Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **CD-12**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME 75**

LOCATION: **LIRR (West Side Yard)**
COORD. **N: 213,877.0** **E: 983,374.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0 feet**
DATUM:
START DATE: **5/27/03** TIME: **8:00 am**
FINISH DATE: **6/1/03** TIME: **4:00 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
6/2/03	11:30 am	5.4	25.0	120.0

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-1 25.0 - 29.5	54	100	87	Gray Quartz, Feldspar, Biotite SCHIST, slightly weathered, sound to slightly fractured, moderate fracture spacing, strong rock, coarse to fine grained. - Garnets 1/8" up to 3/16" throughout run -Yellow rusted joints at 26.5' and 27.9' -Decomposed rock at 27.9' -Faster drilling rate at 26' to 27'	II	R4	30	1.5	2	25.2
									20	1.5	1.0	26.2
									0	1.5	1.0	26.25
									0	1.5	1.0	26.3
									30	1.5	1.0	26.5
									35_{MB}	-	-	27.1
30		C-2 29.5 - 34.6	61	100	100	Gray Quartz, Feldspar, Biotite SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, c-f grained. -Garnets 1/8" up to 3/16" present throughout the run. -Yellowish rusted joint @ 34.1' and 33.2'	II	R4	$*40_{MB}$	-	-	27.5
									35_{MB}	-	-	27.8
									*40	1.5	2	27.9
									35	1.5	2	27.95
									$*40_{MB}$	-	-	28.4
									$*40_{MB}$	-	-	28.9
									$*45_{MB}$	-	-	29.1
									40_{MB}	-	-	29.5
35		C-3 34.6 - 44.2	115	100	100	Gray Quartz, Feldspar, Biotite SCHIST, slightly weathered, sound moderate to fine fracture spacing, strong rock, coarse to fine grained. -Wavy foliation at high angles -Red-yellow stains at 37.6' and 38.3' -Garnets up to 1/4" size -High angle incipient hairline fracture, slightly weathered, cutting across joint at 40.4' -Hornblende Biotite SCHIST from 44' to 44.2'	II	R4	40_{MB}	-	-	31.8
									30_{MB}	1.5	1	33.2
									10	3	1	34.1
									30_{MB}	-	-	34.6
									25_{MB}	-	-	36.1
									35_{MB}	-	-	36.4
									10	1.5	1.0	37.6
									5	1.5	1	38.3
40									15_{MB}	-	-	39
									20	3	1	40.4
									0_{MB}	-	-	41.5
									60	1.5	2	43.8
45						44.2'-48.1 light gray-white GRANITE, unweathered, sound, wide fracture spacing, very strong, medium to fine grained -Some core lost near 44.2' (Hornblende Biotite Schist and top of Granite)	I	R5	30_{MB}	-	-	44.2
									20_{MB}	-	-	46
									35_{MB}	-	-	47.3
		C-4 44.2 - 54.2	118	98	98	48.1'-54.2' - Gray Quartz, Feldspar, Biotite SCHIST, wavy foliation, slightly weathered, slightly to sound fracture, moderate fracture spacing, strong rock,	II	R4	0_{MB}	-	-	48.1
									10	1.5	1	49.4

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **CD-12**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						coarse to fine grained -At 54' light gray-white PEGMATITE -High angle incipient fracture, slightly weathered cuts across joint 53.9'			30_{MB} 35_{MB} 30_{MB} 40_{MB}	- - - -	- - - -	49.6 49.9 51.8 52.5
55						54.2'-59.5' and 62.4'-63.2', light Gray-White GRANITE unweathered, sound, wide fracture spacing, very strong, medium to fine grained.	I	R5	50_{MB} 45_{MB} 0_{MB} 0_{MB}	3 - - -	1.0 - - -	53.9 54.2 55.7 57.3
60		C-5 54.2 - 63.9	116	100	100	59.5' to 62.4' - SCHIST intercalated with Granitic material 63.2' to 63.9' - Dark gray SCHISTOSE GNEISS 63.9' to 63.9 - Dark gray Hornblende Biotite SCHIST Unweathered, sound, wide fracture spacing, strong rock, coarse to fine grained, wavy foliation -From 61.2' to 61.7' - High angle to vertical incipient fracture, slightly weathered and vuggy -Trace Garnet (1/16" to 1/8") at 61.6' to 62.1'	I	R4	60_{MB} 30_{MB} 40_{MB} 30_{MB} 30_{MB} 0 *50	3 - - - - 3 1.5	1 - - - - 1 2	58.8 59.1 59.7 61 62.1 62.6 63.4
65		C-6 63.9 - 73.9	120	100	100	63.9' to 68.3' - Dark gray Hornblende Biotite SCHIST, unweathered, sound, moderate to wide fracture, strong rock, coarse to fine grained 68.3' to 70' and 71.2' to 73.9' - Light gray GRANITE, slightly weathered, sound, wide fracture spacing, very strong rock, medium to fine grained 70' to 71.2' - Gray Mica SCHIST -Rusted Joint @ 69.8' and 73.5' -Occasional high angle to vertical healed hairline fractures	I II	R4 R5	35_{MB} 20_{MB} 25 40 20_{MB} 20 30_{MB} 0_{MB} 40_{MB}	- - 1.5 3 - 1.5 - - -	- - 2 2 - 1.0 - - -	63.9 64 67 68.3 69 69.8 71.1 71.8 72.9
70												
75						73.8' to 78.0' - Light gray-white GRANITE, unweathered, sound, wide fracture spacing, very strong, medium to fine grained.	I	R5	10 0_{MB} 55_{MB} 35_{MB}	1.5 - - -	1 - - -	73.5 73.9 74.8 75.5
80		C-7 73.9 - 83.8	119	100	100	78.0' to 83.8' - Gray Mica SCHIST, slightly weathered, moderate fracture spacing, slightly fractured, strong rock, coarse to fine grained -Some Garnets (1/32" to 3/16")	II	R4	30_{MB} 20_{MB} 25_{MB} *40_{MB} *45 10_{MB} 25_{MB} *40 *40_{MB}	- - - - 3 - - 1.5 -	- - - - 2 - - 2 -	78.2 78.6 78.7 78.8 78.9 79.2 79.8 80.8 81.1
						Gray Mica SCHIST, (40 degree foliation), slightly weathered, slightly to sound fractures, moderate	II	R4	65 *40_{MB}	3.0 -	1.0 -	81.4 81.9

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **CD-12**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-8 83.8 - 90.0	74	100	100	fracture spacing, coarse to fine grained -From 89.6' to 90' - Dark gray Hornblende Biotite SCHIST -Red Garnets (1/16" to 3/16") along run			*35$_{MB}$	-	-	82.2
									*40$_{MB}$	-	-	82.5
									*40	1.5	1	83.1
									*35$_{MB}$	-	-	83.6
									*40$_{MB}$	-	-	83.8
									*40$_{MB}$	-	-	85.5
									*40$_{MB}$	-	-	85.9
90									*40$_{MB}$	-	-	86.2
		C-9 90.0 - 99.0	108	100	87	Gray SCHIST, wavy foliation, slightly weathered, slightly fractured, moderate fracture spacing, coarse to fine grained -Friable from 93.1' to 93.3' -Slickensides at 94.1' -Garnets up to 7/16" -From 96.7' to 98.2' and 98.6' to 98.8' rock appears to be sheared along foliation planes	II	R4	*40$_{MB}$	-	-	86.9
									*40	1	1	87.4
									*40	1.5	1	87.9
									*40$_{MB}$	-	-	88.2
									*40	1.5	2	88.3
							III	R1	*40$_{MB}$	-	-	88.4
									*40	1.5	1	89
									*50	1	1	89.2
95									*50$_{MB}$	-	-	89.6
									*50$_{MB}$	-	-	89.7
									*40$_{MB}$	-	-	90
						Extremely fractured, extremely close to close fracture spacing along foliations planes from 97.4' to 97.9'		R3	0$_{MB}$	-	-	90.1
									0$_{MB}$	-	-	90.15
									*25$_{MB}$	-	-	90.2
									0	1.5	1	90.7
		C-10 99.0 - 109.0	120	100	100	Gray Mica SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained -Garnets within Schist up to 1/4" size	II	R4	0	1.5	1	90.8
									*40$_{MB}$	-	-	91
100									*40	1.5	1	91.2
									20$_{MB}$	-	-	92.1
									*40	1.5	2	93.2
						EXCEPT 102' to 102.9', 104.7' to 106.7', and 108.3' to 109' - Light gray-white GRANITE, sound, slightly weathered, medium to fine grained	II	R5	*40	1.5	2	93.8
									*40	1.5	4	93.9
									*40	0.5	2	94.1
									10	3	2	94.4
						103.8' to 105' and 106.7' to 107.5' - Dark gray Hornblende Biotite GNEISS			50	3	2	94.9
105									10$_{MB}$	-	-	95.5
									10$_{MB}$	-	-	95.6
									0$_{MB}$	-	-	95.7
									30$_{MB}$	-	-	96
									60$_{MB}$	-	-	96.1
									35$_{MB}$	-	-	96.2
									0	1.5	2	96.6
		C-11 109.0 - 119.0	120	100	97	Light gray-white GRANITE, slightly weathered, sound, very strong, moderate to wide fracture spacing, medium to fine grained. Except 109' to 109.4' and 112.8' to 114' - Gray Mica SCHIST	II	R5	40$_{MB}$	-	-	97.1
110									50	1.5	2	97.3
									75$_{MB}$	-	-	97.4
									*45	1.5	4	97.5
									*45	1.5	4	97.6
									*45	1.5	4	97.7
									*45	1.5	4	97.8
									50	1.5	4	97.9
									40	1.5	4	98.1
115									45	1.5	1	98.3
									40	1.5	4	98.6
									40	1.5	4	98.7
									0$_{MB}$	-	-	99
									*45$_{MB}$	-	-	99.5
									*40$_{MB}$	-	-	99.8
									*40	1.5	1	100.1
									*45	1.5	1	100.2
						Light gray-white GRANITE, slightly weathered, wide	II	R5	30	1.5	1	101.4

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **CD-12**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-12 119.0 - 123.9	59	100	100	fracture spacing, sound, very strong, medium to fine grained Except 120.5' to 121.3' - Gray Mica SCHIST -From 120.7' to 121' - possible micro-shears along foliation, extremely thin, extremely close to very close spacing			55_{MB}	-	-	102.1
									30_{MB}	-	-	102.8
									20_{MB}	-	-	102.9
									$*35_{MB}$	-	-	103.1
									30_{MB}	-	-	103.4
									$*35_{MB}$	-	-	103.9
									0_{MB}	-	-	105.2
						E.O.B. at 123.9'.			0_{MB}	-	-	106.5
125									0_{MB}	-	-	108.1
									35_{MB}	-	-	108.3
									50_{MB}	-	-	108.9
									50_{MB}	-	-	109
									*40	3	1	109.1
									*40	3	1	109.3
									15_{MB}	-	-	109.8
									45	1.5	1	110.5
130									10_{MB}	-	-	110.9
									0_{MB}	-	-	111.2
									$0\text{-}30_{MB}$	-	-	111.3
									25_{MB}	-	-	111.5
									$*45_{MB}$	-	-	112.9
									0_{MB}	-	-	113.3
									*50	1.5	1	114
									10_{MB}	-	-	115.1
135									$0\text{-}30_{MB}$	-	-	115.6
									10_{MB}	-	-	115.9
									15_{MB}	-	-	116.1
									0_{MB}	-	-	117.5
									10_{MB}	-	-	118.1
									40_{MB}	-	-	118.9
									35_{MB}	-	-	119
									50_{MB}	-	-	119.5
									0_{MB}	-	-	120.4
140									*45	1.5	4	120.9
									$*45_{MB}$	-	-	121
									35_{MB}	-	-	121.3
									30_{MB}	-	-	123
									30_{MB}	-	-	123.6
									20_{MB}	-	-	123.8
									20_{MB}	-	-	123.9
145												
150												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **CD-15**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME 75**

LOCATION: **LIRR (West Side Yard)**
COORD. **N: 213,874.0** **E: 983,206.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0 feet**
DATUM:
START DATE: **6/2/03** TIME: **8:00 am**
FINISH DATE: **6/6/03** TIME: **4:00 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		2.937" (2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
						0.0 - 6.0		Hand		Auger								Hand Augered Material: 0' to 1' - Concrete 1' to 4' - Light brown, yellowish Sand with little Gravel 4' to 6' - Dark brown, coarse to fine grained Sand, some coarse to medium Gravel, trace organics
5			S	1		6.0 - 8.0	WOH	WOH	WOH	1	12							Brown, c-f SAND, some m-f Gravel, little Silt, very loose, moist.
10			S	2		10.0 - 12.0	2	3	1	2	20							S-2A (10") same as above. S-2B (10") Dark brown to black, m-f SAND, little f-Gravel, small pieces of brick, organics, very loose.
15			S	3		15.0 - 17.0	4	3	3	6	20							S-3A (12") Brown, black and light green c-f SAND, trace c-f Gravel, little Silty Clay, loose. S-3B (8") Light gray SILT, trace m-f Sand, loose.
20			S	4		20.0 - 22.0	2	2	2	3	19							Dark brown Silty CLAY, little m-f Sand, high PI, moist.
																		S-5A (18") Same as above.

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/18/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG
(continued)

BORING NUMBER: **CD-15**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S	5		24.0 - 26.0	3	2	3	4	24	S-5B (6") Gray m-f SAND, some Silt, loose, dry.
			S	6		26.0 - 28.0	2	3	1	6	22	S-6A (11") Gray m-f SAND, some Silt, very loose, trace Gravel, very loose. S-6B (11") Reddish SILT, m-f Sand, very loose, dry.
												28.5
30												Roller bit refusal and begin coring at 28.5'.
35												
40												
45												
50												
55												

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/18/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **CD-15**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME 75**

LOCATION: **LIRR (West Side Yard)**
COORD. **N: 213,874.0** **E: 983,206.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0 feet**
DATUM:
START DATE: **6/2/03** TIME: **8:00 am**
FINISH DATE: **6/6/03** TIME: **4:00 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
30		C-1 28.5 - 32.0	42	100	69	Dark gray SCHIST, slightly weathered, slightly fractured, strong rock, coarse to fine grained Intercalated with light gray fine-medium grained GRANOFELS, faintly foliated (about 80% of rock is Granofels)	II	R4	40	1.5	2	28.6
									70	1.5	2	28.7
									30	1.5	2	29.1
									35	1.5	2	29.3
									*50	1.5	1	29.6
						-Yellow rusted joints @ 28.7' (reddish), 27.3' and 29.6'; 28.5' - 28.6'- quartz vein. -No wall contact at 31.8'	II	R4	60_{MB}	-	-	30
									30_{MB}	-	-	30.5
									55	1.5	2	31.1
						Intercalated dark gray SCHIST and light gray fine fine-medium grained, light gray GRANOFELS, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained			40	4	1	31.3
									0_{MB}	-	-	31.8
35									90	1.5	1	31.9
									0_{MB}	Roller	Bit	32
		C-2 32.0 - 41.3	112	100	96	-Rusty coated joint walls: 34.2' - reddish with Pyrite joint, 36.5' - green with Pyrite joint, 37.9' - reddish joint			$*40_{MB}$	-	-	32.8
									$*55_{MB}$	-	-	33.5
									25	3	1	34.2
									$*40_{MB}$	-	-	35.1
									0	3.0	1	36.2
									*60	1.5	1	36.6
40									45_{MB}	-	-	36.9
									*60	1.5	2	37.3
									60-10	1.5	2	37.9
						Gray SCHIST, slightly weathered, sound, moderate to wide fracture spacing, strong rock, coarse to fine grained Except 43.8' to 45.4", light gray-white PEGMATITE -Garnets 1/8" along the run - Reddish coated joint walls at 42.0', 43.7', 47.2', 48.3'	II	R4	30	1.5	1	39.9
									*60	1.5	1	40.5
									$*60_{MB}$	-	-	40.9
									35_{MB}	-	-	41.3
									*70	1.5	1	41.8
45									40	3	2	42
									40_{MB}	-	-	43.1
		C-3 41.3 - 51.2	119	100	97				90_{MB}	-	-	43.3
									60_{MB}	-	-	43.5
									0	1.5	1.0	43.7
									50_{MB}	-	-	43.8
									0_{MB}	-	-	44.5
									20	1.5	2	45.4
									20	1.5	2	45.5
50									$*50_{MB}$	-	-	46
									$*40_{MB}$	-	-	46.7
						Gray SCHIST, slightly weathered, sound, wide to very wide fracture spacing, strong rock, coarse to fine grained	II	R4	*40	1.5	1.0	47.2
									55	1.5	1.0	48.3
									$*70_{MB}$	-	-	49.1
									$*70_{MB}$	-	-	49.5

