
	6																0
90	6																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	
(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:
6) Bottom of borehole at 114 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • AKRF, A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B83-8

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 158.91	NORTH: 222019.241
DATUM : NYCT	EAST: 997169.878
FINAL BORING DEPTH (FT) 114.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: J. Harris
CASING SIZE: 4" to 9' and 3" to 15'	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 07/27/06 DATE END: 08/01/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/29/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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																1
	6	C17	89-94			5/5	100	87		C15: Medium hard, slightly weathered, fine to coarse grained, dark to light gray, quartz-mica-garnet SCHIST, with thin to moderately thick, sub-horizontal foliation, planar to irregular, closely to moderately closely spaced, sub-horizontal foliation joints/fractures.							0
	6																4
	6																0
95	6									C16: Similar to SCHIST in C15, except moderately closely spaced, moderately dipping cross-foliation joints/fractures.							0
	6																0
	6	C18	94-99			5/5	100	100		C17: Similar to SCHIST in C15, except closely to moderately closely spaced, planar sub-horizontal joints/fractures.							1
	6									92.5' - 92.9': Cross-foliation joints/fractures: Irregular, sub-vertical, with light orange, rutile secondary minerals 1/3" thick.							2
	6																1
100	6																1
	6																10
	6	C19	99-104			5/5	100	75		C18: Similar to SCHIST in C15, except closely to moderately closely spaced joints/fractures.							0
	6																4
	6									C19: Similar to SCHIST in C15, except very closely spaced from 102.6' to 102.9'. 99.8' to 101.2: Cross-foliation joints/fractures: Sub-vertical to vertical, and healed joints coated with light orange rutile secondary mineral ¼" thick.							2
105	6																0
	6																0
	6	C20	104-109			5/5	100	100		C20: Similar to SCHIST in C15. 107.8' - 108.4': Incipient fractures.							1
	6																1
	6																1
110	6																1
	6																3
	6	C21	109-114			5/5	100	80		C21: Similar to SCHIST in C15, except closely spaced joints/fractures. 108.8' and 113.3': Cross-foliation joints/fractures: Planar, irregular, moderately dipping to sub-vertical, with 1/8" non-softening mineral coating.							3
	6																2
	6												6				3
115										Bottom of borehole at 114 feet							
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	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:
6) Bottom of borehole at 114 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B84-4

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.47	NORTH: 222141.2647
DATUM : NYCT	EAST: 997420.5723
FINAL BORING DEPTH (FT) 117.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: D. Samugiel
CASING SIZE: 3" to 12'	ENGINEER: D. Wendt
CASING HAMMER: 300 lb. Donut	DATE START: 9/29/06 DATE END: 10/5/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/24/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 ROD (%)	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	4"									PAVEMENT THICKNESS: 6" Concrete Sidewalk Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1	6-8	3 1 2 1	3	24/12			0	S1: Soft, brown, Silty CLAY, little Sand, trace Gravel (CH-MH / 11-65)							
		S2	8-9	3 100\6"	100\6"	12/3			0	S2: Very dense, coarse GRAVEL (Boulder) (GP / 11-65)							
10		S3	10-11	19 100\6"	100\6"	12/1			0	S3: Decomposed ROCK FRAGMENTS (GP / 11-65)		DEC ROCK					
	7 6 7 3 5	C1	12-17			5.0/4.0	80	61		C1: Hard to moderately hard, slightly to moderately weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very close to closely spaced, sub-horizontal, slightly to moderately weathered, iron-oxide stained foliation joints/fractures.		ROCK					1 2 1 5 1
20	7 8 9 8 14	C2	17-22			5.0/4.6	92	23		C2: Soft to hard, slightly to severely weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, sub-horizontal foliation, rough, very close to closely spaced sub-horizontal, slightly to severely weathered, iron oxide stained foliation joints/fractures. 17.0'-18.3' and 19.2'-19.6': Cross-foliation joints/fractures: Rough, slightly to moderately weathered, very closely spaced, iron-oxide stained, moderately dipping to sub-vertical.							8 2 4 >10
25	12 15 18 21 21	C3	22-27			5.0/5.0	100	95		C3: Hard to very hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, sub-horizontal foliation, rough, very closely to closely spaced, fresh to slightly weathered, sub-horizontal, foliation joints/fractures. 25.9' – 26.9': Cross-foliation joints/fractures: Rough, slightly weathered, sub-vertical.							5 0 1 0 2
	17 8	C4	27-29			2.0/1.9	95	75		C4: Similar to SCHIST in C3 except, hard.							2 2 2 3
30	6																

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) 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).

BORING LOG

Sheet: 2 of 4

DMJM HARRIS • ARUP
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SECOND AVENUE SUBWAY PROJECT

BORING NO. B84-4

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.47	NORTH: 222141.2647
DATUM : NYCT	EAST: 997420.5723
FINAL BORING DEPTH (FT) 117.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: D. Samugiel
CASING SIZE: 3" to 12'	ENGINEER: D. Wendt
CASING HAMMER: 300 lb. Donut	DATE START: 9/29/06 DATE END: 10/5/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/24/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	20	C5	29-32			3.0/2.3	93	63		C5: Hard, slightly weathered, fine to coarse grained, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to closely spaced, slightly weathered, horizontal to sub-horizontal, foliation joints/fractures. 30.2'-30.6': Thin Quartz band 30.1'-30.3': Cross-foliation joint/fracture: Healed, moderately dipping. C6: Hard, slightly weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, horizontal to sub-horizontal foliation, rough, slightly weathered, very closely to closely spaced, horizontal to sub-horizontal, foliation joints/fractures. 33.0'-33.5': Cross-foliation joint/fracture: Healed, sub-vertical. 32.2' and 36.3': Cross-foliation joints/fractures: Slightly weathered, sub-horizontal. C7: Similar to SCHIST in C5, except fresh. 37.2' – 37.9': Cross-foliation joints/fractures: Rough, slightly weathered, moderately dipping. C8: Hard to very hard, fresh, fine to coarse grained, gray, quartz-mica SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, moderately closely spaced, fresh, sub-horizontal foliation joints/fractures. 46.5' – 46.7': Cross-foliation joints/fractures: Rough, moderately dipping. C9: Very soft to medium hard, moderately to severely weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, moderately to severely weathered, very closely to closely spaced, foliation joints/fractures. Cross-foliation joints/fractures: Rough, very closely to closely spaced, slightly to severely weathered, moderately dipping to sub-vertical throughout run. C10: Similar to SCHIST in C7, except closely to moderately closely spaced foliation joints/fractues.						1
	19																4
	19																3
	12																2
35	15	C6	32-37			5.0/4.3	86	66									2
	8																4
	7																3
	4																2
	3																0
40	3.5	C7	37-42			5.0/4.8	96	83									0
	3																1
	5																1
	8																0
	8																0
45	8	C8	42-47			5.0/5.0	100	96									0
	18																1
	13																3
	7																8
	3.5																>10
50	11.5	C9	47-52			5.0/4.3	86	15									1
	14																4
	20																>10
	11																1
	18																0
55	14	C10	52-57			5.0/5.0	100	90									0
	9																2
	17																0
	18																0
	26																0
60	20	C11	57-62			5.0/5.0	100	95									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:
4) Bottom of borehole at 117.5 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • AECOM

