Geotechnical Report
W18-W19 Street Project
New York, New York

The Related Companies
60 Columbus Circle
New York, NY 10023

Mueser Rutledge Consulting Engineers
14 Penn Plaza - 225 West 34th Street
New York, NY 10122

July 1, 2015

Mueser Rutledge Consulting Engineers

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www.mrce.com

July 1, 2015

The Related Companies
60 Columbus Circle
New York, NY 10023

Attention: Mr. Scott Fehmel

Re: Geotechnical Report
Phase I Investigation
W18-W19 Street Project
New York, New York
MRCE File No. 12320

Dear Mr. Fehmel,

As per your request, Mueser Rutledge Consulting Engineers (MRCE) has completed a subsurface investigation for the referenced project. This report presents a summary of our Phase I investigation, our interpretation of subsurface conditions encountered in the borings, and general foundation recommendations for the proposed construction.

PROJECT DESCRIPTION

We understand that you are planning a residential development at the referenced site in Manhattan. The elevated High Line structure runs through the site. The development will include a building with a cellar on both east and west side of the High Line structure. The combined footprint of the proposed development including the High Line easement is about 50,600 square feet. We understand that the east and west buildings may be connected underneath the High Line but outside of those connections the High Line easement will not have a building structure. The two proposed buildings and their connections will have a combined footprint of about 46,000 square feet.

Sidewalk elevations around the site range between Elev. +8 and +14. Elevations in this report are given in feet and refer to the North American Vertical Datum of 1988 (NAVD 88).

EXHIBITS

The following exhibits are attached:

Exhibit	Description
Figure No. 1	Site Location Plan
Drawing No. B-1	Boring Location Plan
Drawing No. C-1	Top of Rock Contour Plan
Drawing No. GS-1	Geologic Sections A-A and B-B
Drawing No. GS-2	Geologic Sections C-C and D-D
Drawing No. GS-R	Geotechnical Reference Standards
Drawing No. RC-1	Rock Classification Criteria

Appendix	Description
Appendix A	MRCE Boring Logs
Appendix B	Previous Borings

SUBSURFACE INVESTIGATION

The NYC Building Code requires drilling of 17 borings for the proposed development assuming deep foundations will be used.

Phase I investigation focused on the portion of the site east of the Highline which is presently used as a parking lot. Remnants of two large oil tanks are present underneath that lot. A total of 25 borings were drilled in Phase I to satisfy the Code requirements but also to further define the subsurface profile and depth to top of rock. The borings were drilled within the eastern portion of the site or on the sidewalks surrounding the western portion of the site. Additional Phase II borings will be drilled at the western portion of the site at a later time.

Borings M-1 through M-25 were drilled by Aquifer Drilling and Testing (ADT) between April 18, 2015 and May 27, 2015 under continuous inspection by our resident engineers, Ms. Alexandra Patrone, Ms. Lysandra Lincoln, Mr. James Brickman, Mr. Nathan Seguin, Mr. Mark Chancey, Ms. Teresa Sandiford, and Mr. Jeremy Bielby, who prepared field logs for each boring. Upon completion of the exploration, an as-drilled survey was completed by Mega Engineering. The surveyed boring locations are shown on Drawing No. B-1.

The borings drilled within the sidewalk surrounding the site and the boring drilled under the highline structure were drilled with a track mounted drill rig. The remaining borings located within the site were drilled with a truck mounted drill rig. Both the track and truck mounted drill rigs used wash-rotary methods with casing and drilling mud to stabilize the borehole.

Samples were obtained using a 2-inch O.D. split-spoon sampler driven with a 140-pound hammer falling 30 inches. The number of hammer blows required to advance the split-spoon sampler through each of four six-inch drive intervals was recorded. The Standard Penetration Test (SPT) resistance or N-value, expressed in blows per foot, is an indication of the relative density of the material sampled and is calculated by summing the blows from the second and third six-inch intervals. In some instances where the sampler was unable to penetrate the full 24 inches due to the presence of dense soils, large gravel, cobbles, boulders, or other obstructions, the sampler was driven until 50 to 100 blows were administered and the actual penetration of the

sampler was measured and recorded. Recovered soil samples were classified in the field and placed in jars for preservation and transport to our in-house laboratory.

Due to the presence of contaminants at the site below the existing gas holder tanks, Integral Consulting, Inc. was present during the subsurface investigation to perform environmental testing on samples collected at depths corresponding to the approximate bottom of the existing tank remnants. In order to facilitate this testing, split spoon samples were taken continuously from 20 to 30 feet below ground surface. Sampling on five-foot centers resumed after 30 feet below ground surface until top of rock was encountered.

Eighteen of the 25 borings were sampled continuously in the top ten feet, at five foot intervals to twenty feet, continuously to thirty feet, and at five foot intervals to top of rock. The remaining seven borings were only sampled continuously from twenty to thirty feet below ground surface and continued without sampling to top of rock. A summary of the sampling procedure for each boring is shown in Table 1 below.

Table 1: Sampling Summary

Sampling	Boring.	
	Track Rig	Truck Rig
Fully Sampled	M-1	M-4P
	M-2	M-6
	M-7	M-12
	M-9	M-15
	M-10	M-17
	M-11	M-18
	M-16A	M-21
	M-24	M-22P
	M-25	M-23
Env. Testing & Rock Core Only	M-3	M-5
	M-8	M-13
	M-20	M-14A
		M-19

The borings cored at least ten feet of bedrock. Bedrock was cored using an NX-size, double-tube core barrel equipped with a diamond bit, recovering a nominal 2-inch diameter rock core. Percent recovery and Rock Quality Designation (RQD) were determined for each core run. RQD is defined as the sum of the lengths recovered core pieces greater than four inches in length between natural breaks expressed as a percentage of the total core run. RQD is an indication of the relative frequency of jointing or natural fracturing of the bedrock. Rock cores were stored in wooden boxes for shipment to our laboratory.

After completion of the boring program, all soil samples and rock cores were delivered to our in-house laboratory for verification of field classifications. Individual soil sample descriptions are provided on the typed logs in Appendix A. The MRCE soil classification is shown on Drawing

No. GS-R. Sketches of recovered cores prepared in the field are attached to the boring logs. Rock core classification terminology and criteria used are shown on Drawing No. RC-1.

In order to isolate zones of contamination during drilling, steel casing was advanced to five feet below the last observed trace of contamination, as advised by Integral's on-site representative. The drilling fluid was then discarded and placed in steel drums to be disposed off-site. A new batch of drilling fluid was mixed and the borehole was advanced to completion using the mud-rotary drilling techniques described above.

Previous Borings In 2009, Arcadis performed a remedial investigation at the site. The borings drilled during this investigation were relatively shallow and in most cases did not extend past the fill layer. The 2009 boring locations are shown on Drawing No. B-1 and their logs are attached as Appendix B.

SUBSURFACE CONDITIONS

General Geology Bedrock below the site is the Paleozoic Hartland Formation, though slivers of serpentine and the Walloomsac formation are also present in the neighborhood. During the Pleistocene a series of glaciers flowed across the region. The rock was scoured down and often covered with a layer of basal till. As the ice retreated it left behind an interlayered mix of outwash sand and glacial lake silt and clay. Minor re-advances of the ice brought in additional lenses of till and gravel. During the Holocene the glaciers continued their retreat and sea-level rose, depositing river sand and organic clay in low-lying areas. Since colonial times fill material has been deposited over the shore line deposits to extend the land into the Hudson River.

General descriptions of the materials encountered in the project borings are summarized below in order of their occurrence with depth:

Stratum F – Fill (NYC Class 7). All fully sampled borings encountered approximately 7 to 33-feet of brown fine to coarse sand with some silt, gravel, clay, and trace concrete and brick. N-values ranged from 0 (weight of rods) to over 100 blows per foot (bpf), with an average of about 28 bpf. Large debris and obstructions may be present within the fill layer. Boring No. M-16A encountered an approximately ten-foot thick brick wall below street grade. This brick wall may be part of the wall of the existing buried tank as shown on Drawing No. B-1.

Stratum O – Organic Silty Clay (NYC Class 4b). Lenses of organic silty clay were present within and below the fill in Boring M-18, M-7, and M-1. The organic silty clay consists of loose to medium dense black to brown organic silty clay and clayey fine sand with some fine sand and trace gravel. N-values ranged from 3 bpf to 25 bpf and averaged about 13 bpf.

Stratum S – Sand (NYC Class 3b). All borings encountered a layer of sand below the fill. The thickness of the sand stratum varies from approximately 15 to 45 feet. The sand primarily consists of medium dense to compact red to brown to gray fine to medium sand with some silt and gravel. Lenses of silt and varved deposits are present within the sand, as shown on the geologic sections, Drawings Nos. GS-1 and GS-2. N-values ranged from 3 bpf to over 100 bpf and averaged about 23 bpf.

Stratum M- Silt (NYC Class 5b). Lenses of silt and varved sand and silt deposits were present with the sand layer. The thickness of the silt ranged from two feet to about 10 feet. The

silt consists of loose to medium dense red brown clayey silt and silty fine sand varved with some brown silt layers. N-values ranged from 4 to 35 bpf and averaged about 19 bpf.

Stratum T – Till (NYC Class 3a). Boring No. M-16A encountered a thin seam of sandy Till above bedrock. One sample was taken in the till with an N-value of 36 bpf.

Stratum DR – Decomposed Rock (NYC Class 3a). A layer of decomposed rock was encountered above the bedrock in Boring Nos. M-11, M-2, M-18, M-12, M-4P, and M-11. The decomposed rock is typically composed dense grey brown micaceous fine to medium sand with some silt. N-values ranged from 50 to over 100 bpf, and averaged over 100 bpf.

Stratum R –Bedrock (NYC Class 1d to 1a). At least ten feet of bedrock was cored in each boring. Top of rock elevation varies from approximately Elev. -30 to Elev. -50. The top of bedrock contour plans is shown on Drawing No. C-1 The bedrock typically consists of slightly weathered to unweathered gray gneissic schist and schistose gneiss, jointed to blocky, with iron stained and weathered joints. Rock core recoveries ranged from 88 to 100 percent and RQD values ranged from 14 to 100 percent.

Groundwater Based on the water level observations made in Boring M-4P, groundwater is approximately twelve feet below ground surface, or Elev. 0. Water level readings were taken throughout the investigation.

FOUNDATION RECOMMENDATIONS

Foundations Considering the depth of unsuitable bearing materials (fill and compressible fine grained soils) deep foundations shall be used to support the proposed buildings. The following two systems and their combinations shall be considered for support of the proposed buildings:

- driven steel piles with tiedowns to resist uplift forces, and
- drilled minicaissons.

Driven Piles We recommend considering closed-end steel pipe piles (12- to 13-inch diameter) filled with concrete or steel H piles (HP12). An allowable compression capacity of 120 to 150 tons shall be employed in design assuming piles will be driven to bedrock. Driving tips or shoes shall be employed as some of the piles will need to penetrated stiffer soils, obstructions and/or thin decomposed rock above bedrock. Spudding or pre-drilling may be required to penetrate shallow hard soils or obstructions.

The contractor should be responsible for determining the actual driving resistance necessary to develop the capacity selected based on the hammer used and this resistance should be confirmed by pile load tests. The project specifications should require piles be driven, inspected, and load tested in accordance with the Code requirements.

Tiedowns If tension tiedowns are needed, they shall consist of preassembled double corrosion protected threaded bar tiedowns sized assuming a side friction of 100 psi. Their capacity check will also need to consider “cone” pullout evaluations and combined effect of all tiedowns.

Mini-Caissons We recommend considering 9- to 13-inch diameter mini-caissons extending into bedrock. The compression and tension capacity of the caissons will be developed within a rock

socket below the permanent casing. We recommend the caisson rock sockets be sized assuming a side friction of 200 psi in compression and 100 psi in tension. The tension capacity check will also need to consider "cone" pullout evaluations and combined effect of the caisson loads.

Lateral Capacities of Caissons and Piles Resistance of caissons and piles to lateral loads will largely depend on the diameter of the cassions/piles and the stiffness of the core beams for the caissons. We can provide lateral capacities of the caissons and piles when foundation plans and loads are available to us. Reduction factors will be required for the lateral capacity of the caisson and pile groups where caisson/pile spacing less than 6 diameters are considered.

Steel Corrosion Steel piles may be subject to corrosion. The corrosion protection may consist of coating the piles. In lieu of the coating, 1/16 inch of the steel pile perimeter may be considered sacrificial with stresses in the steel limited to 12,600 psi. All pile steel, including steel shells should be isolated from the reinforcing steel in the pile cap.

Foundation Slab and Walls The cellar walls and slab should be designed as structural elements able to resist both soil and hydrostatic pressures. The long term groundwater should be assumed to be at approximately Elev. 0. The wall and slab should be checked for short term loading conditions with groundwater at Elev. +5 representing utility leak conditions. At-rest earth pressures should be used for the design of foundation walls, assuming a friction angle of 32 degrees and a total unit weight of 120 pounds per cubic foot. Seismic earth pressures should be considered.

We recommend that the new cellar spaces be fully protected to grade with sheet waterproofing such as Grace or Cetco products. Hydrophilic waterstops should be used. Groutable tubes shall be considered for higher quality cellar usage. Both material and labor warranties should be obtained for the waterproofing system.

Seismic Design The site is in seismic Site Class E as per the Codes. Site Class E results in Seismic Design Category (SDC) C. A site specific study could improve the design accelerations by up to 20 percent when compared with the Code accelerations but would not improve SDC.

Please do not hesitate to call us with any questions.

MUESER RUTLEDGE CONSULTING ENGINEERS

By: A. Patrone
Alexandra Patrone

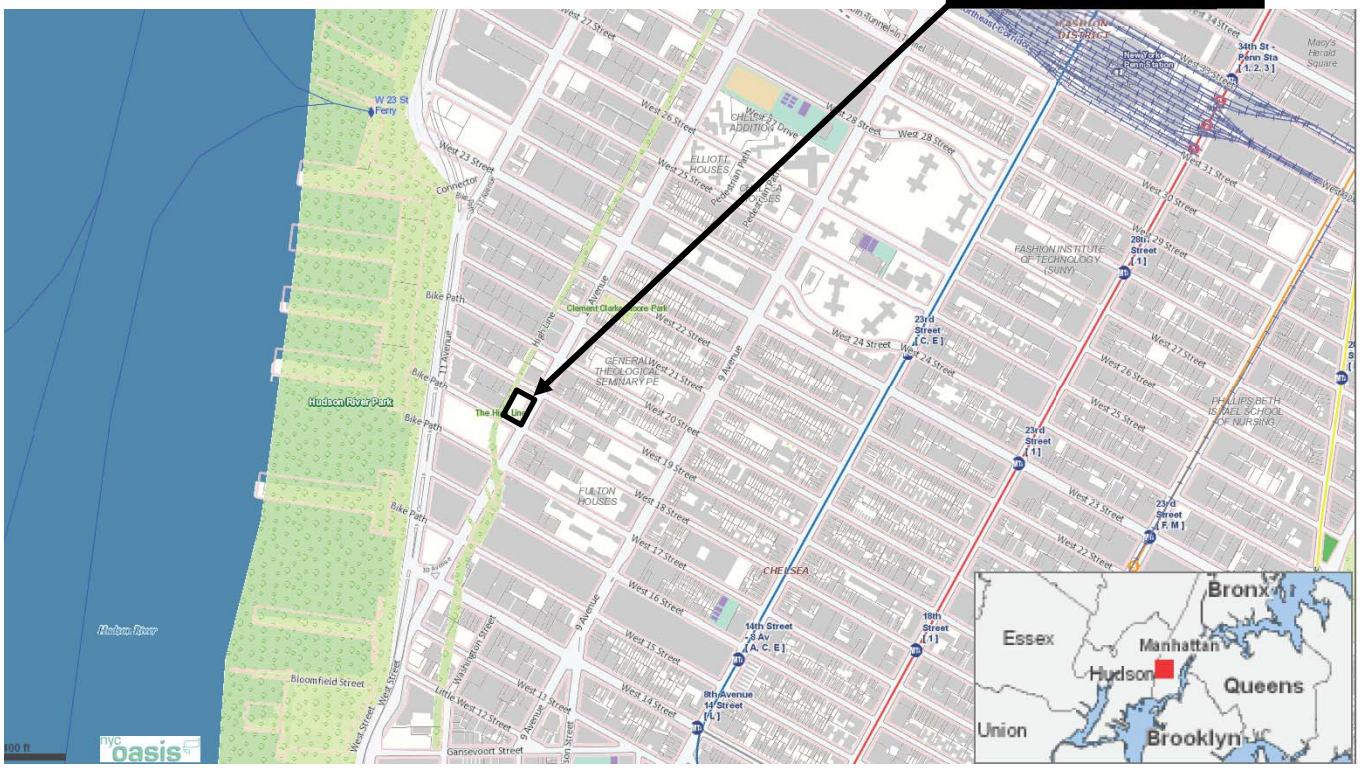
By: Jan Cermak
Jan Cermak, P.E.

AEP:JC: F:\123\12320\Geotech Report

EXHIBITS

N

PROJECT SITE



REFERENCE:

NEW YORK CITY OASIS MAPS (2013)

W18-W19 STREET PROJECT			
NEW YORK			NEW YORK
THE RELATED COMPANIES			
NEW YORK			NEW YORK
MUESER RUTLEDGE CONSULTING ENGINEERS			
14 PENN PLAZA - 225 W 34TH STREET, NEW YORK NY 10122			
SCALE	MADE BY: AEP	DATE: 06-10-15	FILE No.
N.T.S.	CH'KD BY:	DATE:	12320
SITE LOCATION PLAN			FIG. No. 1

GENERAL NOTES:

1. BASE PLAN FROM SURVEY DATED JULY 29, 2014 BY FEHRINGER SURVEYING, P.C.
2. AS-DRILLED LOCATIONS FROM SURVEY DATED JUNE 1, 2015 BY MEGA ENGINEERING AND LAND SURVEYING, P.C.
3. ELEVATIONS ARE IN FEET AND REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
4. BORINGS WERE MADE IN ACCORDANCE WITH THE NEW YORK CITY BUILDING CODE AND THE STANDARD SPECIFICATIONS FOR SUBSURFACE BORING AND SAMPLING BY MUESER RUTLEDGE CONSULTING ENGINEERS (MRCE).
5. ALL BORINGS WERE MADE UNDER THE CONTINUOUS INSPECTION OF MRCE.
6. BORINGS WERE MADE BY AQUIFER DRILLING AND TESTING (ADT) BETWEEN APRIL 18, 2015 AND MAY 27, 2015 UDING MUD-ROTARY DRILLING METHODS EMPLOYING DRILL FLUIDS TO MAINTAIN A STABLE BOREHOLE.
7. SOIL SAMPLES WERE COLLECTED USING A 2-INCH DIAMETER SPLIT-SPOON SAMPLER ADVANCED WITH A 140-POUND HAMMER FALLING 30 INCHES.
8. ROCK CORING WAS PERFORMED USING AN NX-SIZE DOUBLE-BARREL CORE SAMPLER WITH A DIAMOND BIT.
9. BORINGS WERE GROUTED UPON COMPLETION.
10. FOR BORING LOGS, SEE APPENDIX A.

LEGEND:

- M-4PA — AS-DRILLED MRCE BORING, FULLY SAMPLED
  - "P" – PIEZOMETER
  - "A" – OFFSET LOCATION
  - GROUND SURFACE ELEVATION
- M-3 — AS-DRILLED MRCE BORING, ROCK CORE ONLY
  - GROUND SURFACE ELEVATION
- MW-12A — EXISTING MONITORING WELL MADE BY ARCADIS (2007)
- SB-10 — EXISTING BORING MADE BY ARCADIS (2007)

REV.	DATE	BY	DESCRIPTION

W18–W19 STREET DEVELOPMENT
NEW YORK NEW YORK

THE RELATED COMPANIES
NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA – 225 W. 34TH STREET, NY, NY 10122

SCALE	MADE BY: E.C.	DATE: 06-04-2015	FILE NUMBER
GRAPHIC	CH'KD BY: A.E.P.	DATE: 06-04-2015	12320

DRAWING NUMBER
AS-DRILLED BORING LOCATION PLAN — B-1

GRAPHIC SCALE
16' 8' 0 16' 32'

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NOTES:

1. FOR GENERAL NOTES SEE DRAWING NO. B-1.
2. ELEVATIONS OF TOP OF BEDROCK AT BORING LOCATIONS WERE INTERPRETED FROM BORING LOGS.
3. ELEVATIONS ARE IN FEET AND REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)

LEGEND:

M-4P
-35.0 12.1 – AS-DRILLED MRCE BORING
"P" – PIEZOMETER
"A" – OFFSET LOCATION
GROUND SURFACE ELEVATION
ELEVATION OF TOP OF BEDROCK

M-3
-29.5 8.8 – AS-DRILLED MRCE BORING, ROCK CORE ONLY
GROUND SURFACE ELEVATION
ELEVATION OF TOP OF BEDROCK

MW-12A – EXISTING MONITORING WELL MADE BY ARCADIS (2007)

SB-10 – EXISTING BORING MADE BY ARCADIS (2007)

45 – CONTOUR OF TOP OF ROCK ELEVATION

45 – ESTIMATE OF TOP OF ROCK

WEST 19TH STREET

WEST 18TH STREET

10TH AVENUE

3 STORY BRICK

2 STORY BRICK

GRAPHIC SCALE
16' 8' 0 16' 32'

REV.	DATE	BY	DESCRIPTION

W18–W19 STREET DEVELOPMENT
NEW YORK NEW YORK

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MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA – 225 W. 34TH STREET, NY, NY 10122

SCALE	MADE BY: E.C.	DATE: 06-10-2015	FILE NUMBER
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CONTOUR PLAN–TOP OF ROCK — DRAWING NUMBER C-1

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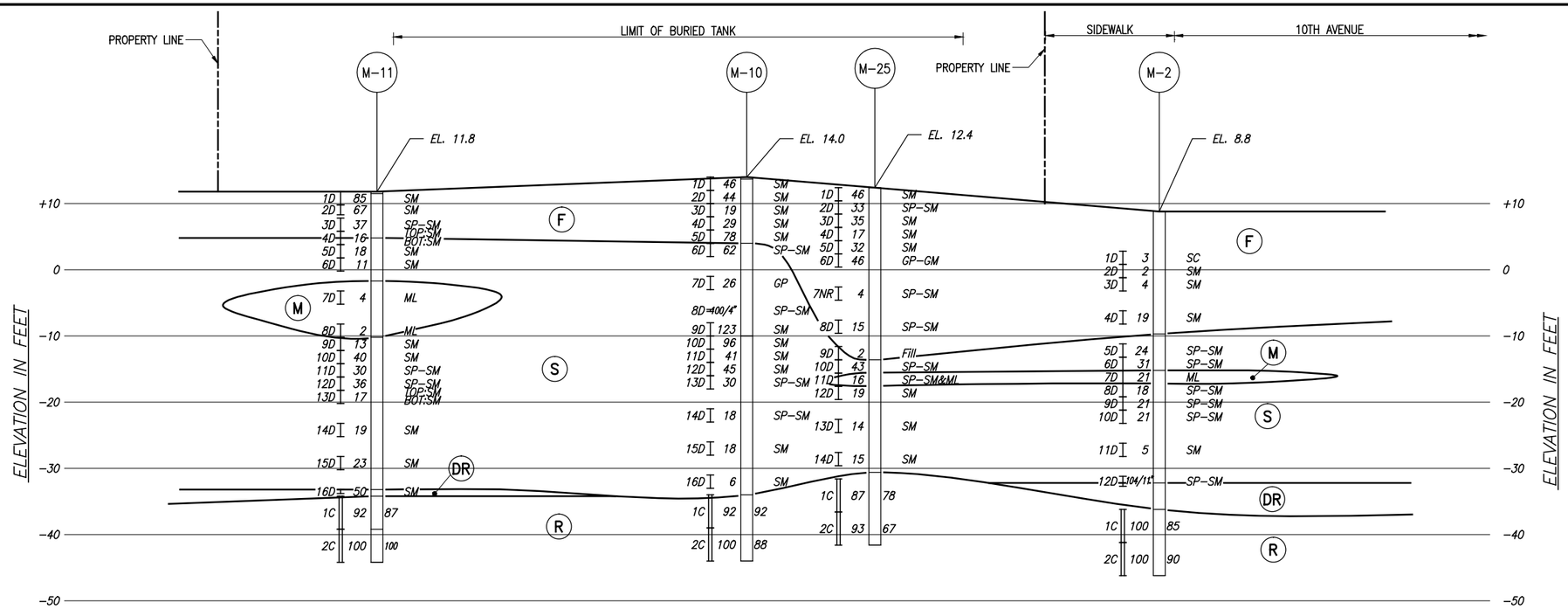
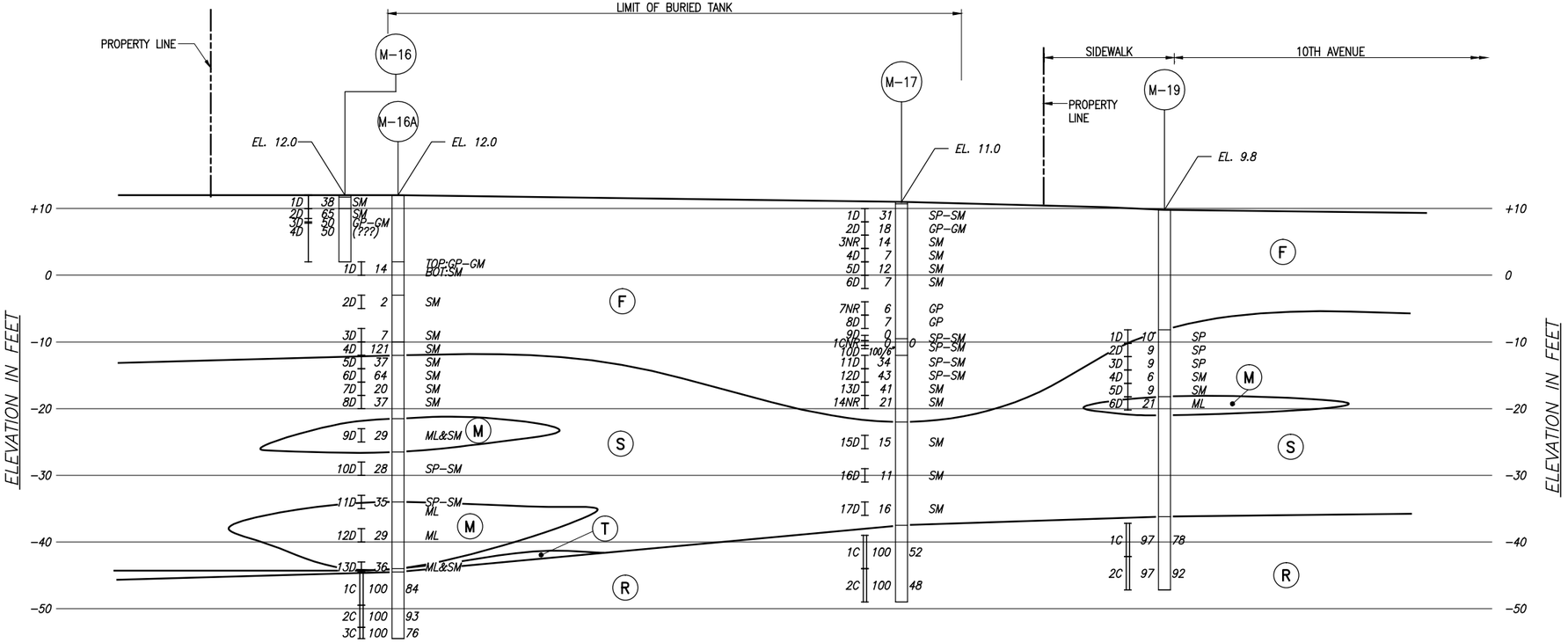


GEOLOGIC SECTION A-A



GEOLOGIC SECTION B-B

GRAPHIC SCALE
10' 5' 0 10' 20'

NOTES:

1. FOR GENERAL NOTES, SEE DRAWING B-1.
2. STRATIFICATIONS AND GROUND SURFACE SHOWN ARE INTERPOLATIONS BETWEEN AND BEYOND BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
3. REFER TO DRAWING NO. GS-R FOR BORING LEGEND.