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **CD-15**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
55		C-4 51.2 - 61.2	120	100	100	-Garnets 1/8" along the run			0_{MB}	-	-	49.9
									40_{MB}	-	-	50.6
									40	1.5	2	51
									0	1.0	2	51.2
									$*70_{MB}$	-	-	52.2
									0_{MB}	-	-	53.8
									$*60_{MB}$	-	-	54.8
									10_{MB}	-	-	55.2
60									40	1.5	2.0	55.4
									20_{MB}	-	-	55.8
									40_{MB}	-	-	56.4
									$*60_{MB}$	-	-	57.2
									$*60_{MB}$	-	-	57.8
		C-5 61.2 - 71.2	120	100	91	Gray SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained Except 69.8' to 71.2' - light gray-white PEGMATITE -Slight rusty coating and greenish gray discoloration on joints at 70' and 71.2' -Possible micro-shear along foliation from 69' to 70'	II	R4	$*65_{MB}$	-	-	58.6
									$*80_{MB}$	-	-	59.9
									$*70_{MB}$	-	-	60.6
									$*70_{MB}$	-	-	61.2
									65_{MB}	-	-	61.4
65									35_{MB}	-	-	62.2
									$*70_{MB}$	-	-	62.6
									$60\text{-}90_{MB}$	-	-	64
									40_{MB}	-	-	65.5
									*60	1.5	3.0	67
									0	1.5	3.0	67.2
									*65	1.5	3.0	67.4
									0_{MB}	-	-	68.5
70									55_{MB}	-	-	69.7
									35	1.5	2	69.9
		C-6 71.2 - 81.2	120	100	95	Gray SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained, wavy foliation -Garnets 1/8" along the run -Rusted Joints: 71.7' and 71.9' - green stains 77.7' and 77.8' - yellow stains -Possible micro-shears along foliation from 71.2' to 71.7' and from 81' to 81.2' -GRANOFELS from 79.4' to 79.7' and 80.3' to 81'	II	R4	*75	1.5	1.0	70
									30_{MB}	-	-	70.1
									65_{MB}	-	-	70.3
									70	1.5	1.0	71.2
									*50	1.5	1.0	71.7
									*60	1.5	1.0	72.7
75									10_{MB}	-	-	73.5
									$0\text{-}50_{MB}$	-	-	75.4
									*70	1.5	1.0	76.3
									35_{MB}	-	-	76.8
									$*55_{MB}$	-	-	77
									20	1.5	2	77.2
									50	1.5	1.0	77.7
									85	1.5	1.0	77.8
80									50	1.5	2.0	77.9
									40_{MB}	-	-	78.4
						Gray SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained, wavy foliation	II	R4	$*40_{MB}$	-	-	79.9
									$*60_{MB}$	-	-	81.2
									30-40	1.5	1.0	84
85		C-7 81.2 - 90.5	112	100	98				0	1.5	2.0	84.2
									40_{MB}	-	-	84.6
									20_{MB}	-	-	84.9
									$*60_{MB}$	-	-	85.3
									$0\text{-}30_{MB}$	-	-	85.7

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **CD-15**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
90									0	1.5	1.0	88.3
									*65	1.5	1.0	89.3
									45	1.5	1.0	90
						Gray SCHIST, unweathered, sound, very wide fracture spacing, strong rock, coarse to fine grained -PEGMATITE Material from 98.3' to 98.7' congruent to foliation	I	R4	30_{MB}	-	-	90.5
									$*65_{MB}$	-	-	90.9
						-Possible micro-shears at 98.2' to 98.3'			$*65_{MB}$	-	-	93
95		C-8 90.5 - 100.0	114	100	100				$*50_{MB}$	-	-	95.3
									40_{MB}	-	-	95.8
									70_{MB}	-	-	96.3
									40_{MB}	-	-	96.5
									20_{MB}	-	-	98.2
100						Gray SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained (100'-103.8'), except PEGMATITE material from 101.1' to 101.5' congruent with wavy foliation	II	R4	60_{MB}	-	-	100
									0_{MB}	-	-	101.3
									$*50_{MB}$	-	-	101.7
									*40	1.5	1.0	102.5
									*30	1.5	2.0	103.1
		C-9 100.0 - 109.6	115	100	92	Light gray PEGMATITE, unweathered, very wide fracture spacing, sound, very strong, medium to fine grained (103.8'-109.6') -Core barrel jammed from 108.5' to 109.6'. Rock damaged.	I	R5	*30	1.5	1.0	103.4
105									*30	1.5	1.0	103.6
									50	1.5	1.0	103.8
									10_{MB}	-	-	104.8
									30_{MB}	-	-	106.1
110						Light gray-white PEGMATITE, unweathered, very wide fracture spacing, sound, very strong, medium to fine grained (109.6'-112',113.4'-116' and 116.4'-117.1')	I	R5				
						Gray SCHIST, unweathered, sound, wide fracture spacing, strong rock, coarse to fine grained (112'-113.4'), (116'-116.4'), (117.1'-118.8')	I	R4	$*65_{MB}$	-	-	112
		C-10 109.6 - 118.8	110	100	100				0_{MB}	-	-	113.3
									40_{MB}	-	-	113.8
115									60_{MB}	-	-	114.3
									50_{MB}	-	-	116.8
									20_{MB}	-	-	117.9
						Gray SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained. Foliation is + or - 65 degrees along the run.	II	R4	55_{MB}	-	-	118.4
									30_{MB}	-	-	118.8
120									$*60_{MB}$	-	-	119.5
									10_{MB}	-	-	120.2
		C-11 118.8 - 125.0	74	100	100				$*70_{MB}$	-	-	121.4

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

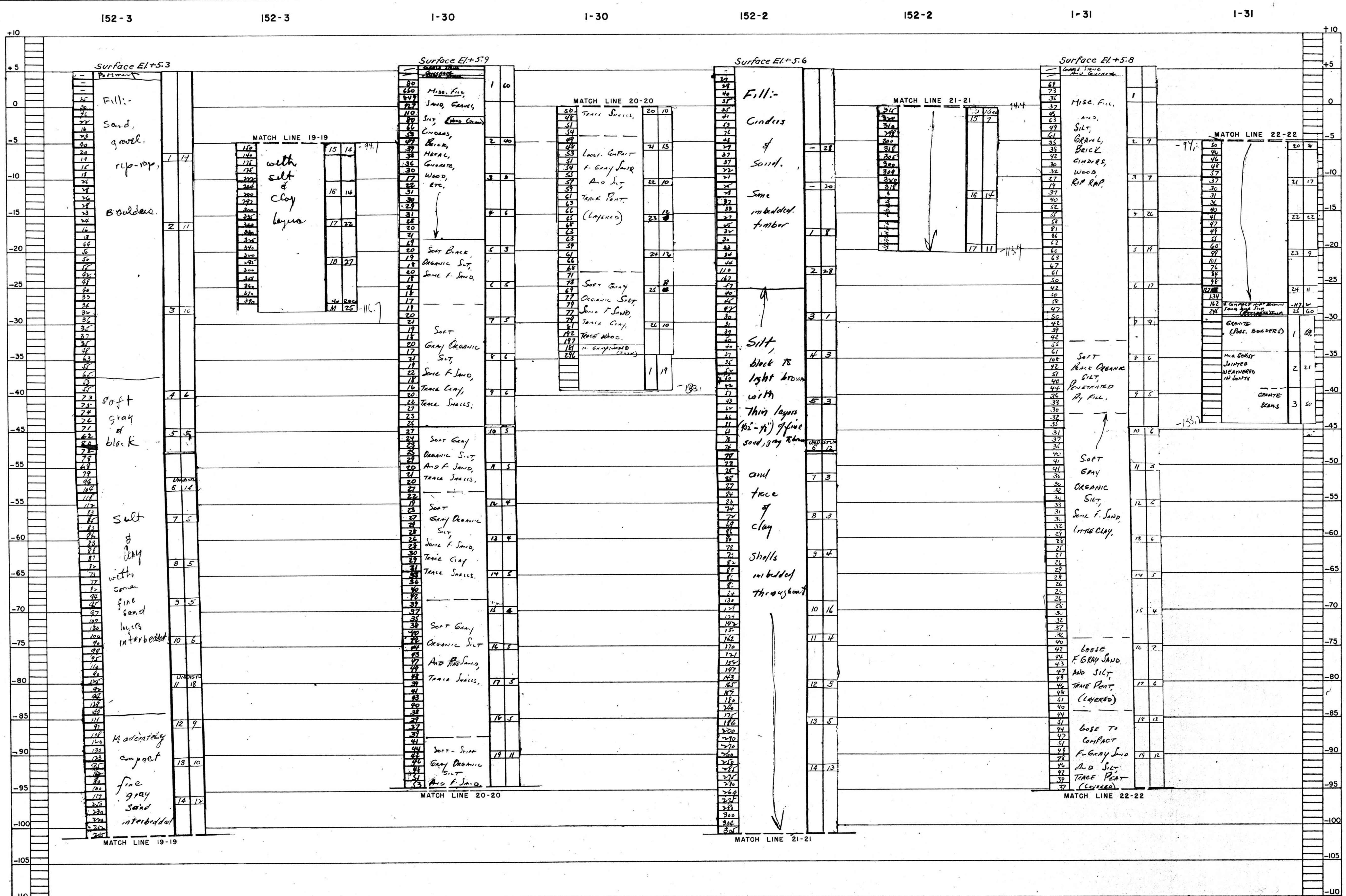
BORING NUMBER: **CD-15**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER: **26553A**

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **M. Blejuwas**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA: ANGLE (deg)	Jr	Ja	DEPTH (feet)
125						E.O.B. at 125'.			20_{MB} $*65_{MB}$ 10_{MB}	- - -	- - -	123.7 124.4 125
130												
135												
140												
145												
150												
155												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06



152-3
152-3
1-30
1-30
152-2
152-2
1-31
1-31
Surface El.+5.3
Fill:- Sand, gravel, rip-rap, Boulders.
Soft gray & black
Silt & clay with some fine sand layers interbedded
Moderately compact fine gray sand interbedded
MATCH LINE 19-19
with silt & clay layers
Surface El.+5.9
Misc. Fill, Sand, Gravel, Silt, Cinders, Brick, Metal, Concrete, Wood, Etc.
Soft Black Organic Silt, Some F. Sand.
Soft Gray Organic Silt, Some F. Sand, Trace Clay, Trace Shells.
Soft Gray Organic Silt And F. Sand, Trace Shells.
Soft Gray Organic Silt, Some F. Sand, Trace Clay, Trace Shells.
Soft Gray Organic Silt And Fine Sand, Trace Shells.
Soft - Stiff Gray Organic Silt And F. Sand.
MATCH LINE 20-20
Trace Shells.
Loose - Compact F. Gray Sand And Silt, Trace Peat. (Layered)
Soft Gray Organic Silt, Some F. Sand, Trace Clay, Trace Wood.
Surface El.+5.6
Fill:- Cinders & Sand.
Some imbedded timber
Silt, black to light brown with thin layers (1/32"-1/8") of fine sand, gray & brown and trace of clay
Shells imbedded throughout
MATCH LINE 21-21
Surface El.+5.8
Misc. Fill, Sand, Silt, Gravel, Brick, Cinders, Wood, Rip Rap.
Soft Black Organic Silt, Penetrated By Fill.
Soft Gray Organic Silt, Some F. Sand, Little Clay.
Loose F. Gray Sand And Silt, Trace Peat, (Layered)
Loose to Compact F. Gray Sand And Silt, Trace Peat (Layered)
MATCH LINE 22-22
Granite (Poss. Boulders)
Mica Schist Jointed Weathered In Laminae
Granite Seams

RECEIVED FROM NYC-DEP AT 96 WORTH STREET RM 338 AUG 8, 2008 (PINDHE)

NO.	DATE	DESCRIPTION	APPR'D.
		REVISIONS	

DR. ____ TR. ____
CK. ____ DES. ____
GROUP LEADER
ENGINEER

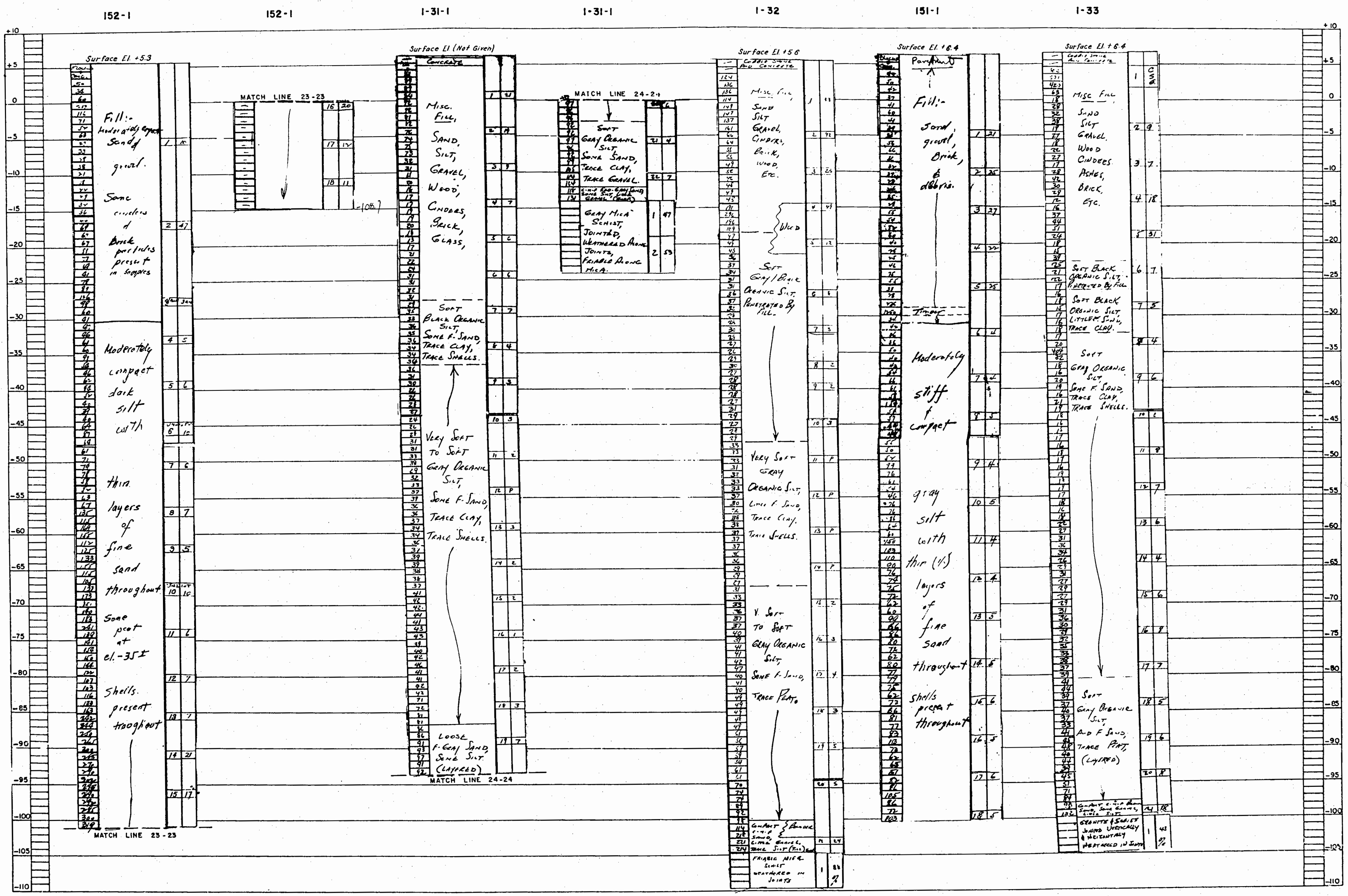
SCALE 1" = 5'

J. Ostrofsky 10/3/68
CHIEF, SUBSURFACE/EXPLORATION SECTION
Byron T. Conrad 10/17/68
CHIEF OF DIVISION

CITY OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ENGINEERING SERVICES
P.W.164 NORTH RIVER WATER POLLUTION CONTROL PROJECT

CONTRACT NO. I
SOUTH BRANCH INTERCEPTING SEWER
BANK ST. TO W. 50TH ST.
BORING LOGS

DATE
393A
SHEET 19 OF 26
27" x 40"



152-1
152-1
1-31-1
1-31-1
1-32
151-1
1-33
Surface El +5.3
Fill:- Moderately compact Sand & gravel. Some cinders & Brick particles present in samples
Moderately compact dark silt with thin layers of fine sand throughout. Some peat at el. -35±. Shells present throughout
MATCH LINE 23-23
MATCH LINE 23-23
Surface El (Not Given)
Concrete
Misc. Fill, Sand, Silt, Gravel, Wood, Cinders, Brick, Glass,
Soft Black Organic Silt, Some F. Sand, Trace Clay, Trace Shells.
Very Soft to Soft Gray Organic Silt, Some F. Sand, Trace Clay, Trace Shells.
Loose F. Gray Sand, Some Silt (Layered)
MATCH LINE 24-24
MATCH LINE 24-24
Soft Gray Organic Silt, Some Sand, Trace Clay, Trace Gravel.
Gray Mica Schist, Jointed, Weathered Along Joints, Friable Along Mica.
Surface El +5.6
Misc. Fill, Sand, Silt, Gravel, Cinders, Brick, Wood, Etc.
Wood
Soft Gray/Black Organic Silt, Penetrated by Fill.
Very Soft Gray Organic Silt, Little F. Sand, Trace Clay, Trace Shells.
V. Soft to Soft Gray Organic Silt, Some F. Sand, Trace Peat.
Friable Mica Schist Weathered in Joints
Surface El. +6.4
Pavement
Fill:- Sand, gravel, Brick, & debris.
Timber
Moderately stiff & compact gray silt with thin (1/2) layers of fine sand throughout. Shells present throughout
Surface El. +6.4
Misc. Fill, Sand, Silt, Gravel, Wood, Cinders, Ashes, Brick, Etc.
Soft Black Organic Silt, Penetrated by Fill.
Soft Black Organic Silt, Little F. Sand, Trace Clay.
Soft Gray Organic Silt, Some F. Sand, Trace Clay, Trace Shells.
Soft Gray Organic Silt, And F. Sand, Trace Peat, (Layered)
Granite & Schist Seamed Vertically & Horizontally Weathered in Joints

NO.	DATE	DESCRIPTION
REVISIONS		APPR'D.