SECOND AVENUE SUBWAY PROJECT

BORING NO. B84-4

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.47	NORTH: 222141.2647
DATUM : NYCT	EAST: 997420.5723
FINAL BORING DEPTH (FT) 117.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: D. Samugiel
CASING SIZE: 3" to 12'	ENGINEER: D. Wendt
CASING HAMMER: 300 lb. Donut	DATE START: 9/29/06 DATE END: 10/5/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/24/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	21									C11: Very hard, fresh, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, moderately closely spaced, slightly weathered, sub-horizontal foliation joints/fractures. 57.9'-58.9': High quartz content. 59.1': Cross-foliation joints/fractures: Rough, fresh, moderately dipping.							1
	34																1
	11	C12	62-67			5.0/5.0	100	75									2
	10																2
	13																0
	13																0
	14									C12: Similar to SCHIST in C11. 62.0' – 63.3': Cross-foliation joint/fracture: Rough, slightly weathered, vertical. 63.8'-64.5': Cross-foliation joint/fracture: Rough, slightly weathered, sub-vertical to vertical. 66.0' – 67.0': Three healed sub-horizontal foliation fractures.							1
70	14																0
	15.5																0
	15	C13	67-72			5.0/5.0	100	100									0
	12																0
	9.5																0
	17																0
	13									C13: Similar to SCHIST in C11. 70.0' – 70.4': Quartz band.							0
75	3	C14	72-77			5.0/5.0	100	100									1
	4																0
	4.5																0
	4.5									C14: Similar to SCHIST in C11.							0
	3																0
80	3.5	C15	77-82.1			5.1/5.1	100	100									0
	4									C15: Similar to SCHIST in C11.							1
	3																0
	4																3
	4									C16: Similar to SCHIST in C11. 83.0'-83.3' and 84.3'-84.8': Cross-foliation joints/fractures: Rough, slightly weathered, moderately dipping.							3
85	4	C16	82.1-87.2			5.1/5.1	99	60									5
	5																0
	6									C17: Very hard, fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, horizontal to sub-horizontal foliation. Very thin quartz bands 0.05'-0.1' thick.							1
	2																0
	2																0
90	2	C17	87.2-92.3			5.1/4.9	96	96									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								

NOTES:
4) Bottom of borehole at 117.5 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 4 of 4

DMJM HARRIS • AKRF A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B84-4

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.47	NORTH: 222141.2647
DATUM : NYCT	EAST: 997420.5723
FINAL BORING DEPTH (FT) 117.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: D. Samugiel
CASING SIZE: 3" to 12'	ENGINEER: D. Wendt
CASING HAMMER: 300 lb. Donut	DATE START: 9/29/06 DATE END: 10/5/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/24/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	2																0
	2																0
	5																0
	3									C18: Similar to SCHIST in C11.							0
95	3	C18	92.3-97.4			5.1/5.1	100	100									0
	3																0
	3																0
	3									C19: Similar to SCHIST in C18. 100.0' - 100.4: Cross-foliation joint/fracture: Rough, slightly weathered, sub-vertical.							0
	3																0
100	2	C19	97 4-102.4			5.0/4.9	98	94									0
	2																1
	2																0
	3									C20: Very hard, fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation.							0
	3																0
105	3	C20	102.4-107.4			5.0/4.9	98	98									0
	4																0
	3																0
	3									C21: Similar to C-20 except, rough, slightly weathered, moderately closely spaced, horizontal, foliation joint/fracture.							0
	3																0
110	3	C21	107.4-112.5			5.1/5.1	100	100									1
	3																0
	3																0
	2.5									C22: Very hard, fresh, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, slightly weathered, horizontal to sub-horizontal foliation joints/fractures.							0
	4																0
115	3	C22	112.5-117.5			5.0/5.0	100	91									1
	4																0
	3												4				2
										Bottom of borehole at 117.5 feet							
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	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:
4) Bottom of borehole at 117.5 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 4

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B84-5

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.73	NORTH: 222118.205
DATUM : NYCT	EAST: 997459.676
FINAL BORING DEPTH (FT) 118.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: R. Verpent/J. St. Germain
CASING SIZE: 4" to 19'	ENGINEER: D. Wendt
CASING HAMMER: 300 lb. Donut	DATE START: 10/13/06 DATE END: 10/18/06
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 01/23/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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"									PAVEMENT THICKNESS: 6" Concrete Sidewalk		FILL	1				
										Hand augered to a depth of 6 feet prior to boring.			2				
5													3				
		S1	6-7.5	5 4 100\6"	104	18/3			0	Loose to very dense, gray brown Clayey SILT, and fine to coarse SAND, trace Gravel (ML & SM / 11-65)							
		S2	8-10	7 11 14 23	25	24/14			0	Medium dense, gray to brown, fine SAND, and SILT, little Clayey Silt pockets (SM / 11-65)							
10		S3	10-12	11 21 29 39	50	24/9			0	Dense, gray to brown, fine to medium SAND, little Silt (SM / 11-65)							
		S4	12-14	18 38 48 47	86	24/12			0	Very dense, brown, fine to coarse SAND, little Silt (SM / 11-65)							
15		S5	14-15.3	11 37 100\4"	137	15/6			0	Very dense, gray to brown, fine to coarse SAND, some Silt, trace Gravel (SM / 11-65)							
		S6	16-16.9	14 100\5"	100	11/4			0	Very dense, gray to brown, fine to coarse SAND, some Silt, trace Gravel (SM / 11-65)							
20	5 4 1 2 2	C1	19-24			5/4.5	90	43		Medium hard to hard, slightly to severely weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, slightly weathered, closely spaced, horizontal to sub-horizontal foliation joints/fractures. 21'-21.3': Iron-oxide staining.		SCHIST					1 1 9 3 2
25	2 2 2 2 2 2.5	C2	24-34.1			10.1/10.1	100	66		Hard to very hard, fresh to slightly weathered, gray, fine to coarse grained, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, slightly weathered, closely spaced, horizontal to sub-horizontal foliation joints/fractures.							3 2 2 2 2 0
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) 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).

BORING LOG

DMJM HARRIS • AECOM
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B84-5

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.73	NORTH: 222118.205
DATUM : NYCT	EAST: 997459.676
FINAL BORING DEPTH (FT) 118.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: R. Verpent/J. St. Germain
CASING SIZE: 4" to 19'	ENGINEER: D. Wendt
CASING HAMMER: 300 lb. Donut	DATE START: 10/13/06 DATE END: 10/18/06
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 01/23/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	3																0
	2.5																1
	3																1
	3																4
35	2																4
	2																4
	2																2
	2																0
	3	C3	34.1-44.1			10/9.9	99	80		Very soft to hard, fresh to completely weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, completely to moderately weathered, very closely to widely spaced, horizontal, foliation joints/fractures. 36.1'-36.5': Severely weathered zone							0
40	2																0
	2																0
	3																0
	3																0
	3																1
45	2																1
	2																4
	2																4
	2	C4	44.1-51.3			7.2/7	97	68		Very hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, moderately to slightly weathered, closely to moderately closely spaced, horizontal to sub-horizontal, foliation joints/fractures. 41.4'-41.8' and 46.7'-47.5': Cross-foliation joints/fractures: Rough, slightly to moderately weathered, sub-vertical to vertical. 45.6'-45.9': Cross-foliation joint/fracture: Rough, slightly weathered, slightly chloritic, sub-horizontal.							2
	2																0
50	2																0
	2																0
	11																2
	3																2
	3																1
55	3																1
	3																1
	4	C5	51.3-61.3			10/10	100	90		Similar to SCHIST in C4. 53.1' and 61': Cross-foliation joints/fractures: Rough, irregular, slightly weathered, vertical.							1
	5																1
	11																1
60	11																3

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:
4) Bottom of borehole at 118.5 feet; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • AECOM

SECOND AVENUE SUBWAY PROJECT

BORING NO. B84-5

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.73	NORTH: 222118.205
DATUM : NYCT	EAST: 997459.676
FINAL BORING DEPTH (FT) 118.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: R. Verpent/J. St. Germain
CASING SIZE: 4" to 19'	ENGINEER: D. Wendt
CASING HAMMER: 300 lb. Donut	DATE START: 10/13/06 DATE END: 10/18/06
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 01/23/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
	10																3
	4																1
	4																1
	3.5																1
65	3.5																2
	3.5	C6	61.3-71.3			10/9.9	99	86		Hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, slightly to moderately weathered, close to moderately closely spaced, horizontal to sub-horizontal, foliation joints/fractures. 68.95'-69.35' and 69.95'-70.35': quartz zone 61.25'-61.8', 61.95'-62.05' and 68.0'-68.1': Cross-foliation joints/fractures: Rough, slightly weathered, moderately dipping to sub-vertical.							3
	3.5																2
	2																0
	3.5																1
70	3																2
	3																3
	3																0
	3																0
	4																1
	4									Similar to SCHIST in C5.							0
75	3																0
	3	C7	71.3-81.3			10/9.9	99	90									2
	4																1
	3																1
80	4																1
	4																0
	3																2
	3																1
	3									Similar to SCHIST in C5. 83.25'-83.75': Cross-foliation joints/fractures: Rough, moderately weathered, sub-vertical. 87.6'-87.8': Cross-foliation joints/fractures: Rough, slightly weathered, moderately dipping.							2
85	2	C8	81.3-88.1			6.8/6.5	95	76									1
	3																2
	3																0
	3																2
	3																1
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:
4) Bottom of borehole at 118.5 feet; borehole grouted upon completion.