GENERAL STRATA DESCRIPTIONS:

(B) **BRICK WALL**

(F) **FILL** – BROWN FINE TO COARSE SAND WITH SOME SILT, GRAVEL, CLAY, AND TRACE CONCRETE AND BRICK

(O) **ORGANIC SILTY CLAY** – BLACK TO BROWN ORGANIC SILTY CLAY AND CLAYEY FINE SAND WITH SOME FINE SAND AND TRACE GRAVEL

(S) **SAND** – RED TO BROWN TO GRAY FINE TO MEDIUM SAND WITH SOME SILT AND GRAVEL

(T) **TILL** –

(DR) **DECOMPOSED ROCK** – GREY BROWN MICACEOUS FINE TO MEDIUM SAND WITH SOME SILT

(R) **BEDROCK** – SLIGHTLY WEATHERED TO UNWEATHERED GRAY GNEISSIC SCHIST AND SCHISTOSE GNEISS, JOINTED TO BLOCKY, WITH IRON STAINED AND WEATHERED JOINTS

REV.	DATE	BY	DESCRIPTION

W18–W19 STREET DEVELOPMENT
NEW YORK NEW YORK

THE RELATED COMPANIES
NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA – 225 W. 34TH STREET, NY, NY 10122

SCALE	MADE BY: E.C. DATE: 06-08-2015	FILE NUMBER
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GEOLOGIC SECTIONS A–A & B–B — DRAWING NUMBER GS–1

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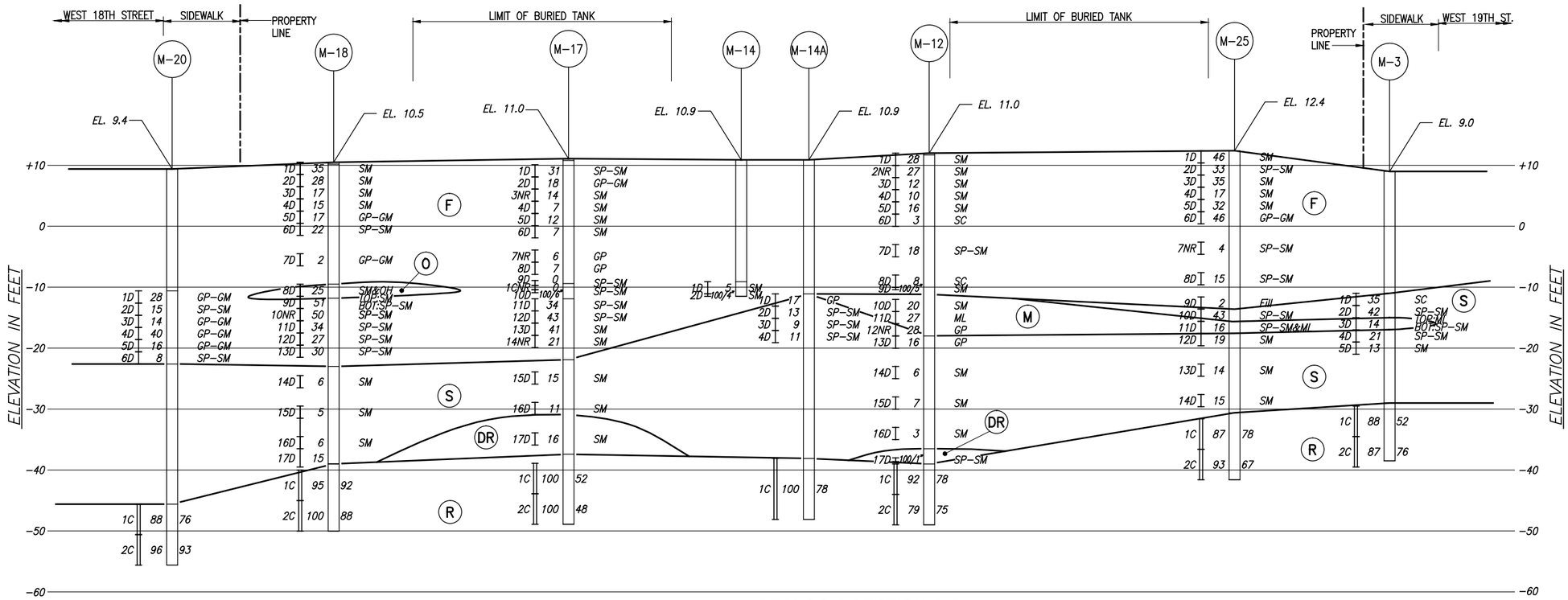
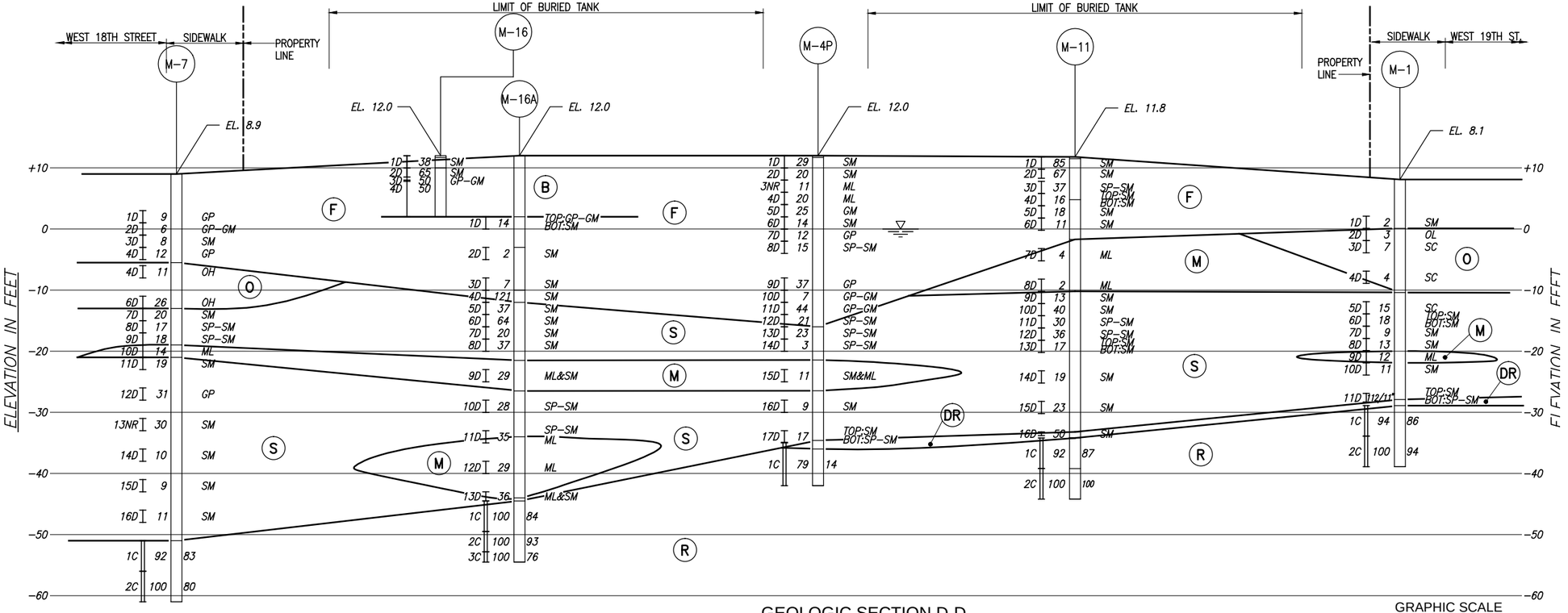


GEOLOGIC SECTION C-C



GEOLOGIC SECTION D-D

GRAPHIC SCALE
10' 5' 0 10' 20'

NOTES:

1. FOR GENERAL NOTES, SEE DRAWING B-1.
2. STRATIFICATIONS AND GROUND SURFACE SHOWN ARE INTERPOLATIONS BETWEEN AND BEYOND BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
3. REFER TO DRAWING NO. GS-R FOR BORING LEGEND.

GENERAL STRATA DESCRIPTIONS:

- (B) **BRICK WALL**
- (F) **FILL** – BROWN FINE TO COARSE SAND WITH SOME SILT, GRAVEL, CLAY, AND TRACE CONCRETE AND BRICK
- (O) **ORGANIC SILTY CLAY** – BLACK TO BROWN ORGANIC SILTY CLAY AND CLAYEY FINE SAND WITH SOME FINE SAND AND TRACE GRAVEL
- (S) **SAND** – RED TO BROWN TO GRAY FINE TO MEDIUM SAND WITH SOME SILT AND GRAVEL
- (T) **TILL** –
- (DR) **DECOMPOSED ROCK** – GREY BROWN MICACEOUS FINE TO MEDIUM SAND WITH SOME SILT
- (R) **BEDROCK** – SLIGHTLY WEATHERED TO UNWEATHERED GRAY GNEISSIC SCHIST AND SCHISTOSE GNEISS, JOINTED TO BLOCKY, WITH IRON STAINED AND WEATHERED JOINTS

REV.	DATE	BY	DESCRIPTION

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14 PENN PLAZA – 225 W. 34TH STREET, NY, NY 10122

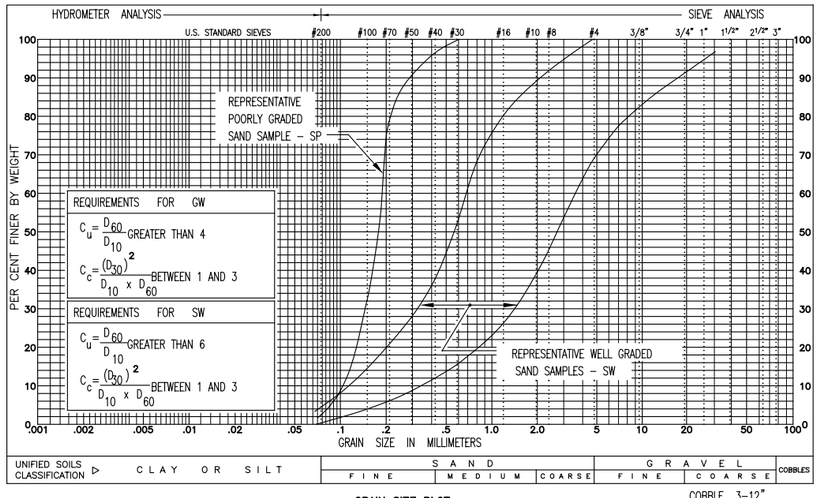
SCALE	MADE BY: E.C. DATE: 06-08-2015	FILE NUMBER
GRAPHIC	CH'KD BY: A.E.P. DATE: 06-08-2015	12320
		DRAWING NUMBER
GEOLOGIC SECTIONS C–C & D–D		GS–2

UNIFIED SOIL CLASSIFICATION (INCLUDING IDENTIFICATION AND DESCRIPTION)

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	FIELD IDENTIFICATION PROCEDURES (EXCLUDING PARTICLES LARGER THAN 3 IN. AND BASING FRACTIONS ON ESTIMATED WEIGHTS)
1	2		3	4	5
COARSE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE (THE NO. 200 SIEVE SIZE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE)	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE. (FOR VISUAL CLASSIFICATION, THE 1/4 -IN. SIZE MAY BE USED AS EQUIVALENT TO THE NO. 4 SIEVE SIZE)	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.	WIDE RANGE IN GRAIN SIZES AND SUBSTANTIAL AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES.
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.	PREDOMINANTLY ONE SIZE OR A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING.
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT-MIXTURES.	NONPLASTIC FINES OR FINES WITH LOW PLASTICITY (FOR IDENTIFICATION PROCEDURES SEE ML BELOW)
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES.	PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE CL BELOW)
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE. (FOR VISUAL CLASSIFICATION, THE 1/4 -IN. SIZE MAY BE USED AS EQUIVALENT TO THE NO. 4 SIEVE SIZE)	CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.	WIDE RANGE IN GRAIN SIZES AND SUBSTANTIAL AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES.
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.	PREDOMINANTLY ONE SIZE OR A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING.
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT-MIXTURES.	NONPLASTIC FINES OR FINES WITH LOW PLASTICITY (FOR IDENTIFICATION PROCEDURES SEE ML BELOW)
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES.	PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE CL BELOW)
FINE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE (THE NO. 200 SIEVE SIZE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE)					IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN NO. 40 SIEVE SIZE
					DRY STRENGTH (CRUSHING CHARACTERISTICS) / DILATANCY (REACTION TO SHAKING) / TOUGHNESS (CONSISTENCY NEAR PL)
	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, SANDY SILTS, ROCK FLOUR, OR CLAYEY SILTS WITH SLIGHT PLASTICITY.	NONE TO SLIGHT / QUICK TO SLOW / NONE
			CL	INORGANIC CLAYS, OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.	MEDIUM TO HIGH / NONE TO VERY SLOW / MEDIUM
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.	SLIGHT TO MEDIUM / SLOW / SLIGHT
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.	SLIGHT TO MEDIUM / SLOW TO NONE / SLIGHT TO MEDIUM
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.	HIGH TO VERY HIGH / NONE / HIGH
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.	MEDIUM TO HIGH / NONE TO VERY SLOW / SLIGHT TO MEDIUM
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS.	READILY IDENTIFIED BY COLOR, ODOR, SPONGY FEEL AND FREQUENTLY BY FIBROUS TEXTURE.

BOUNDARY CLASSIFICATIONS: SOILS POSSESSING CHARACTERISTICS OF TWO GROUPS ARE DESIGNATED BY COMBINATIONS OF GROUP SYMBOLS, I.E.: SP-SC POORLY GRADED SAND WITH CLAY BINDER.

LABORATORY CLASSIFICATION CRITERIA

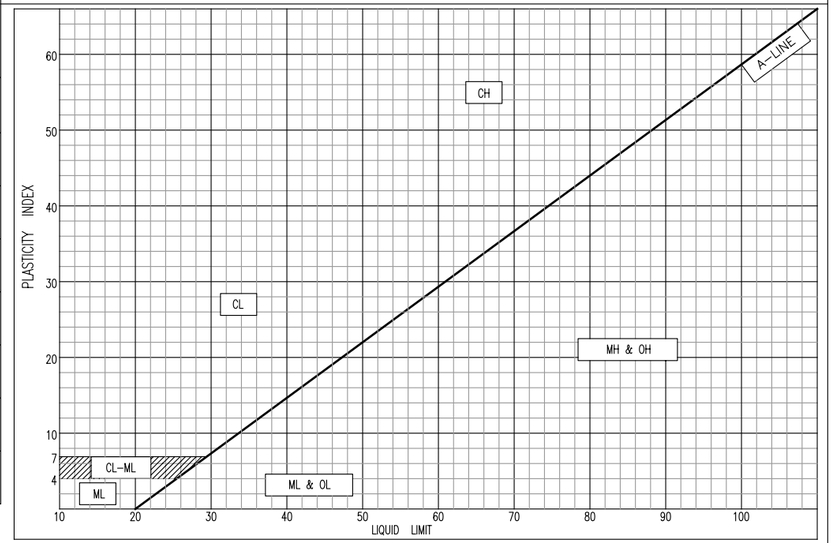


GRAIN SIZE PLOT

COBBLE 3-12"
BOULDER > 12"

DEPENDING ON PERCENTAGE OF FINES (FRACTION SMALLER THAN NO. 200 SIEVE SIZE) COARSE GRAINED SOILS ARE CLASSIFIED AS FOLLOWS:

LESS THAN 5%	GW, GP, SW, SP
MORE THAN 12%	GM, GC, SM, SC
5% TO 12%	BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS, I.E.: SP-SM, GP-GM.



PLASTICITY CHART FOR CLASSIFICATION OF FINE GRAINED SOILS

TERMINOLOGY USED IN MRCE SOIL DESCRIPTIONS

DEGREE OF COMPACTION FOR NON-PLASTIC SOIL

DEGREE OF COMPACTION	BLOWS* PER FOOT
LOOSE	0 TO 10
MEDIUM COMPACT	11 TO 29
COMPACT	30 TO 50
VERY COMPACT	GREATER THAN 50

* STANDARD PENETRATION RESISTANCE USING 140 LB. HAMMER FREE FALLING 30 INCHES TO DRIVE A 2 INCH O.D. SPLIT-SPOON SAMPLER.

CONSISTENCY OF CLAY AND CLAYEY SILT+

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TSF)	IDENTIFICATION CHARACTERISTICS
SOFT	LESS THAN 0.5	EASILY REMOLDED WITH SLIGHT FINGER PRESSURE
MEDIUM	0.5 TO 1.0	REQUIRES SUBSTANTIAL PRESSURE FOR REMOLDING
STIFF	1.0 TO 4.0	DIFFICULT TO REMOLD WITH FINGERS
HARD	GREATER THAN 4.0	CANNOT BE REMOLDED WITH FINGERS

\+ NONPLASTIC SILTS ARE DESCRIBED USING DEGREE OF COMPACTION AS PRESENTED FOR NON-PLASTIC SOIL.

DESCRIPTION OF CONSTITUENT PERCENTAGES AS USED IN SOIL SAMPLE CLASSIFICATIONS

- 1% TO 12% - "TRACE"
- 13% TO 30% - "SOME"
- 31% TO 49% - ADJECTIVE FORM OF SOIL GROUP (EG. SANDY)
- EQUAL AMOUNT - "AND" (EG. SAND AND GRAVEL)

BORING LEGEND

- A — NUMBER, TYPE AND LOCATION OF BORING
- EL. — GROUND SURFACE ELEVATION AT BORING
- B — NUMBER AND TYPE OF SAMPLE
  - D - DRY SAMPLE TAKEN WITH 2 INCH O.D. SPLIT SPOON
  - U - UNDISTURBED SAMPLE TAKEN WITH 3 INCH O.D. FIXED PISTON TYPE SAMPLER
  - UD - UNDISTURBED SAMPLE EXTRUDED IN FIELD AND PLACED IN JAR DUE TO POOR RECOVERY OR DISTURBANCE
  - S - THIN TUBE SAMPLE TAKEN WITH SHELBY TUBE SAMPLER
  - W - WASH SAMPLE
  - NR - NO RECOVERY
- — LENGTH OF SAMPLE ATTEMPT
- N — STANDARD PENETRATION RESISTANCE. NUMBER OF BLOWS FROM 140 LB. HAMMER FREE FALLING 30 INCHES REQUIRED TO DRIVE 2 INCH O.D. SPLIT SPOON SAMPLER ONE FOOT AFTER INITIAL PENETRATION OF 6 INCHES, UNLESS A SPECIFIC PENETRATION IS INDICATED.
  - P - PRESSED OR PUSH SAMPLE
  - WH - SAMPLE TAKEN UNDER WEIGHT OF HAMMER AND RODS
  - WR - SAMPLE TAKEN UNDER WEIGHT OF RODS
- E — AVERAGE NATURAL WATER CONTENT OF SAMPLE, IN PERCENT OF DRY WEIGHT
- G — UNIFIED SOIL CLASSIFICATON GROUP SYMBOL OF SAMPLE
- [J = ATTERBERG LIQUID LIMIT VALUE
- K] = ATTERBERG PLASTIC LIMIT VALUE
- L — COMPRESSIVE STRENGTH IN TSF DETERMINED FROM UNCONFINED COMPRESSION TEST
- M — COMPRESSIVE STRENGTH IN TSF DETERMINED FROM UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
- — GROUNDWATER LEVEL OBSERVED IN BORING *- MUD LEVEL
- — GROUNDWATER LEVEL OBSERVED IN PIEZOMETER
- C — ROCK CORE NUMBER
- — LENGTH OF CORE RUN
- F — LENGTH OF CORE RECOVERED EXPRESSED AS A PERCENT OF THE LENGTH OF CORE RUN
- R — ROCK QUALITY DESIGNATION-THE SUM OF THE LENGTHS OF PIECES OF RECOVERED CORE WHICH ARE EQUAL TO OR GREATER THAN FOUR INCHES IN LENGTH, EXPRESSED AS A PERCENTAGE OF THE TOTAL LENGTH OF CORE RUN. LENGTHS ARE MEASURED BETWEEN IN-SITU SEPARATIONS AND MECHANICAL BREAKS RESULTING FROM CORING ARE IGNORED.
- IMPERVIOUS SEAL
- SAND FILTER SURROUNDING PIEZOMETER INTAKE ELEMENT
- INTAKE ELEMENT
- COBBLE OR BOULDER

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NEW YORK, NY 10122

GEOTECHNICAL REFERENCE STANDARDS

DRAWING NO. GS-R

TABLE R–1 ROCK CORE CLASSIFICATION CRITERIA

HARDNESS/SOUNDNESS CLASSIFICATION	TYPICAL GEOLOGIC CLASSIFICATION	IDENTIFICATION CHARACTERISTICS	GENERAL MINIMUM CORING CHARACTERISTICS				INTACT SPECIMEN TYPICAL MINIMUM COMPRESSIVE STRENGTH
			NX OR LARGER		BX OR SMALLER		
			REC	RQD	REC	RQD	PSI
HARD ROCK UNWEATHERED MAY BE JOINTED	–CRYSTALLINE IGNEOUS, OR METAMORPHIC ROCKS –HIGHLY SILICEOUS SEDIMENTARY ROCKS	– UNWEATHERED FABRIC – RINGS WHEN STRUCK WITH BAR – SHARP AND HARD FRACTURE SURFACE WHEN BROKEN MECHANICALLY – MAY BE JOINTED, BUT JOINTS ARE GENERALLY TIGHT. JOINTS MAY BE IRON STAINED. – DOES NOT DISINTEGRATE UPON EXPOSURE – DOES NOT SLAKE IN WATER	95 OR MORE	85 OR MORE	85 OR MORE	75 OR MORE	3000
MEDIUM HARD ROCK SLIGHTLY WEATHERED MAY BE CLOSELY JOINTED	AS FOR HARD ROCKS AND: – MODERATELY SILICEOUS SEDIMENTARY ROCKS – CERTAIN CALCAREOUS ROCKS	AS FOR HARD ROCK, EXCEPT: – FABRIC MAY BE IRON STAINED – MAY BE CLOSELY JOINTED, BUT JOINTS ARE GENERALLY TIGHT. JOINTS HAVE SLIGHT WEATHERING OR MAY BE IRON STAINED.	70	50	50	40	1500
INTERMEDIATE ROCK MODERATELY WEATHERED MAY BE CLOSELY JOINTED	AS FOR MEDIUM HARD ROCKS AND: – MOST SEDIMENTARY ROCKS OTHER THAN COMPACTION SHALES – MOST CALCAREOUS ROCKS WHICH ARE NOT POROUS	AS FOR MEDIUM HARD ROCK, EXCEPT: – MODERATELY WEATHERED FABRIC – WEATHERED JOINTS – THUDS WHEN STRUCK BY BAR – CAN BE INDENTED WITH A STEEL NAIL – BREAKS READILY WITH HAMMER – PIECES OF WEATHERED SURFACE CAN BE BROKEN OFF BY HAND – DOES NOT DISINTEGRATE UPON EXPOSURE – UNWEATHERED PIECES DO NOT SLAKE	50	35	35	25	500
WEATHERED ROCK HIGHLY WEATHERED MAY BE BROKEN	AS FOR INTERMEDIATE ROCKS AND: – COMPACTION SEDIMENTARIES – CALCAREOUS ROCKS WITH SOIL–FILLED CAVITIES	AS FOR INTERMEDIATE ROCK, EXCEPT: – HIGHLY WEATHERED FABRIC – CAN BE BROKEN EASILY, CRUMBLES WITH DIFFICULTY BY HAND – CAN BE SCRAPED BY KNIFE – MAY SOFTEN UPON EXPOSURE – MAY SLAKE IN WATER – STANDARD PENETRATION RESISTANCE EXCEEDS 50 BLOWS/FOOT	LESS THAN 50	LESS THAN 35	LESS THAN 35	LESS THAN 25	150
		WHEN RECOVERED WITH SOIL SAMPLING TECHNIQUES, DESCRIBED AS FOR SOILS INCLUDING USC GROUP SYMBOLS. (WTHD ROCK) ADDED TO DESCRIPTION.					
DECOMPOSED ROCK (RESIDUAL SOILS)	ALL ROCK TYPES	– ROCK TEXTURE AND STRUCTURE OFTEN PRESERVED – GENERALLY SOIL–LIKE IN CONSISTENCY – CAN BE CRUMPLED BY SLIGHT HAND PRESSURE – CAN BE PEELED WITH A KNIFE – STANDARD PENETRATION RESISTANCE LESS THAN 50 BLOWS/FOOT	GENERALLY RECOVERED WITH SOIL SAMPLING TECHNIQUES AND DESCRIBED AS FOR SOILS INCLUDING USC GROUP SYMBOLS. (DEC ROCK) ADDED TO DESCRIPTION.				

NOTES:

1. ROCK CORE DESCRIPTIONS REPRESENT ONLY THE MATERIAL RECOVERED IN THE CORING OPERATIONS.
2. GENERAL MINIMUM CORING CHARACTERISTICS ASSUME ROCK CORING WITH A DOUBLE TUBE SERIES "M" OR EQUIVALENT CORE BARREL USING GOOD CORING TECHNIQUES AND EQUIPMENT.
3. REC – RECOVERY IS THE LENGTH OF CORE RECOVERED, EXPRESSED AS A PERCENTAGE OF THE LENGTH OF CORE RUN.
4. RQD – ROCK QUALITY DESIGNATION IS THE SUM OF THE LENGTHS OF CORE PIECES FOUR INCHES OR LONGER EXPRESSED AS A PERCENTAGE OF THE TOTAL LENGTH OF CORE RUN. LENGTHS ARE MEASURED BETWEEN IN–STU SEPARATIONS; MECHANICAL BREAKS RESULTING FROM CORING AND VERTICAL JOINTS ARE IGNORED.

TABLE R–4 ROCK CORE SKETCH KEY

SKETCH SYMBOLS

- Joint
- Healed Joint
- Broken
- Part of Core Not Recovered
- Cavities or Vugs in Core
- Clay
- Sand

JOINT ORIENTATION AND CONDITION

			SURFACE – CONDITION			
Parallel	–	//	Curved	– C	Slick	– 1
Crossing	–	X	Irregular	– I	Smooth	– 2
Foliation	–	F	Straight	– S	Rough	– 3
Stratification	–	S				
Unfoliated or Unstratified	–	U				
Mechanical Break	–	MB				

TABLE R–2 WEATHERING AND JOINTING DEFINITIONS

DEGREE OF FABRIC WEATHERING

FABRIC WEATHERING		CHARACTERISTIC
Unweathered	UnW	No decomposition or discoloration rings when struck
Slightly Weathered	SlW	Iron Stained Rings when struck
Moderately Weathered	MdW	Deteriorated fabric Thuds when struck
Highly Weathered	HiW	Friable, easily broken by hand
Decomposed	Dec	Soil–like

DEGREE OF JOINT WEATHERING

JOINT WEATHERING		CHARACTERISTIC
Iron stained joints	FeJtS	Indicates movement of water along joints
Weathered joints	WJts	Joints are not tight and do not match. Joints have friable edges.

DEGREE OF JOINTING

JOINTING		JOINT FREQUENCY
Massive	Mssv	Less than 1 joint in 4 feet
Blocky	Blky	1 joint every 2 to 4 feet
Moderately Jointed	MdJtd	1 joint every foot to 2 feet
Jointed	Jtd	1 to 2 joints per foot
Closely Jointed	ClJtd	2 to 4 joints per foot
Broken	Bkn	More than 4 joints per foot

Vertical joints are ignored in RQD and joint frequency evaluations, but are noted in written descriptions and and on core sketches.