SCALE 1" = 5'-0"

[signature] 10/3/68
CHIEF, SUBSURFACE EXPLORATION SECTION
[signature] 10/17/68
CHIEF OF DIVISION

CITY OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ENGINEERING SERVICES
P.W.164 NORTH RIVER WATER POLLUTION CONTROL PROJECT

CONTRACT NO. 1
SOUTH BRANCH INTERCEPTING SEWER
BANK ST. TO W. 50TH ST.
BORING LOGS

DATE
393A
SHEET 20 OF 26
27" x 40"

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Log of Boring **D-01** Sheet 1 of 3

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4918	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 13.5 feet BPMD	North: 4066	
Drilling Company: Warren George, Inc.	Date Started: 6/19/13	Date Finished: 6/20/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 50 ft	Rock Depth: 35 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 7	Undisturbed --	Core 3
Casing Diameter (in): 3&4"-Inner-Diameter Flush Steel Casing; Casing Depth (ft): 24	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Safety; Weight (lbs): 140; Drop (in): 30	Drilling Foreman: Eddie Cardona		
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel	Inspecting Engineer: Corrie Campbell		
Sampler Hammer: Safety; Weight (lbs): 140; Drop (in): 30			

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+13.5					0					
	+13.0		6-inch thick CONCRETE SLAB			1					
						2					
						3					
						4					
					SPIN	5					
			Brown, medium- to fine-grained, SAND, some silt, trace gravel [FILL] [Class 7]	0.0		6	S-1	SS	5	5 7 6	12
		Class 7				7					
						8					
						9					
			Brown, medium- to fine-grained, silty SAND, trace gravel [FILL] [Class 7]	0.0	SPIN	10	S-2	SS	10	4 2 2 3	4
						11					
						12					
						13					
						14					
			Gray, medium- to fine-grained, SAND, some silt, some gravel [FILL] [Class 7]	0.0		15	S-3	SS	4	9 3 7 11	10
	-3.5					16					
						17					
		Class 6				18					
					SPIN	19					
						20					

Remarks
(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

18' E of W P.L.
66' N of S P.L.

SS= Split Spoon

6/19/13
8:49PM: Begin to drill through concrete slab using 5-7/8" diameter roller bit. Add drilling fluid to tub

Drill to 5'. Rig chatter 0' to 5'. Brown wash.

Take S-1(SS): 5' to 7'

9:30PM
Install 9' of 4" diameter casing: 0' to 9'

Drill to 10'. Smooth drilling. Rig chatter from 9' to 10'. Brown wash

Take S-2(SS): 10' to 12'

Install 5' of casing: 9' to 14'

Drill to 15'. Smooth drilling. Brown wash

Take S-3(SS): 15' to 17'

Brown wash, turned black at 17'. Smooth drilling

Drill to 20'

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Log of Boring **D-01** Sheet 2 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4918
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 13.5 feet BPMD	4066

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 6	Gray, SILT, some sand, trace mica, organic odor [ML] [Class 6]	0.0		20	S-4	SS	24	WOR WOR WOR WOR		Take S-4(SS): 20' to 22'
	-10.0					21						
						22						
						23						
						24						Drill to 25' Smooth drilling. Gray wash
		Class 3	Brown, medium- to fine-grained, SAND, some silt, some gravel, trace mica [SM] [Class 3a]	0.0		25	S-5	SS	6	8 12 21 21	33	Take S-5(SS): 25' to 27'
						26						
						27	S-6	SS	7	4 4 7 12	11	Take S-6(SS): 27' to 29'
	-16.0		Brown, medium- to fine-grained SAND, some decomposed mica schist, trace silt [SP-SM] [Class 3b]			28						
						29						Drill to 30'. Smooth drilling. Brown wash
		Class 1	Gray, decomposed MICA SCHIST, with sand [Class 1d]			30	S-7	SS	2	50/2"	50/2"	Attempt to take S-7(SS): 30' to 32' Refusal at 30'-2" Install casing: 14' to 24'
						31						11:30PM: Drillers stop
						32						
						33						6/20/13 3:20PM: Drill to 35'. Brown wash. Slow drilling. Rig chatter 30' to 35'. Very slow drilling at 35'
						34						
	-21.5				7:00	35	C-1	NX CORE BARREL	REC=56"/60" =93%	RQD=49"/60" =82%		
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet MICA SCHIST, close to moderate fracture spacing, slightly weathered, with fractures dipping approximately 0 degrees and 30 degrees from horizontal [Class 1b] Good quality		4:00	36						3:52PM Begin core C-1: 35' to 40'
					3:00	37						
					5:00	38						4:11PM: Complete C-1
					4:00	39						
		Class 1			2:00	40	C-2	NX CORE BARREL	REC=60"/60" =100%	RQD=31"/60" =52%		
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet MICA SCHIST, close to moderate fracture spacing, moderately weathered, with fractures dipping approximately 45 degrees and 0 degrees from horizontal [Class 1b] Fair quality		2:00	41						4:27PM Begin core C-2: 40' to 45'
					3:00	42						
					3:00	43						4:40PM: Complete C-2
					3:00	44						
	-31.5				3:00	45						

\\LANGAN.COM\DATA\NY\DATA1\170019115\ENGINEERING DATA\GEOTECHNICAL\GINTLOGS\170019115 HUDSON YARDS.GPJ 7/18/2013 10:53:00 AM Report: Log - LANGAN ...Template TEMPLATE.GDT

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Log of Boring **D-01** Sheet 3 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4918
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 13.5 feet BPMD	4066

MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 1	Gray, medium- to fine-grained, feldspar-schistic QUARTZITE, close to moderate fracture spacing, slightly weathered, with fractures dipping approximately 0 degrees and 45 degrees from horizontal [Class 1a] Excellent quality			45–50	C-3	NX CORE BARREL	REC=60"/60" =100%	RQD=58"/60" =97%		4:53PM Begin core C-3: 45' to 50' 5:08pm: Complete C-3 5:15PM to 5:44PM: Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.
	-36.5		End of Boring at 50'			50–70						

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Log of Boring **D-02** Sheet 1 of 3

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4949	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 12.5 feet BPMD	North: 4067	
Drilling Company: Warren George, Inc.	Date Started: 6/20/13	Date Finished: 6/20/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 60 ft	Rock Depth: 44 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 8	Undisturbed --	Core 3
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing; Casing Depth (ft): 19	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Safety; Weight (lbs): 140; Drop (in): 30	Drilling Foreman: Eddie Cardona		
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel	Inspecting Engineer: Corrie Campbell		
Sampler Hammer: Safety; Weight (lbs): 140; Drop (in): 30			

Material Symbol	Elev. (ft)	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+12.5				0						49' E of W P.L. 67' N of S P.L.
	+12.0		6-inch-thick CONCRETE SLAB		1						SS= Split Spoon
					2						6/20/13 6:15PM: Begin drilling through concrete slab
					3						
					4						Drill to 5'
				SPIN	5	S-1	SS	6	3 2 3 2	5	
			Brown, medium- to fine-grained, silty SAND, trace gravel, trace brick, trace wood [FILL] [Class 7]		6						Take S-1(SS): 5' to 7'
					7						6:28PM: Install 9' of 4" diameter casing: 0' to 9'
					8						
		Class 7			9						6:32PM: Drill to 10' Rig chatter 8' to 10' Brown wash
			Brown, medium- to fine-grained, SAND, some wood, some brick, some silt [FILL] [Class 7]		10						6:36PM Take S-2(SS): 10' to 12'
				SPIN	11	S-2	SS	8	3 6 7 4	13	
					12						Install 5' of casing: 9' to 14'
					13						
					14						Drill to 15' Smooth drilling. Brown wash
			Gray, medium- to fine-grained, silty SAND, trace gravel [FILL] [Class 7]		15						Take S-3(SS): 15' to 17'
				SPIN	16	S-3	SS	13	WOR 3 3 2	6	
					17						6:50PM Install 5' of casing: 14' to 19'
	-6.0				18						
		Class 6			19						6:57PM: Drill to 20' Smooth drilling. Gray wash
					20						

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Log of Boring **D-02** Sheet 2 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4949
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 12.5 feet BPMD	4067

Material Symbol	Elev. (ft)	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 6	Gray, sandy SILT [MH] [Class 6]		20	S-4	SS	5	3 2 4 3	6	Take S-4(SS): 20' to 22'
	-11.0				21						
					22						Drill to 25' Smooth drilling. Gray wash. Add drilling fluid to tub
					23						
					24						
			Brown, medium- to fine-grained, silty SAND, trace mica [SM] [Class 3b]		25	S-5	SS	16	4 5 8 8	13	Take S-5(SS): 25' to 27'
					26						
		Class 3			27						
					28						
					29						Drill to 30' Smooth drilling. Brown wash
			Brown, medium- to fine-grained, silty SAND, trace mica [SM] [Class 3b]		30	S-6	SS	1	4 4 7 12	11	Take S-6(SS): 30' to 32'
	-21.0				31						
					32						
					33						
					34						7:15PM: Drill to 35' Rig chatter 33' to 35'
			Brown, sandy decomposed MICA SCHIST, some silt [Class 1d]		35	S-7	SS	4	12 36 41 37	77	Take S-7(SS): 35' to 37'
					36						
		Class 1			37						8:25PM: Drill to 40' Slow drilling. Resistance 37' to 38'. Brown wash. Smooth drilling at 40'
					38						
					39						
			Brown, decomposed MICA SCHIST with sand, trace silt [Class 1d]		40	S-8	SS	3	49 50/2"	50/2"	Take S-8(SS): 40' to 40.7' Refusal at 40.7'
					41						
					42						
					43						Drill to 44'. Resistance at 44'
	-31.5	Class 1		4:00	44	C-1					
					45						

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Log of Boring **D-02** Sheet 3 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4949
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 12.5 feet BPMD	4067

Material Symbol	Elev. (ft)	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Gray, medium- to fine-grained, quartz- feldspar-muscovite- biotite- garnet MICA SCHIST, close to moderate fracture spacing, moderately to slightly weathered, with fractures dipping approximately 0 degrees and 50 degrees from horizontal [Class 1b] Fair quality	3:00 5:00 3:00 3:00	45 46 47 48 49	C-1	NX CORE BARREL	REC=53"/60" =88%	RQD=41"/60" =68%		8:59PM Begin core C-1: 44' to 49' 9:17PM: Complete C-1
		Class 1	Gray, medium- to fine-grained, quartz- feldspar-muscovite- biotite- garnet MICA SCHIST, extremely close to moderate fracture spacing, slightly to moderately weathered, with fractures dipping approximately 50 degrees from horizontal [Class 1b] Fair quality	3:00 3:00 6:00 5:00 4:00	50 51 52 53 54	C-2	NX CORE BARREL	REC=59"/60" =98%	RQD=32"/60" =53%		9:32PM Begin core C-2: 49' to 54' 9:53PM: Complete C-2
			Gray, medium- to-fine grained, quartz- feldspar-muscovite- biotite- garnet MICA SCHIST, very close to moderate fracture spacing, moderately weathered to unweathered, with fractures dipping approximately 0 degrees from horizontal [Class 1a] Good quality	3:00 4:00 5:00 4:00 4:00	55 56 57 58 59	C-3	NX CORE BARREL	REC=60"/60" =100%	RQD=51"/60" =85%		10:12PM Begin core C-3: 54' to 59' 10:32PM: Complete C-3
	-47.5		End of boring at 60'		60 61 62 63 64 65 66 67 68 69 70	C-4	NX CORE BARREL	100%	67%		Some of core stuck in hole. Retrieve until 11:15PM. Core additional 1' in process REC=12"/12" =100% RQD=8"/12" =67% 11:15PM to 11:45PM Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.

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Log of Boring **D-03** Sheet 1 of 3

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4972	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 6.5 feet BPMD	North: 4068	
Drilling Company: Warren George, Inc.	Date Started: 6/28/13	Date Finished: 7/1/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 46.2 ft	Rock Depth: 32 ft	
Size and Type of Bit: 3-7/8" & 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 6	Undisturbed --	Core 3
Casing Diameter (in): 3&4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 32	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Safety	Weight (lbs): 140	Drop (in): 30	Drilling Foreman: Gil Burgess/ Sal Lorenzo
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+6.5					0						72' E of W P.L. 68' N of S P.L. SS= Split Spoon
	+5.5		1-foot-thick GRAVEL			1						
					PUSH	2						
						3						
						4						
			Brown, medium- to fine-grained, SAND, some gravel, trace silt (moist) [FILL] [Class 7]	0.0	SPIN	5	S-1	SS	7	5 8 13 5	21	10:32PM Take S-1(SS): 5' to 7'
						6						
		Class 7			28	7						10:40PM Install 9' of casing: 0' to 9'
						8						10:53PM: Drill to 10' Add drilling fluid to tub Brown wash Smooth drilling
						9						
			Brown, medium- to fine-grained, SAND, with silt (wet) [FILL] [Class 7]	0.0	PUSH	10	S-2	SS	4	1 1 1 1	2	10:59PM Take S-2(SS): 10' to 12'
						11						
						12						11:03PM: Drill to 15' Smooth drilling Brown wash
						13						
						14						
	-8.5					15						11:07PM Take S-3(SS): 15' to 17'
			Gray, medium- to fine-grained, silty SAND, trace mica (moist) [SM] [Class 6]		PUSH	16	S-3	SS	20	1 4 2 3	6	
		Class 6				17						11:10PM: Drill to 20' Smooth drilling Gray wash
						18						11:30PM: End of 6/28
	-12.0					19						7/1/13 4:02PM: Redrill to 20' Smooth drilling. Brown wash. Wash turns gray at 15'
		Class 3				20						

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Log of Boring **D-03** Sheet 2 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4972
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 6.5 feet BPMD	4068

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Brown, medium- to fine-grained, SAND with silt, trace mica (wet) [SM] [Class 3b]			20						
						21	S-4	SS	7	7 7 11 12	18	4:12PM Take S-4(SS): 20' to 22'
					PUSH	22						4:20PM: Drill to 25' Brown wash Smooth drilling
						23						
						24						
		Class 3	Brown, medium- to fine-grained, SAND, some gravel, trace decomposed rock, some silt (wet) [SM] [Class 3a]		43	25	S-5	SS	0	15 18 20 20	38	4:27PM Take S-5(SS): 25' to 27' No recovery
						26						4:37PM Install 5' of casing: 9' to 14' 4:45PM Install 5' of casing: 14' to 19' 4:51PM: Redrill to 25' 5:03PM: Retake S-5(SS)- Try to get recovery 5:07PM: Drill to 30' Rig chatter. Slow drilling
						27						
						28						
						29						
					82	30	S-6	SS	6	22 17 50/1"	50/1"	5:21PM Take S-6(SS): 30' to 32' Refusal at 32'
						31						Attempt to drill to 35' Resistance at 32'
	-25.5					32						5:47PM: Install 32' of 3" diameter casing: 0' to 32'
					4:00	33						Redrill to 32'
			Gray, medium- to fine-grained, feldspar-muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, slightly weathered to unweathered, with fractures dipping approximately 50 degrees from horizontal [Class 1a] Excellent quality		3:00	34	C-1	NX CORE BARREL	REC=48"/50" =95%	RQD=45"/50" =89%		6:28PM Begin core C-1: 32' to 37'
					5:00	35						
					3:00	36						6:47PM Complete core at 36'-2" Clog in barrel
					4:00	37						
		Class 1	Gray, medium- to fine-grained, feldspar-muscovite- biotite- garnet SCHIST, with quartz intrusions, long fracture spacing, unweathered, with fractures dipping approximately 20 degrees from horizontal [Class 1a] Excellent quality		4:00	38	C-2	NX CORE BARREL	REC=60"/60" =100%	RQD=60"/60" =100%		7:07PM Begin core C-2: 36.2' to 41.2'
					3:00	39						7:25PM: Complete C-2
					3:00	40						
					4:00	41						
					5:00	42						
			Gray, medium- to fine-grained, feldspar-muscovite- biotite- garnet SCHIST, long fracture spacing, unweathered, with fractures dipping approximately 20 degrees from horizontal [Class 1a] Excellent quality		4:00	43	C-3	NX CORE BARREL	REC=60"/60" =100%	RQD=60"/60" =100%		8:00PM Begin C-3: 41.2' to 46.2'
					4:00	44						8:25PM: Complete C-3
					7:00	45						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **D-03** Sheet 3 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4972
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 6.5 feet BPMD	4068

MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-39.7	Class 1	End of boring at 46.2'		5:00	45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70	C-3					8:45PM to 9:40PM Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.