BORING LOG

Sheet: 4 of 4

DMJM HARRIS • AKRF
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B84-5

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.73	NORTH: 222118.205
DATUM : NYCT	EAST: 997459.676
FINAL BORING DEPTH (FT) 118.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.	GROUND WATER READINGS
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: R. Verpent/J. St. Germain	DATE / TIME / DEPTH / CASING / STAB. TIME
CASING SIZE: 4" to 19'	ENGINEER: D. Wendt	
CASING HAMMER: 300 lb. Donut	DATE START: 10/13/06 DATE END: 10/18/06	
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 01/23/07	

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
95	3	C9	88.1-98.1			10/9.4	94	89		Similar to SCHIST in C5. 97.9'-98.1': Cross-foliation joint/fracture: Rough, slightly weathered, sub-vertical.							2
	3																0
	3																1
	3																0
	2.5																1
	3																1
	3																1
	2.5																0
100	3	C10	98.1-103.5			5.5/5.5	100	63		Medium to very hard, fresh to severely weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, horizontal foliation, rough, moderately to slightly weathered, closely spaced, horizontal to sub-horizontal, foliation joints/fractures. 98.6'-99.2': Rough, slightly weathered, with calcite deposits and iron-oxide staining. 101.3'-102.7': Highly fractured zone, vertical/horizontal fractures.							2
	2.5																2
	3																1
	2																1
	2																10
	2																1
105	2	C11	103.5-113.5			10/10	100	78		Hard to very hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin to very thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, fresh to slightly weathered, very closely to moderately closely spaced, horizontal to sub-horizontal, foliation joints/fractures. 106.3', 107.6', 109.25'-109.58', 109.6', and 110.7'-110.9': Cross-foliation joints/fractures: Rough to slightly smooth, slightly weathered, moderately dipping to vertical, chloritic. cross foliation fractures.							2
	2																2
	2																3
	3																3
	3																3
110	3																0
	3																3
	3																2
	4																0
	3																0
115	3	C12	113.5-118.5			5/5	100	76		Similar to SCHIST in C-11. 116.0'-116.5': Cross-foliation joints/fractures: Rough, slightly weathered, vertical.							0
	3																1
	4																0
	4																2
	4												4				2
										Bottom of borehole at 118.5 feet							
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	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:
4) Bottom of borehole at 118.5 feet; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • AIRUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B85-3

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 157.56	NORTH: 222582.1314
DATUM : NYCT	EAST: 997727.3183
FINAL BORING DEPTH (FT) 99	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb Safety Hammer
CASING SIZE: 3"
CASING HAMMER: N/A
ROCK CORE: NQ

BORING CO: Jersey Boring and Drilling Co., Inc
FOREMAN: P. Lynch
ENGINEER: D. Persaud
DATE START: 04/19/04 DATE END: 04/21/04
REVIEWED BY: M.A. Ponti, Jr DATE: 5/20/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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: 6" Concrete Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1	6-8	5 16 19 24	35	24/24			0	Dense, brown, fine to medium SAND, some Silt, trace Gravel, trace Cobble, trace Mica (SM / 11-65)							
		S2	8-10	14 16 14 15	30	24/24			0	Dense, brown, slightly micaceous, fine to medium SAND, some Silt, trace Rock Fragments (SM / 7-65)		DEC ROCK					
10		S3	10-11.9	8 8 12 100\5"	20	24/12			0	Medium dense, brown, micaceous, fine to medium SAND, some Silt, trace Rock Fragments (SM / 7-65)							
15	2.0 2.5	C1	15.0-17.2			2.2/2.2	100	100		C1: Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, convoluted, horizontal to sub-horizontal foliation, smooth to rough, closely spaced, horizontal to sub-horizontal, slightly weathered, iron-oxide stained, chloritized, mineralized foliation joints/fractures.		ROCK	4				1 2
	2.5 3.0	C2	17.2-27.0			9.8/9.8	100	100		16.7'-17.0': Apparent healed cross-foliation joint/fracture.							1 0
20	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0									C2: Similar to Schist in C1, except widely spaced foliation joints/fractures; frequent 0.05' to 0.20' thick Quartz bands. 17.9'-18.2': Cross-foliation joints/fractures, rough to smooth, very closely spaced, moderately dipping to sub-vertical.							0 0 0 0 0 0 0 0 1
25	3.0 3.5 3.5 3.5																0 4 7
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) 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) 4" casing spun to a depth of 15'.
5) RQD affected by vertical cross-foliation joint/fracture between 35.9'-36.8'.

BORING LOG

Sheet: 1 of 1

DMJM HARRIS • AKRF

SECOND AVENUE SUBWAY PROJECT

BORING NO. B85-7

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 155.27	NORTH: 221931.6230
DATUM : NYCT	EAST: 997313.3864
FINAL BORING DEPTH (FT) 14.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: A. Dupue
CASING SIZE: 4" & 3"	ENGINEER: M. Grifasi
CASING HAMMER: 300 lb	DATE START: 8/28/2006 DATE END: 8/29/2006
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 01/26/07

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0	4"									PAVEMENT THICKNESS: 4" Concrete Sidewalk Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5																	
10	4 4 4.5 4.5 5	C1	9-14			5.0/4.9	98	27		Medium hard to hard, slightly to moderately weathered, fine to coarse grained, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to closely spaced, planar to undulating, iron-oxide stained, horizontal to sub-horizontal foliation joints/fractures. 13.7': Cross-foliation joint/fracture: Rough, undulating, slightly weathered, iron-oxide stained, sub-vertical.		ROCK	4 5				10 >10 3 2 3
15										Bottom of borehole at 14.0 feet							
20																	
25																	
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) 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) Borehole terminated at 14.0 feet; borehole location was too close to the basement of adjacent building; to avoid any damage to the basement borehole moved further N-W and drilled new borehole as B85-7A.
5) Bottom of borehole at 14.0 feet; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • AECOM

SECOND AVENUE SUBWAY PROJECT

BORING NO. B85-7A

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 159.73	NORTH: 222622.1943
DATUM : NYCT	EAST: 997641.2389
FINAL BORING DEPTH (FT) 118.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: A. Dupue
CASING SIZE: 4" & 3"	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 9/7/06 DATE END: 9/13/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 9/19/06