TABLE R–3 ABBREVIATIONS FOR ROCK CORE CLASSIFICATION

Blocky	Blky	Intermediate	Int
Broken	Bkn	Light	Lt
Brown	brn	Lignite	lign
Calcareous or Calcite	calc	Limestone	lms
Cavities	cvts	Jointed	Jtd
Chlorite	chl	Joints	Jts
Clay, Clayey	cl	Massive	Mssv
Closely Jointed	ClJtd	Medium Hard	MdHd
Coating on joint surface	coat	Mica, Micaceous	Mic
Crushed	crsh	Moderately Jointed	MdJtd
Dark	dk	Moderately Weathered	MdW
Decomposed	Dec	Pockets	pkts
Ditto	do	Quartz	qtz
Dolomite, Dolomitic	Dol	Recovery	Rec
Iron stained Joints	FeJts	Rock Quality Designation	RQD
Iron Stained	FeStn	Sand	sa
Feldspar	feld	Sandstone	ss
Foliation	Fol	Schist, Schistose	sch
Fractured	frct	Shale	sh
Fragments	fgmts	Shear zone	Sz
Gneiss, Gneissic	gns	Siliceous	sil
Gouge	gog	Silt	si
Granite, Granitic	gr	Slickensided	slks
Gray	gry	Slightly Weathered	SlW
Hard	Hd	Unweathered	UnW
Highly Weathered	HiW	Weathered	Wthd
Hornblende	Hbl	Weathered Joints	WJts
Injected	inj	Vein	Vn
Interbedded	Intrbd	Vertical Joints	VJts

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NEW YORK, NY 10122

ROCK CORE CLASSIFICATION CRITERIA

DRAWING NO. RC–1

APPENDIX A

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-1
SHEET 1 OF 3
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** SIDEWALK/8.3±
RES. ENGR. J. BIELBY/T. SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:15							DRILLED	Hand auger to 5'.
05-18-15							AHEAD	
Monday							4"	
Cloudy								
63°F					F	5		Vacuum excavated to
								6'.
	1D	6.0	1-1	Brown silty fine sand, trace medium to coarse				
		8.0	1-1	sand, clay (SM)		8		
	2D	8.0	1-1	Black to brown organic silty clay, some fine				2D-3D, 9D: REC=5"
		10.0	2-2	sand, trace gravel (OL)		10		
	3D	10.0	3-4	Black organic clayey fine sand (SC)				
		12.0	3-2					
					O			
						15		
	4D	15.0	2-2	Black organic clayey fine sand, trace shells (SC)				WC=65, pp=0.23
		17.0	2-3					
						18.5		
						20		
	5D	20.0	7-7	Red brown clayey fine to medium sand, trace				REC=2"
		22.0	8-12	gravel, coarse sand (SC)				
	6D	22.0	12-9	Top 10": Gray brn fine sand, some silt (SM)				
		24.0	9-8	Bot 4": Red brn f-m sand, some silt (SM)				
	7D	24.0	4-4	Red brown fine sand, some silt (SM)		25		
		26.0	5-7					
	8D	26.0	8-6	Red brown silty fine sand (SM)				
		28.0	7-7		S			WC=Water Content
	9D	28.0	5-6	Red brown clayey silt (ML)				in percent of dry
		30.0	6-8			30		weight.
	10D	30.0	5-4	Red brown silty fine sand varved with some				
		32.0	7-11	fine sand, some silt (SM)				pp=Pocket
								Penetrometer
								Unconfined Compres-
						35		sive Strength in tsf.
	11D	35.0	5-12	Top 5": Red brn f-m sand, sm silt, gravel (SM)		36		
		36.4	100/5"	Bot 4": Brn f-c sa, tr rock fgmts, silt, mica (DR) (SP-SM)	**	36.5		**Decomposed rock
09:00	1C	37.0	REC=94%	Hard unweathered gray gneissic schist,				from 36' to 36.5'.
05-19-15		42.0	RQD=86%	moderately jointed				Rig chatter at 36.5'.
Tuesday						40	*	1C: *Coring time from
Cloudy								09:20 to 09:38.
60°F					R			
	2C	42.0	REC=100%	Do1C			*	*Coring time from 09:51
		47.0	RQD=94%					to 10:09.
						45		
10:15						47		End of Boring at 47'.
						50		

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ROCK CORE SKETCH

PROJECT: W 18th - W 19th ST / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

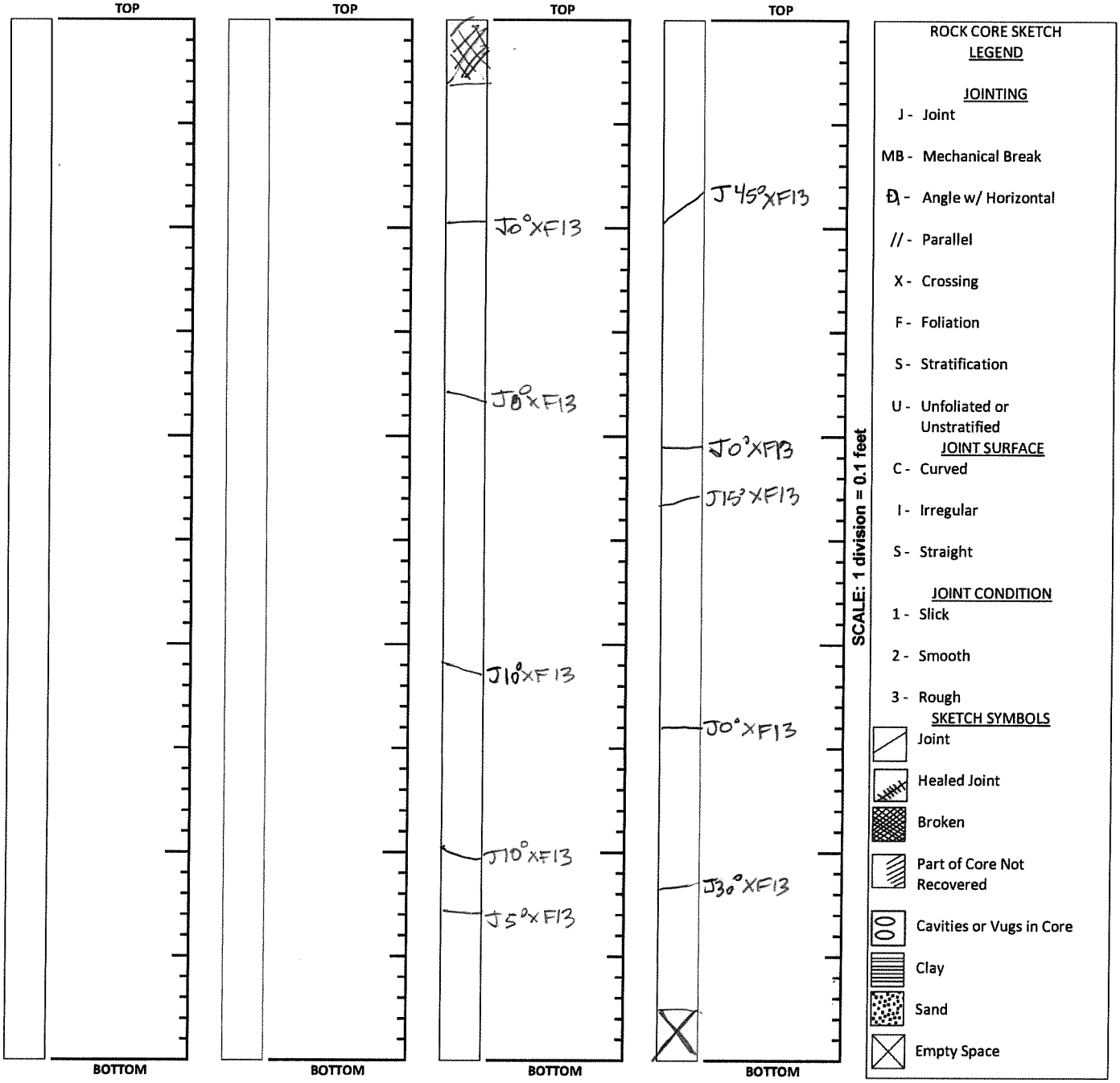
BORING NO. M-1
SHEET 2 OF 3
FILE NO. 12320
SURFACE ELEV. 8.3±
RES ENGR. T. SANDIFORD

Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	100% / 94%

Run No.	REC/RQD
1C	94% / 86%



ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-1
SHEET 3 **OF** 3

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. SIDEWALK/8.3±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED						
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	37	
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK CME-45									

TYPE AND SIZE OF:		DRILLING MUD USED					
D-SAMPLER	2" O. D. SPLIT SPOON	DIAMETER OF ROTARY BIT, IN.			3-7/8		
U-SAMPLER		TYPE OF DRILLING MUD			QUIK GEL		
S-SAMPLER							
CORE BARREL	NX DOUBLE BARREL	AUGER USED					
CORE BIT	NX DIAMOND	TYPE AND DIAMETER, IN.					
DRILL RODS	NWJ						
		CASING HAMMER, LBS.		AVERAGE FALL, IN.			
		*SAMPLER HAMMER, LBS.	140	AVERAGE FALL, IN.	30		

*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	37	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER PAUL GADDIS HELPERS DANNY ROMERO
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER JEREMY M. BIELBY/TERESA SANDIFORD DATE 05-19-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-2
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 8.8±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:15							DRILLED	Vacuum excavated to
05-11-15							AHEAD	6'.
Monday							4"	Hand augered to 6'.
Sunny								
80°F						**5**		
	1D	6.0	3-2	Black, brown clayey fine to medium sand (SC)				1D, 4D: REC=6"
		8.0	1-1					
	2D	8.0	1/12"	Black brown fine to medium sand, some silt,				Odor.
		10.0	1-1	trace wood (SM)	**F**	**10**		2D: REC=7"
	3D	10.0	1-3	Black brown silty fine sand (SM)				
		12.0	1-1					
						15		
	4D	15.0	5-10	Black brown fine to medium sand, some silt,				
		17.0	9-9	trace gravel (SM)				
						18.5		
						20		
	5D	20.0	6-13	Brown black gravelly fine to coarse sand, trace				
		22.0	11-13	silt (SP-SM)	**S**			
	6D	22.0	8-15	Do 5D (SP-SM)				
		24.0	16-14			**24**		
	7D	24.0	10-10	Brown clayey silt, trace fine sand, gravel (ML)		**25**		WC=18
		26.0	11-11					
	8D	26.0	4-8	Brown fine to medium sand, trace gravel, silt				
		28.0	10-11	(SP-SM)				
	9D	28.0	7-12	Brown fine to coarse sand, trace gravel, silt				
		30.0	9-7	(SP-SM)		**30**		
	10D	30.0	12-10	Brown fine to coarse sand, trace silt, gravel				
		32.0	11-12	(SP-SM)				
					S			
14:15						**35**		
09:00	11D	35.0	2-2	Brown silty fine sand (SM)				
05-12-15		37.0	3-4					
Tuesday								
Sunny								
88°F						**40**		
	12D	40.0	1-4	Top: Do 11D (SM)		**41**		
		41.5	100/5.5"	Bot: Gray micaceous fine to medium sand, trace				
				silt (Decomposed Rock) (SP-SM)				
					DR			
								Easy drilling at 44'.
						45		
	1C	45.0	REC=100%	Medium hard to hard gray schistose gneiss,			*	*Coring time from 11:45
		50.0	RQD=85%	trace pegmatite, slightly weathered to				to 12:18.
				unweathered to intermediate to moderately				
				jointed, weathered joints	**R**			
						50		
	2C	50.0	REC=100%	Hard unweathered gray, green gneiss, some			*	*Coring time from 12:35
		55.0	RQD=90%	pegmatite, moderately jointed to jointed				to 12:45.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-2
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 8.8±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 05-12-15 Tuesday Sunny 88°F, 14:00					R	55		Paused run near 2' at 13:10. End of Boring at 55'. WC=Water Content in percent of dry weight.
						60		
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

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ROCK CORE SKETCH

BORING NO. M-2
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 8.8±
RES ENGR. T. SANDIFORD

PROJECT: W 18th - W 19th ST / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

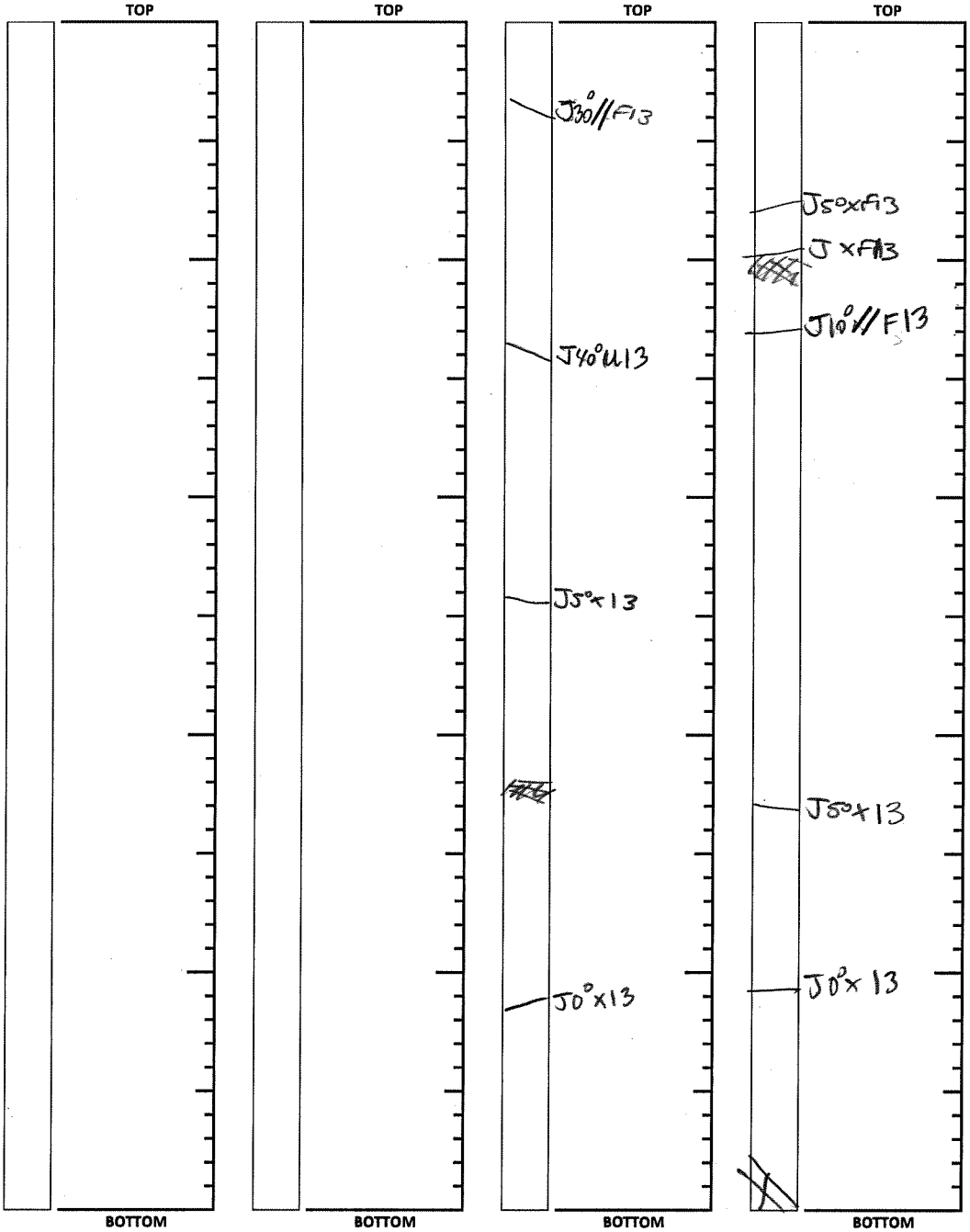
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	100% / 90%

Run No.	REC/RQD
1C	100% / 85%

TOP



BOTTOM

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-2
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 8.8±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

CASING USED: [X] YES [ ] NO

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED: [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK GEL

AUGER USED: [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. ____ AVERAGE FALL, IN. ____
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	45	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER JOHN CAMPBELL HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-12-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-3
SHEET 1 OF 3
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 9.0±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:30							DRILLED	Hand augered with
05-07-15							AHEAD	vacuum to 6'.
Thursday							4"	
Sunny								
70°F						5		
						10		
						15		
						20		
	1D	20.0	9-16	Brown, black clayey fine to medium sand (SC)				Medium sand & black
		22.0	19-14					3" band mid sample.
	2D	22.0	17-17	Brown fine to medium sand, trace gravel, silt				
		24.0	25-32	(SP-SM)				
	3D	24.0	6-4	Top: Brown clayey silt, trace fine sand (ML)		25		3D Top: WC=18
09:00		26.0	10-8	Bot: Brown f-m sand, tr silt, coarse sand (SP-SM)				
05-08-15	4D	26.0	8-11	Brown fine to coarse sand, trace gravel, silt				
Friday		28.0	10-9	(SP-SM)				
Sunny	5D	28.0	5-6	Brown silty fine sand (SM)				
75°F		30.0	7-6		S	30		
						35		
								Hard drilling from 37.5'
	1C	38.5	REC=88%	Medium hard slightly weathered gray gneissic		38.5		to 38.5'. Top of rock at
		43.5	RQD=52%	schist, jointed to closely jointed, weathered		40		38.5'. Mica & black rock
				joints				in wood.
	2C	43.5	REC=87%	Medium hard unweathered gray gneissic schist,	R			Hole collapsed; drilling
		48.5	RQD=76%	jointed		45		out before 2C.
13:00								
						48.5		End of Boring at 48.5'.
						50		WC=Water Content
								in percent of dry
								weight.

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ROCK CORE SKETCH

BORING NO. M-3
SHEET 2 OF 3
FILE NO. 12320
SURFACE ELEV. 9.0±
RES ENGR. T. SANDIFORD

PROJECT: W 18th - W 19th St / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD

TOP

BOTTOM

Run No.	REC/RQD

TOP

BOTTOM

Run No.	REC/RQD
2C	87% / 76%

TOP 43.5

J0°xF13
J5°xF13
JxF13
J90//F13
J70°xF13
J35°xF13
J30°xF13

BOTTOM 48.5

Run No.	REC/RQD
1C	88% / 52%

TOP 38.5

J5°xF13
J5°xF13
J90°//FxF13
J20°xF13
J0°xF13
J0°xF13
J0°xF13
J0°xF13
J0°xF13
J0°xF13

BOTTOM 43.5

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-3
SHEET 3 **OF** 3

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 9.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG	TYPE OF FEED DURING CORING		CASING USED					
			X YES					
TRUCK	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30
SKID	HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE	OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK							

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED: X YES / NO
DIAMETER OF ROTARY BIT, IN.: 3-7/8
TYPE OF DRILLING MUD: QUIK GEL

AUGER USED: YES / X NO
TYPE AND DIAMETER, IN.:

CASING HAMMER, LBS.: AVERAGE FALL, IN.:
*SAMPLER HAMMER, LBS.: 140 AVERAGE FALL, IN.: 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED: YES / X NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	38.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR: AQUIFER DRILLING & TESTING CO., INC.
DRILLER: JOHN CAMPBELL HELPERS:
REMARKS: BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER: TERESA SANDIFORD DATE: 05-08-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-4P
SHEET 1 OF 5
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 12.0±
RES. ENGR. NATHAN SEGUIN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:00	1D	0.0	23-14	Dark brown to black fine to coarse sand, some	**	0.25	DRILLED	**Pavement from 0' to
04-22-15		2.0	15-15	silt, gravel (Fill) (SM)			AHEAD	0.25'.
Wednesday	2D	2.0	8-10	Brown silty fine to medium sand, some gravel			4"	
Clear		4.0	10-15	& brick fragments (Fill) (SM)				
60°F	3NR	4.0	7-6	No recovery		5		
		6.0	5-4					
	4D	6.0	4-10	Dark gray silt, some fine sand, gravel (ML)				
		8.0	10-6					
	5D	8.0	3-16	Brown fine to coarse sandy gravel, some silt				5D, 10D, 14D: REC=6"
		10.0	9-11	(Fill) (GM)		10		
	6D	10.0	7-6	Red brown brick fragments, some fine to				Spoon bouncing on
14:40		12.0	8-50/2"	coarse sand, some silt & wood fgmts (Fill) (SM)				wood; tip from 10' to
09:00	7D	12.0	52-5	Wood & gravel wash (Fill) (GP)				12'; REC=1"
04-23-15		14.0	7-7					
Thursday	8D	14.0	4-7	Dark gray coarse to fine sand, some gravel,	F	15		REC=4"
Clear		16.0	8-8	trace wood, silt, brick (Fill) (SP-SM)				
55°F								
						20		
	9D	20.0	4-11	Dark gray gravelly coarse to fine sand, trace				Casing moved down
		22.0	26-12	brick, silt (Fill) (GP)				with blows from 0" to
	10D	22.0	2-2	Dark gray fine to medium sand, gravel, trace				18".
		24.0	5-28	silt (Fill) (GP-GM)				9D, 14D: REC=6"
	11D	24.0	11-27	Dark gray fine to coarse sandy gravel, trace		25		
		26.0	17-11	silt, brick (GP-GM)				
	12D	26.0	5-9	Gray fine to coarse sand, some gravel, trace				
		28.0	12-18	silt (SP-SM)		28		
	13D	28.0	11-12	Red brown coarse to fine sand, some gravel,				
		30.0	11-11	trace silt (SP-SM)		30		
	14D	30.0	1-1	Red brown fine to coarse sand, trace silt				
		32.0	2-9	(SP-SM)				
						35		
	15D	35.0	3-3	Red brown silty fine sand varved with some				
		37.0	8-7	brown silt layers (SM&ML)				
					S			
						40		
	16D	40.0	4-4	Brown silty fine sand (SM)				
		42.0	5-5					
						45		
	17D	45.0	6-7	Top 15": Red brn fine sand, sm silt, tr mica (SM)				
		46.9	10-50/5"	Bot 3": Gray brn f-m sand, tr silt (DR) (SP-SM)		46.6		
	1C	47.0	REC=79%	Intermediate slightly weathered gray gneissic	DR	48		
		54.0	RQD=14%	schist, broken to closely jointed, iron stained				
				& weathered joints		50		
					R			

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-4P
SHEET 2 OF 5
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 12.0±
RES. ENGR. JAMES BRICKMAN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
04-23-15					R		*	*Coring time not taken.
Thurs., Clear								Inspecting two rigs.
55°F, 14:00						54		End of Boring at 54'.
						55		
						60		
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

MRCE Form BL-1

BORING NO. M-4P

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ROCK CORE SKETCH

BORING NO. M-4P
SHEET 3 OF 5
FILE NO. 12320
SURFACE ELEV. 12.0±
RES ENGR. J. Brickman

PROJECT: W 19th - W 19th ST / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

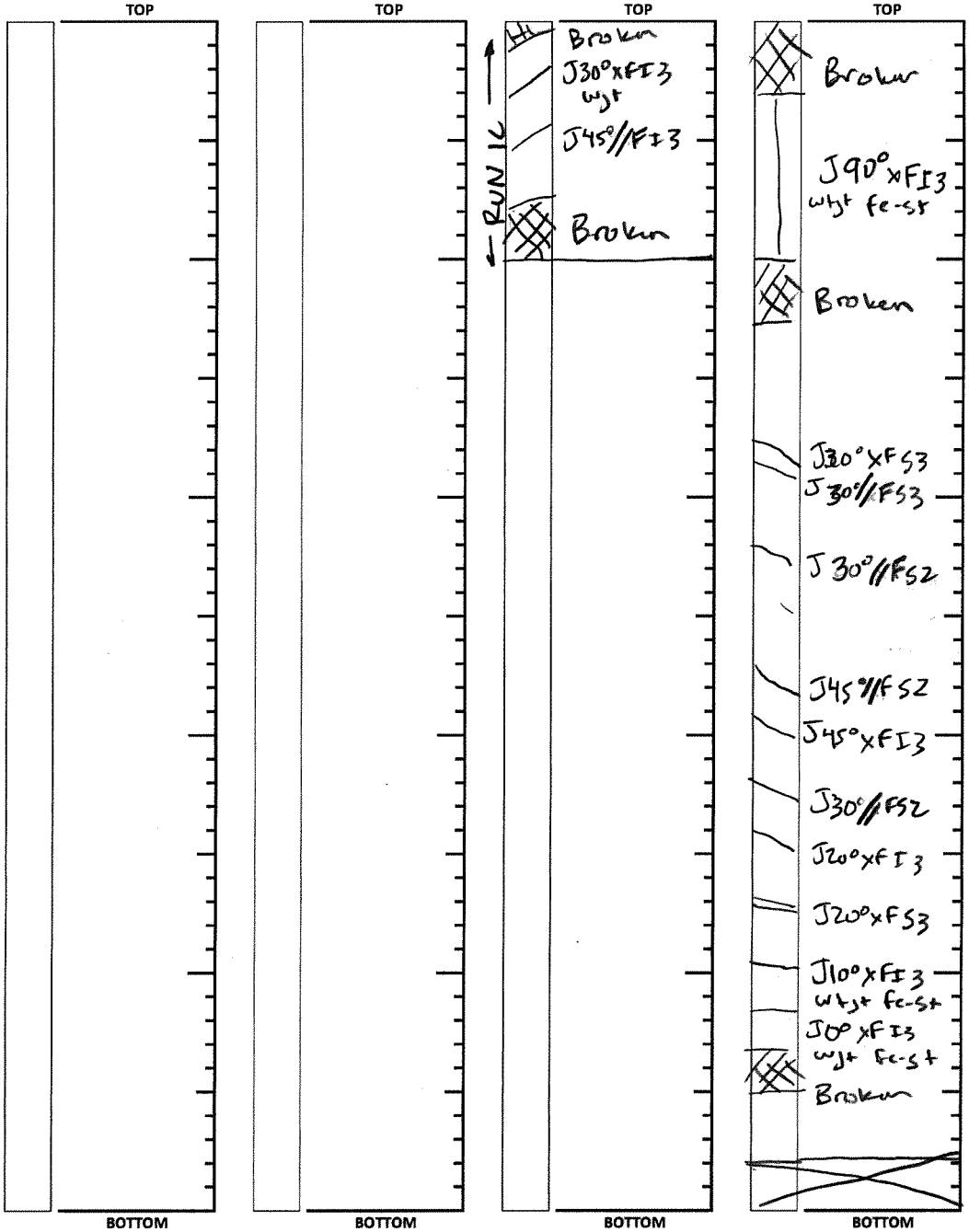
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
1C Cont'd	79/14

Run No.	REC/RQD
1C	79/14

TOP



BOTTOM

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

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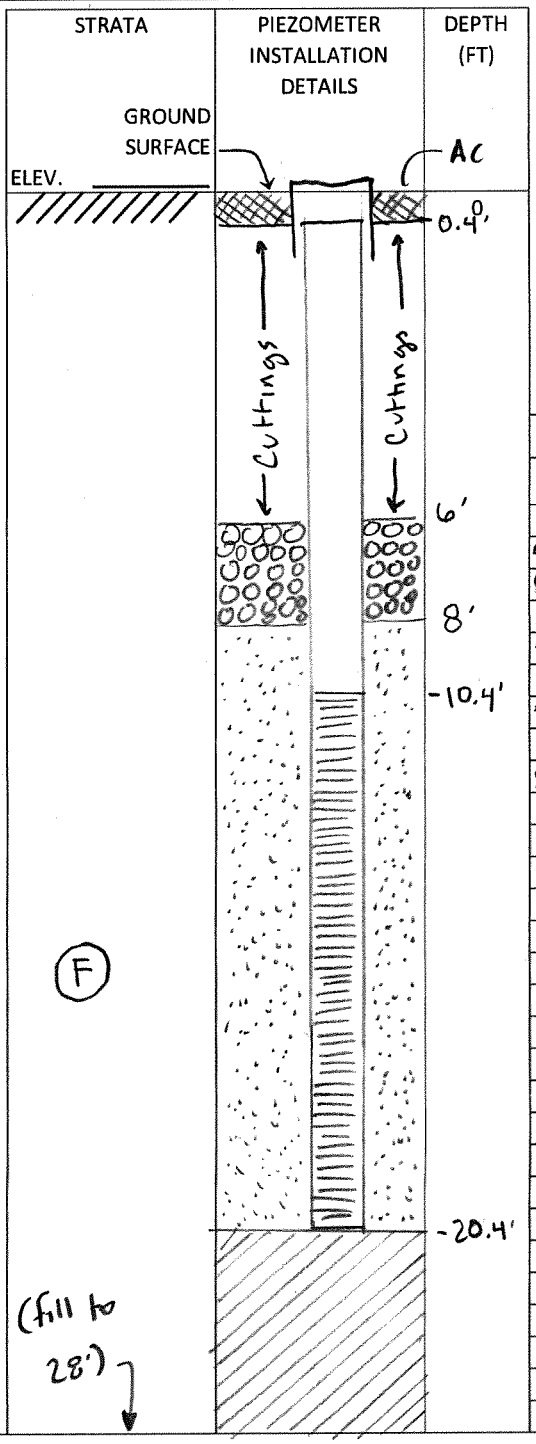
PIEZOMETER RECORD

PIEZOMETER OR BORING NO. M-4P
SHEET 4 OF 5
FILE NO. 12320
INSTALLATION DATE 4-24-15
RES ENGR. J. Brickman

PROJECT: W 18th - 19th St / 10th Ave
LOCATION: Ctr of site, just E of highline (see BLP)
PIEZOMETER LOCATION: New York, NY

☐ SEE SKETCH ON BACK



PIEZOMETER TYPE PVC Std. Pipe

INTAKE POINT
depth to bottom, ft = 20.4'
depth to top, ft = 10.4'
length, ft = 10' = L
diameter, in = 2', ft = 0.167 = 2R

STANDPIPE/RISER
elevation of rim, ft =
diameter, in = 2', ft = 0.167 = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
4/28/15	1108		11.7	over weekend
4/29/15	1115		12.4	After flushing
4/30/15	1300		11.7	
5/5/15	1300		11.7	
5/6/15	1200		11.8	
5/11/15	1100		11.7	
5/15/15	1030		11.9	
5/22/15	1350		11.9	
5/26/15	1500		12.0	

SAND
GRAVEL
BENTONITE
GROUT

GROUND SURFACE ELEV.