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Log of Boring **D-05** Sheet 1 of 3

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4914	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 9.5 feet BPMD	North: 4090	
Drilling Company: Warren George, Inc.	Date Started: 6/21/13	Date Finished: 6/27/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 66 ft	Rock Depth: 46 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 7	Undisturbed --	Core 5
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 29	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Safety	Weight (lbs): 140	Drop (in): 30	Drilling Foreman: Eddie Cardona/ Gil Burgess
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+9.5											14' E of W P.L. 90' N of S P.L. SS= Split Spoon
	+9.0		6-inch-thick CONCRETE SLAB			0						6/21/13 4:00PM: Drillers arrive 4:20PM: Drill through concrete slab using 5-7/8" diameter drill bit
						1						
						2						
						3						
					SPIN	4						4:33PM: Drill to 5' Rig chatter 0.5' to 5' Slow drilling
						5						
			Brown, medium- to fine-grained, SAND and WOOD, some silt [FILL] [Class 7]	0.0		6	S-1	SS	10	9 2 4 3	6	5:00PM Take S-1(SS): 5' to 7'
						7						5:05PM Install 9' of casing: 0' to 9'
						8						
		Class 7				9						5:27PM: Drill to 10' Brown wash
						10						
			Brown, medium- to fine-grained SAND with gravel, trace silt [FILL] [Class 7]	0.0	SPIN	11	S-2	SS	1	2 0 4 5	4	Take S-2(SS): 10' to 12'
						12						Install 5' of casing: 9' to 14'
						13						Drill to 15' Smooth drilling Brown wash
						14						
						15						Take S-3(SS): 15' to 17'
			Gray, medium- to fine-grained, SAND, trace silt, trace gravel [FILL] [Class 7]	0.0	SPIN	16	S-3	SS	1	1 2 2 1	4	Little recovery Push spoon again from 15' to 17' to try to get enough for environmental sample
	-8.5					17						
						18						Install 5' of casing: 14' to 19'
		Class 6				19						Drill to 20' Smooth drilling Brown to black wash at 18'
						20						

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Log of Boring **D-05** Sheet 2 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4914
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 9.5 feet BPMD	4090

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 6	Black, organic SILT, trace gravel [OH] [Class 6]	0.1	SPIN	20–22	S-4	SS	9	2 2 2 3	4	Take S-4(SS): 20' to 22' Install 5' of casing: 19' to 24'
	-14.0											Drill to 25' Brown wash Smooth drilling
		Class 6	Brown, medium- to fine-grained, silty SAND, trace gravel [SM] [Class 6]	0.0	SPIN	25–27	S-5	SS	16	3 4 4 6	8	Take S-5(SS): 25' to 27' Install 5' of casing: 24' to 29'
	-19.0											6:20PM to 7:00PM Drillers take lunch Drill to 30' Brown wash Smooth drilling
		Class 3	Brown, medium- to fine-grained, SAND with silt, trace mica [SM] [Class 3b]	0.0		30–32	S-6	SS	20	5 7 12 22	19	Take S-6(SS): 30' to 32'
	-24.0											
			Gray, decomposed MICA SCHIST, some sand [Class 1d]			35–36	S-7	SS	8	35 50/3"	50/3"	Take S-7(SS): 35' to 37' Refusal at 35'-8"
		Class 1				37–39						Drill to 40' Some rig chatter Brown wash Resistance at 40'
			Gray, medium- to fine-grained, quartz-muscovite- biotite SCHIST, extremely close to moderate fracture spacing, slightly to moderately weathered, with fractures dipping approximately 0 degrees to 45 degrees from horizontal [Class 1d] Very poor quality		10:00 9:00 7:00 6:00 12:00	40–45	C-1	NX CORE BARREL	REC=29"/72" =40% RQD=8"/72" =11%			8:01PM Begin core C-1: 40' to 46' 8:27PM: Stop drilling- clog Still in weathered rock Drill to 43' 9:11PM: Complete C-1

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Log of Boring **D-05** Sheet 3 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4914
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 9.5 feet BPMD	4090

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-36.5	Class 1			14:00	45	C-1					
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, slightly weathered [Class 1b] Fair quality		4:00	46	C-2	NX CORE BARREL	REC=60"/60" =100%	RQD=37"/60" =62%	9:27PM Begin core C-2: 46' to 51'
	-38.3				3:00	47						
		Class 1	Light gray to pink, medium- to fine-grained, PEGMATITE, extremely close to close fracture spacing, slightly weathered, with fractures dipping approximately 0 degrees from horizontal [Class 1b] Fair quality		4:00	48						9:54PM: Complete C-2
					10:00	49						
					11:00	50						
		Class 1	Light gray to pink, PEGMATITE, close fracture spacing, slightly weathered, with fractures dipping approximately 0 degrees from horizontal [Class 1b] Fair quality		5:00	51	C-3	NX CORE BARREL	REC=59"/60" =98%	RQD=31"/60" =52%	Begin core C-3: 51' to 56'
	-43.5				7:00	52						
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, extremely close to moderate fracture spacing, moderately to slightly weathered, with fractures dipping approximately 0 degrees from horizontal [Class 1b] Fair quality		4:00	53						10:36PM: Complete C-3
					5:00	54						
					5:00	55						
	-46.5				10:00	56	C-4	NX CORE BARREL	REC=60"/60" =100%	RQD=8"/60" =13%	11:00PM Begin core C-4: 56' to 61'	
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, extremely close to close fracture spacing, slightly to highly weathered, with fractures dipping approximately 0 degrees and 40 degrees from horizontal [Class 1d] Very poor quality		4:00	57						11:26PM: Complete C-4
					4:00	58						11:45PM to 12:10AM Drillers transfer rig to LIRR railyard side
					4:00	59						
					4:00	60						12:15AM: End of 6/21
	-51.5				4:00	61						6/27/13 3:30PM: Driller arrive on site 4:40PM to 5:15PM Set up boring D-5 5:18PM: Redrill to 61'
		Class 1	Gray, medium- to fine-grained, quartz-muscovite- biotite- garnet SCHIST, intrusions of quartz and granulite, close to moderate fracture spacing, slightly weathered to unweathered, with fractures dipping approximately 45 degrees from horizontal [Class 1a] Excellent quality		6:00	62	C-5	NX CORE BARREL	REC=56"/60" =93%	RQD=54"/60" =90%	6:15PM Begin core C-5: 61' to 66'
					5:00	63						
					8:00	64						6:45PM: Complete C-5
					7:00	65						
	-56.5		End of boring at 66'			66						7:00PM to 8:15PM Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.
						67						
						68						
						69						
						70						

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Log of Boring **D-06** Sheet 1 of 3

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4930	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 10 feet BPMD	North: 4095	
Drilling Company: Warren George, Inc.	Date Started: 6/17/13	Date Finished: 6/19/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 54.5 ft	Rock Depth: 38 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 7	Undisturbed --	Core 3
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 38	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: None	Weight (lbs): --	Drop (in): --	Drilling Foreman: Eddie Cardona
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+10.0					0					
						1					
						2					
						3					
					SPIN	4					
			Brown, coarse- to fine-grained, SAND with silt, trace gravel [FILL] [Class 7]	0.0		5	S-1	SS	10	4 3 2 2	5
						6					
						7					
		Class 7				8					
						9					
			Black, coarse- to fine-grained, SAND with silt, strong petroleum odor [FILL] [Class 7]	62.1		10	S-2	SS	6	1 5 10 8	15
				44.3	SPIN	11					
						12					
						13					
						14					
			Brown medium- to fine-grained SAND with silt, some gravel, trace brick [FILL] [Class 7]	1.0	SPIN	15	S-3	SS	13	2 8 9 4	17
						16					
						17					
						18					
	-8.5					19					
		Class 6				20					

Remarks
(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

30' E of W P.L.
95' N of S P.L.

SS= Split Spoon

6/17/13
10:29PM to 10:47PM
Drill through 6" thick concrete slab using 5-7/8" diameter drill bit

Drill to 5'
Rig chatter. Slow drilling.
Brown wash
10:54PM
Take S-1(SS): 5' to 7'

11:01PM: Install 9' of 4" diameter casing: 0' to 9'

11:13PM: Drill to 10'

Take S-2(SS): 10' to 12'
Strong petroleum odor

Drill to 15'
Black/brown wash
Rig chatter 12' to 15'
Slow drilling
11:30PM: Drilling stops

6/18/13
3:35PM
Take S-3(SS): 15' to 17'

Install 5' of casing: 9' to 14'
Install 5' of casing: 14' to 19'

3:54PM: Drill to 20'
Smooth drilling. Gray wash

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Log of Boring **D-06** Sheet 2 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4930
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 10 feet BPMD	4095

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 6	Gray, sandy SILT, trace gravel, trace mica [ML] [Class 6]	3.0		20–21	S-4	SS	14	1 1 2 3	3	Take S-4(SS): 20' to 22'
	-13.0				SPIN	22–24						Drill to 25' Smooth drilling. Gray wash turns brown at 23'
						25–26	S-5	SS	0	7 7 10 8	17	Take S-5(SS): 25' to 27' No recovery
		Class 3	Brown, silty SAND, some gravel [SM] [Class 3a]	1.0	SPIN	26–29						Drill to 30' Smooth drilling. Rig chatter 28' to 30'. Brown wash.
						29–31	S-6	SS	4	7 16 26 8	42	Take S-6(SS): 30' to 32'
			Brown, medium- to fine-grained, silty SAND, some gravel [SM] [Class 3a]	0.7	129	31–36	S-7	SS	5	47 50/5"	50/5"	Drll to 35' Rig chatter 32' to 35' Brown wash. Take S-7(SS): 35' to 36' Refusal at 36' Drill to 38' Rig chatter. Resistance at 38' 5:45PM: Drillers leave because of rain
	-28.0					36–38						
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, slightly weathered, with fractures dipping approximately 45 degrees from horizontal [Class 1a] Excellent quality		12:00 6:00 4:00 6:00 5:00 4:00	38–45	C-1 NX CORE BARREL		REC=60"/60" =100%	RQD=57"/60" =95%		6/19/2013 3:35PM: Install 38' of 3" diameter casing: 0' to 38' 3:54PM: Redrill to 38.5' with tricone roller bit. Add drilling fluid to tub 4:21PM Begin core C-1: 38.5' to 43.5' 4:54PM: Complete C-1
							C-2					

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Log of Boring **D-06** Sheet 3 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4930
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 10 feet BPMD	4095

MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, quartz intrusions, close to moderate fracture spacing, slightly weathered, fractures dipping approximately 50 degrees from horizontal [Class 1a] Excellent quality		5:00 4:00 4:00 5:00	45 46 47 48	C-2	NX CORE BARREL	REC=60"/60" =100%	RQD=59"/60" =98%		5:14PM: Begin core C-2: 43.5' to 48.5' 5:36PM: Complete C-2
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, quartz intrusions, close to moderate fracture spacing, slightly weathered, fractures dipping approximately 45 degrees from horizontal [Class 1b] Good quality		4:00 3:00 3:00 4:00 5:00 6:00	49 50 51 52 53 54	C-3	NX CORE BARREL	REC=72"/72" =100%	RQD=58"/72" =81%		6:01PM Begin core C-3: 48.5' to 53.5' 8:18PM: Complete C-3 Started losing water at 51' 6:37PM: Only 30" in core barrel, attempt to retrieve remaining core 7:07PM: Unsuccessful at retrieving rock 7:14PM: Drill additional 1' to try to retrieve core
	-44.5		End of Boring at 54.5'			55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70						8:10PM: Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.

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Log of Boring **D-07** Sheet 1 of 3

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4949	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 12 feet BPMD	North: 4092	
Drilling Company: Warren George, Inc.	Date Started: 7/5/13	Date Finished: 7/5/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 51 ft	Rock Depth: 36 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 7	Undisturbed --	Core 3
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 19	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Safety	Weight (lbs): 140	Drop (in): 30	Drilling Foreman: Sal Lorenzo
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Jason Hertz
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+12.0				0						49' E of W P.L. 93' N of S P.L. SS= Split Spoon
					1						
				SPIN	2						8:15AM: Set up boring Add water/ drilling fluid to tub Start drilling to 5'
					3						
					4						
			Brown, medium- to fine-grained, SAND, some silt, trace fine-grained gravel, trace brick [FILL] [Class 7]		5	S-1	SS	4	32 100/2"	100/2"	Take S-1(SS): 5' to 7' Refusal at 5.67'
		Class 7			6						Install casing to 4'
				SPIN	7						
					8						Drill to 10' Brown wash Slight chatter 8' to 9'
					9						
			Brown, medium- to fine-grained, SAND, some silt, trace fine-grained gravel, trace brick [FILL] [Class 7]		10	S-2	SS	3	27 50/4"	50/4"	Take S-2(SS): 10' to 12' Refusal at 10.83'
					11						Install casing to 9'
	-1.0				12						
					13						Drill to 15' Brown wash Slight chatter 11' to 12' Smooth drilling at 13'
				SPIN	14						
			Gray to black, medium- to fine-grained, organic silty SAND, trace gravel, trace shells [SM/ML] [Class 6]		15	S-3	SS	13	1 2 2 5	4	Take S-3(SS): 15' to 17'
		Class 6			16						
					17						Install casing to 19'
	-6.5				18						Drill to 20' Smooth drilling to 20'
		Class 3			19						
					20						

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Log of Boring **D-07** Sheet 2 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4949
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 12 feet BPMD	4092

Material Symbol	Elev. (ft)	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Gray to black, medium- to fine-grained, organic silty SAND, trace shells [SM] [Class 3b]		20	S-4	SS	12	3, 4, 18, 10	22	Take S-4(SS): 20' to 22'
					21						
					22						Drill to 20'
					23						Medium to hard drilling at 25'
					24						Gray wash turns brown at 24'
			Red to brown, medium- to fine-grained, silty SAND, trace fine-grained gravel, trace mica [SM] [Class 3a]		25	S-5	SS	14	5, 7, 34, 17	41	Take S-5(SS): 25' to 27'
					26						
		Class 3			27						Drill to 25'
					28						Brown wash
					29						
			Red to brown, medium- to fine-grained, silty SAND, trace fine-grained gravel, trace mica [SM] [Class 3a]		30	S-6	SS	13	13, 16, 18, 17	34	Take S-6(SS): 30' to 32'
					31						
					32						Drill to 35'
					33						Brown wash
					34						
	-23.0				35	S-7	SS	1	100/2"	100/2"	Take S-7(SS): 35' to 37'
	-24.0	Class 1	Decomposed MICA SCHIST [Class 1d]								Refusal
				3:00	36						
			Gray, medium- to fine-grained, quartz- feldspar-muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, slightly weathered, with fractures dipping close to horizontal to approximately 40 degrees from horizontal [Class 1a] Excellent quality	4:00	37	C-1	NX CORE BARREL	REC=60"/60" =100%	RQD=56"/60" =93%		12:25PM
				3:00	38						Begin core C-1: 36' to 41'
				4:00	39						
		Class 1		5:00	40						
				3:00	41						
			Gray, medium- to fine-grained, quartz- feldspar-muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, slightly weathered, with fractures dipping close to horizontal to approximately 40 degrees from horizontal [Class 1a] Excellent quality	4:00	42	C-2	NX CORE BARREL	REC=60"/60" =100%	RQD=54"/60" =90%		1:20PM
				4:00	43						Begin C-2: 41' to 46'
				4:00	44						
				4:00	45						

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Log of Boring **D-07** Sheet 3 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4949
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 12 feet BPMD	4092

MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				3:00	45	C-2					
				4:00	46	C-3	NX CORE BARREL	REC=60"/60" =100%	RQD=50"/60" =83%		1:55PM Begin core C-3: 46' to 51'
		Class 1	Gray, medium- to fine-grained, quartz- feldspar-muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, slightly weathered, with fractures dipping close to horizontal to approximately 40 degrees from horizontal [Class 1b] Good quality	5:00	47						
				4:00	48						
				3:00	49						
				3:00	50						
	-39.0		End of boring at 51'		51						Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.
					52						
					53						
					54						
					55						
					56						
					57						
					58						
					59						
					60						
					61						
					62						
					63						
					64						
					65						
					66						
					67						
					68						
					69						
					70						

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Log of Boring **D-08** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4967	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 6.5 feet BPMD	North: 4092	
Drilling Company: Warren George, Inc.	Date Started: 7/3/13	Date Finished: 7/3/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 40.5 ft	Rock Depth: 25.5 ft	
Size and Type of Bit: 3-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 6	Undisturbed --	Core 3
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 20	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Donut	Weight (lbs): 300	Drop (in): 30	Drilling Foreman: Sal Lorenzo
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Michael Zonin
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)
	+6.5				0					
	+5.5		1-foot-thick GRAVEL		1					
				PUSH	2					
					3					
					4					
					5	S-1	SS	3	3 3 5 3	8
		Class 7	Brown to tan to black, coarse- to fine-grained SAND and medium- to fine-grained GRAVEL, some brick, some asphalt, cobble and coarse-grained gravel in tip (wet) [FILL] [Class 7]	SPIN	6					
					7					
					8					
					9					
					10					
			Gray, medium- to fine-grained, SAND, some silt, trace gravel, trace brick (wet) [FILL] [Class 7]		11	S-2	SS	16	3 5 3 4	8
				PUSH	12					
	-7.0				13					
					14					
					15					
		Class 6	Black to dark gray, medium- to fine-grained, SAND, some silty clay, some shell fragments (wet) [SM] [Class 6]		16	S-3	SS	16	2 2 5 7	7
				300 lb Hammer	17					
	-12.0				18					
		Class 3			19					
					20					

Remarks
(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

__ E of W P.L.
__ N of S P.L.
SS= Split Spoon

7/3/13
5:10PM: Set up rig

5:12PM: Drill to 5' using 3-7/8" tricone roller bit
Black wash: 1' to 3'
Red/brown/tan wash 3' to 5'
Light chatter

5:15PM
Take S-1(SS): 5' to 7'

5:20PM
Push 4" casing to 5'
Spin casing to 9'

5:30PM to 6:15PM
Stop drilling because of rain

6:20PM: Drill to 10'

6:25PM
Take S-2(SS): 10' to 12'

6:35PM: Spin 4" casing

6:40PM: Drill to 15'
Smooth drilling. Brown wash

6:55PM
Take S-3(SS): 15' to 17'

7:15PM: Use 300 lb hammer to advance casing to 20'

7:30PM to 8:00PM: Break

8:15PM: Clean out casing
Gray wash

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Log of Boring **D-08** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4967
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 6.5 feet BPMD	4092

Material Symbol	Elev. (ft)	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Red to brown, fine-grained, SAND, some silt (wet) [SM] [Class 3b]		20						
					21	S-4	SS	14	5 8 10 10	18	8:25PM Take S-4(SS): 20' to 22'
		Class 3	Red to brown, fine-grained, SAND, some silt (wet) [SM] [Class 3a]		22						8:35PM Take S-5(SS): 22' to 24'
					23	S-5	SS	10	12 14 18 35	32	8:50PM: Drill to 25' Red/brown to gray wash Light chatter 23' to 25'
	-18.5				24						
	-19.0	Class 1	Decomposed MICA SCHIST		25	S-6	SS	2	50/5"	50/5"	9:00PM Take S-6(SS): 25' to 27' Refusal at 25'5"
			Gray, medium- to fine-grained, feldspar-muscovite- biotite SCHIST, close to moderate fracture spacing, moderately weathered, with fractures dipping approximately 0 to 45 degrees from horizontal [Class 1b] Good quality	2:00	26	C-1 NX CORE BARREL		REC=47"/60" =78%	RQD=47"/60" =78%		9:05PM: Drill to 25.5'
				4:00	27						9:10PM Begin core C-1: 25.5' to 30.5'
				4:00	28						9:27PM: Complete C-1
				3:00	29						
				4:00	30						
				4:00	31	C-2 NX CORE BARREL		REC=57"/60" =95%	RQD=53"/60" =88%		9:37PM Begin core C-2: 30.5' to 35.5'
		Class 1	Gray, coarse- to fine-grained, feldspar-muscovite- biotite SCHIST, moderate fracture spacing, slightly weathered, with fractures dipping approximately 0 to 70 degrees from horizontal [Class 1a] Good quality	6:00	32						
				7:00	33						9:50PM: Complete C-2
				7:00	34						
				8:00	35						
				9:00	36	C-3 NX CORE BARREL		REC=60"/60" =100%	RQD=53"/60" =88%		10:05PM Begin core C-3: 35.5' to 40.5'
			Gray, coarse- to fine-grained, feldspar-muscovite- biotite SCHIST, moderate fracture spacing, slightly weathered, with fractures dipping approximately 70 degrees from horizontal [Class 1a] Good quality	8:00	37						
				7:00	38						10:37PM: Complete C-3
				9:00	39						
				9:00	40						
	-34.0		End of boring at 40.5'		41						
					42						
					43						
					44						
					45						