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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"									PAVEMENT THICKNESS: 4" Concrete Sidewalk		FILL	1				
										Hand augered to a depth of 6 feet prior to boring.			2				
5													3				
		S1	6.5-7.8	40 90 100\4"	190\10"	16/14				S1: Very dense, gray-brown, fine to coarse SAND, little Silt, little Gravel, trace Mica, trace Wood, trace Brick Fragments(SM / 6-65)							
		S2	8.0-8.2	100\3"	NA	3/3				S2: Very dense, gray-brown, ROCK FRAGMENTS, little fine to coarse Sand, little Silt, trace Mica (decomposed rock) (GM / 6-65)		DEC ROCK					
10	6											ROCK					
	6									Hard, slightly weathered, light to dark gray, fine to coarse grained, quartz-mica-garnet SCHIST, with thin, sub-horizontal foliation, rough, closely spaced, iron-oxide stained, sub-horizontal foliation joints/fractures.							2
	6	C1	9-14			5.0/4.9	98	60		13.8', 10.5', 12.5' and 13.1': Cross-foliation joints/fractures: Rough, planar to undulating, iron-oxide stained, moderately dipping to sub-vertical.							4
	6									13.5': Cross-foliation joint/fracture: Sub-vertical, incipient, with deep vugs.							2
	6																5
15	6									Similar to SCHIST in C1. 15.5' and 16.5'-17.3': Cross-foliation joints/fractures: Undulating, iron-oxide stained, moderately dipping to sub-vertical. 15.0', 15.3', 16.0' and 19.0': 1" thick white, and light gray, Quartz and Feldspar veins. 17.6': Pyrite minerals 1/64" platey.							1
	6																2
	6	C2	14-19			5/5	100	73									2
	6																5
	6																3
	6																2
20	6																0
	6																3
	6									Hard, fresh to slightly weathered, dark to light gray, fine to coarse grained, quartz-mica-garnet SCHIST, with thin, convoluted, sub-horizontal to vertical foliation, rough, very closely to closely spaced, iron-oxide stained, sub-horizontal to sub-vertical foliation joints/fractures.							0
	6																3
	6																0
	6	C3	19-29			10/9.2	92	77									2
25	6									20.3', 21.0', 22.5', 22.8', 23.1', 23.8', and 26.6': Cross-foliation joints/fractures: Rough, planar to undulating, moderately dipping to sub-vertical. 27.8': Planar, discontinuous joint, with yellow brown calcite deposits. 26.8'-27.1' and 28.0'-28.2': Cross-foliation joints/fractures: Sub-vertical, Incipient.							2
	6																0
	6																3
	6																1
	6																1
	6																3
30	7																4

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

BORING LOG

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B85-7A

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 159.73	NORTH: 222622.1943
DATUM : NYCT	EAST: 997641.2389
FINAL BORING DEPTH (FT) 118.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: A. Dupue
CASING SIZE: 4" & 3"	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 9/7/06 DATE END: 9/13/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 9/19/06

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
35	7	C4	29-39			10/10	100	68		29.0' – 39.0', 29.0' - 29.9' and 33.7' - 39.0': Similar to SCHIST in C3, except closely to moderately closely spaced joints/fractures. 29.9'-33.7': Moderately hard, slightly weathered, medium to dark gray, fine to medium grained, quartz-mica-amphibole SCHIST, with faint, thin, sub-horizontal foliation, rough, very closely to closely spaced, sub-horizontal foliation joints/fractures with several vugs. 31.4' and 31.7': 1" thick, white, quartz and feldspar veins. 34.6': Cross-foliation joint/fracture: Sub-vertical, with a thin white calcite coating along joint surface.							1
	7																1
	7																0
	7																2
	7																1
	7																2
	7																1
	7																0
	7																2
40	7	C5	39-47			8/8	100	97		39.0'-43.0': Very hard to hard, fresh, light to dark gray, fine to coarse grained, quartz-mica-garnet SCHIST, with thin, sub-horizontal foliation, rough, widely spaced, sub-horizontal foliation joint/fracture. 43.0'-47.0' Very hard, fresh, (except slightly weathered 46.8 to 47.0) dark gray, fine to medium grained, quartz-mica-amphibole SCHIST, with faint, thin, sub-horizontal foliation, rough, moderately closely spaced, sub-horizontal foliation joints/fractures. 44.3' and 45.5': Cross-foliation joints/fractures: Rough, planar, tightly healed, sub-vertical, with white calcite coating. 46.5-46.8': Incipient fracture.							0
	7																0
	7																0
	7																0
	7																2
45	7																0
	7																2
	7																5
	15	C6	47-49			2/2	100	NA		Similar to SCHIST in C5 as 43.0'-47.0'. 47.5'-48.0' and 48.7'-48.3': Light pink and light gray, quartz and feldspar Pegmatite veins.							3
	15																1
50	15																4
	9									Hard to very hard, fresh to slightly weathered, dark gray to gray, fine to coarse grained, quartz-mica SCHIST, with thin, poorly laminated, sub-horizontal foliation, rough, very closely to widely spaced, sub-horizontal foliation joints/fractures. 49.0 - 49.4': Pink and white quartz and feldspar Pegmatite vein. 50.0' - 50.2': Very closely spaced foliation fractures with vugs.							0
	7																0
	7																0
	7	C7	49-59			10/10	100	96									0
55	7																0
	7																0
	7																0
	7																0
	7																0
	7																0
60	7																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										

Notes:
4) 89.0' – 94.0': Possible core pieces lodged in bit may have contributed to longer coring rates.
5) 102' to 104': Missing core run.
6) Bottom of borehole at 118.0 feet; acoustic televiewer survey performed; borehole grouted upon completion

BORING LOG

DMJM HARRIS • AKRF, A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B85-7A

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 159.73	NORTH: 222622.1943
DATUM : NYCT	EAST: 997641.2389
FINAL BORING DEPTH (FT) 118.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: A. Dupue
CASING SIZE: 4" & 3"	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 9/7/06 DATE END: 9/13/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 9/19/06

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	7	C8	59-69			10/9.9	99	93		Similar to SCHIST in C7 64.6'-65.0' and 65.2'-65.8': Thick bands of fine to medium grained amphibole SCHIST. 59.7': Cross-foliation joint/fracture: Moderately dipping. 60.0' – 60.3': Cross-foliation joint/fracture: Sub-vertical, thin, tightly healed joint with 1/64" light orange calcite coating.							1
	7																1
	7																0
	7																1
	7																0
	7																0
	7																0
	7																1
70	7	C9	69-79			10/10	100	100		Similar to SCHIST in C7, except slightly convoluted foliation. 76.6' - 77.2': Cross-foliation joint/fracture: Rough, planar, sub-vertical, with 1/16" thick, dark orange and yellow calcite coating.							1
	7																0
	7																0
	7																0
	9																0
75	9																1
	8																0
	7																0
	7																1
	7																1
80	7	C10	79-89			10/10	100	95		Similar to SCHIST in C7, except very hard from 84.0' 79.6' – 79.8': Sub-horizontal, ¼" thick dark gray green mylonite veins. 82.6' - 82.8': Cross-foliation joint/fracture: Incipient, sub-vertical. 82.8'- 83.0 ': Cross-foliation joint/fracture: Rough, undulating, sub-vertical, with dark yellow calcite along joint.							2
	7																3
	7																2
	7																2
	8																1
85	10																1
	15																0
	12																0
	14																1
	14																1
90	30												4				0
																	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	
(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:
4) 89.0' – 94.0': Possible core pieces lodged in bit may have contributed to longer coring rates.
5) 102' to 104': Missing core run.
6) Bottom of borehole at 118.0 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 4 of 4

DMJM HARRIS • AECOM

SECOND AVENUE SUBWAY PROJECT

BORING NO. B85-7A

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 159.73	NORTH: 222622.1943
DATUM : NYCT	EAST: 997641.2389
FINAL BORING DEPTH (FT) 118.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: A. Dupue
CASING SIZE: 4" & 3"	ENGINEER: C. Burzynski
CASING HAMMER: 300 lb. Donut	DATE START: 9/7/06 DATE END: 9/13/06
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 9/19/06