PIEZOMETER NO. M-4P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-4P
SHEET 5 **OF** 5

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 12.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED						
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	45	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER										

CASING USED: [X] YES [ ] NO

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED: [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK GEL

AUGER USED: [ ] YES [X] NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SEE SHEET NO. 4

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	47	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	7	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOMINIC PEPE HELPERS GEORGE RAYMOND
REMARKS PIEZOMETER INSTALLED.
RESIDENT ENGINEER NATHAN SEGUIN/JAMES BRICKMAN DATE 04-23-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-5
SHEET 1 OF 3
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 10.0±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:00							DRILLED	Vacuum excavated to
05-14-15							AHEAD	5'.
Thursday							4"	Advanced unsampled
Sunny								6' to 20'.
65°F						5		Casing shifting East
								at 4'. Driller will not
								pull & realign.
						10		
					F			
						15		
						20		
	1D	20.0	2-3	Brown silty fine sand, trace mica (SM)				
		22.0	2-4					
	2D	22.0	4-4	Do 1D (SM)				
		24.0	6-6					
	3D	24.0	2-4	Brown clayey silt varved with trace light brown		25		
		26.0	4-6	silty clay (ML)				
	4D	26.0	6-3	Brown silty fine sand, trace mica (SM)				
		28.0	5-8					
	5D	28.0	3-5	Do 4D (SM)				
		30.0	5-7		S	30		
						35		
								Advanced unsampled
								to top of rock at 40'.
								Soft rock at 38'.
								Core to realign at
						40		40' at 12:00.
	1C	40.0	REC=93%	Medium hard slightly weathered to unweathered			*	*Coring time from
		45.0	RQD=88%	gray gneissic schist to schistose gneiss, jointed				12:05 paused at 12:10,
				to iron stained & weathered joints				12:12 to 12:40.
								Slow drilling; core
						45		bouncing side to side.
	2C	45.0	REC=100%	Medium hard unweathered gray gneissic schist	R		*	*Coring time from
		50.0	RQD=90%	to schistose gneiss, jointed to moderately				12:55 to 13:38; slow
				jointed to moderately jointed, weathered joints				drilling.
13:45						50		End of Boring at 50'.

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ROCK CORE SKETCH

BORING NO. M-5
SHEET 2 OF 3
FILE NO. 12320
SURFACE ELEV. 10.0±
RES ENGR. T. SANDIFORD

PROJECT: W18th - W19th ST / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD

TOP

BOTTOM

Run No.	REC/RQD

TOP

BOTTOM

Run No.	REC/RQD
2C	100 % / 90 %

TOP 45

J0°xF13
J10°xF13
J0°xF13
J0°xF13
J40°xF13

BOTTOM 50

Run No.	REC/RQD
1C	93 % / 88 %

TOP 40

J0°xF13
J0°xF13
J10°xF13
J0°xF13
J0°xF13
J10°xF13
J40°xF13

BOTTOM 45

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-5
SHEET 3 **OF** 3

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 10.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED	X YES		NO
DIAMETER OF ROTARY BIT, IN.	3-7/8		
TYPE OF DRILLING MUD	QUIK MUD		
AUGER USED	YES	X	NO
TYPE AND DIAMETER, IN.			
CASING HAMMER, LBS.		AVERAGE FALL, IN.	
*SAMPLER HAMMER, LBS.	140	AVERAGE FALL, IN.	30

*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	40	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER JOHN CAMPBELL HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-14-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-6
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. +12.0±
RES. ENGR. NATHAN SEGUIN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:30	1D	0.0	49-13	Black fine to coarse sand, some silt, trace	**	**0.25**	DRILLED	**Pavement from 0' to
04-21-15		2.0	24-45	gravel, brick fragments (Fill) (SM)			AHEAD	0.25'.
Wednesday	2D	2.0	39-66	Red brick, brown fine to medium sand, silt			4"	
Partly Sunny		4.0	72-80	(Fill) (SM)				
60°F	3D	4.0	9-54	Do 2D (Fill) (SM)		**5**		
		5.8	112-65/3"					
	4D	6.0	7-100	Do 2D (Fill) (SM)				
		7.0						
	5D	8.0	48-100/3"	Do 2D (Fill) (SM)				
		8.8				**10**		
	6D	10.0	50-100/1"	Brown silty fine to medium sand, some brick				
		10.6		fragments (Fill) (SM)				
					F			
						15		
	7D	15.0	115/3"	Do 6D (Fill) (SM)				REC=2"
		15.3						Difficult advancement
								with roller bit below 16'.
						20		
	8NR	20.0	100/3"	No recovery				
		20.3						Highly contaminated;
	9D	22.0	100/3"	Red brown brick fragments, some fine to				sheen/petroleum.
		22.3		coarse sand, silt (Fill) (SM)				
	10D	24.0	100/3"	Brown silty fine to medium sand, some gravel		**25**		Rig bounce from 24.5'
		24.3		(Fill) (SM)				to 25'.
	11NR	25.0	26-17	No recovery		**27**		
		27.0	7-10					
	12D	27.0	12-23	Red brown gravelly fine to coarse sand, some				Spoon sample split
		29.0	23-21	silt (SM)		**30**		at 29.5'.
	13D	29.0	29-8	Brown fine to coarse sand, trace silt, gravel				
		31.0	8-8	(SP-SM)				Spoon sample split
	14D	31.0	7-7	Top 1.5': Do 13D (SP-SM)				at 32.5'.
		33.0	8-6	Bot 0.5': Red brown silty fine to medium sand				
				(SM)		**35**		
09:00	15D	35.0	6-7	Red brown fine sandy silt (ML)				REC=6"
04-22-15		37.0	7-6		S			
Thursday								
Clear								
60°F						**40**	▼	
	16NR	40.0	6-5	No recovery				
		42.0	7-9					
						45		Weathered rock in tip.
	17D	45.0	7-100/5"	Brown fine to coarse sand, some silt, gravel		**45.9**		
		45.9		(SM)			*	*Coring time at 7
	1C	47.0	REC=100%	Medium hard slightly weathered to unweathered				minutes per foot.
		52.0	RQD=58%	gray schistose gneiss, closely jointed to jointed,	R			
				iron stained & weathered joints		**50**		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-6
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. +12.0±
RES. ENGR. NATHAN SEGUIN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
04-22-15							*	*Coring time from 12
Thursday	2C	52.0	REC=100%	Medium hard slightly weathered gray schistose				to 13 minutes per foot.
Clear		54.0	RQD=0%	gneiss, broken to closely jointed, Fe & WJts	R		*	*Coring time at 5
60°F	3C	54.0	REC=100%	Medium hard slightly weathered to unweathered		55		minutes per foot.
		57.0	RQD=90%	gray schistose gneiss to gneissic schist,				
11:50				jointed, iron stained joints		57		End of Boring at 57'.
						60		
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

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ROCK CORE SKETCH

BORING NO. M-6
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. +12 +/-
RES ENGR. N. SEGUIN

PROJECT: W 18th - W 19th St. / 10th Ave
LOCATION: NEW YORK, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD

TOP
BOTTOM

Run No.	REC/RQD

TOP
BOTTOM

Run No.	REC/RQD
2C	100%/0%
3C	100%/90%

TOP 52
J90°/FS2 slfeat
J10°XFS3
J10°XFS3
J10°XFI3 fe+wjts
BOT 2C
TOP 3C
J10°XFS2 fe+wjt
J10°XFI2
J15°XI3
J60°XFI3
J60°XFI3
J15°XFS3
BOT 3C
BOTTOM 57

Run No.	REC/RQD
1C	100%/58%

TOP 47
J0°XFS3
J0°XFS3 feat
J10°XFS3 feat
JFI3 60°//F
J15°XFS3
J10°XFS3
J0°XFS3
J10°XFI3 feat
J15°XFS2 Feat
J0°XFS3
J0°XFS3
J80°//FS2
J15°//FS3
BOT 1C
BOTTOM 52

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-6
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. +12.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	40
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED	X YES		NO
DIAMETER OF ROTARY BIT, IN.	3-7/8		
TYPE OF DRILLING MUD	QUIK GEL		
AUGER USED	YES	X	NO
TYPE AND DIAMETER, IN.			

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	47	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOMENIC PEPE HELPERS GEORGE RAYMOND
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER THERESA SANDIFORD DATE 04-22-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-7
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 8.9±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:00							DRILLED	
05-01-15							AHEAD	
Friday							4" 3"	
Cloudy								
55°F						5		
	1D	6.0	5-5	Brown, tan gravel (GP)				1D, 4D: REC=1"
		8.0	4-4		F			
	2D	8.0	4-3	Brown, tan fine to coarse sandy gravel, trace				REC=2"
		10.0	3-3	silt (GP-GM)		10		
	3D	10.0	7-5	Brown gravelly fine to coarse sand, some silt				
		12.0	3-5	(SM)				
	4D	12.0	2-7	Black gravel, trace fine to coarse sand (GP)				
		14.0	5-7					
						14.5		
	5D	15.0	19-7	Stiff gray organic silty clay, trace shells, fine				WC=53
		17.0	4-3	sand (OH)				
					O			
						20		
	6D	20.0	7-11	Stiff gray organic silty clay, some fine sand (OH)				WC=36
		22.0	15-19			22		Blows from driller.
	7D	22.0	11-9	Brown fine to medium sand, some silt, trace				
		24.0	11-11	coarse sand (SM)				Cobbles spun from
	8D	24.0	8-8	Brown fine to medium sand, trace silt (SP-SM)		25		10:40 to 12:00.
		26.0	9-8					Blows from driller.
	9D	26.0	10-9	Do 8D (SP-SM)				Blows from driller.
		28.0	9-9					
	10D	28.0	6-8	Brown, green silt, some fine sand (ML)				
		30.0	6-7			30		
	11D	30.0	9-10	Brown fine to coarse sand, some silt, trace				
		32.0	9-9	gravel, clay (SM)				
						35		
	12D	35.0	6-17	Brown gravel, trace fine to coarse sand (GP)				
		37.0	14-10		S			
09:00								
05-04-15								
Monday						40		
Sunny	13NR	40.0	26-13	No recovery				
80°F		42.0	17-12					
						45		
	14D	45.0	8-5	Brown silty fine sand, trace clay (SM)				
		47.0	5-8					
						50		
	15D	50.0	5-4	Brown, red brown silty fine sand, trace mica				
		52.0	5-5	(SP)				

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-7
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 8.9±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							DRILLED	
05-04-15							AHEAD	
Monday							3"	
Sunny								
80°F						55		
	16D	55.0	8-5	Do 15D (SM)	S			
		57.0	6-8					
								Hard drilling at 58'.
						60		3" Casing to 60'.
	1C	60.0	REC=92%	Medium hard slightly weathered to unweathered			*	*Coring time from 12:55
		65.0	RQD=83%	gray gneissic schist, closely jointed to jointed,				to 13:15 at 4 minutes
				slightly weathered joints				per foot.
						65		
	2C	65.0	REC=100%	Medium hard unweathered gray schistose	R			Did not get core times;
		70.0	RQD=80%	gneiss & gneissic schist, closely jointed to				covering two rigs.
				jointed, slightly weathered joints				
14:30						70		End of Boring at 70'.
								WC=Water Content
								in percent of dry
								weight.
						75		
						80		
						85		
						90		
						95		
						100		

MRCE Form BL-1

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ROCK CORE SKETCH

BORING NO. M-7
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 8.9±
RES ENGR. T. SANDIFORD

PROJECT: W 18Th St / 10Th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT See B&P
REF. CODES/STANDARDS

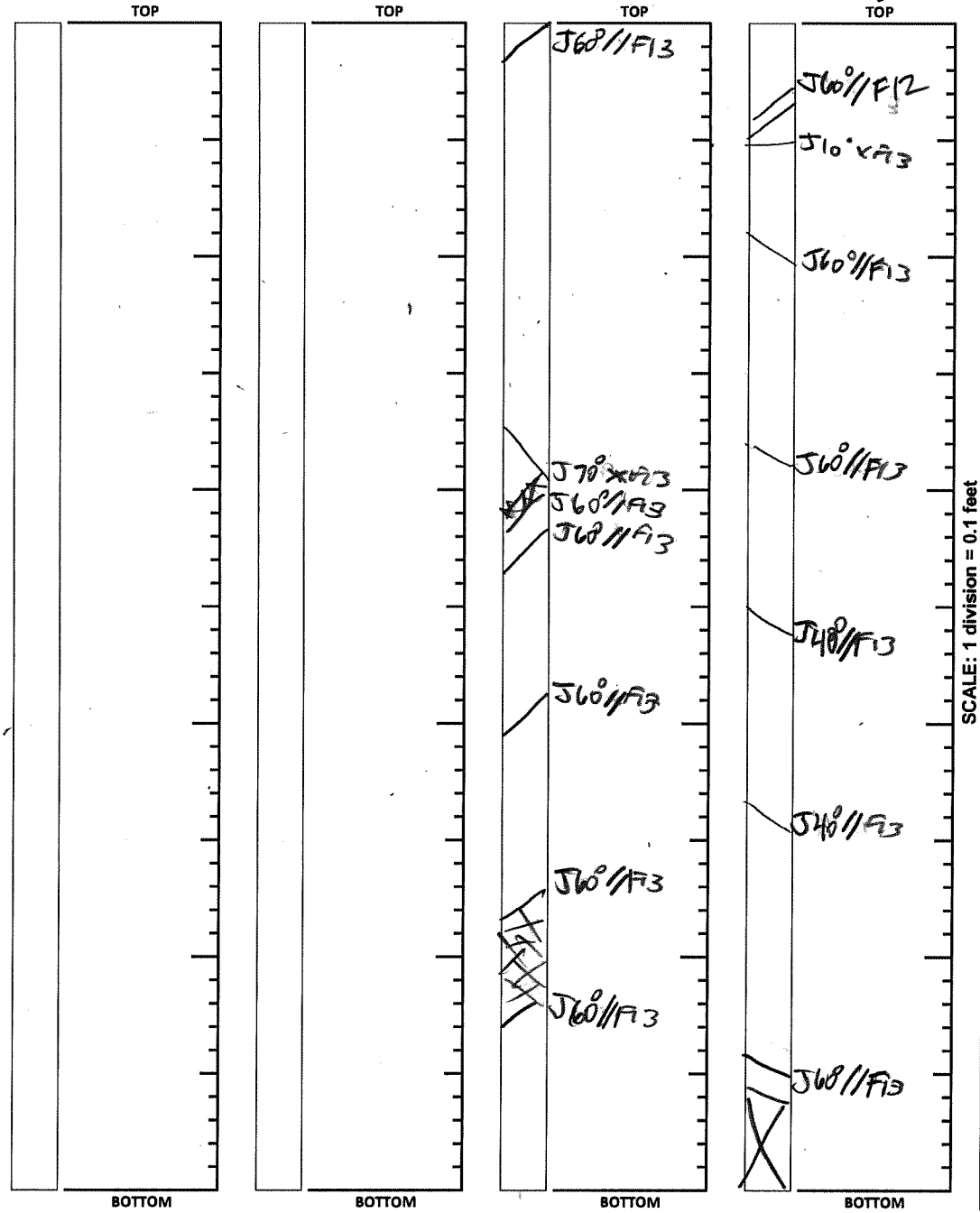
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	100 % / 80 %

Run No.	REC/RQD
1C	92 % / 83 %

TOP



BOTTOM

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-7
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 8.9±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED						
					X	YES		NO		
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	40	
SKID		HYDRAULIC	X	DIA., IN.	3	DEPTH, FT. FROM	0	TO	60	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED: X YES ☐ NO
DIAMETER OF ROTARY BIT, IN.: 3-7/8
TYPE OF DRILLING MUD: QUIK MUD

AUGER USED: ☐ YES X NO
TYPE AND DIAMETER, IN.:

CASING HAMMER, LBS.: AVERAGE FALL, IN.:
*SAMPLER HAMMER, LBS.: 140 AVERAGE FALL, IN.: 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES X NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	60	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR: AQUIFER DRILLING & TESTING CO., INC.
DRILLER: PAUL GADDIS HELPERS: CHRIS RUBAN
REMARKS: BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER: TERESA SANDIFORD DATE: 05-04-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-8
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 9.6±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:00							DRILLED	Drove casing to 20'.
04-30-15							AHEAD	
Thursday							4"	
Sunny								
60°F						5		
						10		
						15		
						20		
	1D	20.0	8-6	Red brown fine to coarse sandy gravel, trace				REC=2"; no contami-
		22.0	7-5	silt (GP)				nation from 20' to 30'.
	2D	22.0	8-7	Red brown fine to coarse sand, some gravel,				
		24.0	7-6	trace silt (SP-SM)				
	3D	24.0	4-5	Red brown fine to coarse sand, trace gravel,		25		
		26.0	6-7	silt (SP-SM)				
	4D	26.0	8-7	Red brown silty fine sand, trace mica (SM)				
		28.0	10-10					
	5D	28.0	17-12	Do 4D (SM)				
		30.0	10-9			30		
						35		
					S			
						40		
						45		
						50	*	*Coring time from
	1C	50.0	REC=100%	Medium hard slightly weathered gray gneissic	R			13:28 to 13:44 at 3.2
		55.0	RQD=83%	schist, moderately jointed to jointed, WJts				minutes per foot.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-8
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 9.6±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
05-20-15								
Wednesday								
Partly Sunny								
65°F						**55**		
	2C	55.0	REC=85%	Top 1.5": Do 1C	**R**		*	*Coring time from
		60.0	RQD=58%	Bot: Hard unweathered gray pegmatite,				14:00 to 14:28 at 5.6
				moderately jointed				minutes per foot.
14:30						**60**		End of Boring at 60'.
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

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ROCK CORE SKETCH

PROJECT: W 18th St - W 19th St / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

BORING NO. M-8
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 9.6 ±
RES ENGR. T. SANDIFORD

Run No.	REC/RQD

TOP
BOTTOM

Run No.	REC/RQD

TOP
BOTTOM

Run No.	REC/RQD
2C	85% / 58%

TOP 55
J40°xF13
J60°//F13
J60°//F13
J60°//F13
J60°//F13
J10°xF13
J20°xUF13
60 BOTTOM

Run No.	REC/RQD
1C	100% / 83%

TOP 50
J0°xF13 WJ
J10°xF13
J70°//F13
J0°xF13
J40°xF13
BOTTOM 55

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-8
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 9.6±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED						
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK									

TYPE AND SIZE OF:					
D-SAMPLER	2" O. D. SPLIT SPOON	DRILLING MUD USED	X	YES	NO
U-SAMPLER		DIAMETER OF ROTARY BIT, IN.	3-7/8		
S-SAMPLER		TYPE OF DRILLING MUD	QUIK GEL		
CORE BARREL	NX DOUBLE BARREL	AUGER USED		YES	X NO
CORE BIT	NX DIAMOND	TYPE AND DIAMETER, IN.			
DRILL RODS	NWJ				

CASING HAMMER, LBS. _____ AVERAGE FALL, IN. _____
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ____ YES X NO SKETCH SHOWN ON _____

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	50	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOUG WOOD HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 04-30-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-9
SHEET 1 OF 3
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 8.8±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:45							DRILLED	Hand auger to 1.5'.
05-11-15							AHEAD	Vacuum excavated to
Monday							4"	1.5'. Roller bit slowly
Sunny								through brick obstruc-
50°F	1D	4.0	5-3	Brown, red fine to coarse sand, some gravel,		**5**		tion.
		6.0	2-2	clay, trace brick fragments (SC)				Harder drilling at 3.5'.
	2D	6.0	3-3	Do 1D (SC)				Wash shows brick &
		8.0	4-4		**F**			gravel pieces; 4'
	3NR	8.0	16-5	No recovery				softened.
		10.0	4-2			**10**		1D: REC=6"
	4D	10.0	1-1	Brown clayey fine to coarse sand, trace gravel				2D: REC=2"
		12.0	1-3	(SC)				4D: REC=3"
						15		
	5D	15.0	2-2	Black, brown gravelly organic silty clay (OH)				
		17.0	8-11					
						20		
	6D	20.0	7-7	Brown black clayey silt, some fine sand (ML)				1" Coarse gravel & 2"
14:45		22.0	7-11					medium sand at top of
09:00	7D	22.0	12-11	Interlayered brown fine to medium sand, some				sample.
05-12-15		24.0	10-8	silt & fine to coarse sand, trace silt (SM&SP-SM)				6D: WC=19
Tuesday	8D	24.0	6-8	Brown black fine to coarse sand, trace silt		**25**		Top had 1" band of
Sunny		26.0	9-12	(SP-SM)				silty clay.
86°F	9D	26.0	4-5	Brown fine to coarse sand, trace silt (SP-SM)				
		28.0	9-12		**S**			
	10D	28.0	11-11	Brown clayey fine sand, trace silt, gravel (SM)				REC=1"
		30.0	11-12			**30**		
	11D	30.0	9-7	Brown silty fine sand varved with some clayey				
		32.0	7-10	silt (SM&ML)				
						35		
	12D	35.0	1-2	Red brown silty fine sand (SM)				WC=Water Content
		37.0	4-8					in percent of dry
								weight.
						39.5		Hard drilling at 39.5'.
	13D	40.0	100/1"	Gray micaceous fine to medium sand, trace	**DR**	**41**	*	1C: *Coring time from
		40.1		silt (Decomposed Rock) (SP-SM)				12.58 to 13:11 at 8.6
	1C	41.0	REC=83%	Medium hard unweathered to slightly weathered				minutes per foot.
		42.5	RQD=50%	gray gneissic schist, jointed to MdJtd				At 13:11, core barrel
	2C	42.5	REC=98%	Do 1C		**45**		jammed.
		46.0	RQD=98%				*	2C: *Coring time from
	3C	46.0	REC=97%	Do 1C	**R**			13:25 to 13:40 at 4.3
		51.0	RQD=87%					minutes per foot.
							*	3C: *Coring time from
						50		13:51 to 14:02 at 2.2
14:00						**51**		minutes per foot.
								End of Boring at 51'.

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ROCK CORE SKETCH

BORING NO. M-9
SHEET 2 OF 3
FILE NO. 12320
SURFACE ELEV. 8.8±
RES ENGR. J. SANDIFORD

PROJECT: W 18th – W 19th ST / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD

TOP
BOTTOM

Run No.	REC/RQD
3C	97 % / 87 %

TOP 46
J80°xF13
J20°xF13
J20°xF13
J70°/1/S2
J70°/1/S2
BOTTOM 51

Run No.	REC/RQD
2C	98 % / 98 %

TOP 46
1C
42.5'
J40°xF13
J40°xF13
BOTTOM 46

Run No.	REC/RQD
1C	83 % / 50 %

TOP 41.0
J0°xF13
J68°/1/F13
J
42.5'
2C
BOTTOM 46

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-9
SHEET 3 **OF** 3

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 8.8±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED		X YES		NO		
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED X YES NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK GEL

AUGER USED YES X NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED YES X NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	41	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER PAUL GADDIS HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-12-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-10
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 14.0±
RES. ENGR. J. BRICKMAN/T. SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
14:00	1D	0.0	27-18	Black fine to coarse sand, some silt, trace gravel,	**	**0.33**	DRILLED	**Asphalt from 0' to
04-23-15		2.0	28-31	brick (SM)			AHEAD	0.33'.
Thurs., Clear	2D	2.0	20-24	Gray fine to coarse sand, some silt, trace			4"	
55°F, 14:15		4.0	20-21	gravel (SM)				
11:30	3D	4.0	13-9	Gray & brown fine to coarse sand, some silt,		**5**		3D, 5D, 8D: Petroleum
04-24-15		6.0	10-10	trace gravel (SM)	**F**			odor.
Friday	4D	6.0	10-14	Gray fine to coarse sand, some silt, gravel (SM)				
Clear		8.0	15-18					
50°F	5D	8.0	9-16	Gray fine to coarse sand, some gravel, silt				
		10.0	62-33	(SM)		**10**		
	6D	10.0	17-21	Gray fine to coarse sand, some gravel fragments,				
		12.0	41-22	trace silt (SP-SM)				
						15		
	7D	15.0	12-14	Gray gravel fragments, some fine to coarse				REC=3"
		17.0	12-10	sand, trace silt (GP)				
					S			
						20		
14:00	8D	20.0	100/4"	Brown fine to coarse sand, some gravel, trace				
09:15		20.3		clayey silt (SP-SM)				Wood pieces from 22'
04-27-15	9D	22.0	15-73	Brown fine to medium sand, some gravel, silt				to 24'.
Monday		24.0	50-17	(SM)		**24**		
Cloudy	10D	24.0	41-60	Red brown fine to coarse sand, some gravel,		**25**		
60°F		26.0	36-34	silt (SM)				
	11D	26.0	27-21	Do 10D (SM)				
		28.0	20-39					
	12D	28.0	15-25	Do 10D (SM)				
		30.0	20-20			**30**		
	13D	30.0	10-15	Brown fine to medium sand, trace silt (SP-SM)				
		32.0	15-17					
						35		
	14D	35.0	8-9	Do 13D (SP-SM)				
		37.0	9-13		**S**			
						40		
	15D	40.0	4-7	Brown fine sand, some silt, trace mica (SM)				
		42.0	11-11					
						45		
	16D	45.0	WH-2	Brown silty fine sand, trace mica (SM)				
		47.0	4-7					
	1C	48.0	REC=92%	Medium hard slightly weathered gray gneissic		**48**		Hard drilling at 48'.
		53.0	RQD=92%	schist, jointed, iron stained joints			*	*Coring time between
					R	**50**		13:06 to 13:20 at 2.8
								minutes per foot.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-10
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 14.0±
RES. ENGR. J. BRICKMAN/T. SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								Coring time not taken;
04-27-15								covering two rigs.
Monday								
Cloudy	2C	53.0	REC=100%	Medium hard unweathered gray gneissic schist,	R			
60°F		58.0	RQD=88%	jointed		55		
14:00						58		End of Boring at 58'.
						60		
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

BORING NO. M-10

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ROCK CORE SKETCH

BORING NO. M-10
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 14.0±
RES ENGR. T. SANDIFORD

PROJECT: W 18TH - W 19th ST / 10TH AVE
LOCATION: NEW YORK, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