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Log of Boring **D-10** Sheet 1 of 3

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4914	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 8 feet BPMD	North: 4113	
Drilling Company: Warren George, Inc.	Date Started: 6/27/13	Date Finished: 6/28/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 55 ft	Rock Depth: 35 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 6	Undisturbed --	Core 4
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 14	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Donut	Weight (lbs): 300	Drop (in): 30	Drilling Foreman: Gil Burgess
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casing blws/ ft	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+8.0					0					10 20 30 40	14' E of W P.L. 113' N of S P.L. SS= Split Spoon
	+7.3		8-inch-thick CONCRETE SLAB			1						6/27/13 8:33PM to 8:49PM Drill through concrete slab using 5-7/8" roller bit 8:55PM: Drill to 5' Smooth drilling. Brown wash 9:15PM: End of 6/27/13 because of rain
					PUSH	2						
						3						
						4						
		Class 7				5				10		
			Gray, medium- to fine-grained, SAND, some silt, trace brick, trace gravel, trace mica (moist) [FILL] [Class 7]	0.0	63	6	S-1	SS	13	6 5	11	6/28/13 3:15PM Take S-1(SS): 5' to 7'
						7						3:26PM Install 9' of casing: 0' to 9' Have to pound on cap of casing
	-0.5					8						
					PUSH	9						4:02PM: Drill to 10' Brown wash Rig chatter 7' to 8' Add drilling fluid to tub
			Black, organic SILT with sand, some wood (wet) [OL] [Class 6]			10				1		4:08PM Take S-2(SS): 10' to 12'
						11	S-2	SS	20	1 1	2	
					38	12				1 2		4:16PM: Drill to 15' Smooth drilling Gray wash
						13						
		Class 6				14						
			Black, organic SILT with sand, trace mica (wet) [OL] [Class 6]			15				5		4:22PM Take S-3(SS): 15' to 17'
						16	S-3	SS	9	6 2	8	
						17				2		4:26PM: Install 5' of casing from 9' to 14'
						18						4:36PM: Drill to 20' Smooth drilling. Gray wash
						19						
						20						

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Log of Boring **D-10** Sheet 2 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4914
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 8 feet BPMD	4113

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 6	Black, organic SILT with sand, trace brick, trace gravel, trace shells (wet) [OL] [Class 6]			20	S-4	SS	15	1 2 3 14	5	4:46PM Take S-4(SS): 20' to 22'
	-15.5					21						
						22						4:52PM: Drill to 25' Smooth drilling Gray wash
						23						
						24						
			Brown, fine-grained, SAND with silt, trace mica (wet) [SM] [Class 3b]			25	S-5	SS	12	6 9 10 12	19	5:01PM Take S-5(SS): 25' to 27'
						26						
						27						5:08PM: Drill to 30' Rig chatter Slow drilling at 29' Brown wash
		Class 3				28						
						29						
			Brown, medium- to fine-grained, SAND, some silt, trace mica (wet) [SM] [Class 3b]			30	S-6	SS	4	13 13 16 20	29	5:14PM Take S-6(SS): 30' to 32'
						31						
						32						5:19PM: Drill to 35' Slow drilling 33' to 35' Brown wash Encounter rock at 35'
						33						
						34						
	-27.0					35	C-1	NX CORE BARREL	REC=48"/60" =80%	RQD=47"/60" =78%		5:46PM Begin core C-1: 35' to 40'
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, intrusions of quartzite, very close to moderate fracture spacing, unweathered to slightly weathered, with fractures dipping approximately 45 degrees from horizontal [Class 1b] Good quality			36						
						37						6:05PM: Complete core C-1
						38						
						39						
	-32.0					40	C-2	NX CORE BARREL	REC=48"/60" =80%	RQD=20"/60" =33%		6:21PM Begin core C-2: 40' to 45'
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, extremely close to close fracture spacing, moderately to slightly weathered, with fractures dipping approximately 45 degrees from horizontal [Class 1d] Poor quality			41						
						42						6:41PM: Complete C-2
						43						6:50 to 7:10PM Change lift on rock core
						44						7:32PM to 7:47PM Collect remainder of C-2 stuck in hole
	-37.0					45						

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Log of Boring **D-10** Sheet 3 of 3

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4914
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 8 feet BPMD	4113

MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, slightly weathered to unweathered, with fractures dipping approximately 60 degrees from horizontal [Class 1b] Good quality			45–50	C-3	NX CORE BARREL	REC=54"/60" =90%	RQD=46"/60" =77%		7:59PM Begin core C-3: 45' to 50' 8:20PM: Complete C-3
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, close to wide fracture spacing, unweathered, with fractures dipping approximately 60 degrees from horizontal [Class 1a] Excellent quality			50–55	C-4	NX CORE BARREL	REC=58"/60" =97%	RQD=54"/60" =90%		8:43PM Begin core C-4: 50' to 55' 9:06PM: Complete C-4
	-47.0		End of boring at 55'			55						9:20PM to 10:25PM Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.
						56–70						

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Log of Boring **D-11** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4932	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 9 feet BPMD	North: 4119	
Drilling Company: Warren George, Inc.	Date Started: 6/17/13	Date Finished: 6/17/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 38 ft	Rock Depth: 23 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 4	Undisturbed --	Core 3
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 23	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: None	Weight (lbs): --	Drop (in): --	Drilling Foreman: Eddie Cardona
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+9.0					0					
	+8.5		6-inch-thick CONCRETE SLAB		PUSH	1					
						2					
						3					
						4					
		Class 7	Brown, medium- to fine-grained, SAND with silt, some decomposed mica schist (moist) [FILL] [Class 7]	0.1	SPIN	5	S-1	SS	12	3 5 3 3	8
						6					
						7					
						8					
						9					
			Dark brown, medium- to fine-grained, silty SAND, trace shells, trace gravel (wet) [FILL] [Class 7]	0.1	SPIN	10	S-2	SS	12	1 1 3 4	4
	-4.5					11					
						12					
						13					
						14					
		Class 6	Black, sandy organic SILT, trace mica (wet) [OL] [Class 6]	0.1	PUSH	15	S-3	SS	11	5 2 2 2	4
						16					
					SPIN	17					
	-9.5					18					
		Class 3				19					
						20					

Remarks
(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

32' E of W P.L.
119' N of S P.L.

SS= Split Spoon

6/17/13
4:00PM to 4:17PM
Drill through 6" thick concrete slab using 5-7/8" diameter tricone roller bit

Drill to 5'
Rig chatter from 0.5' to 2' and 3.5' to 5'. Add drilling fluid at 1'. Dark brown wash

4:26PM
Take S-1(SS): 5' to 7'

4:30PM
Replace casing drill bit

4:43PM
Install 9' of 4" diameter casing: 0' to 9'

5:14PM: Drill to 10'
Brown wash
Very slow drilling 9' to 10'

5:26PM
Take S-2(SS): 10' to 12'

Drill to 15'
Dark brown wash
Smooth drilling

5:34PM
Take S-3(SS): 15' to 17'

Drill to 20'
Brown/black wash
Smooth drilling

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Log of Boring **D-11** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4932
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 9 feet BPMD	4119

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 3	Brown, medium- to fine-grained, silty SAND, some gravel, trace shells (wet) [SM] [Class 3a]	0.0	SPIN	20	S-4	SS	5	6 18 50/2"	50/2"	5:41PM Take S-4(SS): 20' to 22' Refusal at 21.2'
	-12.2					21						
		Class 1	Decomposed rock [Class 1d] Very poor quality			22						5:48PM: Drill to 23' Slow drilling 21.1' to 22' Brown/gray wash Rig chatter
	-14.0					23						6:14PM Install 5' of casing: 9' to 14'
					10:00	24						6:17PM Install 5' of casing: 14' to 19'
			Gray, medium- to fine-grained, quartz-feldspar GRANULITE, close to moderate fracture spacing, slightly weathered, with fractures dipping approximately 5 degrees and 70 degrees from horizontal [Class 1a] Excellent quality		7:00	25	C-1	NX CORE	REC=58"/60" =97%	RQD=57"/60" =95%		6:21PM Install 4' of casing: 19' to 23' 6:46PM: Redrill to 23'
					6:00	26						7:58PM Begin core C-1: 23' to 28'
					7:00	27						
					5:00	28						8:33PM: Complete C-1
					6:00	29						
			Gray, medium- to fine-grained, quartz-feldspar GRANULITE, moderate fracture spacing, slightly weathered, with fractures dipping approximately 70 degrees from horizontal [Class 1a] Excellent quality		5:00	30	C-2	NX CORE	REC=58"/60" =97%	RQD=58"/60" =97%		8:43PM Being core C-2: 28' to 32'
		Class 1			4:00	31						9:10PM: Complete C-2
					6:00	32						
					6:00	33						
					6:00	34						9:21PM Begin core C-3: 33' to 38'
			Gray, medium- to fine-grained, quartz-feldspar GRANULITE, quartz intrusions, wide fracture spacing, slightly weathered, with fractures dipping approximately 50 degrees from horizontal [Class 1b] Fair quality		6:00	35	C-3	NX CORE	REC=40"/60" =67%	RQD=40"/60" =67%		9:48PM: Complete C-3
					6:00	36						Last 20" of core did not break off Try to retrieve last 20" Unable to break off
					5:00	37						
	-29.0				4:00	38						
			End of Boring at 38'			39						10:10PM: Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.
						40						
						41						
						42						
						43						
						44						
						45						

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Log of Boring **D-12** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4972	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 7.5 feet BPMD	North: 4111	
Drilling Company: Warren George, Inc.	Date Started: 7/8/13	Date Finished: 7/8/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 38.5 ft	Rock Depth: 23.5 ft	
Size and Type of Bit: 3-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 4	Undisturbed --	Core 3
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 9	Water Level (ft.): First --	Completion ---	24 HR. --
Casing Hammer: Safety	Weight (lbs): 140	Drop (in): 30	Drilling Foreman: Sal Lorenzo
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+7.5	Class 7	Brown, medium- to fine-grained, SAND with silt, trace gravel, thin organic layer, slight petroleum odor (moist) [FILL] [Class 7]	0.0	SPIN / 99	0–7	S-1	SS	15	4 3 6 3	9
	-6.0	Class 7	Brown, medium- to fine-grained, SAND, some silt, trace gravel (wet) [FILL] [Class 7]	0.0		10–12	S-2	SS	4	3 2 2 1	4
	-11.0	Class 6	Black, sandy SILT, trace mica (wet) [ML] [Class 6]	0.0		15–17	S-3	SS	20	1 2 3 6	5
		Class 3				20					

Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

72' E of W P.L.
111' N of S P.L.
SS= Split Spoon

7/8/13
3:00PM: Drillers arrive

3:38PM: Drill to 5'
Brown wash
Rig chatter 0' to 5'

3:47PM
Take S-1(SS): 5' to 7'

3:53PM
Install 9' of casing: 0' to 9'

4:08PM: Drill to 10'
Brown wash. Smooth drilling

4:14PM
Take S-2(SS): 10' to 12'

4:18PM: Drill to 15'
Smooth drilling. Brown wash

4:21PM
Take S-3(SS):15' to 17'

4:24PM: Drill to 20'
Gray wash. Smooth drilling
Encounter obstruction
19' to 19.5'

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Log of Boring **D-12** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4972
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 7.5 feet BPMD	4111

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 3	Brown, medium- to fine-grained, silty SAND, trace gravel, trace mica (wet) [SM] [Class 3b]	0.0		20–23	S-4	SS	14	4, 6, 14, 15	20	4:34PM Take S-4(SS): 20' to 22' 4:37PM: Attept to drill to 25' Encounter resistance at 23.5'
	-16.0				5:00	24	C-1	NX CORE BARREL	REC=54"/60" =90%	RQD=53"/60" =88%		5:08PM Begin core C-1: 23.5' to 28.5'
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, close to long fracture spacing, slighty weathered, with fractures dipping close to horizontal [Class 1a] Good quality		7:00	25						
					6:00	26						5:33PM: Complete C-1
					4:00	27						
					3:00	28						
					5:00	29	C-2	NX CORE BARREL	REC=60"/60" =100%	RQD=58"/60" =97%		5:47PM Begin core C-2: 28.5' to 33.5'
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet- SCHIST, close to long fracture spacing, slightly weathered to unweathered, with fractures dipping close to horizontal and approximately 45 degrees from horizontal [Class 1a] Excellent quality		5:00	30						
					6:00	31						6:01PM: Core barrel clog Have to remove from ground at 30.5'
					7:00	32						6:13PM: Resume drilling
					7:00	33						6:38PM: Complete C-2
					6:00	34	C-3	NX CORE BARREL	REC=60"/60" =100%	RQD=60"/60" =100%		6:51PM Begin core C-3: 33.5' to 38.5'
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, moderate to long fracture spacing, slightly weathered to unweathered, with fractures dipping approximately 45 degrees from horizontal [Class 1a] Excellent quality		5:00	35						
					4:00	36						7:16PM: Complete C-3
					4:00	37						
	-31.0				5:00	38						7:30PM to 8:30PM Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.
			End of boring at 38.5'			39–45						8:30PM: Drillers off site

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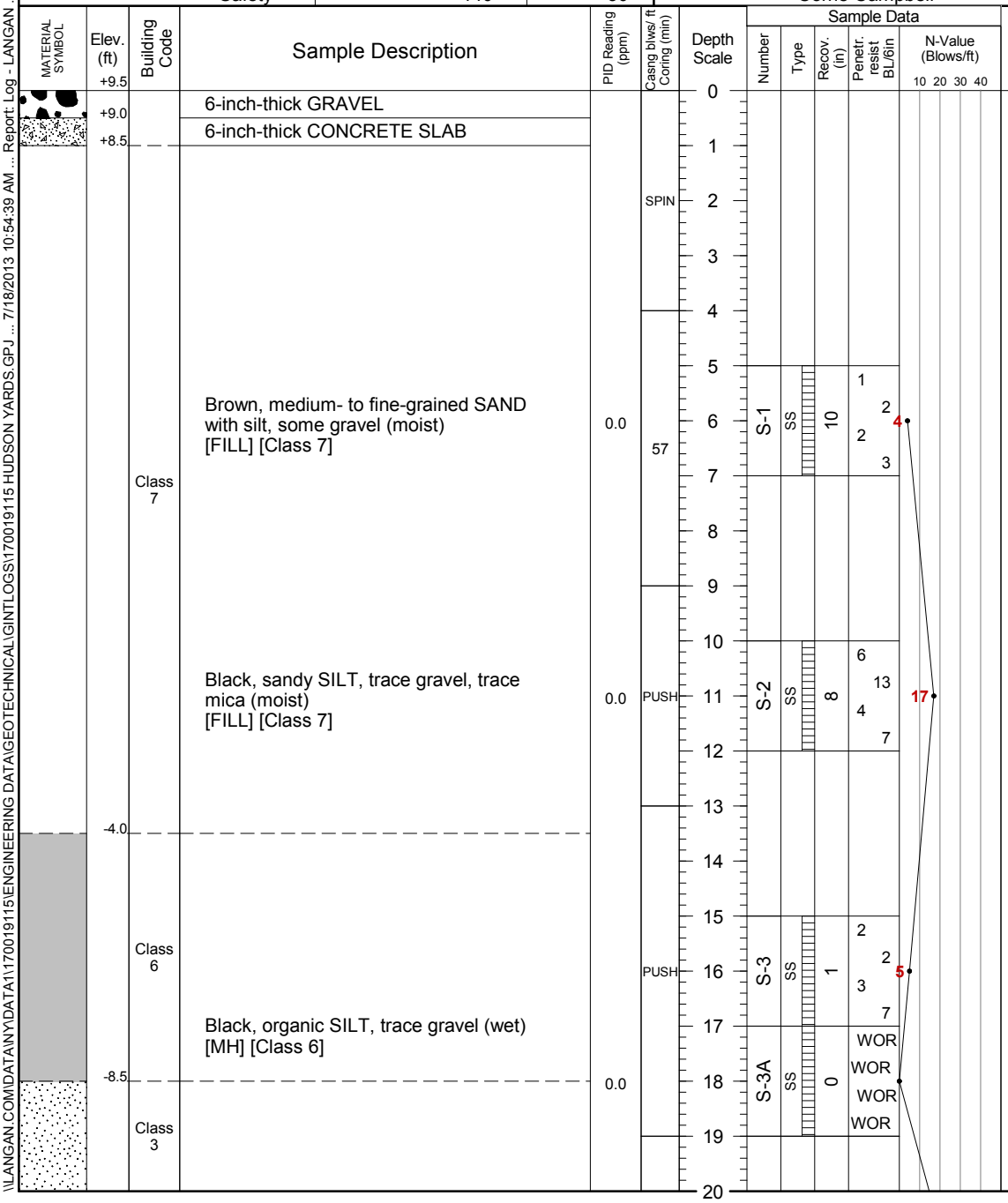
Log of Boring **D-14** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4916	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 9.5 feet BPMD	North: 4146	
Drilling Company: Warren George, Inc.	Date Started: 6/26/13	Date Finished: 6/26/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 41 ft	Rock Depth: 25.5 ft	
Size and Type of Bit: 3-7/8" & 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 5	Undisturbed --	Core 3
Casing Diameter (in): 3&4"-Inner-Diameter Flush Steel Casing; Casing Depth (ft): 26	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Donut; Weight (lbs): 300; Drop (in): 30	Drilling Foreman: Gil Burgess		
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel	Inspecting Engineer: Corrie Campbell		
Sampler Hammer: Safety; Weight (lbs): 140; Drop (in): 30			



Remarks

(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

16' E of W P.L.
146' N of S P.L.
SS= Split Spoon

6/26/13
10:41AM: Drill to 5'
Encounter concrete slab at 0.5'. Slow drilling
10:45AM: Drill through concrete slab

11:02AM
Take S-1(SS): 5' to 7'