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
95	17	C11	89-99			10/10	100	100		Similar to SCHIST in C7, except slightly convoluted, sub-horizontal to moderately dipping foliation. 92.2' - 92.4' and 97.2' - 97.4': 1 ½" light gray and white quartz and feldspar vein. 94.5', 94.7' - 95.1', 95.2' - 95.5': Cross-foliation joint/fracture: 1/16" thick, tightly healed, moderately dipping to sub-vertical, with white kaolinite.							1
	30																0
	25																0
	30																0
	10																0
	8																0
	8																0
	8																0
	8																1
100	8	C12	99-109			10/8.0	80	65		Similar to SCHIST in C7 100.6' and 104.0': Hard to medium hard, slightly to completely weathered, quartz-mica SCHIST. 100.7', 101.4', 101.8' and 105.4': Cross-foliation joint/fracture: Smooth, planar, moderately dipping to sub-vertical, with gray waxy chlorite coating. 108.0' – 108.3': Cross-foliation joint/fracture: Tightly healed, sub-vertical, with 1/8" thick dark yellow calcite vein. 108.8'-109.0': Cross-foliation joint/fracture: Sub-vertical, incipient fracture.			5				0
	8																2
	8																10
	8																N
	8																1
105	8																1
	8																2
	8																2
	8																3
110	8																4
	8																0
	8																0
	8																0
	8	C13	109-118			9.0/8.9	99	95		Very hard, fresh, except slightly weathered, from 109.0' to 109.4' gray to dark gray, fine to coarse grained, quartz-mica SCHIST, with thin, sub-horizontal foliation, rough, widely spaced, except closely spaced from 109.0' to 109.4', sub-horizontal foliation joints/fractures.							0
115	8																0
	8																0
	8																1
	8																0
													6				0
120										Bottom of borehole at 118.0 feet.							

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:

4) 89.0' – 94.0': Possible core pieces lodged in bit may have contributed to longer coring rates.

5) 102' to 104': Missing core run.

6) Bottom of borehole at 118.0 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 4

DMJM HARRIS • AECOM
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS85-2

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.40	NORTH: 222675.112
DATUM : NYCT	EAST: 997547.824
FINAL BORING DEPTH (FT) 116.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: J. Bryant
CASING SIZE: 4"	ENGINEER: G.Gutshteyn
CASING HAMMER: 300 lb. Donut	DATE START: 8/21/06 DATE END: 8/25/06
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 8/25/06

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
8/22/06	10:00	12.2'	15.0'	

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"									PAVEMENT THICKNESS: 5" Concrete Sidewalk Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5	5 5	S1	5-6.9	7 9 11 100\5"	20	23/12	12			Medium dense, brown, fine to coarse SAND, some Clayey Silt, trace Gravel (SM / 11-65)							
	5/4																
	5/4 5/3 5/4 5/4 5	C1	8-13			5/4.1	82	20		Hard to medium hard, slightly to moderately weathered, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to closely spaced, horizontal to sub-horizontal, iron-oxide stained foliation joints/fractures. Cross-foliation joints/fractures: Rough, very closely to closely spaced, vertical to sub-vertical, slightly to moderately weathered, iron-oxide stained throughout run.		ROCK					6 8 5 10 1
10	5 5												4				N
15	4 4 2	C2	15-18			3/2.5	83	52		Hard, slightly weathered, fine to coarse grained, light gray, quartz-mica SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to closely spaced, horizontal to sub-horizontal, iron-oxide stained foliation joints/fractures. 15.2'-15.4': Cross-foliation joints/fractures: Rough, irregular, very closely spaced, sub-vertical, slightly weathered, iron-oxide stained sericite.							3 3 1 1
20	4 4 4 4.5 4	C3	18-28			10/9.3	93	60		Similar to Schist in C2. 19.4'-20.2' and 26.7'-27.3': Cross-foliation joints/fractures: Rough, very closely spaced, sub-vertical, slightly to moderately weathered, iron-oxide stained, chloritized, brecciated.							5 2 3 2 2
25	4.5 4.5 4.5 5																2 2 2 4
30	4 4.5																3 3

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) Could not keep a seal at 13'. Spun casing to 15' and cleaned out borehole to prevent sidewalk from undermining.

BORING LOG

DMJM HARRIS • AKRF A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS85-2

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.40	NORTH: 222675.112
DATUM : NYCT	EAST: 997547.824
FINAL BORING DEPTH (FT) 116.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: J. Bryant
CASING SIZE: 4"	ENGINEER: G.Gutshteyn
CASING HAMMER: 300 lb. Donut	DATE START: 8/21/06 DATE END: 8/25/06
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 8/25/06

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 ROD (%)	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
35	4	C4	28-38			10/9.9	99	44		C4: 28'-35': Very hard to hard, fresh to slightly weathered, fine to coarse grained, light gray, quartz-mica SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, very closely to closely spaced, horizontal to sub-horizontal, iron-oxide stained foliation joints/fractures. Frequently occurring cross-foliation joints/fractures, rough, irregular, very closely to closely spaced, moderately to sub-vertical, slightly to moderately weathered, iron-oxide stained, chloritized. 35'-38': Very hard, fresh fine to medium grained, light gray to dark green quartz-mica-amphibole SCHIST, with thin, horizontal foliation, rough, very closely to closely spaced, horizontal to sub-horizontal, slightly weathered, chloritic, horizontal foliation joints/fractures. Frequent healed joints/fractures, moderately to sub-vertical dipping, chloritized. 37.5'-37.9': Cross-foliation joints/fractures: Rough, irregular, sub-vertical, slightly weathered, chloritized.			5				0
	4																3
	5																5
	5																3
	5																3
	4																2
	4																1
	5																7
40	6	C5	38-48.1			10.1/10.1	100	78		C5: Very hard, fresh, fine to coarse grained, light gray to dark gray, poorly laminated, quartz-mica SCHIST, with thin to thick, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, horizontal, slightly weathered, chloritized foliation joints/fractures. 38.25'-38.6': Cross-foliation joints/fractures: Rough, irregular, sub-vertical, slightly weathered, chloritized. 43.2'-43.5': Cross-foliation joints/fractures: Rough, irregular, sub-vertical, moderately to severely weathered, chloritized.							2
	6																0
	5																3
	5.5																3
	5																1
	4																4
45	5																1
	6																1
	6																1
	6																1
	5																1
50	5	C6	48.1-58.1			10/9.9	99	70		Similar to SCHIST in C5. 49'-49.2' and 55.3'-55.5': Cross-foliation joints/fractures: Rough, irregular, very closely spaced, sub-vertical, fresh to slightly weathered. 56.35'-56.65': Medium hard to soft, moderately to severely weathered, quartz-mica SCHIST, with rough, horizontal to sub-vertical, moderately to severely weathered, 0.2' thick clay filled joints/fractures.							1
	4.5																1
	5																2
	5																5
	4.5																3
55	5																1
	5																1
	4																5
	5																2
	4																0
60	4.5																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) Core barrel blocked-up at 35.2', rock overdrilled.
6) 87.6'-88.1': Did not retrieve rock; re-cored this zone and rock core was deformed.
7) Bottom of borehole at 116.5 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • AKLP

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS85-2

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.40	NORTH: 222675.112
DATUM : NYCT	EAST: 997547.824
FINAL BORING DEPTH (FT) 116.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: J. Bryant
CASING SIZE: 4"	ENGINEER: G.Gutshteyn
CASING HAMMER: 300 lb. Donut	DATE START: 8/21/06 DATE END: 8/25/06
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 8/25/06

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
65	4.5	C7	58.1-68.1			10/10	100	85		Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, frequent bands of poorly laminated, mica rich foliation, rough, very closely to moderately closely spaced, horizontal to sub-horizontal, fresh to slightly weathered foliation joints/fractures. 61.2'-61.4' and 66.2'-66.5': Cross-foliation joints/fractures: Rough, irregular, closely spaced, moderately dipping, fresh to slightly weathered.							2
	5																2
	5																2
	4.5																2
	4.5																1
	4.5																1
	5																4
	5																2
	5																2
70	6	C8	68.1-78.1			10/9.8	98	70		Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, smooth to rough, very closely to moderately closely spaced, horizontal to sub-honzontal, fresh to slighlly weathered foliation joints/fractures. 71.1'-71.7': Cross-foliation joints/fractures: Medium hard, moderately dipping, moderately to severely weathered, healed, sub-vertical. 72.4'-73' and 74.9'-75.2': Healed sub-vertical micro-folds.							1
	6																2
	5																4
	6																1
	5																3
	5																2
75	6																2
	6																0
	5.5																2
	6																0
	6	C9	78.1-88.1			10/10	100	74		Similar to Schist in C8. 84.25'-85.2 and 81.4'-81.7': Cross-foliation fracture zone: Smooth to rough, very closely to closely spaced, moderately dipping to sub-vertical, slightly weathered, chloritized.							0
80	6																0
	5																0
	6																2
	5																1
	5																1
	6																>10
85	6																4
	5.5																2
	6												6				N
	5																2
90	5																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) Core barrel blocked-up at 35.2', rock overdrilled.