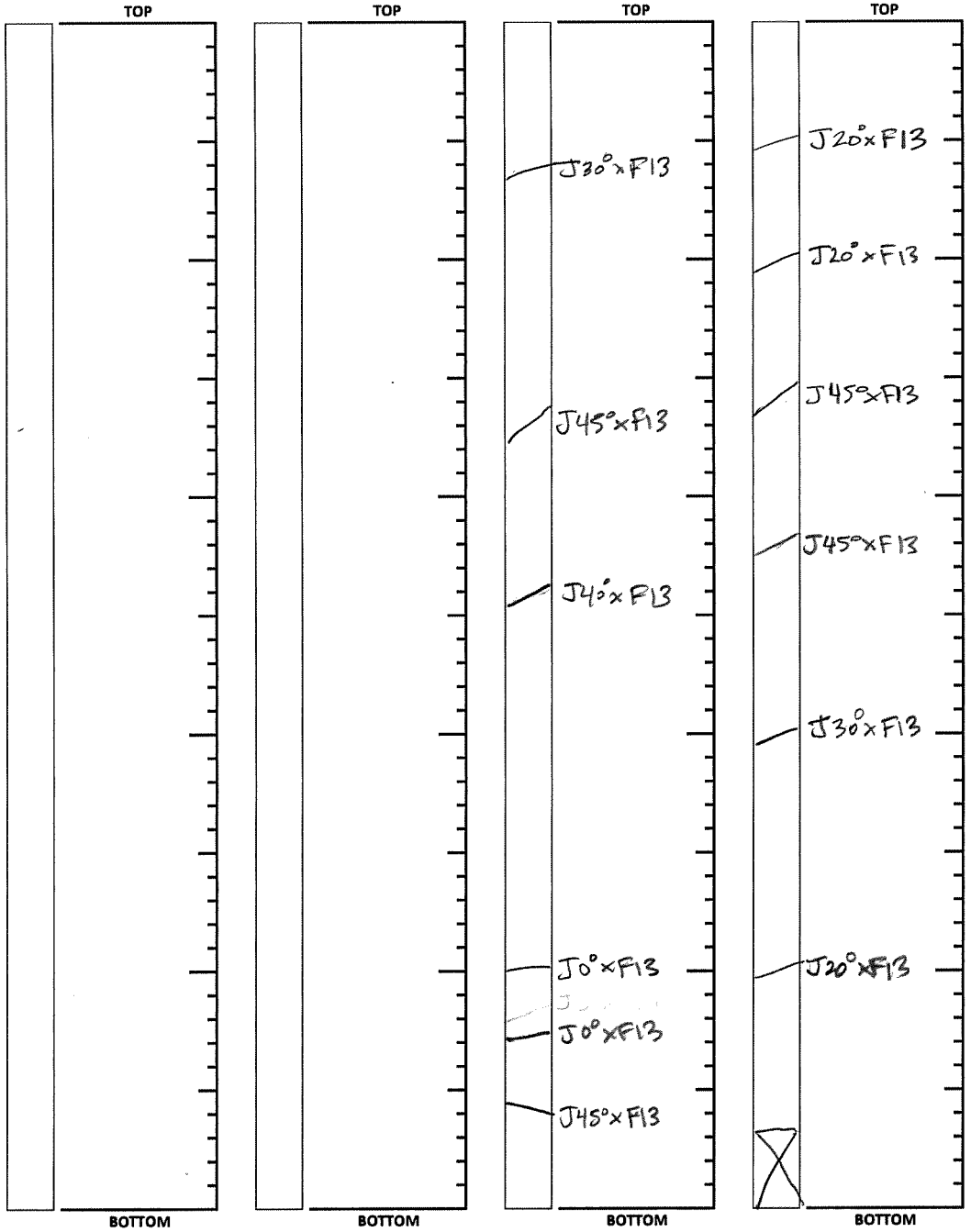
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	100% / 100%

Run No.	REC/RQD
1C	92% / 92%

TOP



BOTTOM

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Ð - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-10
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 14.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED						
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK (CME)									

TYPE AND SIZE OF:			
D-SAMPLER	2" O. D. SPLIT SPOON	DRILLING MUD USED	X YES / NO
U-SAMPLER		DIAMETER OF ROTARY BIT, IN.	3-7/8
S-SAMPLER		TYPE OF DRILLING MUD	
CORE BARREL	NX DOUBLE BARREL	AUGER USED	YES / X NO
CORE BIT	NX DIAMOND	TYPE AND DIAMETER, IN.	
DRILL RODS	NWJ		

CASING HAMMER, LBS. _____ AVERAGE FALL, IN. _____
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ____ YES X NO SKETCH SHOWN ON _____

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	48	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOUG/DOMINICK PEPE HELPERS LEO/GEORGE RAYMOND
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER JAMES BRICKMAN/TERESA SANDIFORD DATE 04-27-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK: _____

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-11
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 11.8±
RES. ENGR. N. SEGUIN/J. BRICKMAN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:30	1D	0.0	35-51	Dark brown to black silty fine to coarse sand,	**	**0.25**	DRILLED	**Pavement from 0' to
04-22-15		2.0	34-22	some gravel, trace brick fragments (SM)			AHEAD	0.25'.
Wednesday	2D	2.0	12-20	Red brick & fine to coarse sand, some gravel,			4"	
Clear		3.5	47-25/0"	silt (SM)	F			
65°F	3D	4.0	11-16	Red brown fine to coarse sand, trace brick,		**5**		REC=6"
		6.0	21-15	silt (SP-SM)				
	4D	6.0	6-10	Top: Red brn f-c sand, some silt, gravel (SM)		**7**		4D, 10D: Spoon sample
		8.0	6-9	Bot: Brown silty fine sand, trace gravel (SM)				split.
	5D	8.0	11-11	Brown silty fine sand, some gravel (SM)				
		10.0	7-8			**10**		
	6D	10.0	6-5	Do 5D (SM)	S			
		12.0	6-6					
						13.5		
						15		
	7D	15.0	3-2	Dark gray to brown clayey silt, some fine sand				
		17.0	2-3	(ML)				
					M			
						20		
	8D	20.0	2-1	Dark gray clayey silt, some fine sand, trace				
		22.0	1-3	gravel (ML)		**22**		
	9D	22.0	4-6	Dark gray gravelly fine to coarse sand, some				
		24.0	7-11	silt (SM)				
	10D	24.0	7-11	Dark gray fine to medium sand, some silt, trace		**25**		
		26.0	29-29	gravel (SM)				
	11D	26.0	14-13	Red brown fine to medium sand, some silt				
		28.0	17-19	(SP-SM)				
	12D	28.0	13-15	Red brown fine to coarse sand, some gravel,				
		30.0	21-18	trace silt (SP-SM)		**30**		
	13D	30.0	11-9	Top: Brown fine to coarse sand, some gravel,				Highly contaminated
		32.0	8-9	silt (SM)				spoon sample split.
				Bot: Brown silty fine sand (SM)				
					S			
						35		
	14D	35.0	8-9	Brown silty fine sand (SM)				
14:40		37.0	10-11					
09:00								
04-23-15								
Thursday						**40**		
Clear	15D	40.0	7-11	Brown silty fine sand (SM)				
55°F		42.0	12-12					
						45		Intermediate rock from
	16D	45.0	69-50/1"	Gray brown micaceous fine to medium sand,	DR	**46**		46' to 48.5', medium
		45.6		some silt (Decomposed Rock) (SM)			3.5*	hard below.
	1C	46.0	REC=92%	Medium hard slightly weathered to unweathered			4*	*Coring time in
		51.0	RQD=87%	gray gneissic schist, schistose gneiss, jointed			4*	minutes per foot.
				to blocky, iron stained & weathered joints	R	**50**	5*	
							3*	

BORING NO. M-11

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-11
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 11.8±
RES. ENGR. JAMES BRICKMAN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd					**DR**	**51**		
04-23-15	2C	51.0	REC=100%	Hard unweathered gray schistose gneiss,			-	- No coring time taken.
Thursday		56.0	RQD=100%	massive			-	
Clear					**R**		-	
55°F						**55**	3.5*	
12:00						**56**	3*	End of Boring at 56'.
						60		
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

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ROCK CORE SKETCH

PROJECT: W 18th-19th St / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

BORING NO. M-11
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 11.8±
RES ENGR. J. Brickman

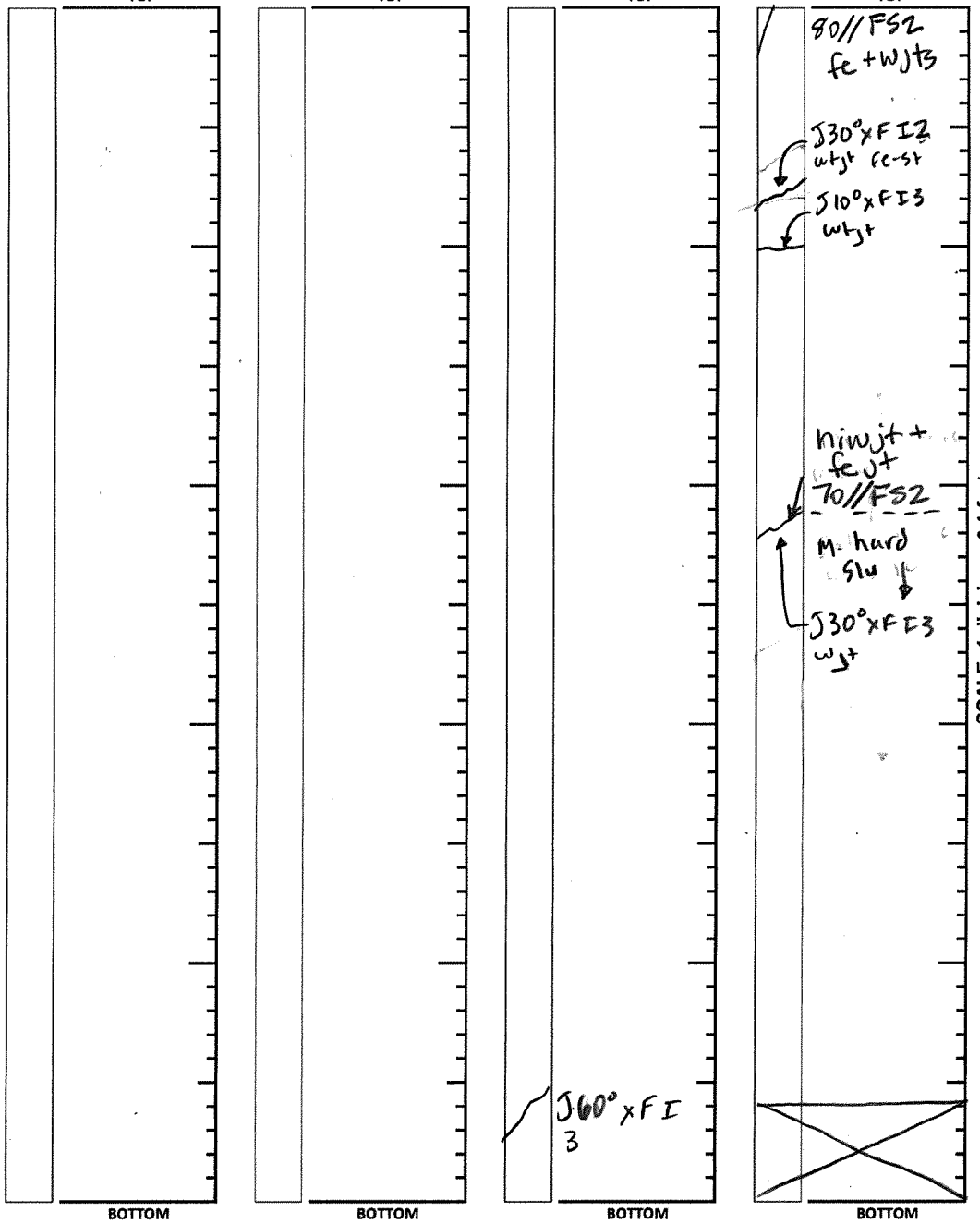
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	100/100

Run No.	REC/RQD
1C	92/87

TOP



BOTTOM

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-11
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 11.8±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG	TYPE OF FEED DURING CORING		CASING USED					
			X YES					NO
TRUCK	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	
SKID	HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE	OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK							

TYPE AND SIZE OF:					
		DRILLING MUD USED	X YES		NO
D-SAMPLER	2" O. D. SPLIT SPOON	DIAMETER OF ROTARY BIT, IN.	3-7/8		
U-SAMPLER		TYPE OF DRILLING MUD	QUIK GEL		
S-SAMPLER					
CORE BARREL	NX DOUBLE BARREL	AUGER USED	YES	X	NO
CORE BIT	NX DIAMOND	TYPE AND DIAMETER, IN.			
DRILL RODS	NWJ				
	WITH 2' AWJ ABV SPOON	*CASING HAMMER, LBS.	140	AVERAGE FALL, IN.	30
		*SAMPLER HAMMER, LBS.	140	AVERAGE FALL, IN.	30
		*USED AUTOMATIC HAMMER.			

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	46	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOUG WOOD HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER NATHAN SEGUIN/JAMES BRICKMAN DATE 04-23-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-12
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 11.0±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:00	1D	0.0	32-11	Gray fine to coarse sand, some silt, trace gravel	**	**0.33**	DRILLED	**Asphalt from 0' to
04-27-15		2.0	17-15	(SM)			AHEAD	0.33' at surface.
Monday	2NR	2.0	11-13	No recovery			4"	No recovery.
Cloudy		4.0	14-11					
50°F	3D	4.0	7-7	Gray fine to coarse sand, some gravel, silt (SM)		**5**		
		6.0	5-6					
	4D	6.0	4-5	Gray fine to coarse sand, some gravel, silt (SM)				4D, 13D: REC=1"
		8.0	5-3					
	5D	8.0	9-12	Gray & red fine to coarse sand, some brick				REC=5"; brick in
		10.0	4-3	fragments, gravel, silt (Fill) (SM)		**10**		sample.
	6D	10.0	1-1	Gray black fine to medium sand, some organic				Rig chatter; stopped
		12.0	2-1	clay (SC)				filling from 12:24 to
								11:27.
						15		
	7D	15.0	9-12	Gray black fine to medium sand, some gravel,	**F**			
		17.0	6-6	trace silt, mica (SP-SM)				
						20		
	8D	20.0	6-5	Gray, red fine to medium sand, some clay, brick				8D-10D: Petroleum
		22.0	3-6	fragments (SC)				odor.
	9D	22.0	100/5"	Gray to black fine to coarse sand, some gravel,				8D: REC=5"
		22.4		silt (SM)				9D: Spoon bouncing.
	10D	24.0	4-5	Do 9D (SM)		**25**		
		26.0	15-15					
	11D	26.0	12-13	Brown silt, trace fine to coarse sand (ML)				
		28.0	14-26					
	12NR	28.0	15-14	No recovery				
		30.0	14-9			**30**		
	13D	30.0	6-7	Gray gravel (GP)				
		32.0	9-6					
09:00								
04-28-15								
Tuesday						**35**		
Cloudy	14D	35.0	2-4	Red brown fine to medium sand, some silt,				
50°F		37.0	2-4	trace mica (SM)				
					S	**40**		
	15D	40.0	3-4	Brown to red brown silty fine sand, trace mica				
		42.0	3-4	(SM)				
						45		
	16D	45.0	2-1	Brown silty fine sand varved with trace fine sandy				
		47.0	2-3	silt (SM)				
						48.5		
					DR	**50**		
	17D	50.0	60-100/1"	Gray to black micacaceous fine to medium		**51**		REC=6"
		50.6		sand, trace silt (Decomposed Rock) (SP-SM)				

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-12
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 11.0±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								No coring time
04-28-15	1C	51.0	REC=92%	Medium hard unweathered gray gneissic				recorded; covering
Tuesday		56.0	RQD=78%	schist, closely jointed to jointed				2 rigs.
Cloudy								
50°F						**55**		
					R			
	2C	56.0	REC=79%	Hard unweathered gray schistose gneiss,				
		61.0	RQD=75%	moderately jointed				
						60		
14:00						**61**		End of Boring at 61'.
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

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www.mrce.com

ROCK CORE SKETCH

BORING NO. M-12
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 11.0±
RES ENGR. T. SANDIFORD

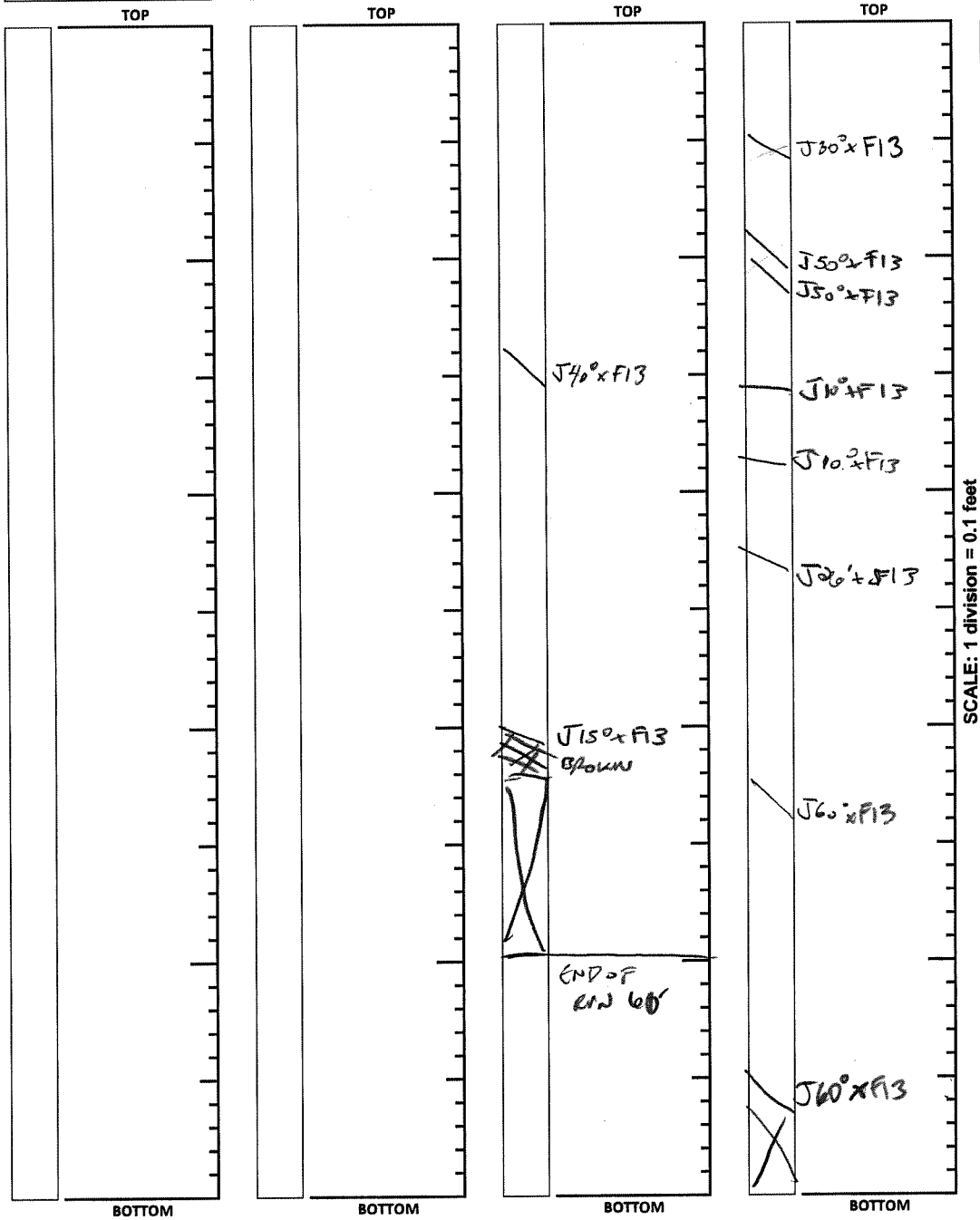
PROJECT: W 18th - W 19th ST / 10 Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	79% / 75%

Run No.	REC/RQD
1C	92% / 78%



ROCK CORE SKETCH LEGEND

JOINTING
J - Joint
MB - Mechanical Break
∢ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-12
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 11.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED	X	YES	NO
DIAMETER OF ROTARY BIT, IN.	3-7/8		
TYPE OF DRILLING MUD	QUIK GEL		
AUGER USED		YES	X NO
TYPE AND DIAMETER, IN.			

CASING HAMMER, LBS. _____ AVERAGE FALL, IN. _____
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ____ YES X NO SKETCH SHOWN ON _____

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	51	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER PAUL GADDIS/DOMINIC PEPE HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 04-28-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-13
SHEET 1 OF 3
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 9.3±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:00							DRILLED	Hand auger to 6'.
05-13-15							AHEAD	Vacuum excavated to
Wednesday							4"	6'.
Cloudy								Advanced unsampled
65°F						5		to 20'.
						10		
					F			
						15		
						20		
	1D	20.0	3-3	Brown silty fine sand, trace mica (SM)				
		22.0	3-3					
	2D	22.0	2-5	Do 1D (SM)				
		24.0	4-6					
	3D	24.0	2-3	Do 1D (SM)		25		
		26.0	4-4					
	4D	26.0	5-5	Do 1D (SM)				
		28.0	7-9		S			
	5D	28.0	6-7	Do 1D varved with trace silt (SM)				
		30.0	9-9			30		
								Chunky drilling at 33.5'.
								Advanced unsampled
						35		to 35'; top of rock.
	1C	35.0	REC=100%	Medium hard slightly weathered to unweathered			*	*Coring time from 12:15
		40.0	RQD=73%	gray gneissic schist to schistose gneiss,				to 12:34 at 3.8 minutes
				jointed to moderately jointed, weathered joints				per foot.
						40		
	2C	40.0	REC=100%	Hard unweathered gray schistose gneiss,	R		*	*Coring time from 12:45
		45.0	RQD=100%	moderately jointed to jointed				to 13:02 at 3.4 minutes
								per foot.
13:15						45		End of Boring at 45'.
						50		

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www.mrce.com

ROCK CORE SKETCH

PROJECT: W 158th - W 179th St / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

BORING NO. M-13
SHEET 2 OF 3
FILE NO. 12320
SURFACE ELEV. 9.3±
RES ENGR. T. SANDIFORD

Run No.	REC/RQD

TOP

Run No.	REC/RQD

TOP

Run No.	REC/RQD
2C	100 % / 100 %

TOP 40'

Run No.	REC/RQD
1C	100 % / 73 %

TOP 35'

J50°xF13
J10°xF13
J30°xPI3
J0°xF13
J0°xFS2
J0°xFS3
J0°xF53
J10°xFI3
J0°xF53
J10°xFI3
J20°xF13

SCALE: 1 division = 0.1 feet

BOTTOM
BOTTOM
BOTTOM 45'
BOTTOM 40'

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-13
SHEET 3 **OF** 3

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 9.3±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED	X	YES	NO
DIAMETER OF ROTARY BIT, IN.	3-7/8		
TYPE OF DRILLING MUD	QUIK MUD		
AUGER USED		YES	X NO
TYPE AND DIAMETER, IN.			

CASING HAMMER, LBS. _____ AVERAGE FALL, IN. _____
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ____ YES X NO SKETCH SHOWN ON _____

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	35	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER JOHN CAMPBELL HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-13-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-14
SHEET 1 OF 2
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 10.9±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE		BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:30 04-28-15 Tuesday Sunny 55°F							DRILLED AHEAD 4" 5"	Advanced unsampled to 20'.
						5		
						10		
						15		
						20		4" Casing to 20'.
	1D	20.0	2-3	Black, brown fine to medium sand, some silt, gravel (SM)	S			1D-2D: Petroleum odor.
		22.0	2-1					
09:00 05-29-15 Wednesday Sunny 65°F, 10:00	2D	22.0	100/4"	Brown fine to coarse sand, some gravel, silt (SM)		22.4		5" Casing over top to 22.4'.
		22.4						
						25		Obstruction at 22.4' causing water pressure from spinning casing to cause leak in pave-ment 15' away.
						30		Cobbles observed in casing at 22.4'.
						35		Boring offset 11' North.
						40		End of Boring at 22.4'.
						45		
						50		

BORING NO. M-14

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-14
SHEET 2 **OF** 2

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 10.9±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED			X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	5	DEPTH, FT. FROM	0	TO	22.5			
SKID		HYDRAULIC	X	DIA., IN.	4	DEPTH, FT. FROM	0	TO	20			
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO				
OTHER												

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.		
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.		
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.		

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	22.4	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOMINICK HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 04-29-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-14A
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 10.9±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:30				Advanced down to 22' unsampled.			DRILLED	Spun 4" casing.
04-29-15							AHEAD	Advanced down to 22'
Wednesday							4"	unsampled; offset
Sunny								12' North of M-14.
65°F						5		
						10		
						15		
						20		
						22		
	1D	22.0	4-7	Brown, black gravel, some fine to coarse				REC=4"
		24.0	10-12	sand, trace silt (GP)				
	2D	24.0	10-6	Brown, black medium to fine sand, trace		25		
		26.0	7-8	coarse sand, silt (SP-SM)				
	3D	26.0	4-4	Brown fine to coarse sand, trace gravel, silt				
		28.0	5-4	(SP-SM)				
	4D	28.0	4-5	Brown fine to medium sand, trace silt (SP-SM)				
		30.0	6-4			30		Casing to 30'.
								Clearing mud tub at
								11:20.
						35		
					S			
						40		
						45		
14:45						49		Top of rock at 49'.
09:00	1C	49.0	REC=100%	Medium hard to hard slightly weathered to		50	*	*Coring time from 09:00
04-30, Thurs.		59.0	RQD=78%	unweathered gray gneissic schist, jointed to	R			to 09:55 at 5 minutes
Cldy., 55°F				moderately jointed, iron stained & WJts				per foot 10' core.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-14A
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 10.9±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
04-30-15								
Thursday								
Cloudy								
55°F					R	55		
								Boring offset 12' North
								of Boring Log M-14.
14:00						59		End of Boring at 59'.
						60		
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

BORING NO. M-14A

Mueser Rutledge Consulting Engineers
14 Penn Plaza - 225 West 34th Street
New York, NY 10122
T: 917 339-9300 F: 917 339-9400
www.mrce.com

ROCK CORE SKETCH

BORING NO. M-14A
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 10.9±
RES ENGR. T. SANDIFORD

PROJECT: W 18th St - W 19th St / 10 Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD

TOP

Run No.	REC/RQD

TOP

Run No.	REC/RQD
1C (cont)	

TOP 54'

Run No.	REC/RQD
1C	100% / 78%

TOP 49'

8'-8"

J0°xF13
J20°xF13
J28°xF13
J5°xF13
J0°xF13
J5°xF13
J38°xF13
J45°xF13
J88°//F52
J30°xF13
J45°xF13
J20°xF13 fc+WJt
J60°xF13
J0°xF13
Mechanical Break

BOTTOM
BOTTOM
BOTTOM 59'
BOTTOM 54'

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-14A
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 10.9±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED: X YES ___ NO
DIAMETER OF ROTARY BIT, IN.: 3-7/8
TYPE OF DRILLING MUD: QUIK GEL

AUGER USED: ___ YES X NO
TYPE AND DIAMETER, IN.:

CASING HAMMER, LBS. ___ AVERAGE FALL, IN. ___
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ___ YES X NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	49	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR: AQUIFER DRILLING & TESTING CO., INC.
DRILLER: DOMINICK HELPERS:
REMARKS: BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER: TERESA SANDIFORD DATE: 04-29-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-15
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** +10.0±
RES. ENGR. L. LINCOLN/N. SEGUIN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:30	1D	0.0	61-9	Black fine to coarse sand, some gravel, silt,	**	**0.25**	DRILLED	**Asphalt from 0' to
04-19-15		2.0	7-16	trace brick (Fill) (SM)			AHEAD	0.25'.
Sunday	2D	2.0	13-9	Black brown fine to medium sand, some			4"	Petroleum odor.
Clear		4.0	22-34	gravel, silt, trace brick (Fill) (SM)				
60°F	3D	4.0	2-6	Black fine to coarse sandy gravel, trace silt,		**5**		3D, 6D: REC=5"
		6.0	12-7	brick (Fill) (GP-GM)				
	4D	6.0	4-4	Black fine to coarse sand, some silt, trace				
		8.0	4-4	gravel (Fill) (SM)				
	5NR	8.0	9-5	No recovery				
		10.0	1-1			**10**		
	6D	10.0	WH/12"	Black fine to coarse sand, some clay (SC)				
		12.0	1/12"					
	7D	12.0	WH/24"	Dark brown fine to medium sand, trace silt,	**F**			
		14.0		clayey silt seams (SP-SM)				
						15		
	8D	15.0	1-2	Black fine to coarse sand, some gravel, trace				REC=3"
		17.0	1-4	silt (SP-SM)				
						20		
	9D	20.0	1-100/4"	Black fine to coarse sandy gravel, trace brick,				REC=4"
		22.0		silt (GP-GM)				
	10D	22.0	19-18	Brown fine to coarse sandy gravel, some silt				
		24.0	14-13	(GM)		**24**		
	11D	24.0	4-3	Brown silty fine sand varved with trace clayey	**S**	**25**		
		26.0	3-4	silt seams (SM)		**26**		
	12D	26.0	28-34	Brown fine sand, some silt varved with some	**C**			
		28.0	24-10	clayey silt (SM&ML)		**28.5**		
10:00	13D	28.0	4-12	Brown fine to coarse sandy gravel, trace silt				
04-20-15		30.0	8-7	(GP-GM)		**30**		
Monday	14D	30.0	6-4	Top: Red brown fine to coarse sand, some		**31**		Spoon sample split.
Rain		32.0	5-5	gravel, silt (SM)				
50°F				Bot: Red brown fine to medium sand, some				
				silt (SM)				
						35		
	15NR	35.0	4-5	No recovery				
		37.0	4-3					
						40		
	16D	40.0	2-3	Red brown fine sand, some silt (SM)	**S**			
		42.0	3-4					
						45		
	17D	45.0	6-5	Red brown silty fine sand (SM)				
		47.0	7-7					
						49		
						50	▼	
	1C	50.0	REC=100%	Hard unweathered to slightly weathered gray	**R**		*	*Coring time at 4
		55.0	RQD=91%	gneissic schist, jointed to MdJtd, Fe & WJts				minutes per foot.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-15
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. +10.0±
RES. ENGR. L. LINCOLN/N. SEGUIN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
04-20-15								
Monday								
Rain								
50°F						55		
	2C	55.0	REC=100%	Hard unweathered gray gneissic schist, blocky	R		*	*Coring time at 4
		60.0	RQD=97%					minutes per foot.
13:15						60		End of Boring at 60'.
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

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ROCK CORE SKETCH

BORING NO. M-15
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. +10±
RES ENGR. N. SEGUIN

PROJECT: W 18th - W 19th St, 10th Ave.
LOCATION: NEW YORK, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD
2C	100%/97%

Run No.	REC/RQD
1C	100%/91%

Run No.	REC/RQD

Run No.	REC/RQD

TOP 55 2C
J60°XFS2
J45°XFS3
BOTTOM 60

TOP 50 1C
J60°//FS3
MB
J45°XFS3
J30°XF13
J30°XFS3
MB BOT 1C
BOTTOM 55

TOP
BOTTOM

TOP
BOTTOM

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Ð - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-15
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. +10.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	50
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED	X YES		NO
DIAMETER OF ROTARY BIT, IN.	3-7/8		
TYPE OF DRILLING MUD	QUIK GEL		
AUGER USED	YES	X	NO
TYPE AND DIAMETER, IN.			