11:06AM: Install 9' of 4" diameter casing: 0' to 9'

11:21AM: Drill to 10'
Rig chatter 7' to 9'
Brown wash
Turns gray from 8' to 10'

11:28AM
Take S-2(SS): 10' to 12'

11:32AM: Drill to 15'
Smooth drilling
No return

11:38AM
Take S-3(SS): 15' to 17'
Little recovery
Push spoon in again at same depth to collect sample

11:45AM:
Take S-3A(SS): 17' to 19'
No recovery
Attempt using 3" spoon, minimal recovery

12:06PM: Drill to 20'
Smooth drilling
Black to brown wash at 18'
Encounter obstruction 19.5'

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Log of Boring **D-14** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4916
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 9.5 feet BPMD	4146

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 3	Brown, medium- to fine-grained, silty SAND, trace gravel, trace mica (wet) [SM] [Class 3b]	0.0	SPIN	20–22	S-4	SS	13	13, 10, 12, 21	22	12:15PM Take S-4(SS): 20' to 22'
	-14.0					22–23						12:23PM: Drill to 25' Smooth drilling Brown wash
		Class 1	Gray, decomposed MICA SCHIST with sand [Class 1d] Very poor quality			24–25	S-5	SS	5	50/5"	50/5"	12:34PM Take S-5(SS): 25' to 25.5' Refusal at 25'5"
	-16.0											12:40PM: Drill 4" into rock to create seal for casing 1:35PM: Install 20' of 3" diameter casing: 0' to 20' 1:56PM: Redrill to 25.5' 2:05PM Install 7' of casing:19' to 26'
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, quartz intrusions, close to moderate fracture spacing, slightly weathered, with fractures dipping approximately 50 degrees from horizontal [Class 1b] Good quality		6:00 5:00 5:00 5:00 5:00	26–30	C-1	NX CORE BARREL	REC=54"/60" =90%	RQD=47"/60" =78%		2:35PM Begin core C-1: 26' to 31' Lose water at 27.5' 3:01PM: Complete C-1
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, unweathered, with fractures dipping approximately 50 degrees from horizontal [Class 1b] Good quality		3:00 5:00 3:00 9:00 16:00	31–35	C-2	NX CORE BARREL	REC=47"/60" =78%	RQD=47"/60" =78%		3:26PM Begin core C-2: 31' to 36' 4:02PM: Complete C-2 Believe part of core got ground up due to long core time at end
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, very close to moderate fracture spacing, moderately weathered, with fractures dipping 40 degrees from horizontal [Class 1b] Fair quality		2:00 2:00 2:00 3:00 6:00	36–40	C-3	NX CORE BARREL	REC=39"/60" =65%	RQD=32"/60" =53%		4:18PM Begin core C-3: 36' to 41' 4:33PM: Complete C-3
	-31.5		End of boring at 41'			41–45						4:45PM: Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.

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Log of Boring **D-15** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4930	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 9 feet BPMD	North: 4142	
Drilling Company: Warren George, Inc.	Date Started: 6/23/13	Date Finished: 6/23/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 43 ft	Rock Depth: 27 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 5	Undisturbed --	Core 4
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 27	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Donut	Weight (lbs): 300	Drop (in): 30	Drilling Foreman: Gil Burgess
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+9.0		1-foot-thick GRAVEL			0					
	+8.0					1					
	+7.5		6-inch-thick CONCRETE SLAB		PUSH	2					
					9	3					
						4					
			Brown, medium- to fine-grained, SAND, some silt [FILL] [Class 7]	0.0	79	5	S-1	SS	1	3 3 2 2	5
		Class 7				6					
						7					
					PUSH	8					
						9					
			Brown, medium- to fine-grained, silty SAND, trace gravel [FILL] [Class 7]	0.0		10	S-2	SS	6	3 4 5 4	9
					36	11					
						12					
	-6.0					13					
						14					
			Black, organic SILT, some sand, trace gravel [OL] [Class 6]	0.0		15	S-3	SS	13	1 0 1 1	1
		Class 6			PUSH	16					
	-9.5					17					
		Class 3				18					
						19					
						20					

Remarks

(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

30' E of W P.L.
142' N of S P.L.

SS= Split Spoon

6/22/13
8:20AM: Drill to 5'
6" concrete slab: 1' to 1.5'

8:37AM
Take S-1(SS): 5' to 7'

8:51AM: Drill to 10'. Rig chatter 7' to 8'. Brown wash.

9:00AM: Install 9' of 4" diameter casing: 0' to 9'

9:16 AM: Redrill to 9'

9:23AM
Take S-2(SS): 10' to 12'

9:38AM: Install 5' of casing from 9' to 14'

9:47AM: Drill to 15'. Brown wash- turns black at 15'. Smooth drilling.

9:56AM
Take S-3(SS): 15' to 17'

Dril to 20'. Smooth drilling. No return

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Log of Boring **D-15** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4930
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 9 feet BPMD	4142

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 3	Brown, medium- to fine-grained, silty SAND, some gravel [SM] [Class 3b]	0.0	SPIN	20–22	S-4	SS	2	9 10 11 12	21	10:11AM Take S-4(SS): 20' to 22' Little recovery- push spoon again to get more sample 10:30AM: Drill to 25'. Rig chatter 23' to 25'. No return. 10:50AM Take S-5(SS): 25' to 27' Refusal at 26.5' 11:15PM: Drill to 27'. Encounter bedrock at 27' 11:34AM: Install 27' of 3" diameter casing: 0' to 27' 11:55AM: Redrill to 27'
			Brown, coarse- to fine-grained, SAND, some gravel, trace silt [SP] [Class 3a]	0.0	SPIN	25–26	S-5	SS	6	10 13 28 50/4"	41	
	-18.0				4:00	27	C-1	NX CORE BARREL	75%	50%		12:12AM Begin core C-1: 27'-28' 12:42AM: Core barrel clogged- remove & unclog REC=9"/12" =75% RQD=6"/12" =50%
			Gray, medium-to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, close to wide fracture spacing, slightly weathered, with foliations dipping approximately 0 degrees and 30 degrees from horizontal [Class 1a] Good Quality		13:00 7:00 8:00 5:00 6:00	28–33	C-2	NX CORE BARREL	REC=59"/60" =98%	RQD=53"/60" =88%		1:24PM Begin core C-2: 28' to 33' 1:50PM: Complete core C-2
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, quartz intrusions, close to moderate fracture spacing, slightly weathered to unweathered, with fractures dipping approximately 0 degrees and 40 degrees from horizontal [Class 1a] Good quality		4:00 7:00 4:00 3:00 4:00	33–38	C-3	NX CORE BARREL	REC=56"/60" =93%	RQD=53"/60" =88%		2:12PM Begin core C-3: 33'-38' 2:34PM: Complete core C-3
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, quartz intrusions, wide fracture spacing, unweathered, with fractures dipping approximately 30 degrees from horizontal [Class 1a] Good quality		3:00 4:00 3:00 4:00 9:00	38–43	C-4	NX CORE BARREL	REC=52"/60" =87%	RQD=52"/60" =87%		2:53PM Begin core C-4: 38' to 43' 3:16PM: Complete core C-4
	-34.0		End of boring at 43'			43						3:45PM to 4:30PM Boring was backfilled. Drillers cleaned up around completed boring. 4:45PM: End of 6/23/13
						44–45						

N-Value (Blows/ft) axis: 10 20 30 40

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Log of Boring **D-16** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4956	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 9 feet BPMD	North: 4142	
Drilling Company: Warren George, Inc.	Date Started: 7/10/13	Date Finished: 7/11/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 45.5 ft	Rock Depth: 30.5 ft	
Size and Type of Bit: 3-7/8" & 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 7	Undisturbed --	Core 4
Casing Diameter (in): 3&4"-Inner-Diameter Flush Steel Casing; Casing Depth (ft): 25	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Safety; Weight (lbs): 140; Drop (in): 30	Drilling Foreman: Sal Lorenzo		
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel	Inspecting Engineer: Corrie Campbell		
Sampler Hammer: Safety; Weight (lbs): 140; Drop (in): 30			

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+9.0		1-foot-thick GRAVEL			0					
	+8.0				PUSH	1					
						2					
						3					
						4					
			Brown, medium- to fine-grained, gravelly SAND, trace silt (moist) [FILL] [Class 7]	0.0	256	5	S-1	SS	5	4 11 11 14	22
		Class 7				6					
						7					
						8					
						9					
			Brown, medium- to fine-grained, SAND with silt, trace gravel (wet) [FILL] [Class 7]	0.0		10	S-2	SS	6	10 5 3 2	8
					PUSH	11					
			12' to 13.5': Brown, medium- to fine-grained, SAND, some silt, trace wood (wet) [FILL] [Class 7]	0.0		12	S-3	SS	19	3 3 3 2	6
	-4.5					13					
		Class 5	13.5 'to 14': Gray, sandy SILT (wet) [ML] [Class 6]			14					
	-5.5					15					
			Gray, fine-grained, SAND with silt, trace shells (wet) [SM] [Class 3b]	0.0	129	16	S-4	SS	9	1 6 8 6	14
						17					
		Class 3	Gray, fine-grained, SAND with silt, trace shells (wet) [SM] [Class 3b]	0.0		18	S-5	SS	15	10 9 14 17	23
						19					
						20					
			Brown, medium- to fine-grained, SAND with gravel, some silt (wet) [SM] [Class 3b]			21	S-6	SS	4	5 10	20

Remarks
(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

56' E of W P.L.
142' N of S P.L.
SS= Split Spoon

7/10/13
6:15PM: Drill to 5'
Rig chatter 0' to 5'
Brown wash

6:35PM
Take S-1(SS): 5' to 7'

6:38PM
Install 9' of casing: 0' to 9'

6:52PM: Drill to 10'
Brown wash
Rig chatter 6' to 10'

7:00PM
Take S-2(SS): 10' to 12'

7:04PM
Take S-3(SS): 12' to 14'

7:10PM: Drill to 15'
Smooth drilling. Gray wash

7:17PM
Take S-4(SS): 15' to 17'

7:20PM
Take S-5(SS): 17' to 19'

7:23PM: Drill to 20'
Smooth drilling. Brown wash

7:32PM
Take S-6(SS): 20' to 22'

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Log of Boring **D-16** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4956
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 9 feet BPMD	4142

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale
		Class 3		0.0	233	21–22
	-14.5					23
		Class 1	Gray, decomposed MICA SCHIST with sand, trace shells [Class 1d]	0.0		24–25
			Gray, decomposed MICA SCHIST [Class 1d] Very poor quality		6:00	26
					4:00	27
					4:00	28
					3:00	29
	-21.5				7:00	30
		Class 1	30.5' to 31.5': Gray, medium- to fine-grained, quartz- feldspar- muscovite- biotite- garnet SCHIST, slightly weathered		7:00	31
	-22.5				4:00	32
			31.5' to 35.5': Gray, medium- to fine-grained, quartz- feldspar- muscovite- biotite GRANULITE, close to moderate fracture spacing, slightly weathered to unweathered, with fractures dipping close to horizontal and approximately 80 degrees from horizontal [Class 1a] Good quality		3:00	33
					4:00	34
					3:00	35
		Class 1	Gray, medium- to fine-grained, quartz- feldspar- muscovite- biotite- garnet GRANULITE, close to long fracture spacing, unweathered, with fractures dipping close to horizontal and approximately 45 degrees from horizontal, pegmatite intrusions from 39' to 40' [Class 1a] Excellent quality		4:00	36
					3:00	37
					4:00	38
					3:00	39
					4:00	40
			40.5' to 42': Gray, medium- to fine-grained, quartz- feldspar- muscovite- biotite GRANULITE, with pegmatite intrusions		10:00	41
	-33.0				8:00	42
		Class 1	42' to 45.5': Gray, medium- to fine-grained, quartz- feldspar- muscovite- biotite- garnet SCHIST, moderate to long fracture spacing, umweathered, with fractures dipping close to horizontal [Class 1b] Good quality		10:00	43
					6:00	44
	-36.5				6:00	45
			End of boring at 45.5'			46–47

Sample Data

Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)
S-6	SS	4	10 12	20
S-7	SS	3	50/3"	50/3"
C-1	NX CORE BARREL	REC=6"/60" =10%	RQD=0"/60" =0%	
C-2	NX CORE BARREL	REC=60"/60" =100%	RQD=52"/60" =87%	
C-3	NX CORE BARREL	REC=60"/60" =100%	RQD=60"/60" =100%	
C-4	NX CORE BARREL	REC=54"/60" =90%	RQD=46"/60" =77%	

Remarks
(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

7:38PM: Drill to 25'
Resistance 23' to 23.5'
Slow drilling. Rig chatter

7:46PM
Take S-7(SS): 25' to 27'
Refusal at 25'-3"

8:12PM: Install 25' of 3" diameter casing: 0' to 25'

8:34PM: Redrill to 25.5'

8:47PM
Begin core C-1: 25.5' to 30.5'

9:14PM: Complete core

9:28PM
Begin core C-2: 30.5' to 35.5'

9:35PM: Core barrel clogged
9:47PM: Resume drilling

10:03PM: Complete C-2

10:20PM
Begin core C-3: 35.5' to 40.5'

10:38PM: Complete C-3

10:45PM: Light broke
11:10PM: End of 7/10/13

7/11/13
3:10PM: Drillers on-site

3:25PM
Begin core C-4: 40.5' to 45.5'

3:45PM: Core barrel clogged
3:52PM: Resume drilling
4:10PM: Core barrel clogged
4:20PM: Resume drilling

4:32PM:
Boring was backfilled. Drillers cleaned up around completed boring and moved to new location.

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Log of Boring **D-18** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4911	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 7.5 feet BPMD	North: 4172	
Drilling Company: Warren George, Inc.	Date Started: 6/13/13	Date Finished: 6/14/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 34 ft	Rock Depth: 19 ft	
Size and Type of Bit: 3-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 2	Undisturbed --	Core 4
Casing Diameter (in): 3&4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 19	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Donut	Weight (lbs): 140	Drop (in): 30	Drilling Foreman: Eddie Cardona
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)		Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+7.5					0					
	+7.0		6-inch-thick GRAVEL			1					
						2					
						3					
						4					
					SPIN	5					
			Brown, coarse- to fine-grained, SAND, some gravel, some silt, trace mica [FILL] [Class 7]	0.0		6	S-1	SS	13	22 8 9 6	17
						7					
						8					
						9					
		Class 7				10	S-2	SS	0	50/0"	50/0"
			Gray, schist- pegmatite- granulite- BOULDERS, with trace shells [FILL] [Class 7]		6:00	11	C-1	NX CORE	REC=41"/60" =68%	RQD=24"/60" =40%	
					5:00	12					
					3:00	13					
					3:00	14					
			2-inch thick WOOD			15	C-2A	NX CORE	0%	0%	
					SPIN	16					
						17					
						18					
	-11.5	Class 1			9:00	19	C-2				
						20					

Remarks
(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

11' E of W P.L.
172' N of S P.L.

SS= Split Spoon

6/13/13
4:30PM: Drill to 5'
Rig chatter. Brown wash. At 1' add drilling fluid.

4:43PM:
Take S-1(SS): 5' to 7'

4:46PM: Install 9' of 4" diameter casing: 0' to 9'
5:00PM: Rig making unusual noises, very slow drilling
5:21PM to 7:15PM:
Swivel fell off. Return to shop

7:20PM: Drill to 9.5'.
Obstruction at 9.5'

7:30PM
Take S-2(SS): 9.5' to 9.6'
No recovery

8:30PM: Drillers leave site because of rain

6/14/13
2:43PM: Drillers arrive

3:55PM
Begin core C-1: 10' to 15'
4:12PM: Complete C-1
No water return

5:22PM
Begin core C-2A at 15'
5:31PM
Barrel pulled. 2" thick wood chunk in tip of core.
REC=0"/6" =0%
RQD=0"/6" =0%

4:50PM: Install 15' of 3" diameter casing: 0' to 14'.
Obstruction at 6'
5:15PM: Redrill to 19' using 2-7/8" diamter tricone roller bit. Boulders from 0' to 19'

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Log of Boring **D-18** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4911
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 7.5 feet BPMD	4172

MATERIAL SYMBOL	Elev. (ft)		Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, moderate fracture spacing, unweathered to slightly weathered, with fractures dipping approximately 30 degrees from horizontal [Class 1a] Excellent quality		8:00 4:00 5:00 7:00	20 21 22 23 24	C-2	NX CORE	REC=56"/60" =93%	RQD=56"/60" =93%		Install 5' of casing: 14' to 19'. Slow installation. Boulders encountered. Gray wash 5:45PM: Redrill to 19 ft. Gray wash. Multiple obstructions 5:58PM Begin core C-2: 19' to 24' 6:31PM: Complete C-2
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, quartz intrusions, close to moderate fracture spacing, slightly to moderately weathered, with fractures dipping approximately 35 degrees from horizontal [Class 1b] Good quality		7:00 3:00 4:00 3:00 4:00	24 25 26 27 28 29	C-3	NX CORE	REC=55"/60" =92%	RQD=49"/60" =82%		6:40PM Begin core C-3: 24' to 29' 7:01PM: Complete C-3
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite SCHIST, quartz intrusions, close to moderate fracture spacing, slightly weathered, with fractures dipping approximately 30 degrees from horizontal [Class 1a] Excellent quality		3:00 2:00 5:00 5:00 4:00	29 30 31 32 33	C-4	NX CORE	REC=55"/60" =92%	RQD=55"/60" =92%		7:13PM Begin core C-4: 29' to 34' 7:31PM: Complete C-4
	-26.5		End of Boring at 34'			34						7:45PM to 8:30PM Boring was backfilled. Drillers cleaned up around completed boring and moved to new location. 9:15PM: End of 6/14/13
						35 36 37 38 39 40 41 42 43 44 45						