6) 87.6'-88.1': Did not retrieve rock; re-cored this zone and rock core was deformed.

7) Bottom of borehole at 116.5 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 4 of 4

DMJM HARRIS • AECOM

SECOND AVENUE SUBWAY PROJECT

BORING NO. ISS85-2

BORING STATION:	OFFSET:
PROJECT NO. CM 1188	COORDINATES:
G. SURF EL. 160.40	NORTH: 222675.112
DATUM : NYCT	EAST: 997547.824
FINAL BORING DEPTH (FT) 116.5	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George Inc.
SAMPLER HAMMER: 140 lb. Safety Hammer	FOREMAN: J. Bryant
CASING SIZE: 4"	ENGINEER: G.Gutshteyn
CASING HAMMER: 300 lb. Donut	DATE START: 8/21/06 DATE END: 8/25/06
ROCK CORE: NQ	REVIEWED BY: C. Snee DATE: 8/25/06

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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 ROD (%)	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
95	5	C10	88.1-97.9			9.8/9.8	100	58		Very hard to hard, fresh to slightly weathered, fine to coarse grained, light gray to gray, quartz-mica-garnet SCHIST, with very thin to thin, convoluted, crenulated, horizontal to sub-horizontal foliation, smooth to rough, very closely to moderately closely spaced, fresh to slightly weathered, horizontal to sub-horizontal, slightly chloritized, kaolinite, sericite foliation joints/fractures. 88.1'-88.6', 89.1'-89.5', 90.9'-91.7', 92'-92.8' and 93.6'-94': Cross-foliation joints/fractures: Smooth to rough, irregular, very close to closely spaced, sub-vertical to vertical, slightly to moderately weathered, chloritized. 88.6'-89': Healed sub-vertical fracture.							3
	6																6
	6																4
	6																6
	6																1
	6																1
	6																0
	6																0
100		C11	97.9-107.8			9.9/9.9	100	95		Similar to SCHIST in C10, except closely to moderately closely spaced joints/fractures. 101.6'-103.3': Fresh, fine to medium grained, poorly laminated mica SCHIST. 106.2'-106.8': Cross-foliation joints/fractures: Rough, irregular, sub-vertical, slightly weathered.							0
																	0
																	1
																	0
																	1
105																	0
																	1
																	1
																	1
	4.5																0
110	5																0
	5																1
	4.5																1
	5	C12	107.8-116.5			8.7/8.7	100	93		Similar to Schist in C10, except closely to moderately closely spaced joints/fractures. 112.75'-113.1': Cross-foliation joint/fracture: Rough, irregular, sub-vertical, slightly weathered. 116'-116.5': Band of very hard, fresh, quartz-mica-amphibole SCHIST.							1
	5																1
	5																2
115	6																1
	6																1
													7				0
										Bottom of borehole at 116.5 feet							
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	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) Core barrel blocked-up at 35.2', rock overdrilled.
6) 87.6'-88.1': Did not retrieve rock; re-cored this zone and rock core was deformed.
7) Bottom of borehole at 116.5 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B86-3

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 158.02	NORTH: 222663.68
DATUM : NYCT	EAST: 997714.01
FINAL BORING DEPTH (FT) 37.0	

SAMPLER: 2" O.D. Split Spoon
SAMPLER HAMMER: 140 lb (Automatic)
CASING SIZE: 3"
CASING HAMMER: N/A (Spun)
ROCK CORE: NX

BORING CO: Jersey Boring and Drilling Corp.
FOREMAN: Peter Lynch
ENGINEER: Sara Rocha
DATE START: 07/08/05 DATE END: 07/08/05
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
0	3" Spun									PAVEMENT THICKNESS: 3" Stone Blocks		FILL	1				
													2				
													3				
5		S1	6-6.25	100/3"	100/3"	3/3			-	Very dense, brown, fine to coarse SAND, little Silt, trace Rock Fragments, (SM / 7-65)		DEC ROCK					
	2.5											ROCK					9
	2.5	C1	7-10.1			3.1/3.1	100	0	-	Hard to very hard, fresh to slightly weathered, fine to coarse grained, light to dark gray-peach, quartzo-feldsphar-mica-garnet SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, rough, very closely to closely spaced, horizontal to sub-horizontal, slightly weathered, strongly iron-oxide stained foliation joints/fractures.							6
10	2.5									9.8'-10.1': Soft to hard, slightly to completely weathered zone.							10
	2.5	C2	10.1-12.1			2/1.2	60	37	-	7.1', 7.9' and 8.4': Cross-foliation joints/fractures, rough, closely spaced, moderately dipping, slightly weathered, strongly iron-oxide stained with dissolution.			4				N
	2.5									7.4'-8.0' and 9.1'-9.8': Cross-foliation joints/fractures, rough, irregular, uneven, closely spaced, vertical, slightly weathered, strongly iron-oxide stained to clay coated with dissolution.			5				5
	2																6
	2																5
15	2	C3	12.1-17.1			5/5	100	80	-								3
	2																0
	2																0
	2																0
	2																2
20	2	C4	17.1-22.0			4.9/4.9	100	100	-	C2: 10.1'-10.9': Possible core loss. 10.9'-12.1': Similar to Schist in C1. 10.9'-11.2': Cross-foliation joint/fracture, rough, irregular, vertical, slightly weathered, iron-oxide stained, partially healed.							2
	2																1
	2																0
	2									C3: Very hard, fresh, fine to coarse grained, light to dark gray, quartz-mica-garnet SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, rough, very closely to moderately closely spaced, horizontal to sub-horizontal, slightly weathered, slightly to strongly iron-oxide stained foliation joints/fractures; occasional very thin quartz veins. 12.4': Healed sub-horizontal foliation joint/fracture.			6				2
	2																6
25	2	C5	22-27			5/5	100	42	-								10
	2																0
	2.5																1
	2																3
	2																1
30	5	C6	27-31.9			4.9/4.9	100	87	-								3

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).
4) Core barrel jammed/blocked.
5) "N" denotes, no available data.
6) RQD affected by vertical joints/fractures between 21.6'-23.7' and 23.4'-24.9'.

BORING LOG

DMJM HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B86-3

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 158.02	NORTH: 222663.68
DATUM : NYCT	EAST: 997714.01
FINAL BORING DEPTH (FT) 37.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Corp.	GROUND WATER READINGS	
SAMPLER HAMMER: 140 lb (Automatic)	FOREMAN: Peter Lynch	DATE / TIME / DEPTH / CASING / STAB. TIME	
CASING SIZE: 3"	ENGINEER: Sara Rocha		
CASING HAMMER: N/A (Spun)	DATE START: 07/08/05 DATE END: 07/08/05		
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 11/14/05		