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	50	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOMENIC PEPE HELPERS GEORGE RAYMOND
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER LYSANDRA LINCOLN/NATHAN SEGUIN DATE 04-20-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-16
SHEET 1 OF 2
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** +12.0±
RES. ENGR. ALEXANDRA PATRONE

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:15	1D	0.0	36-18	Brown fine to medium sand, some silt, trace	**	0.25		**Asphalt from 0' to
04-18-15		2.0	20-20	gravel, concrete, brick (Fill) (SM)	F	2		0.25'.
Saturday	2D	2.0	11-15	Do 1D (Fill) (SM)				
Clear		3.5	50/2"					
70°F	3D	4.0	50/2"	Red brick fragments (Fill) (GP-GM)		5		
		4.2			BRICK WALL			
								Hard drilling to 8'.
								Offset Boring.
12:30						10		End of Boring at 10'.
	4D	10.0	50/2"					
						15		
						20		
						25		
						30		
						35		
						40		
						45		
						50		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-16
SHEET 2 **OF** 2

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. +12.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
TRUCK		MECHANICAL		DIA., IN.		DEPTH, FT. FROM		TO	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK								

TYPE AND SIZE OF:		DRILLING MUD USED	[ ] YES [X] NO
D-SAMPLER	2" O. D. SPLIT SPOON	DIAMETER OF ROTARY BIT, IN.	
U-SAMPLER		TYPE OF DRILLING MUD	
S-SAMPLER			
CORE BARREL	NX DOUBLE BARREL	AUGER USED	[ ] YES [X] NO
CORE BIT	NX DIAMOND	TYPE AND DIAMETER, IN.	
DRILL RODS			
		CASING HAMMER, LBS.	AVERAGE FALL, IN.
		*SAMPLER HAMMER, LBS. 140	AVERAGE FALL, IN. 30

*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	10	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOUG WOOD HELPERS
REMARKS BOREHOLE OFFSET BACKFILLED.
RESIDENT ENGINEER ALEXANDRA PATRONE DATE 04-18-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-16A
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. +12.0±
RES. ENGR. A. PATRONE/L. LINCOLN/N. SEGUIN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12:30							DRILLED	
04-18-15							AHEAD	
Saturday							4"	
Clear								
70°F					BRICK WALL	5		
						10		Drilled ahead to 10'.
	1D	10.0	16-10	Top 4": Red brick fragments (GP-GM)				1D, 4D: Petroleum
		12.0	4-6	Bot 2": Black fine to medium sand, some				odor.
				organic silt (Fill) (SM)	F			
						15		
	2D	15.0	WH-1	Black organic silty fine sand (SM)				
		17.0	1-2					
					S			
						20		
	3D	20.0	WH-2	Black fine to coarse sand, some silt (SM)				
14:40		22.0	5-14			22		
07:30	4D	22.0	14-25	Black to brown fine to coarse sand, some brick,	F			
04-19-15		24.0	96-66	gravel, silt (Fill) (SM)		24		
Sunday	5D	24.0	14-14	Black to brown, red brown silty fine to medium		25		
Clear		26.0	23-19	sand, trace gravel (SM)				
60°F	6D	26.0	22-26	Brown fine to coarse sand, some gravel, silt				
		28.0	38-21	(SM)				
	7D	28.0	7-8	Brown silty fine to medium sand, trace gravel	S			
		30.0	12-26	(SM)		30		
	8D	30.0	16-17	Brown silty fine sand (SM)				
		32.0	20-29					
						33.5		
						35		
	9D	35.0	7-14	Brown fine sandy silt varved with some silty fine	V			
		37.0	15-19	sand (ML&SM)				
						38.5		
						40		
	10D	40.0	16-14	Red brown coarse to fine sand, some gravel,				
		42.0	14-13	trace silt (SP-SM)				
					G			
						45		
	11D	45.0	17-16	Top: Red brown gravelly coarse to fine sand,		46		
		47.0	19-26	trace silt (SP-SM)				
				Bot 12": Red brown clayey silt, some fine sand				11D Bot: WC=27
				(ML)	V			
						50		
	12D	50.0	12-14	Red brown fine sandy silt, trace gravel (ML)				REC=2"
		52.0	15-21					

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-16A
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. +12.0±
RES. ENGR. A. PATRONE/L. LINCOLN/N. SEGUIN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 04-19-15 Sunday Clear 60°F					V	55		
14:30	13D	55.0	11-15	Red brown clayey silt varved with silt, some		56		
		56.5	21-50/2"	fine sand (ML&SM)	**	56.5		**Till from 56' to 56.5'.
11:50 04-20-15 Monday Rain 55°F	1C	56.5	REC=100%	Hard slightly weathered to unweathered gray			*	*Coring time in 2
		61.5	RQD=84%	gneissic schist, trace pegmatite, blocky				minutes per foot.
						60		
	2C	61.5	REC=100%	Hard slightly weathered to unweathered gray	R		*	*Coring time in 7
		64.8	RQD=93%	pegmatite, trace gneissic schist, jointed				minutes per foot.
	3C	64.8	REC=100%	Hard slightly weathered to unweathered gray		65	*	*Coring time in 10
		66.5	RQD=76%	pegmatite, moderately jointed				minutes per foot.
13:25						66.5		End of Boring at 66.5'.
						70		WC=Water Content in percent of dry weight.
						75		
						80		
						85		
						90		
						95		
						100		

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ROCK CORE SKETCH

BORING NO. M-16A
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 12.0±
RES ENGR. J. Brickman (done after the fact)

PROJECT: W 18th / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

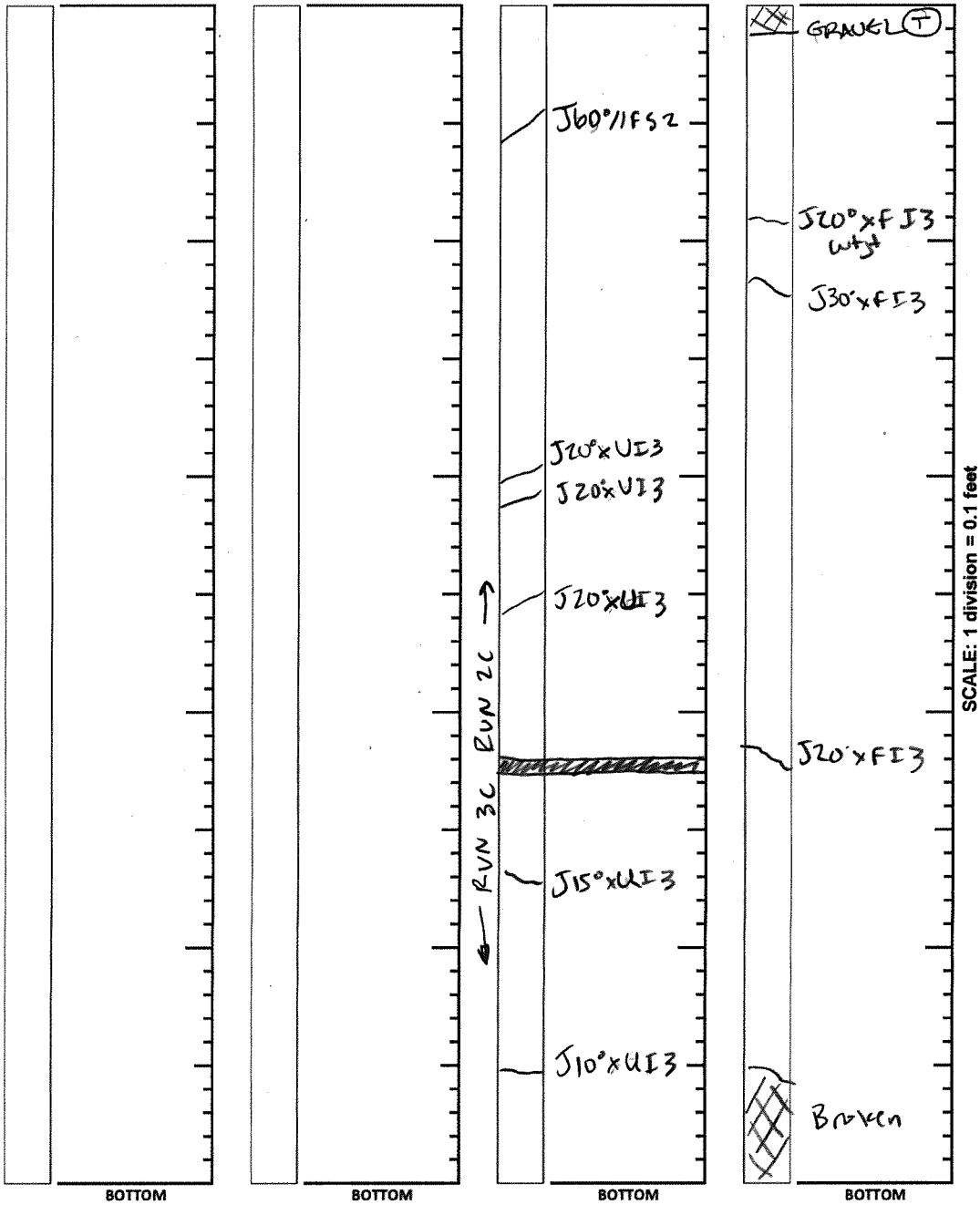
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	100/93
3C	100/76

Run No.	REC/RQD
1C	100/84

TOP



BOTTOM

ROCK CORE SKETCH LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-16A
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. +12.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X YES			NO		
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	35
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK								

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED ☐ YES ☒ NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD

AUGER USED ☐ YES ☒ NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	56.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOUG WOOD HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER ALEXANDRA PATRONE/THERESA SANDIFORD/NATHAN SEGUIN DATE 04-20-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-17
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** +11.0±
RES. ENGR. A. PATRONE/L. LINCOLN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:30					**	0.25	DRILLED	**Asphalt from 0' to
04-18-15	1D	1.0	10-12	Black, gray, red, medium to fine sand, some			AHEAD	0.25'.
Saturday		3.0	19-32	brick, gravel, concrete, tr silt (Fill) (SP-SM)			4"	Petroleum odor from
Clear	2D	3.0	10-10	Black gravel, some fine to coarse sand, trace				0' to 35'.
70°F		5.0	8-12	silt (GP-GM)		5		2D, 11D: REC=6"
	3NR	5.0	7-8	No recovery				
		7.0	6-8					
	4D	7.0	5-3	Gray medium to fine sand, some silt, trace				
		9.0	4-4	gravel, brick (Fill) (SM)				
	5D	9.0	12-7	Gray fine to medium sand, some silt, trace		10		
		11.0	5-4	coarse sand, gravel (SM)	F			
	6D	11.0	4-2	Gray fine to coarse sand, some gravel, silt,				
		13.0	5-5	trace coarse sand (SM)				
						15		
	7NR	15.0	4-2	No recovery				
		17.0	4-9					
	8D	17.0	2-2	Black to red gravel & brick, trace fine to coarse				REC=2"
		19.0	5-8	sand, silt (Fill) (GP)				
						20		
	9D	20.0	5-50/2"	Black to red fine to coarse sand, trace brick,		20.5		Refusal at 20.8'.
		20.8		gravel, silt (Fill) (SP-SM)				Refusal at 22'.
	1CNR	20.8	REC=0%	No recovery	CONC			
		21.5				23		Drill ahead to 23'; rods
	10D	21.5	100/6"	Do 9D (Fill) (SP-SM)		25		drop.
		22.0						
	11D	23.0	13-19	Brown coarse to fine sand, some gravel, trace				REC=6"
		25.0	15-10	brick, concrete, silt (Fill) (SP-SM)				Safety hammer used
	12D	25.0	29-31	Black fine to medium sand, some gravel, trace	F			for Sample 12D.
		27.0	12-28	silt, coarse sand (Fill) (SP-SM)		30		
	13D	27.0	17-29	Brown black fine to medium sand, some silt,				
		29.0	12-12	trace coarse sand, gravel (SM)				
	14NR	29.0	12-10	No recovery		33		
		31.0	11-13					
						35		Switch mud at 35'.
	15D	35.0	7-7	Red brown fine sand, some silt (SM)				
14:00		37.0	8-12					
07:00								
04-19-15								
Sunday						40		
Clear	16D	40.0	4-5	Red brown silty fine to medium sand (SM)	S			
60°F		42.0	6-7					
						45		
	17D	45.0	4-7	Do 16D varved with trace clayey silt (SM)				
		47.0	9-13					
								Hard drilling at 48'.
						48.5		
						50		
	1C	50.0	REC=100%	Medium hard to intermediate slightly weathered	R			
		55.0	RQD=52%	gray gneissic schist, jointed to broken, Fe & WJts				

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-17
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. +11.0±
RES. ENGR. A. PATRONE/L. LINCOLN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 04-19-15 Sunday Clear 60°F								
						55		
	2C	55.0	REC=100%	Intermediate to medium hard slightly weathered gray gneissic schist, broken to jointed, iron stained & weathered joints	**R**			
		60.0	RQD=48%					
09:30						**60**		End of Boring at 60'.
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

ROCK CORE SKETCH

BORING NO. M-17
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEVATION +11.0 ±
RESIDENT ENGINEER A. PATRONE / L. LINCOLN

PROJECT: W18 - W19 / 10TH AVE
LOCATION:

Run No.	REC/RQD
1C	100/52

Run No.	REC/RQD
2C	100/48

Run No.	REC/RQD

Run No.	REC/RQD

TOP

MB
JXF 10° I3
JXF 10° fe+wJt
JXF 10°
JXF 10°
JXF 30°
JXF 10° fe+wJts
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 60°
JXF 10°
JXF 10°
J/F 80°

JXF 10° I3
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 30°
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 10°
JXF 10°
J/F 80°

BOTTOM

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH LEGEND

JOINTING
J - Joint
MB - Mechanical Break
∠ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-17
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. +11.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	40
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED	X YES		NO
DIAMETER OF ROTARY BIT, IN.	3-7/8		
TYPE OF DRILLING MUD	QUIK MUD		
AUGER USED	YES	X	NO
TYPE AND DIAMETER, IN.			

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER GUS SURI HELPERS SCOTT ODWYER
REMARKS
RESIDENT ENGINEER ALEXANDRA PATRONE/LYSANDRA LINCOLN DATE 04-19-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-18
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. +10.5±
RES. ENGR. A. PATRONE/L. LINCOLN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:20	1D	0.0	33-15	Black fine to medium sand, some gravel, silt,	**	**0.25**	DRILLED	**Asphalt from 0' to
04-18-15		2.0	20-14	trace brick, concrete (Fill) (SM)			AHEAD	0.25'.
Saturday	2D	2.0	15-16	Red to black fine to coarse sand, some brick,			5"	Petroleum odor from
Clear		4.0	12-14	gravel, silt (Fill) (SM)				0' to 35'.
70°F	3D	4.0	8-11	Red to green fine to coarse sand, some gravel,		**5**		
		6.0	6-7	brick, silt (Fill) (SM)				
	4D	6.0	15-9	Black to gray fine to medium sand, some gravel,				
		8.0	6-6	silt (Fill) (SM)				
	5D	8.0	6-6	Gray fine to coarse sandy gravel, trace wood,				5D, 7D: REC=2"
		10.0	11-3	silt (Fill) (GP-GM)		**10**		
	6D	10.0	2-11	Gray fine to coarse sand, some gravel, trace	**F**			6D, 12D: REC=6"
		12.0	11-4	silt (Fill) (SP-SM)				
						15		
	7D	15.0	9-1	Gray to red gravel & brick, some fine to coarse				
		17.0	1-6	sand, trace silt (Fill) (GP-GM)				
						20		Free phase (internal)
	8D	20.0	1/12"	Black fine to medium sand, some silt, organic	**M/S**			from 20' to 22'.
		22.0	24-45	silty clay layer, trace gravel (SM&OH)				Contaminated at bot-
	9D	22.0	64-30	Top 2": Brown f-m sand, some silt (SM)		**22.3**		tom of tank from 20' to
		24.0	21-44	Bot 22": Brn f-c sand, tr gvl, brk, si (Fill) (SP-SM)				22.3'.
	10NR	24.0	5-6	No recovery		**25**		
		26.0	9-11					
	11D	26.0	15-15	Black fine to medium sand, some gravel, trace				
		28.0	19-30	silt, coarse sand (Fill) (SP-SM)				
	12D	28.0	30-12	Black fine to coarse sand, some gravel, trace	**F**			
		30.0	15-14	brick, silt (Fill) (SP-SM)		**30**		
	13D	30.0	22-18	Do 13D (Fill) (SP-SM)				Switch mud; drum
		32.0	12-13					cuttings.
						33.5		
						35		
	14D	35.0	3-3	Red brown fine sand, some silt (SM)				
		37.0	3-4					
						40		
	15D	40.0	2-2	Do 14D (SM)				
		42.0	3-4		**S**			
						45		
	16D	45.0	2-2	Do 14D (SM)				
		47.0	4-3					
								Mica in return at 49.5'.
								***Decomposed rock
						49.5		from 49.5' to 50'.
	17D	50.0	50/0"	Gray micaceous fine to medium sand, trace	***			
14:00				silt (Decomposed Rock) (SP-SM)	**R**			

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-18
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. +10.5±
RES. ENGR. A. PATRONE/L. LINCOLN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
07:00							3*	*Coring time in
04-19-15	1C	50.5	REC=95%	Hard unweathered gray gneissic schist, jointed			2*	minutes per foot.
Sunday		55.5	RQD=92%	to moderately jointed, iron stained joints			2*	
Clear							3*	
60°F						**55**	3*	
	2C	55.5	REC=100%	Hard unweathered gray gneissic schist, blocky	**R**		2*	
		60.5	RQD=88%				2*	
							2*	
							2*	
						60	2*	
09:15						**60.5**		End of Boring at 60.5'.
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

ROCK CORE SKETCH

BORING NO. M-18
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEVATION +10.5 ±
RESIDENT ENGINEER A. PATRONE / L. LINCOLN

PROJECT: W 18 - W 19 / 10TH AVE
LOCATION: NEW YORK, NY

Run No.	REC/RQD
1C	95/92

Run No.	REC/RQD
2C	100/88

Run No.	REC/RQD

Run No.	REC/RQD

TOP

COBBLE

JX 45° I 3 feet

JX 45°

JX 45° feet

JX 45°

BOTTOM

TOP

JX F 35° I 3

JXF 10°

JXF 10°

J ∥ F 70°

BOTTOM

TOP

BOTTOM

TOP

BOTTOM

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH LEGEND

JOINTING
J - Joint
MB - Mechanical Break
∠ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-18
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION NEW YORK, NEW YORK **SURFACE ELEV.** +10.5±
BORING LOCATION SEE BORING LOCATION PLAN **DATUM** NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	X YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	5	DEPTH, FT. FROM	0	TO	35
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED X YES NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK MUD

AUGER USED YES X NO
TYPE AND DIAMETER, IN.

*CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED YES X NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOMENIC PEPE HELPERS GEORGE RAYMOND
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER ALEXANDRA PATRONE/LYSANDRA LINCOLN DATE 04-19-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-19
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 9.8±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:00							DRILLED	Vacuum excavated to
05-15-15							AHEAD	5'.
Friday							4"	Hand excavated to 5'.
Cloudy								Cuttings & drill water
60°F						**5**		contaminated from 0'
								to 30'.
								Advanced unsampled
								from 6' to 18'.
					F	**10**		
								Hard drilling at 16' to
								16.9'. Mud shows
						15		white specs.
								Possible foundation
								mat.
						18		
	1D	18.0	6-5	Brown fine to coarse sand, some gravel, trace				
		20.0	5-4	silt (SP)		**20**		
	2D	20.0	5-5	Do 1D (SP)				
		22.0	4-5					REC=2"
	3D	22.0	3-4	Brown fine to coarse sand, trace gravel, silt (SP)				
		24.0	5-5		**S**			
	4D	24.0	2-3	Brown silty fine sand, trace mica (SM)		**25**		
		26.0	3-5					
	5D	26.0	3-4	Do 4D (SM)				
		28.0	5-8			**28**		
	6D	28.0	5-13	Red brown & brown silt, some fine sand (ML)				
		30.0	8-14			**30**		
						35		
						40		
						45		
						46		Chunky drilling at 46'.
							*	*Coring time from
	1C	47.0	REC=97%	Medium hard slightly weathered to unweathered				13:22 to 13:37 at 3
		52.0	RQD=78%	gray gneissic schist, jointed, iron stained &				minutes per foot.
				weathered joints	**R**	**50**		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-19
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 9.8±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
05-15-15								
Friday	2C	52.0	REC=97%	Hard unweathered gray gneissic schist to			*	*Coring time from
Cloudy		57.0	RQD=92%	schistose gneiss, moderately jointed	**R**			13:50 to 14:15 at 5
60°F						**55**		minutes per foot.
								Note: Rig pressure
14:15						**57**		inconsistant.
								End of Boring at 57'.
						60		
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

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ROCK CORE SKETCH

BORING NO. M-19
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 9.8±
RES ENGR. T. SANDIFORD

PROJECT: W 18th - W 19th ST / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

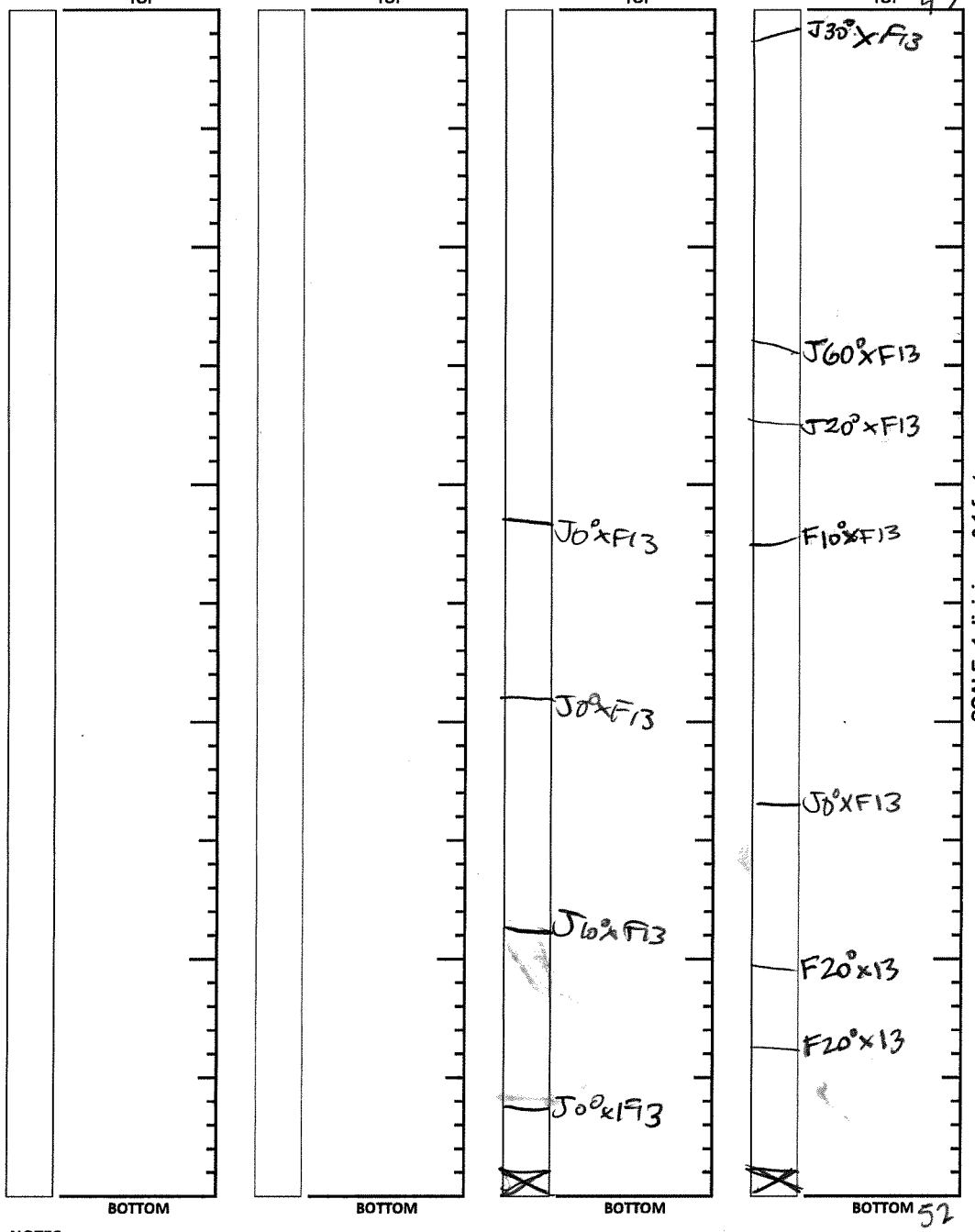
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	97% / 92%

Run No.	REC/RQD
1C	97% / 78%

TOP 42



BOTTOM 52

ROCK CORE SKETCH LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-19
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 9.8±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED	X YES		NO
DIAMETER OF ROTARY BIT, IN.	3-7/8		
TYPE OF DRILLING MUD	QUIK MUD		
AUGER USED		YES	X NO
TYPE AND DIAMETER, IN.			
CASING HAMMER, LBS.		AVERAGE FALL, IN.	
*SAMPLER HAMMER, LBS.	140	AVERAGE FALL, IN.	30

*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	47	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER PAUL GADDIS HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-15-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-20
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 9.4±
RES. ENGR. MARK CHANCY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:10							DRILLED	Unsampled to 20'.
04-28-15							AHEAD	Unsampled from 32'
Tuesday							4.5"	to 55'.
Sunny								
61°F						5		
						10		
						15		
								Hard drilling to 18'
								approximately; bore-
						20		hole keeps collapsing.
	1D	20.0	13-15	Black fine to coarse sandy gravel, trace silt				REC=6"
04-29-15		22.0	13-11	(GP-GM)				
Wednesday	2D	22.0	7-8	Black medium to coarse sand, trace silt				REC=5"
		24.0	7-6	(SP-SM)				
	3D	24.0	11-7	Black gravelly fine coarse sandy gravel, trace		25		REC=2"
		26.0	7-12	silt (SM)				
	4D	26.0	14-14	Black gravel, trace silt, some fine to coarse	S			REC=3"
		28.0	26-24	sand (GP-GM)				
	5D	28.0	14-10	Light brown fine to coarse sandy gravel, trace				
		30.0	6-4	silt GP-GM)		30		
	6D	30.0	3-3	Brown fine to coarse sand, trace silt (SP-SM)				
		32.0	5-6			32		
						35		
						40		
						45		
						50		

BORING NO. M-20

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-20
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 9.4±
RES. ENGR. MARK CHANCY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							DRILLED	
04-29-15							AHEAD	
Wednesday							4.5"	
							↓	
						55		
	1C	55.0	REC=88%	Medium hard slightly weathered to unweathered			4*	*Coring time in
		60.0	RQD=76%	gray gneissic schist, trace pegmatite,			3.5*	minutes per foot.
				moderately to jointed, iron stained & weathered jo			3*	
							3*	
						60	3.5*	
	2C	60.0	REC=96%	Medium hard unweathered gray gneissic	**R**		5*	
		65.0	RQD=93%	schist, moderately jointed, iron stained &			1.5*	
				weathered joints			2*	
							2*	
						65	3*	End of Boring at 65'.
						70		
						75		
						80		
						85		
						90		
						95		
						100		

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ROCK CORE SKETCH

BORING NO. M-20
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 9.4±
RES ENGR. Mark Chaney

PROJECT: West 18th – West 19th / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS NYC BC

Run No.	REC/RQD
1C	53/60 = 88% / 46/60 = 76%

TOP

MB
J30°xF13
J20°xF13
J0°xF13 & Jt
J0°xF13
J30I3xF
MB

BOTTOM

Run No.	REC/RQD
2C	58/60 = 96% / 56/60 = 93%

TOP

J45I3xF
MBxF
J30I3xF
J0°xFS2

BOTTOM

Run No.	REC/RQD

TOP

BOTTOM

Run No.	REC/RQD

TOP

BOTTOM

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Ø - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-20
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 9.4±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED		X YES		NO		
TRUCK		MECHANICAL		DIA., IN.	4.5	DEPTH, FT. FROM	0	TO	55	
SKID	X	HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER										

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	5-3/4"
DRILL RODS	NW

DRILLING MUD USED X YES NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK GEL

AUGER USED YES X NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*SAMPLER HAMMER, LBS. AVERAGE FALL, IN.
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED YES X NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.		
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.		
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.		