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Log of Boring **D-19** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4931	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 8.5 feet BPMD	North: 4172	
Drilling Company: Warren George, Inc.	Date Started: 6/25/13	Date Finished: 6/25/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 45 ft	Rock Depth: 25 ft	
Size and Type of Bit: 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 4	Undisturbed --	Core 4
Casing Diameter (in): 4"-Inner-Diameter Flush Steel Casing	Casing Depth (ft): 24	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Donut	Weight (lbs): 300	Drop (in): 30	Drilling Foreman: Sal Lorenzo
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel			Inspecting Engineer: Corrie Campbell
Sampler Hammer: Safety	Weight (lbs): 140	Drop (in): 30	

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+8.5		12-inch-thick GRAVEL			0						31' E of W P.L. 172' N of S P.L. SS= Split Spoon
	+7.5					1						6/25/13 10:23AM: Drill to 5' Rig chatter 0' to 5'. Brown wash
					SPIN	2						
						3						
						4						
			Brown, coarse- to fine-grained, gravelly SAND, trace silt (moist) [FILL] [Class 7]	0.0		5	S-1	SS	3	50/3"	50/3"	10:35AM Take S-1(SS): 5' to 7' Refusal 5'-3" 10:40AM: Drill to 10' Rig chatter
					60	6						
						7						10:53AM: Install 9' of 4" diameter casing
						8						11:02AM: Redrill to 10' Smooth drilling Brown wash
		Class 7				9						
			Gray, coarse- to fine-grained, SAND with gravel, trace silt (wet) [FILL] [Class 7]			10	S-2	SS	6	2 5 3 2	8	11:10AM Take S-2(SS): 10' to 12' 11:13AM: Drill to 15; Rig chatter 10' to 15' No return Boulder from 11' to 12' and 13' to 13.5'- Slow drilling
					PUSH	11						
						12						
						13						
						14						
			Gray, medium to fine grained, silty SAND, trace brick, trace mica (wet) [FILL] [Class 7]	0.0		15	S-3	SS	7	6 5 6 9	11	12:00PM Take S-3(SS): 15' to 17' 12:04AM: Drill to 20' Brown wash. Smooth drilling
					SPIN	16						
						17						
						18						
	-10.0					19						
		Class 3				20						

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Log of Boring **D-19** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4931
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 8.5 feet BPMD	4172

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Class 3	Brown, medium- to fine-grained, silty SAND, trace mica (wet) [SM] [Class 3b]	0.0	SPIN	20–25	S-4	SS	5	9 9 12 50/5"	21	12:13PM Take S-4(SS): 20' to 21.9' Refusal at 21'-11" 12:20PM: Drill to 25' 12:30PM: Drill bit gets clogged at 20.5' 12:40PM: Continue to drill to 24'. Rig chatter 20' to 24'. Slow drilling 1:05PM: Resistance at 24'. Drill 4" into rock to be able to seat casing
	-15.5											
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, moderate to wide fracture spacing, unweathered, with fractures dipping approximately 45 degrees from horizontal [Class 1a] Excellent quality		4:00 3:00 4:00 3:00 4:00	25–30	C-1	NX CORE BARREL	REC=56"/60" =93%	RQD=56"/60" =93%		1:33PM: Install 24' of 3" diameter casing: 0' to 24' 1:53PM: Drill to 25' 2:05PM Begin core C-1: 25' to 30' 2:23PM: Complete C-1
	-21.5											
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet-SCHIST, close to moderate fracture spacing, slightly weathered to unweathered, with fractures dipping approximately 30 degrees from horizontal [Class 1d] Poor quality		4:00 15:00 16:00 11:00 12:00	30–35	C-2	NX CORE BARREL	REC=24"/60" =40%	RQD=18"/60" =30%		2:45PM Begin core C-2: 30' to 35' 3:43PM: Complete C-2 4:03PM: Bad recovery Attempt to spin in casing more to create a better seal in rock 4:07PM: Redrill to 35' Remove wash accumulated at bottom of hole
	-26.5											
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, long fracture spacing, slightly weathered, with fractures dipping approximately 30 degrees from horizontal [Class 1a] Excellent quality		6:00 5:00 5:00 4:00 4:00	35–40	C-3	NX CORE BARREL	REC=56"/60" =93%	RQD=56"/60" =93%		4:40PM Begin core C-3: 35' to 40' 5:06PM: Complete C-3
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, unweathered to slightly weathered, with fractures dipping approximately 40 degrees from horizontal [Class 1b] Good quality		4:00 4:00 5:00 4:00 6:00	40–45	C-4	NX CORE BARREL	REC=60"/60" =100%	RQD=50"/60" =83%		5:24PM Begin core C-4: 40' to 45' 5:47PM: Complete C-4 6:04PM: Part of core stuck in hole. Lower rods back down to retrieve 6:30PM: Able to remove remainder of core 6:45PM: Boring was backfilled.
	-36.5		End of boring at 45'			45						

\\LANGAN.COM\DATA\NY\DATA1\170019115\ENGINEERING DATA\GEOTECHNICAL\GINTLOGS\170019115 HUDSON YARDS.GPJ ... 7/18/2013 10:55:14 AM ... Report: Log - LANGAN ... Template TEMPLATE.GDT

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Log of Boring **D-20** Sheet 1 of 2

Project: HUDSON YARDS - TOWER D	Project No.: 170019115	East: 4967	
Location: LIRR west side yard, Terra Firma, Manhattan NY	Elevation and Datum: Approx. 8 feet BPMD	North: 4174	
Drilling Company: Warren George, Inc.	Date Started: 7/11/13	Date Finished: 7/11/13	
Drilling Equipment: Acker AD2 Truck-Mounted Drill Rig	Completion Depth: 33.5 ft	Rock Depth: 18.5 ft	
Size and Type of Bit: 3-7/8" & 2-7/8" Diameter Tricone Roller Bit	Number of Samples: Disturbed 3	Undisturbed --	Core 4
Casing Diameter (in): 3&4"-Inner-Diameter Flush Steel Casing; Casing Depth (ft): 18	Water Level (ft.): First --	Completion --	24 HR. --
Casing Hammer: Safety; Weight (lbs): 140; Drop (in): 30	Drilling Foreman: Sal Lorenzo		
Sampler: 2"-Outer-Diameter Split Spoon/ NX Core Barrel	Inspecting Engineer: Corrie Campbell		
Sampler Hammer: Safety; Weight (lbs): 140; Drop (in): 30			

Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+8.0					0					
	+7.0		1-foot-thick GRAVEL			1					
					36	2					
						3					
						4					
		Class 7	Brown, medium- to fine-grained, gravelly SAND, trace silt (moist) [FILL] [Class 7]	0.0	186	5	S-1	SS	3	3 6 9	9
						6					
						7					
	-0.5					8					
						9					
		Class 6	Black, sandy SILT, trace gravel, trace shell (wet) [ML] [Class 6]	0.0	45	10	S-2	SS	13	2 3 1 1	4
	-4.0					11					
						12					
					4:00	13	C-1	NX CORE BARREL	REC=6"/60" =10%	RQD=0"/60" =0%	
		Class 1	Decomposed MICA SCHIST and GRANULITE [Class 1d] Very poor quality		1:00	14					
					4:00	15					
					1:00	16					
					3:00	17					
	-10.3		Decomposed MICA SCHIST, trace shells [Class 1d]	0.0		18	S-3	SS	1	50/3"	50/3"
		Class 1			5:00	19	C-2				
						20					

Remarks

(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

67' E of W P.L.
175' N of S P.L.
SS= Split Spoon

7/11/13
5:52PM: Drill to 5'
Smooth drilling
Gravel pad in first 1'
Rig chatter. Brown wash

5:58PM
Take S-1(SS): 5' to 7'

6:02PM
Install 9' of casing: 0' to 9'
Have to take out once to straighten
6:30PM: Drill to 10'
Brown wash. Rig chatter

6:39PM
Take S-2(SS): 10' to 12'

6:41PM: Drill to 15'
Encounter resistance at 13'
Black to brown wash at 12'

6:55PM: Install 13' of 3" diameter casing: 0' to 13'

7:05PM: Redrill to 13' using 2-7/8" diameter drill bit

7:15PM
Begin core C-1: 13' to 18'

7:40PM
Take S-3(SS): 18' to 20'
Refusal at 18'-3"

7:42PM: Install 4.5' of 3" diameter casing to 18' with 300 lb hammer

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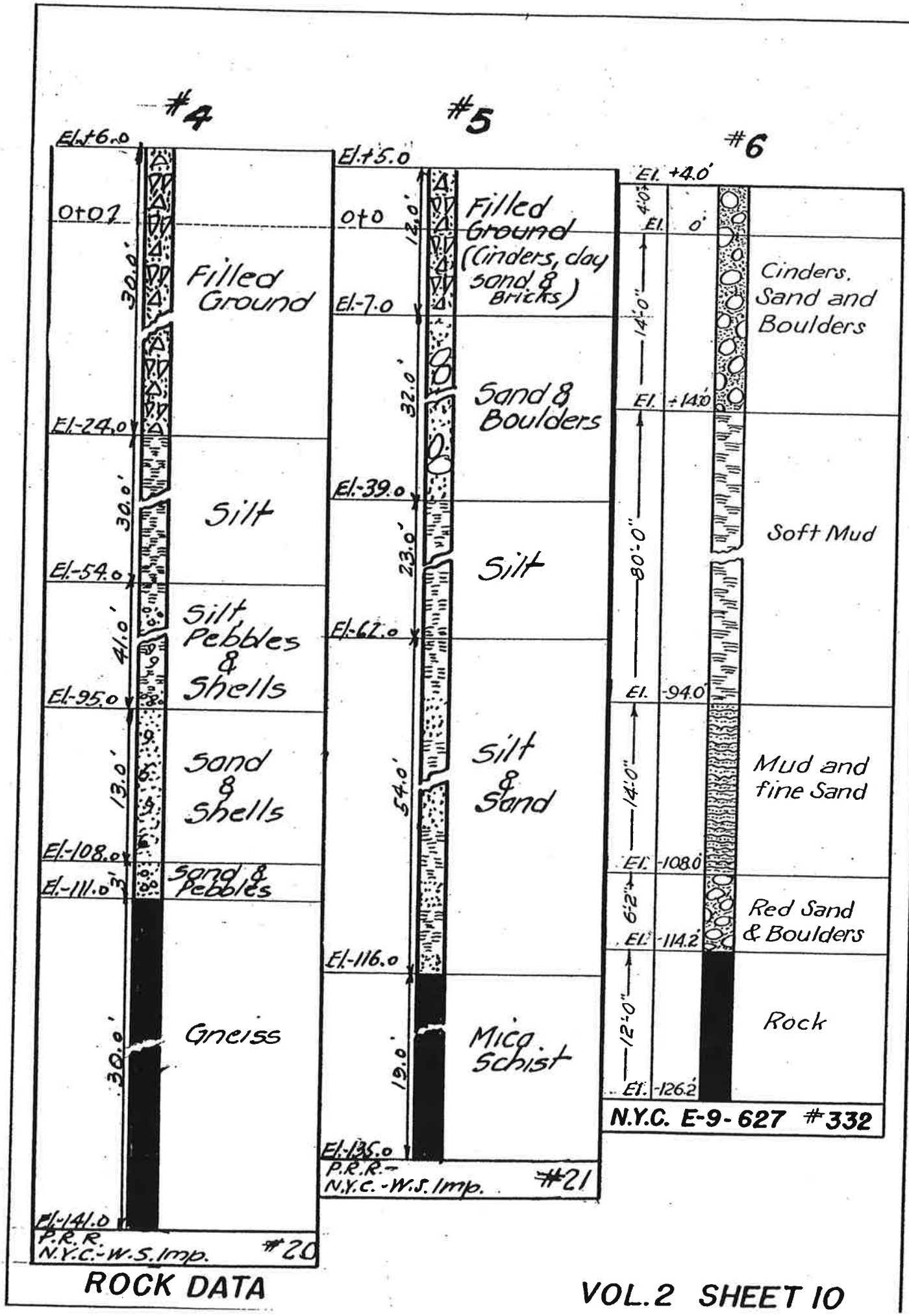
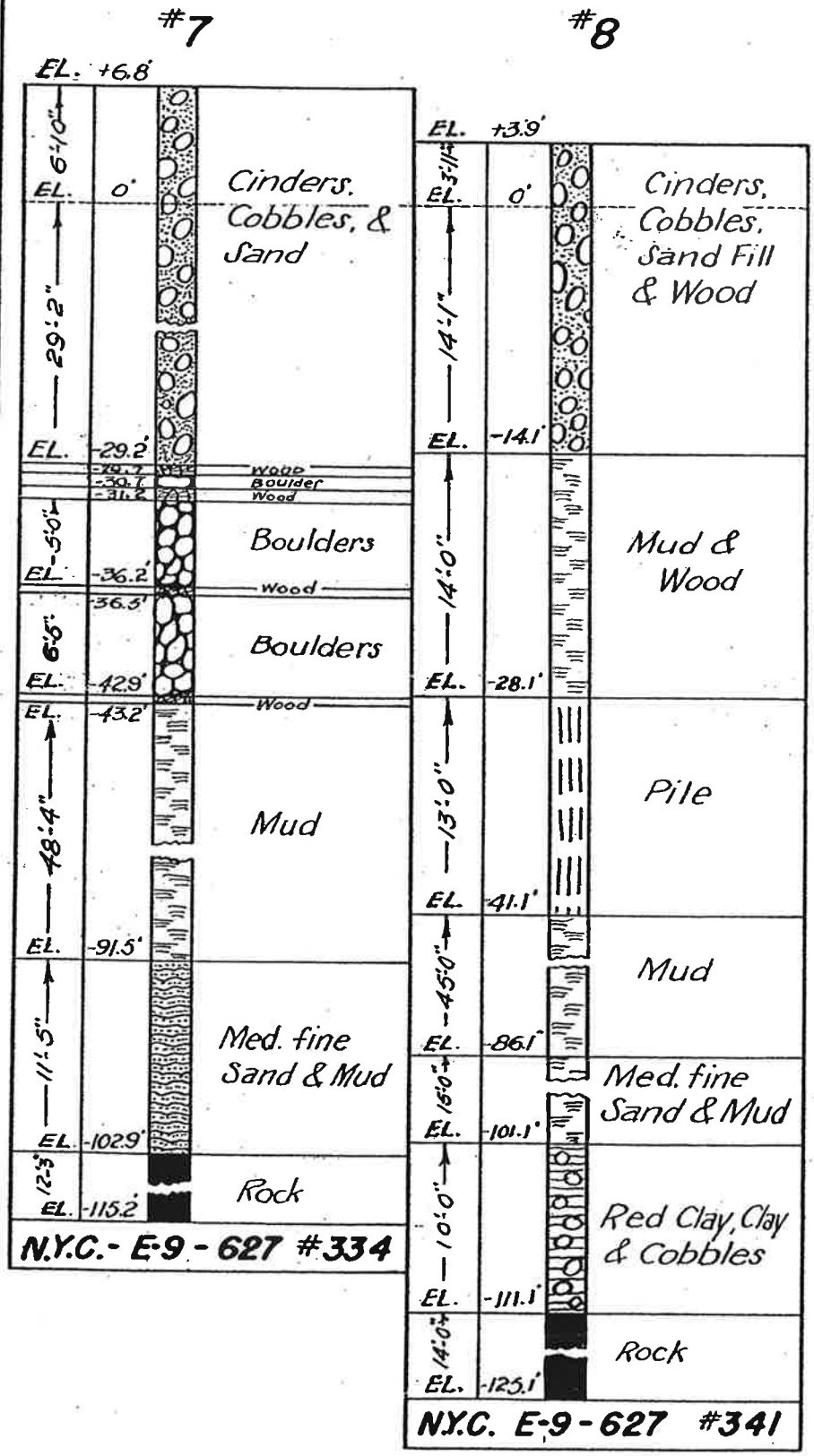
Log of Boring **D-20** Sheet 2 of 2

Project	Project No.	East
HUDSON YARDS - TOWER D	170019115	4967
Location	**Elevation and Datum**	**North**
LIRR west side yard, Terra Firma, Manhattan NY	Approx. 8 feet BPMD	4174