DEPTH (FT)	CASING (BPF) OR	SAMPLE / CORE NO	SAMPLE DEPTH (FT)	BLOWS / 6 INCH	N VALUE (BPF)	PEN/REC: SOIL (IN/IN)	TOTAL CORE REC (%)	ROCK CORE ROD (%)	FIELD TEST DATA	SAMPLE DESCRIPTION	STRATA SYMBOL	STRATIGRAPHY	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
35	4	C7	31.9-37			5.1/5.1	100	97	-	13.6'-14.5': Very hard, fresh, fine grained, green-black, quartz-mica-amphibole SCHIST, with very thin, sub-horizontal to moderately dipping foliation, rough to smooth, with closely spaced, sub-horizontal to moderately dipping, slightly weathered, iron-oxide stained foliation joints/fractures;occasional very thin quartz veins. C4: Similar to quartz-mica-garnet SCHIST in C3, except occasional very thin amphibole Schist zones. 13.7'-14.0': Cross-foliation joint/fracture, irregular, rough to smooth, moderately dipping to sub-vertical, slightly weathered, iron-oxide stained, slightly chloritized, blackened surface.			7				1
	3.5																0
	3																1
	4.5																1
	3.5																1
	3																3
	2.5																2
40										C5:22.0'-22.5' and 26.2'-26.9': Similar to mica Schist in C3, except slightly weathered, iron oxide stained, slightly kaolinized foliation joints/fractures. 22.5'-26.2': Similar to amphibole Schist in C3. 21.6'-23.7': Cross-foliation joint/fracture, partially healed, rough, vertical, slightly weathered, chloritized, slightly iron-oxide stained. 23.5': Cross-foliation joint/fracture, rough to smooth, irregular, horizontal to moderately dipping, slightly weathered, slightly kaolinized, iron-oxide stained. 23.4'-24.9': Cross-foliation joint/fracture, rough, uneven, vertical, slightly weathered, iron-oxide stained, stilbite, mineralization. 25.9'-26.4': Healed, parallel, vertical joints/fractures.							
45																	
50										C6: Similar to mica Schist in C3, except slightly convoluted foliation, serecitized foliation joints/fractures; occasional very thin to thin quartz veins; occasional very thin to thin quartz veins; occasional very thin quartzo-feldspathic zones. 29.1'-29.9': Similar to amphibole Schist in C3. 29.5'-29.9': Healed sub-vertical joint/fracture.							
55										C7: Similar to mica Schist in C7, except slightly kaolinized foliation joints/fractures. 32.7'-33.7': Very hard, fresh, coarse grained, light gray to peach, PEGMATITE.							
60																	

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								

7) Bottom of borehole at 37.0'; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 1

DM|M HARRIS • ARUP

SECOND AVENUE SUBWAY PROJECT

BORING NO. B86-4

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 157.59	NORTH: 222653.4267
DATUM : NYCT	EAST: 997745.9654
FINAL BORING DEPTH (FT) 24.0	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Jersey Boring and Drilling Co., Inc.
SAMPLER HAMMER: 140 lb Automatic	FOREMAN: P. Lynch
CASING SIZE: 3"	ENGINEER: D. Persaud
CASING HAMMER: Spun	DATE START: 08/04/04 DATE END: 08/04/04
ROCK CORE: NQ	REVIEWED BY: M.A. Ponti, Jr DATE: 09/24/04

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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: 6" Concrete Hand augered to a depth of 6 feet prior to boring.		FILL	2 3				
5		S1	5-7	1 4 12 14	16	24/18				Medium dense, brown, fine to medium SAND, some Silt, trace Gravel, trace Mica (SM / 11-65)							
		S2	7-7.5	21 50\0"	50/0"	6/6				Medium dense, brown, fine to medium SAND, some Silt, trace Gravel, trace Mica (SM / 11-65)							
		S3	9-9.2	50\2"	50/2"	2/2				Very dense, brown, fine to coarse SAND, little Gravel, trace light to dark gray Rock Fragments, trace Silt (SP-SM / 11-65)							
10	3.0											ROCK					2
	3.0									C1: Very hard, fresh, fine to coarse grained, light gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, sub-horizontal foliation, rough to smooth, very closely to moderately spaced, horizontal to sub-horizontal, slightly weathered, iron-oxide stained foliation joints/fractures; occasional very thin to thin quartz bands.							2
	3.0									11.3'-11.8': Fracture zone, smooth, uneven, horizontal to sub-horizontal, slightly weathered, slightly iron-oxide stained foliation joints/fractures.							3
	3.0	C1	9.5-14.2			4.7/4.7	100	87		C2: Similar to Schist in C1, except no apparent foliation joints/fractures.							1
	3.0									17.2'-19.3': Very hard, fresh, fine to medium grained, dark green-gray, quartz-amphibole SCHIST, with very thin, crenulated, horizontal to sub-horizontal foliation, rough to smooth, very closely to moderately closely spaced, horizontal to sub-horizontal, slightly weathered, iron-oxide stained foliation joints/fractures.							0
15	4.0									17.2'-17.4': Fracture zone, smooth, planar to uneven, horizontal to sub-horizontal, slightly weathered, iron-oxide stained foliation joints/fractures.							0
	4.5									C3: 19.3'-19.5', 22.4'-24.0': Similar to amphibole Schist in C2, except no apparent foliation joints/fractures.							0
	4.5	C2	14.2-19.3			5.1/5.1	100	100		19.5'-22.4': Similar to Schist in C1, except closely spaced, horizontal to sub-horizontal, slightly weathered, iron-oxide stained foliation joints/fractures.							0
	5.0									19.9'-20.2' and 20.8'-21.0': Fracture zone, rough, moderately dipping to sub-vertical, slightly weathered, chloritized cross-foliation joints/fractures.							3
	5.0																0
20		C3	19.3-24.0			4.7/4.7	100	75					4				1
																	7
																	2
																	0
													5				0
25																	
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) 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) RQD affected by cross-foliation joints/fractures between 19.9' and 21', 20.8' and 21'.
5) Bottom of borehole at 24'; borehole grouted upon completion.

BORING LOG

Sheet 1 of 3

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B86-12

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.52	NORTH: 222617.1076
DATUM : NYCT	EAST: 997798.4403
FINAL BORING DEPTH (FT) 81.4	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.	GROUND WATER READINGS
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: A. London	DATE / TIME / DEPTH / CASING / STAB. TIME
CASING SIZE: 3" to 7'	ENGINEER: G. Gutshteyn	
CASING HAMMER: 300 lb Donut	DATE START: 2/22/07 DATE END: 2/23/07	
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 5/4/2007	

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 ROD (%)	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	3"									PAVEMENT THICKNESS: 4" Concrete sidewalk Hand augered to a depth of 6 feet prior to boring.		FILL	1 2 3				
5		S1	6-7.8	10 17 24 100/2"	41	20/10	10		0	Dense, brown, fine to medium SAND, some Silt, trace Clay lenses (SM / 7-65)							
10	4 4 4 4 4	C1	9.2-19.2			10/8	80	14		Very soft to medium hard, moderately to completely weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough to smooth, planar to irregular, very closely to closely spaced, horizontal to sub-horizontal, iron-oxide stained foliation joints/fractures. 14.2'-16.2': Very soft, severely to completely weathered, very closely spaced, sub-horizontal foliation fractures and moderately dipping to vertical, rough, irregular cross-foliation fractures (probable loss of recovery in this zone)		ROCK	4				5
15	4 3 3 3 4																2 3 4 6 7 >10 >10 >10
20	4 5 5 5 6	C2	19.2-29.2			10/10	100	53		19.2'-22.4' and 26.5'-29.2': Similar to SCHIST in C1, except medium hard, slightly to moderately weathered, no iron-oxide at fractures. 22.4'-26.5': Medium hard to hard, slightly to moderately weathered, fine to medium grained, dark greenish gray, quartz-mica-amphibole SCHIST, with thin, faint horizontal foliation, rough, planar to irregular, very closely to closely spaced, slightly to moderately weathered, horizontal foliation joints/fractures. 19.7' and 26.0'-26.4': Cross-foliation joints/fractures: Rough, irregular, moderately weathered, moderately dipping to vertical, chlorite coated. 20.7'-21.1' and 21.6'-22.2': Rough, irregular, vertical fractures. 21.1'-21.6': Healed, vertical fractures. 22.2': Cross-foliation joint/fracture: Smooth, irregular, sub-vertical.						8 5 5 5 3 4 2 6 4 2
25	5 5 6 5 6																0
30	4																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								

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) Probable loss of recovery from 14.2 to 18.2 Ft.