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	55	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER PAUL GADDIS HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER MARK CHANCY DATE 04-29-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-21
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 8.6±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:15							DRILLED	Vacuum excavated to
04-30-15							AHEAD	6'.
Thursday							4"	Hand excavated to 5'.
Sunny								Cobbles & coarse
65°F						**5**		gravel observed in
								cuttings of vacuum.
	1D	6.0	3-5	Brown gravel, trace fine to coarse sand (GP)				Part of recovery filled
		8.0	5-3					water observed at 6.5'.
	2D	8.0	5-4	Brown fine to coarse sand, some silt, trace				1D, 16D, 19D: REC=3"
		10.0	5-3	gravel (SM)		**10**		2D: REC=5"
	3D	10.0	2-2	Brown tan gravel, trace fine to coarse sand	**F**			REC=1"
		12.0	3-2	(GP)				Shells in sample.
						15		
	4D	15.0	3-3	Brown black fine to coarse sand, gravel,				REC=2"
		17.0	6-3	trace silt, organic clay (GP-GM)				Sand in sample.
						20		Cuttings is clay &
	5NR	20.0	1-1	No recovery				gravel.
		22.0	2-1					
	6D	22.0	3-2	Soft brown black organic silty clay, trace fine				WC=63
14:30		24.0	2-2	sand, shells (OH)				
09:00	7D	24.0	3-3	Brown gray clayey fine to medium sand (SC)		**25**		
05-01-15		26.0	7-7		**O**			
Friday	8D	26.0	8-9	Top: Do 7D, trace gravel (SC)				
Cloudy		28.0	7-12	Bot: Stiff light brown silty clay (CL)				8D Bot: WC=30
55°F	9D	28.0	4-6	Do with medium sand, some clay and stiff				
		30.0	11-14	brown silty (SC+CL)		**30**		
	10D	30.0	10-12	Brown silty fine sand (SM)				
		32.0	13-15					
						35		
	11D	35.0	6-5	Brown silt (ML)				Fixing hammer from
		37.0	6-6					10:00 to 11:45.
						40		
	12D	40.0	8-9	Brown fine to coarse sand with fine gravel				
		42.0	10-7	(GP)	**S**			
						45		
	13D	45.0	20-18	Do 12D (GP)				REC=6"
		47.0	24-10					
						50		
	14D	50.0	13-10	Do 12D (GP)				
		52.0	7-18					

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-21
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 8.6±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
05-01-15								
Fri., Cloudy								
55°F								
13:00						**55**		
10:30	15NR	55.0	9-8	No recovery				
5-5-15		57.0	18-13					
Tuesday								Rig chatter at 58'.
Partly								
Cloudy						**60**		Hole collapsed at 60'.
77°F	16D	60.0	12-10	Purple clay (CL)				
		62.0	11-12					
						65		
	17D	65.0	10-14	Brown fine to medium sand (SP)				
		67.0	30-30					
								Rig chatter at 68'.
					S			
						70		
	18D	70.0	18-16	Brown medium to coarse sand, trace fine				
		72.0	18-16	gravel (SP)				
						75		
	19D	75.0	19-16	Do 18D (SP)				REC=3"
		77.0	18-12					
14:30						**80**		
09:00	20D	80.0	9-9	Brown fine sand, some silt (SM)				
05-06-15		82.0	10-10					
Wednesday								
Cloudy								
60°F						**85**		
	21D	85.0	8-15	Brown fine to medium sand, some silt, trace		**86**		
		86.1	100/2"	rock fragments (SM)	**DR**			
						88		
	1C	88.0	REC=100%	Hard slightly weathered to unweathered gray			*	*Coring time from
		93.0	RQD=92%	schistose gneiss to gneissic schist, jointed		**90**		13:29 to 13:50 at 4.2
				to moderately jointed, slightly weathered				minutes per foot.
				joints				Driller advanced to 88'
								for stick up purposes.
	2C	93.0	REC=95%	Hard unweathered gray gneissic schist,	**R**		*	*Coring time from
		98.0	RQD=82%	moderately jointed to jointed		**95**		14:09 to 14:28 at 3.8
								minutes per foot.
14:28						**98**		End of Boring at 98'.
						100		WC=Water Content
								in percent of dry
								weight.

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ROCK CORE SKETCH

PROJECT: W 18th St - W 19th ST / 10 Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

BORING NO. M-21
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 8.6 ±
RES ENGR. T. SANDIFORD

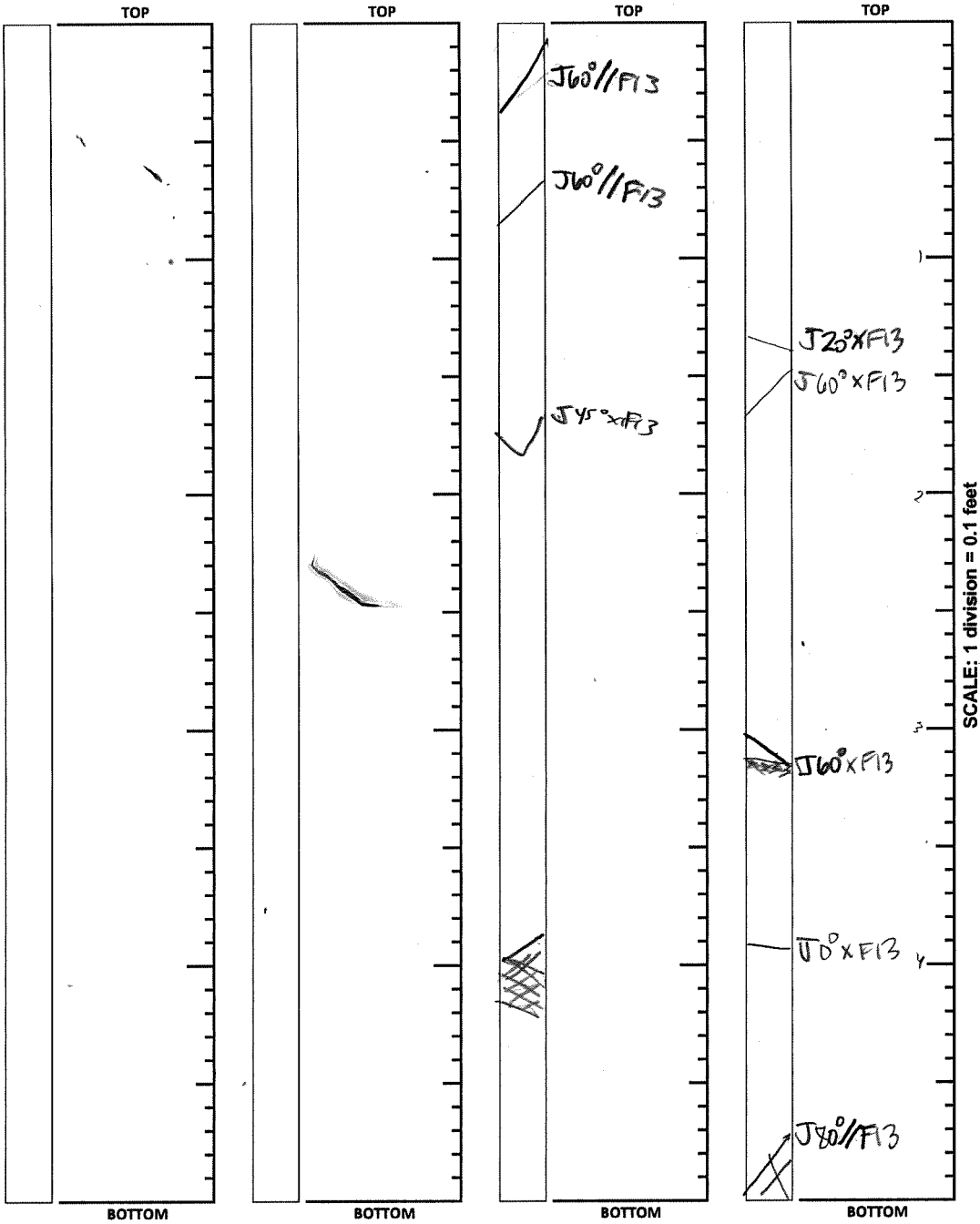
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	95% / 82%

Run No.	REC/RQD
1C	100% / 92%

TOP



BOTTOM

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Ð - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-21
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 8.6±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X YES			NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	35
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED X YES NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK GEL

AUGER USED YES X NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED YES X NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	88	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOMINIC PEPE/PAUL GADDIS HELPERS GEORGE RAYMOND
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-05-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-22P
SHEET 1 OF 7
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 8.0±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00							DRILLED	Hand auger to 6'.
05-01-15							AHEAD	
Friday							4" 3"	Vacuum cleared of
Cloudy								utilities to 6'.
55°F						**5**		
								Driller accidentally
								advanced to 15' with-
								out sampling.
						10		Covering 3 rigs,
					F			inspection; did not
								noticed to revert.
						15		
	1D	15.0	22-21	Brown gravel, some fine to coarse sand, trace				REC=3"
		17.0	9-5	silt (GP-GM)				
						20		
	2D	20.0	18-14	Brown, purple, gravel, some fine to coarse				Driller blows.
		22.0	10-10	sand, trace silt (GP-GM)				River deposit with
	3D	22.0	13-7	Top: Brn f-c sand, tr gravel, silt (SP-SM)				shell fragments from
		24.0	5-4	Bot: Brn blk organic si clay, tr f sand, shells (OH)				23' to 26'.
	4D	24.0	1-2	Do 3D Bottom (OH)		**25**		
		26.0	2-3					
	5D	26.0	7-4	Do 3D Bottom (OH)				WC=52
		28.0	4-4					
	6D	28.0	9-13	Brown fine to coarse sand, some gravel, trace				
		30.0	14-17	silt (SP-SM)		**30**		
	7D	30.0	29-32	Do 6D (SP-SM)				
		32.0	19-19					
						35		
	8D	35.0	12-19	Brown gravel, some fine to coarse sand, silt				
		37.0	25-34	(GM)	**S**			
						40		
	9D	40.0	12-17	Brown fine to medium sand, some silt (SM)				
		42.0	14-14					
						45		
	10D	45.0	9-16	Top: Brown fine to coarse sand, some gravel,				
13:15		47.0	18-23	trace silt (SP-SM)				
09:00				Bot: Red brown silt varved with trace clayey silt				10D Bot: WC=29
05-04-15				(ML)				
Monday						**50**		Casing to 50'.
Sunny	11D	50.0	39-73	Brown, gray gravelly fine to coarse sand (SP-SM)				
80°F		52.0	19-20					

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-22P
SHEET 2 OF 7
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 8.0±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							DRILLED	
05-04-15							AHEAD	
Monday							3"	
Sunny								
80°F						**55**		
	12D	55.0	19-21	Brown fine to medium sand, some gravel, trace				
		57.0	20-17	silt (SP-SM)				
						60		
	13D	60.0	11-29	Brown fine to coarse sand, some gravel, trace				
		62.0	32-37	silt (SP-SM)				
	1C	63.0	REC=	Cobble to sandstone, hard red brown				Hard drilling at 62.5'.
		68.0						1C Cored for 1' then
						65		rods dropped through
								68'.
	14D	68.0	17-26	Brown, red brown gravelly fine to coarse sand,				Borehole collapsed
13:00		70.0	53-42	trace silt (SP-SM)		**70**		at 70'; clearing out.
09:00	15D	70.0	18-21	Brown fine to coarse sandy gravel, trace silt				
05-05-15		72.0	31-22	(GP-GM)				
Tuesday								
Cloudy								
77°F						**75**		
	16D	75.0	18-21	Brown fine to coarse sand, trace gravel, silt	**S**			
		77.0	20-25	(SP-SM)				
						80		Hole collapsed at 80'
	17D	80.0	97-32	Do 16D (SP-SM)				pulling rods created
		82.0	26-24					vacuum for sand to
								fill hole up to 76'.
								Keeping possible
13:00						**85**		head while putting
09:00	18D	85.0	18-20	Brown fine to coarse sand, some gravel, trace				rods.
05-06-15		87.0	21-16	silt (SP-SM)				
Wednesday								
Cloudy,								
Rain						**90**		
60°F	19D	90.0	21-31	Brown clayey gravel (GC)				REC=0.25"
		92.0	31-46					
						95		
	20D	95.0	19-24	Brown fine to coarse sand, trace gravel, silt				
		97.0	26-26	(SP-SM)				
						100		
	21D	100.0	15-26	Do 20D (SP-SM)				
		102.0	33-34					

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-22P
SHEET 3 OF 7
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 8.0±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
05-06-15					S			
Wednesday								Mica & decomposed
Cldy., Rain						104		rock in wash at 104'.
60°F					DR	105		Hard drilling at 104'.
09:00	22D	105.0	50/1.5"	Top: Brn f-m sand, some silt (SP-SM)				Bit punched through
05-07-15		105.1		Bot: Gray f-m sand, some silt (DR) (SM)				to 105'.
Thursday	1C	105.0	REC=100%	Medium hard slightly weathered to unweathered				22D: REC=1.5"
Sunny		110.0	RQD=88%	gray & black hornblende schist, trace			*	*Coring time from
75°F				pegmatite, jointed, weathered joints	R	110		10:09 to 10:29 at 4
	2C	110.0	REC=100%	Hard unweathered gray hornblende schist,				minutes per foot.
		115.0	RQD=100%	moderately jointed, mineral coated & iron				
				stained joints				
14:25						115		End of Boring at 115'.
								WC=Water Content
								in percent of dry
								weight.
						120		
						125		
						130		
						135		
						140		
						145		
						150		

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ROCK CORE SKETCH

PROJECT: W 18th - W 19th St / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

BORING NO. M-22P
SHEET 4 OF 7
FILE NO. 12320
SURFACE ELEV. +8.0±
RES ENGR. T. SANDIFORD

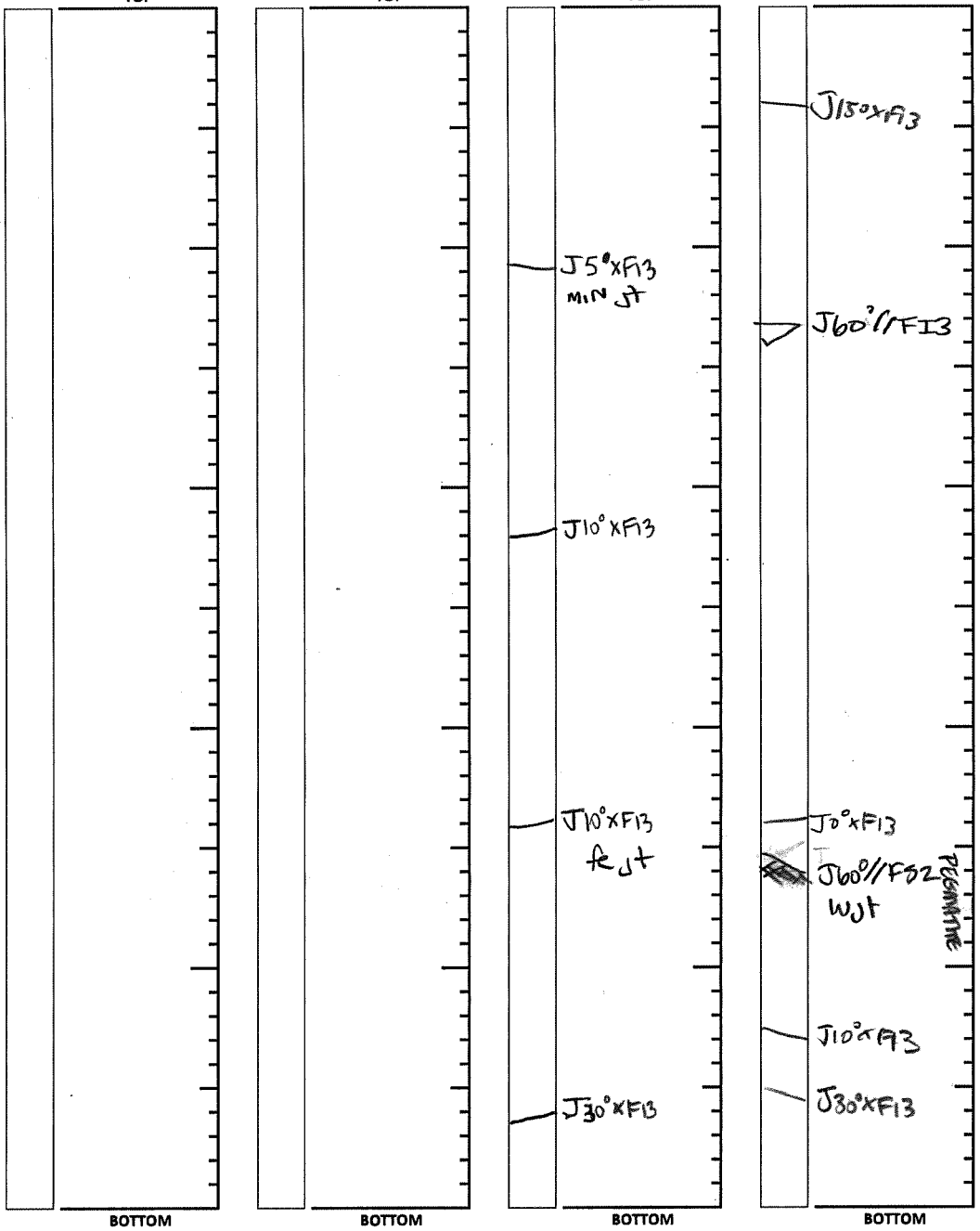
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	100% / 100%

Run No.	REC/RQD
1C	100% / 88%

TOP



BOTTOM

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Ð - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

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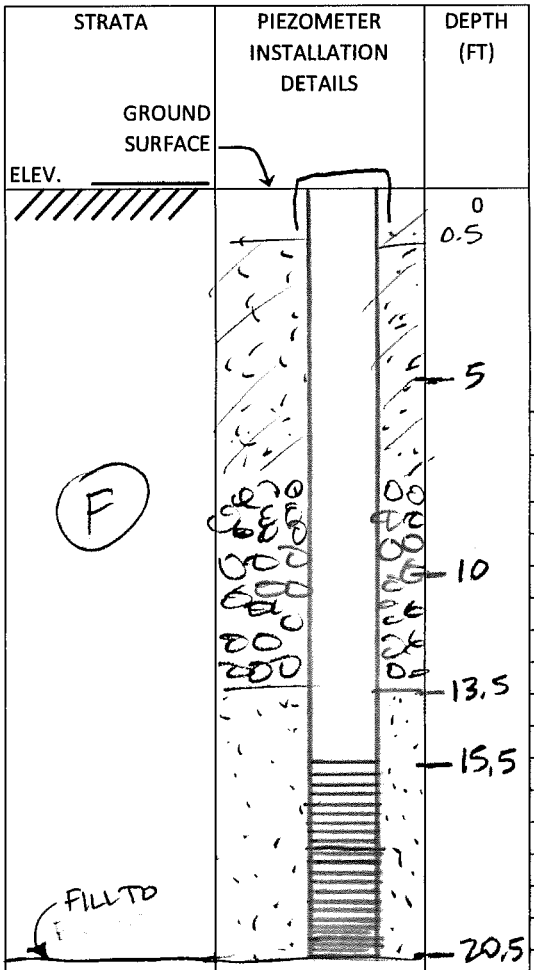
PIEZOMETER RECORD

PIEZOMETER OR BORING NO. M-22P-A
SHEET 5 OF 7
FILE NO. 12320
INSTALLATION DATE 5/18/15 - 5/19/15
RES ENGR. TSANDIFER

PROJECT: W 18th ST - W 19th ST / 10th Ave
LOCATION: New York, NY
PIEZOMETER LOCATION:

☐ SEE SKETCH ON BACK



PIEZOMETER TYPE 5' SCREEN

INTAKE POINT
depth to bottom, ft = 20.5
depth to top, ft = 15.5
length, ft = 5 = L
diameter, in = 2 , ft = = 2R

STANDPIPE/RISER
elevation of rim, ft =
diameter, in = , ft = = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			
5/21/15	1100	18.5'		INITIAL READING
5/22/15	1345	7.5'		
5/26/15	1000	7.8'		
5/26/15	1500	7.8'		

SAND
GRAVEL
BENTONITE
GROUT

GROUND SURFACE ELEV.

PIEZOMETER NO. M-22P-A

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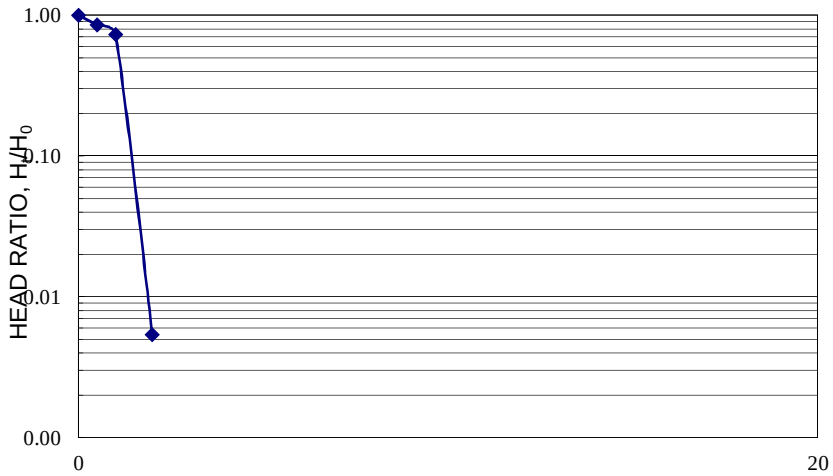
VARIABLE HEAD PERMEABILITY TEST

☐ **BOREHOLE OR** ☑ **PIEZOMETER NO.** M-22P-A

PROJECT: W 18th - W 19th St / 10th Ave
LOCATION: New York, NY
PIEZOMETER LOCATION: B-22P-A

SHEET 6 **OF** 7
FILE NO. 12320
TEST NO. 1
RES ENGR. Teresa Sandiford
CALC. BY TJS **DATE** 5/21/2015
CH'KD BY **DATE**



INTAKE POINT
depth to bottom, ft = 20.5
depth to top, ft = 15.5
length, ft = 5 = L
diameter, in = 2 , ft = 0.17 = 2R

STANDPIPE/RISER
elevation of rim, ft = 0
diameter, in = 2 , ft = 0.17 = 2r

depth of casing, ft =

depth to which stand-pipe was bailed, ft = = Z

READING TIME			ORIGINAL TEST DEPTH, H_0 (ft.)	DEPTH AT TIME t, H_t (ft.)	UNBALANCED HEAD $DH_t = H_t - H_0$ (ft.)	HEAD RATIO DH_t/DH_0	REMARKS
DATE	CLOCK	Δt MIN.					
5/21/2015	10:00	0	18.5	0	18.5	1.00	Falling Head Test
	10:00	0.5		2.7	15.8	0.85	
	10:01	1		5	13.5	0.73	
	10:02	2		18.4	0.1	0.01	

PIEZOMETER NO. M-22P-A

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-22P
SHEET 7 **OF** 7

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 8.0±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED						
						X	YES		NO	
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	20	
SKID		HYDRAULIC	X	DIA., IN.	3	DEPTH, FT. FROM	0	TO	80	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK									

TYPE AND SIZE OF:

D-SAMPLER 2" O. D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL NX DOUBLE BARREL
CORE BIT NX DIAMOND
DRILL RODS NWJ

DRILLING MUD USED X YES NO
DIAMETER OF ROTARY BIT, IN. 3-7/8, 2-7/8
TYPE OF DRILLING MUD QUIK GEL

AUGER USED YES X NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					SEE PIEZOMETER SHEET NO. 5.