BORING LOG

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

SECOND AVENUE SUBWAY PROJECT

BORING NO. B86-12

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.52	NORTH: 222617.1076
DATUM : NYCT	EAST: 997798.4403
FINAL BORING DEPTH (FT) 81.4	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.	GROUND WATER READINGS
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: A. London	DATE / TIME / DEPTH / CASING / STAB. TIME
CASING SIZE: 3" to 7	ENGINEER: G. Gutshteyn	
CASING HAMMER: 300 lb Donut	DATE START: 2/22/07 DATE END: 2/23/07	
ROCK CORE: NX	REVIEWED BY: DATE:	

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
35	4	C3	29.2-37.9			8.7/8.7	100	86		Hard, slightly to moderately weathered, fine to coarse grained, light gray to gray, quartz-mica SCHIST, with thin, convoluted, crenulated, sub-horizontal to moderately dipping foliation, rough to smooth, planar, very closely to closely spaced, fresh to moderately weathered, sub-horizontal to moderately dipping foliation joints/fractures. 35.9', 36.2', 36.5', and 34.5': Cross-foliation joints/fractures: Rough, planar, moderately dipping. 37.6': Cross-foliation joint/fracture: Rough, irregular, moderately weathered, sub-vertical, chlorite coated.							2
	5																3
	5																3
	5																0
	5																2
	5																1
	5																2
	3																6
40	8	C4	37.9-44.7			6.8/6.8	100	79		Hard, slightly weathered, fine to coarse grained, gray, quartz-mica SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, planar to irregular, very closely to closely spaced, fresh to moderately weathered, horizontal to sub-horizontal, slightly chlorite coated foliation joints/fractures. 38.0'-38.6': Quartz-mica Pegmatite SCHIST. 43.5'-43.7': Very closely spaced, moderately weathered.							3
	6																2
	5																0
	5																0
	5																2
	5																3
	5																1
45	14	C5	44.7-54.3			9.6/9.6	100	71		Hard to very hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica-garnet SCHIST, with thin, poorly laminated, horizontal to sub-horizontal foliation, rough, planar to irregular, very closely to closely spaced, horizontal to sub-horizontal foliation joints/fractures. 50.9'-51.5': Band of quartz-mica-amphibole SCHIST. 51.4'-51.7': Cross-foliation joint/fracture: Healed, sub-vertical to vertical.							0
	16																1
	20																2
	14																2
50	9																3
	9																2
	7																1
	6																3
	7																2
	8																2
55	6	C6	54.3-64.2			9.9/9.9	100	92		Similar to SCHIST in C5, except very closely to moderately closely spaced fractures. 58.4': Cross-foliation joint/fracture: Smooth, planar, slightly weathered, moderately dipping. 61.0'-61.1': Very closely fractured, moderately weathered. 62.1': Smooth, curved.							2
	6																1
	6																1
	6																1
	6																2
60	6																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) Bottom of borehole at 81.4 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

DMJM HARRIS • ARUP
A Joint Venture

SECOND AVENUE SUBWAY PROJECT

BORING NO. B86-12

BORING STATION:	OFFSET:
PROJECT NO. CM1188	COORDINATES:
G. SURF EL. 156.52	NORTH: 222617.1076
DATUM : NYCT	EAST: 997798.4403
FINAL BORING DEPTH (FT) 81.4	

SAMPLER: 2" O.D. Split Spoon	BORING CO: Warren George, Inc.	GROUND WATER READINGS
SAMPLER HAMMER: 140 lb Safety Hammer	FOREMAN: A. London	DATE / TIME / DEPTH / CASING / STAB. TIME
CASING SIZE: 3" to 7"	ENGINEER: G. Gutshteyn	
CASING HAMMER: 300 lb Donut	DATE START: 2/22/07 DATE END: 2/23/07	
ROCK CORE: NX	REVIEWED BY: DATE:	

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 ROD (%)	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																3
	6																2
	7																1
	7																0
65	6																0
	5																1
	5																2
	5																1
	5	C7	64.2-74.2			10/10	100	82		Hard to very hard, fresh to slightly weathered, fine to coarse grained, gray, quartz-mica SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough to smooth, planar to irregular, very closely to moderately closely spaced, slightly weathered, horizontal to sub-horizontal foliation joints/fractures. 67.4'-67.7': Cross-foliation joint/fracture: Rough, irregular, slightly weathered, sub-vertical. 71.2'-72.2': Slight chlorite coating at fracture.							0
70	5																2
	6																1
	6																4
	6																2
	6																1
75	6																2
	6																2
	6																1
	7	C8	74.2-81.4			7.2/7.2	100	58		Similar to SCHIST in C7. 75.3'-78.4': Cross-foliation joint/fracture: Smooth, slightly weathered, moderately dipping, chlorite coated, slickensides. 79.0'-81.4': Cross-foliation joint/fracture: Several smooth to rough, planar to irregular, very closely to closely spaced, moderately dipping to vertical with sub-vertical to vertical healed, kaolinite, chlorite coated.							2
	6																1
80	7																2
	7																3
													5				3
										Bottom of borehole at 81.4 feet							7
85																	
90																	

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) Bottom of borehole at 81.4 feet; acoustic televiewer survey performed; borehole grouted upon completion.

BORING LOG

Sheet: 1 of 1

DMJM HARRIS

SECOND AVENUE SUBWAY PROJECT

BORING NO. B86-13

BORING STATION:	OFFSET:
PROJECT NO. CM-1188	COORDINATES:
G. SURF EL. 155.61	NORTH: 222591.5651
DATUM : NYCT	EAST: 997844.7167
FINAL BORING DEPTH (FT) 29.4	

SAMPLER: NA	BORING CO: Warren George Inc
SAMPLER HAMMER: NA	FOREMAN: A. London
CASING SIZE: 3" to 5'	ENGINEER: G. Gutshteyn
CASING HAMMER: 300 lb Donut	DATE START: 2/20/2007 DATE END: 2/21/2007
ROCK CORE: NX	REVIEWED BY: C. Snee DATE: 5/4/2007

GROUND WATER READINGS

DATE	TIME	DEPTH	CASING	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
0	3"									PAVEMENT THICKNESS. 6" Concrete Sidewalk Hand augered to a depth of 6 feet pnor to boring.		FILL	1 2 3				
5																	
10	3	C1	9.4-19.4			10/9.8	98	51		Medium hard to hard, slightly to moderately weathered, fine to coarse grained, light gray to gray quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, planar to irregular, very closely to moderately closely spaced, sub-horizontal iron-oxide stained foliation joints/fractures. 11.4', 12.5', 13.0' and 16.2'-16.6': Cross-foliation joints/fractures: Rough, irregular, moderately dipping to sub-vertical, iron-oxide stained, slight chlorite coating.		SCHIST					4
	4																5
	4																5
	4																5
	4																2
15	4																3
	4																2
	4																2
	4																2
	5																1
20	5	C2	19.4-29.4			10/9.6	96	65		Medium hard to hard, slightly to moderately weathered, fine to coarse grained, light gray to gray quartz-mica-garnet SCHIST, with thin, convoluted, crenulated, horizontal to sub-horizontal foliation, rough, irregular, very closely to closely spaced, slightly to moderately weathered, sub-horizontal, iron-oxide stained, slightly chloritic foliation joints/fractures. 21.2', 21.9', 22.4' and 28.9'-29.4': Cross-foliation joints/fractures: Rough, irregular, moderately dipping to sub-vertical, iron-oxide stained. 25.4'-25.7': Cross-foliation joint/fracture: Smooth, irregular, sub-vertical, with 1/16" thick chlorite coating.							4
	5																5
	5																5
	5																1
	5																1
25	5																1
	5																4
	5																1
	5																3
	5												4				4
30										Bottom of borehole at 29.4 feet							

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 boundanes 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) Bottom of borehole at 29.4 feet; acoustic televiewer survey performed; borehole grouted upon completion.