PIEZOMETER INSTALLED X YES NO SKETCH SHOWN ON SEE SHEET NO. 5

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOUG WOOD HELPERS LEO
REMARKS PIEZOMETER INSTALLED.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-07-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-23
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 7.7±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:45							DRILLED	Hand excavated to 5'.
05-20-15							AHEAD	
Wednesday							4"	
Partly Cloudy								
65°F						**5**		
	1D	6.0	4-5	Brown gravelly fine to coarse sand, some silt,				
		8.0	6-6	trace organic silt clay layer (SM)				
	2D	8.0	3-3	Brown fine to coarse sand, some silt, trace				Petroleum odor.
		10.0	3-5	gravel (SM)		**10**		
	3D	10.0	5-3	Brown black fine to coarse sand, trace gravel,	**F**			REC=4"
		12.0	3-4	silt (SP-SM)				
						15		
	4D	15.0	4-3	Gray gravelly fine to coarse sand, trace silt				REC=1", possible
		17.0	3-2	(SP)				wash.
						20		
	5D	20.0	10-18	Top: Gray f-c sand, gravel, tr silt (GP-GM)		**21**		5D: WC=52
		22.0	6-2	Bot: Black organic silty clay (OH)				5D Bot: Petroleum
	6D	22.0	4-3	Black organic silty clay, some fine to coarse				odor.
15:00		24.0	3-2	sand, trace shells (OH)				6D: WC=42
09:00	7D	24.0	8-6	Black silty clay, trace fine sand, shell, wood		**25**		WC=51
05-21-15		26.0	3-4	(OH)				
Thursday	8D	26.0	6-6	Black organic silty clay, trace fine to medium				WC=41
Cloudy		28.0	3-3	sand, shells (OH)				
60°F	9D	28.0	5-4	Soft gray organic silty clay, trace shells (OH)				WC=56
		30.0	5-4		**O**	**30**		
	10D	30.0	WH/24"	Do 9D (OH)				WC=58
		32.0						
						35		
	11D	35.0	9-11	Do 9D, trace gravel (OH)				11D, 16D-17D:
		37.0	10-11					REC=1"
						38.5		
						40		
	12D	40.0	12-9	Brown fine to medium sand, some silt (SM)				
		42.0	9-8					
						44		
						45		
	13D	45.0	18-12	Brown clayey silt, trace silty clay (ML)				WC=33
		47.0	6-5		**M**			
						48.5		
						50		
	14D	50.0	15-14	Brown silty fine to medium sand, trace coarse	**S**			
		52.0	9-11	sand, gravel (SM)				

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-23
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 7.7±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							DRILLED	
05-21-15							AHEAD	
Thursday							4"	
Cloudy								
60°F						55		
	15D	55.0	9-11	Brown gravelly fine to coarse sand, trace silt				
		57.0	9-10	(SP-SM)				
						60		
	16D	60.0	25-24	Brown gravel (GP)				Gravel stuck in spoon
		62.0	28-17					tip.
					S			
						65		
	17D	65.0	10-9	Brown gravel, trace coarse to fine sand (GP)				
		67.0	11-7					
						70		
	18D	70.0	9-10	Brown coarse to fine sand, some gravel, trace				
14:00		72.0	7-9	silt (SP-SM)				
09:00								
05-22-15								Hard drilling from 74'
Friday						74.5		to 74.5'. TOR=74.5
Sunny	19D	75.0	100/0.5"	Boulder				from drilling.
70°F		75.0						Hard drilling from 75'
								to 80'.
13:30						80		
09:45	20D	80.0	100/0"	Gray rock fragments (GP)				
05-26-15	1C	80.0	REC=100%	Medium hard unweathered gray gneissic			*	Coring time from 10:32
Tuesday		85.0	RQD=84%	schist, moderately jointed to jointed				to 10:46 at 2.5
Sunny								minutes per foot.
70°F					R	85		
	2C	85.0	REC=100%	Hard unweathered gray gneissic schist,			*	Coring time from 11:02
		90.0	RQD=100%	massive				to 11:03 at 2 minutes
								per foot.
						90		
	3C	90.0	REC=92%	Hard unweathered gray gneissic schist,			*	*Coring time from
		95.0	RQD=92%	moderately jointed				11:44 to 11:58 at
								2.75 minutes per foot.
12:00						95		End of Boring at 95'.
								WC=Water Content
								in percent of dry
								weight.
						100		

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ROCK CORE SKETCH

BORING NO. M-23
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 7.7±
RES ENGR. T. SANDIFORD

PROJECT: W 18th - W 19th ST / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD

Run No.	REC/RQD
3C	92 % / 92%

Run No.	REC/RQD
2C	100 % / 100 %

Run No.	REC/RQD
1C	100 % / 74 %

TOP | TOP | TOP 85' | TOP 80'

J60°xFI3 V. Soft. JT.
J50°xFI3
J20°xFI3 MB
MB//F70°
J70°xFI3
J0°xFI3 with JT
J70°//S2
Broken, V. Soft, H. with.
J75°//S2

BOTTOM | BOTTOM | BOTTOM 90' | BOTTOM 95'

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES 2C, No fractures. Solid 5' RUN.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-23
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION NEW YORK, NEW YORK **SURFACE ELEV.** 7.7±
BORING LOCATION SEE BORING LOCATION PLAN **DATUM** NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
				X	YES		NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	60
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED X YES NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK MUD

AUGER USED YES X NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED YES X NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	80	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	15	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER JOHN CAMPBELL HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-26-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-24
SHEET 1 OF 3
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 7.7±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00							DRILLED	Hand excavated to 3'.
05-20-15							AHEAD	Brick layer encountered
Wednesday							4"	roller bit from 3' to 6'.
Partly Sunny								
65°F						**5**		
	1D	6.0	9-3	Top: Brn gravelly f-c sand, some clay (SC)	**F**			
		8.0	2-1	Bot: Black clayey f-m sand, trace gravel (SC)				
	2D	8.0	4-5	Black gravel, some medium to coarse sand (GP)				REC=1"
		10.0	5-4			**10**		
	3D	10.0	10-6	Brown, red gravelly fine to coarse sand, some				
		12.0	2-4	clay (SC)				
						13.5		
						15		
	4D	15.0	3-1	Soft black organic silty clay, trace fine sand &				WC=65
		17.0	1-2	gravel (OH)				REC=3"
					O			
						20		
	5D	20.0	1-2	Soft gray organic silty clay, trace fine sand, shells				WC=58
		22.0	2-2	(OH)				5D, 12D: REC=6"
	6D	22.0	3-6	Do 5D (OH)				WC=48
		24.0	8-3			**24**		
	7D	24.0	3-4	Brown silty clay, trace to some fine sand, gravel		**25**		
		26.0	4-6	(CL)				
	8NR	26.0	5-9	No recovery	**V**			
		28.0	12-18					WC=30
	9D	28.0	11-8	Brown & red brown silt varved with some clayey				
		30.0	8-13	silt (ML)		**30**		
	10D	30.0	36-14	Red brown silty fine sand varved with some				
		32.0	11-13	brown fine sand, some silt (SM)				
						35		
	11D	35.0	8-8	Brown fine sand, some silt (SM)	**S**			
		37.0	13-20					
								WC=Water Content
						40		in percent of dry
	12D	40.0	8-5	Top 1": Red brown silty fine sand (SM)	**DR**			weight.
		41.2	100/3"	Bot: Gray mic f-m sand, some silt (DR) (SM)		**42**		
	1C	42.0	REC=97%	Hard, unweathered to slightly weathered, gray			*	*Coring time from 13:42
		47.0	RQD=88%	gneissic schist, blocky, iron stained weathered				to 14:00.
				joints		**45**		
	2C	47.0	REC=96%	Hard unweathered gray gneissic schist, trace	**R**		*	*Coring time from 14:13
		52.0	RQD=96%	pegmatite, moderately jointed, iron stained				to 14:30.
				joints		**50**		
14:30						**52**		End of Boring at 52'.

MRCE Form BL-1

BORING NO. M-24

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www.mrce.com

ROCK CORE SKETCH

PROJECT: W 18th - W 19th St / 10th Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

BORING NO. M-24
SHEET 2 OF 3
FILE NO. 12320
SURFACE ELEV. 7.7 ±
RES ENGR. T. SANDIFORD

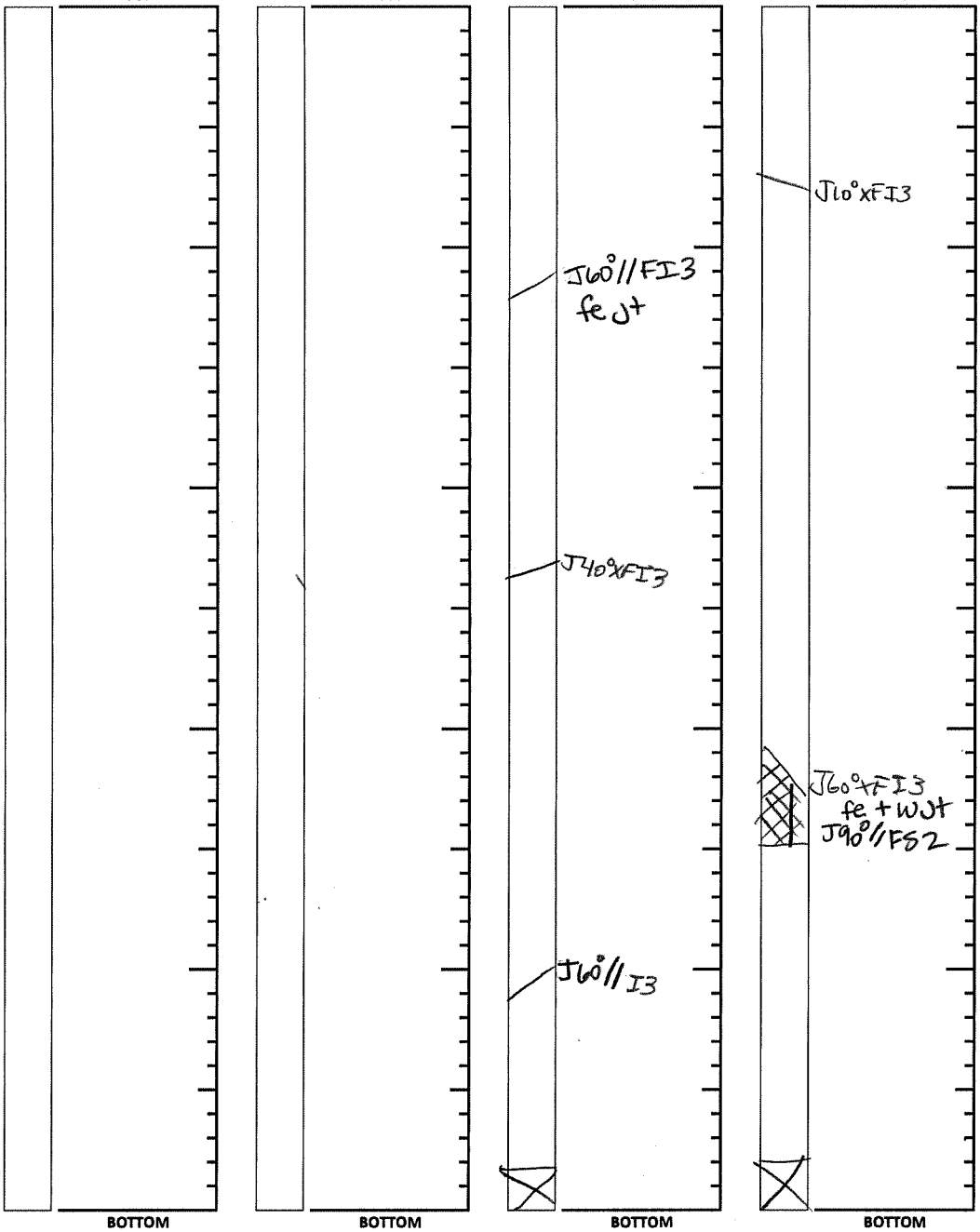
Run No.	REC/RQD

Run No.	REC/RQD

Run No.	REC/RQD
2C	96 % / 96 %

Run No.	REC/RQD
1C	97 % / 88 %

TOP



BOTTOM

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Ð - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-24
SHEET 3 **OF** 3

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 7.7±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED					
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER	TRACK								

CASING USED: [X] YES [ ] NO

TYPE AND SIZE OF:

D-SAMPLER	2" O. D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	NX DOUBLE BARREL
CORE BIT	NX DIAMOND
DRILL RODS	NWJ

DRILLING MUD USED: [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK MUD

AUGER USED: [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. ____ AVERAGE FALL, IN. ____
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	42	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER PAUL GADDIS HELPERS
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 05-20-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK:

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-25
SHEET 1 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION: NEW YORK, NEW YORK
SURFACE ELEV. 12.4±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.0	38-25	Gray black fine to coarse sandy gravel, trace	**	**0.33**	DRILLED	**Asphalt from 0' to
04-28-15		2.0	21-24	silt (Fill) (GM)			AHEAD	0.33'.
Tuesday	2D	2.0	11-17	Brown fine to medium sand, brick, trace gravel,			4"	
Sunny		4.0	16-9	coarse sand, silt (Fill) (SP-SM)				
55°F	3D	4.0	8-18	Brown fine to coarse sand, some brick, trace		**5**		
		6.0	17-11	gravel, silt (Fill) (SM)				
	4D	6.0	8-9	Gray black fine to coarse sand, some silt,				4D-6D: Petroleum
		8.0	8-7	trace gravel (Fill) (SM)				odor.
	5D	8.0	11-17	Do 4D (Fill) (SM)				
		10.0	15-11			**10**		
	6D	10.0	19-16	Gray black fine to coarse sandy gravel, trace				
		12.0	30-41	silt (Fill) (GP-GM)				
					F			
						15		
	7NR	15.0	5-2	No recovery				
		17.0	2-1					
						20		
	8D	20.0	3-8	Red brown fine to coarse sand and brick				8D-12D: Petroleum
		22.0	7-100/4"	fragments, trace gravel, silt (Fill) (SP-SM)				odor.
								Cobble dropped from
								22' to 24'.
	9D	24.0	1/12"	Brown gravel and brick fragments, trace fine		**25**		REC=2"
		26.0	1-4	to coarse sand (Fill)		**26**		
	10D	26.0	17-22	Black brown fine to coarse sand, trace silty				
		28.0	21-19	gravel (SP-SM)				
	11D	28.0	5-6	Red brown fine to medium sand, trace silt,				
		30.0	10-12	some silt layer (SP-SM+ML)		**30**		
	12D	30.0	9-8	Red brown fine to medium sand, some silt,				
		32.0	11-12	trace mica (SM)				
					S	**35**		
	13D	35.0	4-5	Red brown silty fine sand, trace mica (SM)				
		37.0	9-10					
						40		
	14D	40.0	3-8	Red brown fine to medium sand, some silt,				
		42.0	7-13	trace mica (SM)				
						43		
	1C	44.0	REC=87%	Medium hard slightly weathered gray gneissic		**45**	*	Coring time from
		49.0	RQD=78%	schist, closely jointed to jointed				01:09 to 01:14 at 3.8
								minutes per foot.
					R			2C: Didn't observe
								coring time for 2C.
	2C	49.0	REC=93%	Medium hard slightly weathered to		**50**		Run paused for 20
		54.0	RQD=67%	unweathered gray gneissic schist, jointed to				minutes to fix pump.
				closely jointed				

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. M-25
SHEET 2 OF 4
PROJECT: WEST 18TH - WEST 19TH STREET/10TH AVENUE **FILE NO.** 12320
LOCATION: NEW YORK, NEW YORK **SURFACE ELEV.** 12.4±
RES. ENGR. TERESA SANDIFORD

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 04-28-15 Tues., Sunny 55°F, 14:30					R			
						54		End of Boring at 54'.
						55		
						60		
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

Mueser Rutledge Consulting Engineers
14 Penn Plaza - 225 West 34th Street
New York, NY 10122
T: 917 339-9300 F: 917 339-9400
www.mrce.com

ROCK CORE SKETCH

BORING NO. M-25
SHEET 3 OF 4
FILE NO. 12320
SURFACE ELEV. 12.4 ±
RES ENGR. T. SANDIFORD

PROJECT: W 14th - W 19th ST / 10 Ave
LOCATION: New York, NY
TEST/INSP. EQUIPMENT
REF. CODES/STANDARDS

Run No.	REC/RQD

TOP
BOTTOM

Run No.	REC/RQD

TOP
BOTTOM

Run No.	REC/RQD
2C	93% / 61%

TOP 49'
J 15° x F13
J 0° x F13
J 30° x F13
J 0° x F13
J 10° x F13
J 10° x F13
J 0° x F13
54'
BOTTOM

Run No.	REC/RQD
1C	87% / 78%

TOP 44'
J 30° x F13
Broken
J 0° x F13
J 0° x F13
J 0° x F13
J 10° x F13
J 80° x F13
J 20° x F13
49'
BOTTOM

SCALE: 1 division = 0.1 feet

ROCK CORE SKETCH
LEGEND

JOINTING
J - Joint
MB - Mechanical Break
Θ - Angle w/ Horizontal
// - Parallel
X - Crossing
F - Foliation
S - Stratification
U - Unfoliated or Unstratified

JOINT SURFACE
C - Curved
I - Irregular
S - Straight

JOINT CONDITION
1 - Slick
2 - Smooth
3 - Rough

SKETCH SYMBOLS
Joint
Healed Joint
Broken
Part of Core Not Recovered
Cavities or Vugs in Core
Clay
Sand
Empty Space

NOTES 1C - PAUSED RUN FOR 2 MIN @ ~25' TO FIX PUMP
2C - PAUSED RUN FOR 20 MIN to fix pump.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. M-25
SHEET 4 **OF** 4

PROJECT WEST 18TH - WEST 19TH STREET/10TH AVENUE
FILE NO. 12320
LOCATION NEW YORK, NEW YORK
SURFACE ELEV. 12.4±
BORING LOCATION SEE BORING LOCATION PLAN
DATUM NAVD 88

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED						
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	30	
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO		
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO		
OTHER	TRACK									

TYPE AND SIZE OF:					
D-SAMPLER	2" O. D. SPLIT SPOON	DRILLING MUD USED	X	YES	NO
U-SAMPLER		DIAMETER OF ROTARY BIT, IN.	3-7/8		
S-SAMPLER		TYPE OF DRILLING MUD	QUIK GEL		
CORE BARREL	NX DOUBLE BARREL	AUGER USED		YES	X NO
CORE BIT	NX DIAMOND	TYPE AND DIAMETER, IN.			
DRILL RODS	NWJ				

CASING HAMMER, LBS. _____ AVERAGE FALL, IN. _____
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*USED AUTOMATIC HAMMER.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION
					NO WATER LEVEL OBSERVATIONS MADE.

PIEZOMETER INSTALLED ____ YES X NO SKETCH SHOWN ON _____

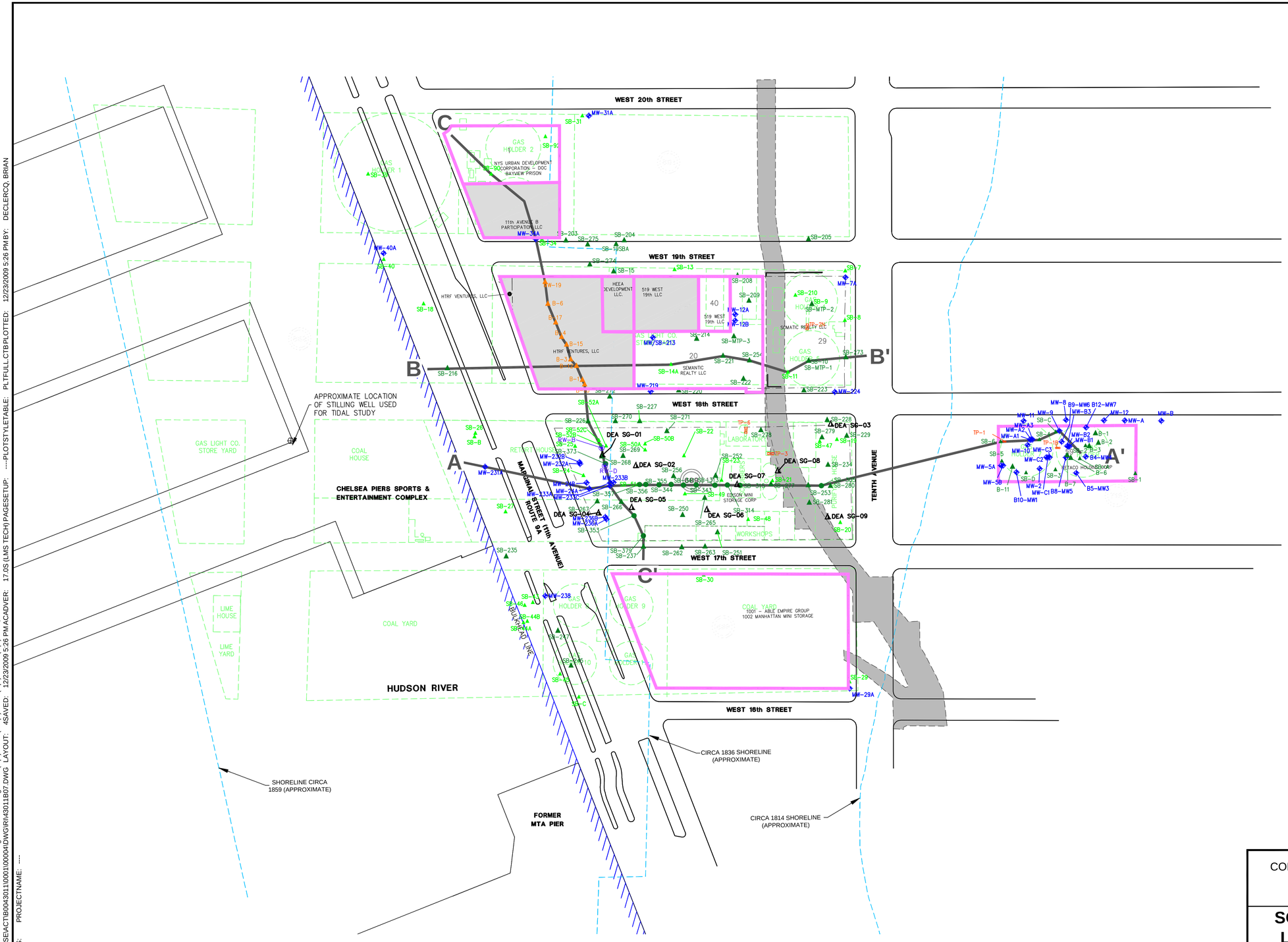
STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	44	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	10	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING CO., INC.
DRILLER DOUG WOOD HELPERS LEO
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER TERESA SANDIFORD DATE 04-28-15
CLASSIFICATION CHECK: CHERYL J. MOSS TYPING CHECK: _____

APPENDIX B



LEGEND:

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- PRE-DESIGN NAPL DELINEATION SOIL BORING LOCATION
- RECOVERY WELL LOCATION
- BORING LOCATION (BBL)
- TEST PIT LOCATION
- APROXIMATE SOIL GAS SAMPLE LOCATION
- LOT BOUNDARY
- 691 BLOCK ID
- 43 LOT ID
- BULKHEAD
- HIGH LINE
- REMEDIATED PROPERTY
- A—A' CROSS SECTION TRANSECT LOCATION

NOTE:

1. BLOCK AND LOT ID AND PROPERTY LINE INFORMATION WAS OBTAINED FROM NEW YORK CITY DEPARTMENT OF FINANCE AUTOMATED CITY REGISTER INFORMATION SYSTEM (ACRIS).
2. SURVEY CONTROL WAS TAKEN FROM SITE WIDE BASE SURVEY PREPARED BY MUNOZ ENGINEERING, P.C. DATED APRIL 2007.
3. CURBING AND STREET BOUNDARIES TAKEN FROM MUNOZ ENGINEERING DRAWING ENTITLED MONITORING WELLS AND BORINGS LOCATION SURVEY" DATED 11/24/2008 AND TRC DRAWING ENTITLED PROPOSED REMEDIAL INVESTIGATION SAMPLE LOCATIONS" DATE UNKNOWN.
4. ALL LOCATIONS ARE APPROXIMATE.
5. HISTORICAL SHORELINES DIGITIZED FROM W BRIDGES, 1814, COLTON, 1836, AND PERRIS, 1859.
6. FORMER MANUFACTURED GAS PLANT (MGP) STRUCTURES ARE FROM THE CONSOLIDATED GAS COMPANY PLANT, AS SHOWN ON SANBORN MAPPING DATED 1895.
7. BORINGS WERE COMPLETED BY BBL DURING THE PRELIMINARY SITE INVESTIGATION (2002) AND PHASE II SITE INVESTIGATION (2003).

0 80' 160'
GRAPHIC SCALE

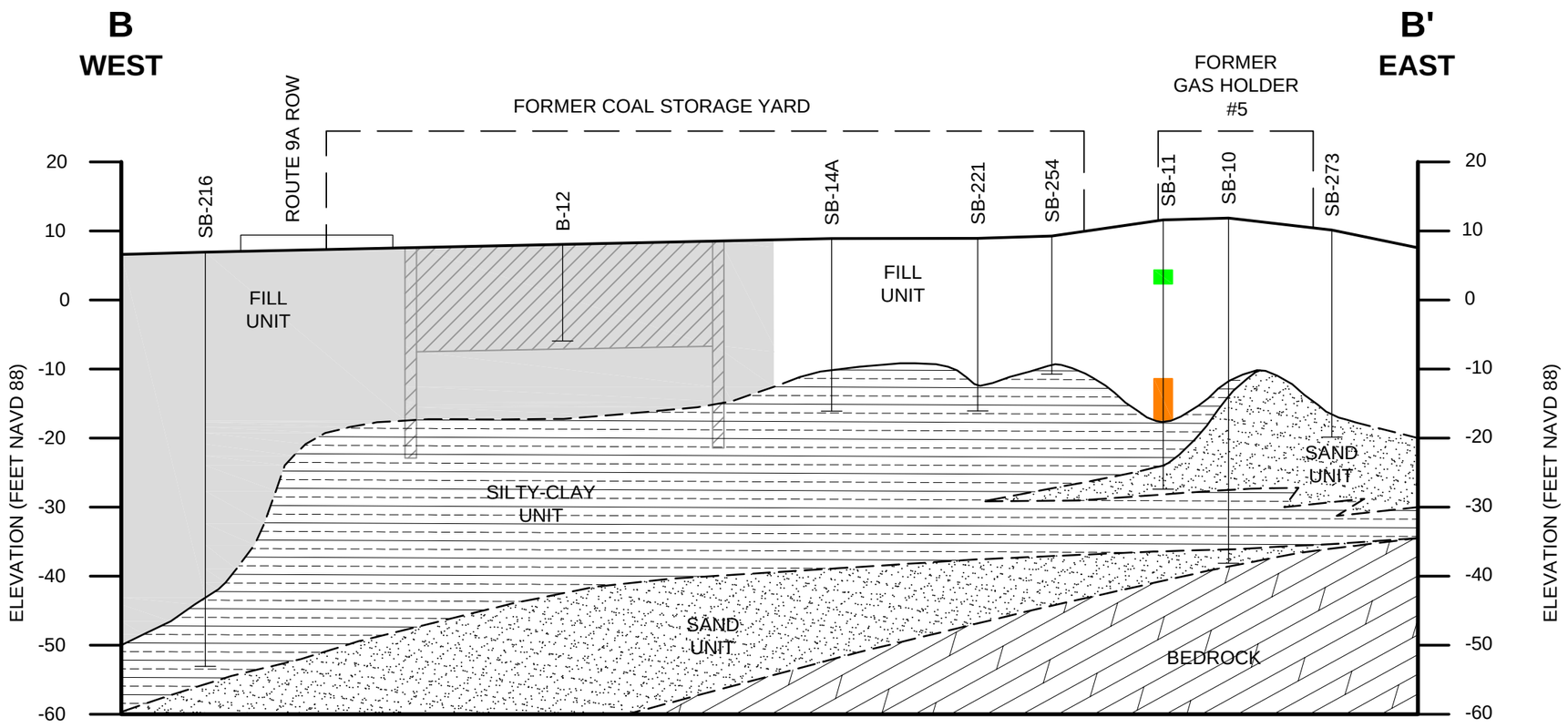
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
WEST 18TH STREET FORMER GAS WORKS
REMEDIAL INVESTIGATION REPORT

SOIL AND GROUNDWATER SAMPLE LOCATIONS AND CROSS SECTION TRANSECTS

ARCADIS

FIGURE 4

CITY:Syracuse DIV/GROUP:Env-141 DB:A.Schilling LD:A.Schilling PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIB\043011\000010000\4\DWG\R\043011B07.DWG LAYOUT: 4SAVED: 12/23/2009 5:26 PM BY: DECLERCQ, BRIAN
PLTSTYLETABLE: PLTFULL.CTB PLOTTED: 12/23/2009 5:26 PM BY: DECLERCQ, BRIAN
XREFS: IMAGES: PROJECTNAME: ----
43011X00
43011X03
43011X04
43011X05
43011X07



LEGEND:

SB-216 — BORING

GROUND SURFACE

LITHOLOGICAL CONTACT

BOTTOM OF BORING

STAINING/SHEEN

OLM/TLM

FILL

SILT AND CLAY

SAND UNIT

BEDROCK (HARTLAND FORMATION)

AREA REMEDIATED BY EXCAVATION AND/OR BARRIER WALL

APPROXIMATE EXTENT OF HISTORICAL CRIBBING

NOTES:

1. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
2. HORIZONTAL LOCATION OF HOLDER WALLS BASED ON HISTORIC MAPS.
3. EXCAVATION DEPTH AND BARRIER WALLS AT BLOCK 690, LOT 12 FROM THE REMEDIAL ENGINEER'S FINAL ENGINEERING REPORT, WEST 19th STREET DEVELOPMENT SITE, NEW YORK, NEW YORK, 2006.

0 20' 40'
VERTICAL SCALE

0 80' 160'
HORIZONTAL SCALE

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
WEST 18TH STREET FORMER GAS WORKS
REMEDIAL INVESTIGATION REPORT

CROSS SECTION B - B'

ARCADIS

FIGURE
5-B