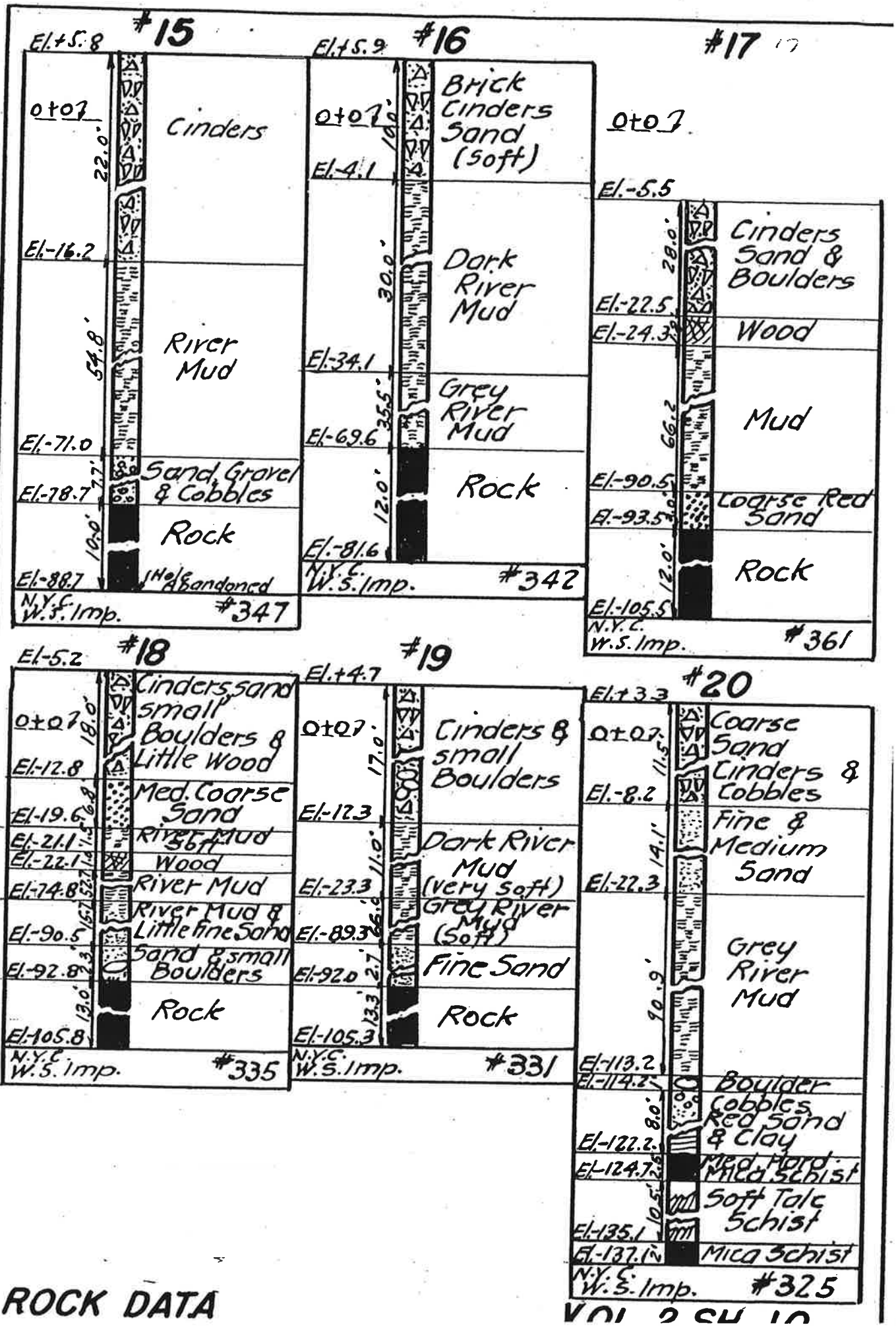
Material Symbol	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, moderate fracture spacing, unweathered, with fractures dipping approximately 45 degrees from horizontal [Class 1b] Good quality		4:00 3:00 5:00 4:00	20 21 22 23	C-2	NX CORE BARREL	REC=47"/60" =78%	RQD=47"/60" =78%		7:53PM: Drill to 18.5' Resistance at 18.5' 8:04PM Begin core C-2: 18.5' to 23.5' 8:25PM: Complete C-2
		Class 1	Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, moderate to long fracture spacing, unweathered, with fractures dipping close to horizontal and approximately 40 degrees from horizontal [Class 1a] Excellent quality		5:00 4:00 4:00 3:00 4:00	24 25 26 27 28	C-3	NX CORE BARREL	REC=60"/60" =100%	RQD=60"/60" =100%		8:44PM Begin core C-3: 23.5' to 28.5' 9:04PM: Complete C-3
	-25.5		Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet SCHIST, moderate to long fracture spacing, unweathered, with fractures dipping approximately 40 degrees from horizontal [Class 1a] Excellent quality		4:00 4:00 4:00 4:00 3:00	29 30 31 32 33	C-4	NX CORE BARREL	REC=58"/60" =97%	RQD=56"/60" =93%		9:17PM Begin core C-4: 28.5' to 33.5' 9:36PM: Complete C-4 10:15PM to 11:15PM Boring was backfilled. Drillers cleaned up around completed boring and moved to new location. 11:30PM: End of 7/11/13
			End of boring at 33.5'			34 35 36 37 38 39 40 41 42 43 44 45						

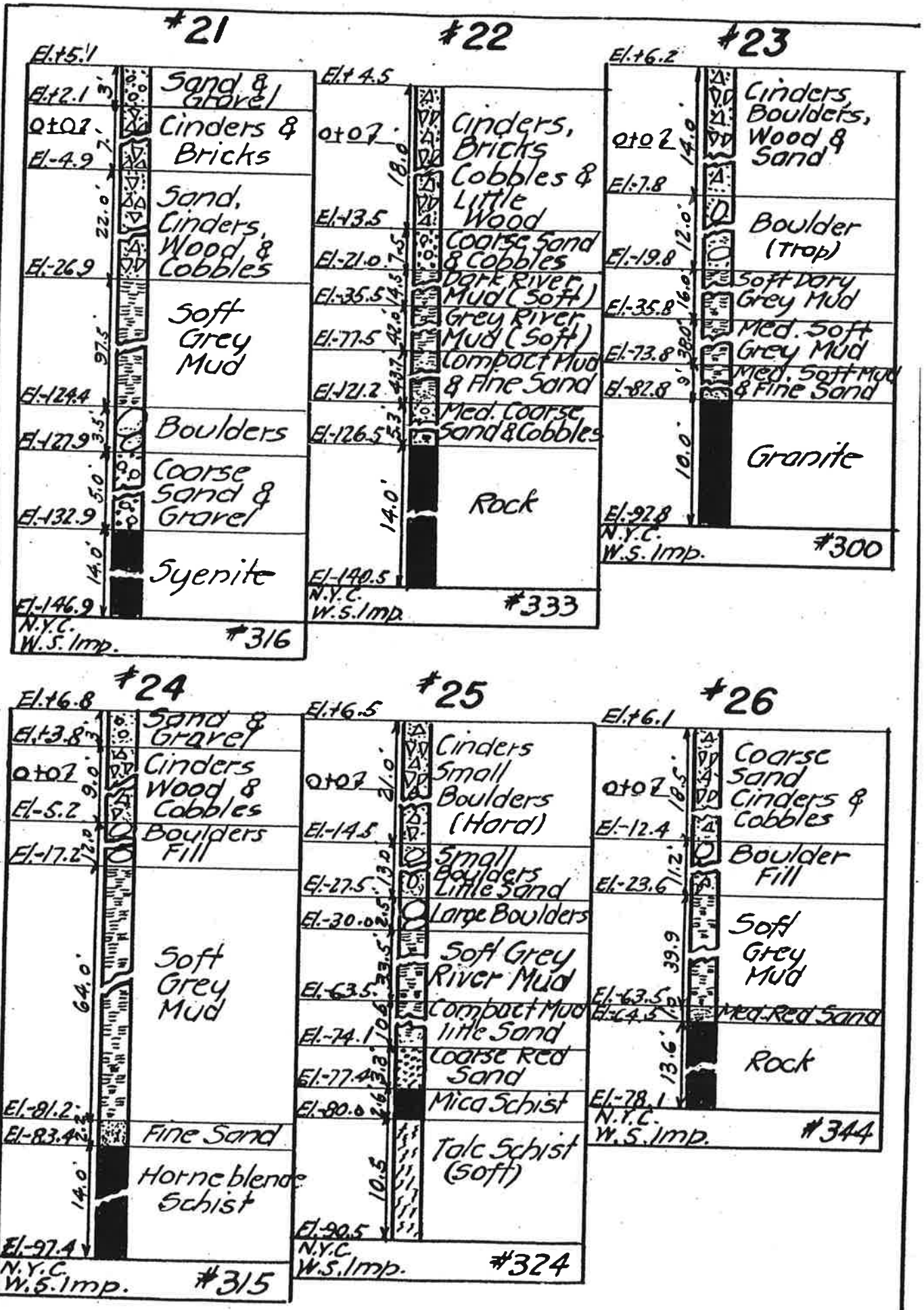

#4
El.+6.0
0+07
30.0'
Filled Ground
El.-24.0
30.0'
Silt
El.-54.0
41.0'
Silt, Pebbles & Shells
El.-95.0
13.0'
Sand & Shells
El.-108.0
El.-111.0
3'
Sand & Pebbles
30.0'
Gneiss
El.-141.0
P.R.R. N.Y.C.-W.S.Imp. #20
#5
El.+5.0
0+0
12.0'
Filled Ground (Cinders, clay sand & Bricks)
El.-7.0
32.0'
Sand & Boulders
El.-39.0
23.0'
Silt
El.-62.0
54.0'
Silt & Sand
El.-116.0
19.0'
Mica Schist
El.-135.0
P.R.R.- N.Y.C.-W.S.Imp. #21
#6
El. +4.0'
4'-0"
El. 0'
14'-0"
Cinders, Sand and Boulders
El. +14.0
80'-0"
Soft Mud
El. -94.0'
14'-0"
Mud and fine Sand
El. -108.0'
6'2"
Red Sand & Boulders
El. -114.2'
12'-0"
Rock
El. -126.2'
N.Y.C. E-9-627 #332
ROCK DATA
VOL.2 SHEET 10



ROCK DATA

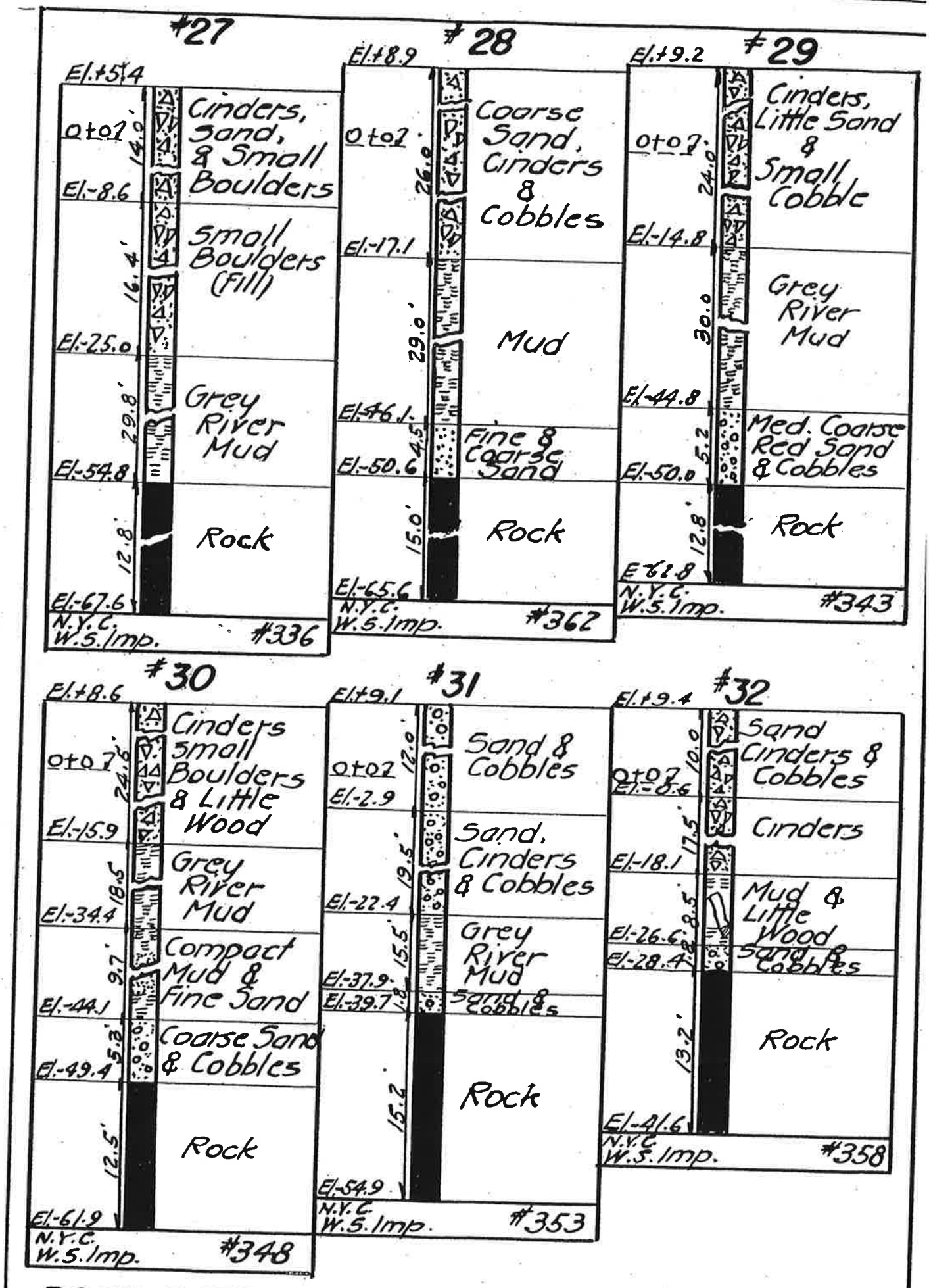
VOL.2 SHEET 10


#15
El.+5.8
0 to 7
22.0'
Cinders
El.-16.2
54.8'
River Mud
El.-71.0
7.7'
Sand, Gravel & Cobbles
El.-78.7
10.0'
Rock
El.-88.7
Hole Abandoned
N.Y.C. W.S. Imp.
#347
#16
El.+5.9
0 to 7
10.0'
Brick Cinders Sand (soft)
El.-4.1
30.0'
Dark River Mud
El.-34.1
35.5'
Grey River Mud
El.-69.6
12.0'
Rock
El.-81.6
N.Y.C. W.S. Imp.
#342
#17
0 to 7
El.-5.5
28.0'
Cinders Sand & Boulders
El.-22.5
Wood
El.-24.3
66.2'
Mud
El.-90.5
3.0'
Coarse Red Sand
El.-93.5
12.0'
Rock
El.-105.5
N.Y.C. W.S. Imp.
#361
#18
El.-5.2
0 to 7
18.0'
Cinders Sand small Boulders & Little Wood
El.-12.8
6.8'
Med. Coarse Sand
El.-19.6
1.5'
River Mud
El.-21.1
1.4'
Wood
El.-22.1
52.7'
River Mud
El.-74.8
15.7'
River Mud & Little fine Sand
El.-90.5
2.3'
Sand & small Boulders
El.-92.8
13.0'
Rock
El.-105.8
N.Y.C. W.S. Imp.
#335
#19
El.+4.7
0 to 7
17.0'
Cinders & small Boulders
El.-12.3
11.0'
Dark River Mud (very soft)
El.-23.3
66.6'
Grey River Mud (Soft)
El.-89.9
2.7'
Fine Sand
El.-92.0
13.3'
Rock
El.-105.3
N.Y.C. W.S. Imp.
#331
#20
El.+3.3
0 to 7
11.5'
Coarse Sand
Cinders & Cobbles
El.-8.2
14.1'
Fine & Medium Sand
El.-22.3
90.9'
Grey River Mud
El.-113.2
1.0'
Boulder
El.-114.2
8.0'
Cobbles Red Sand & Clay
El.-122.2
2.5'
Red Hard Mica Schist
El.-124.7
10.5'
Soft Talc Schist
El.-135.1
2.0'
Mica Schist
El.-137.1
N.Y.C. W.S. Imp.
#325
ROCK DATA
VOL 2 SH 10



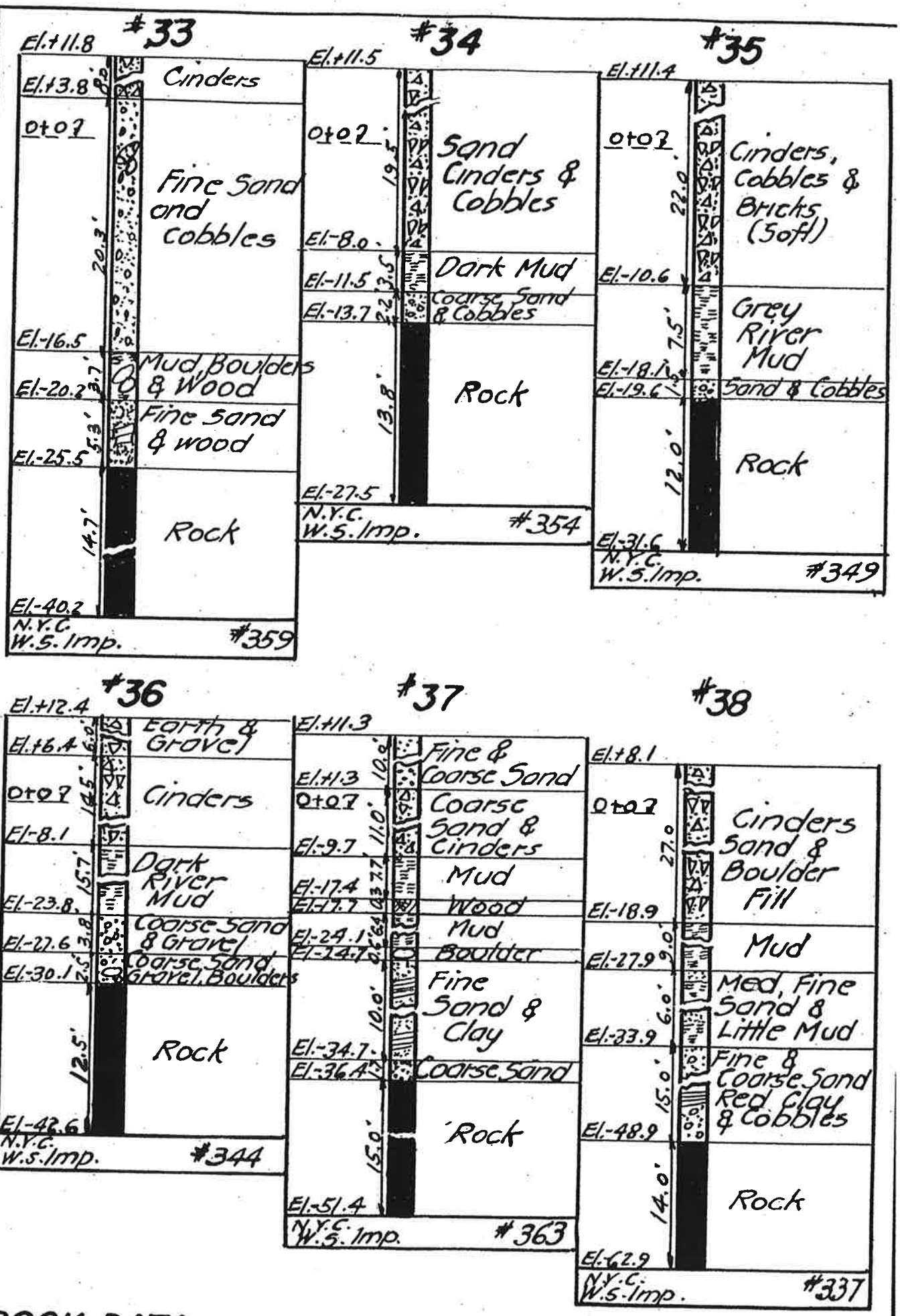
ROCK DATA

VOL. 2 SH. 10



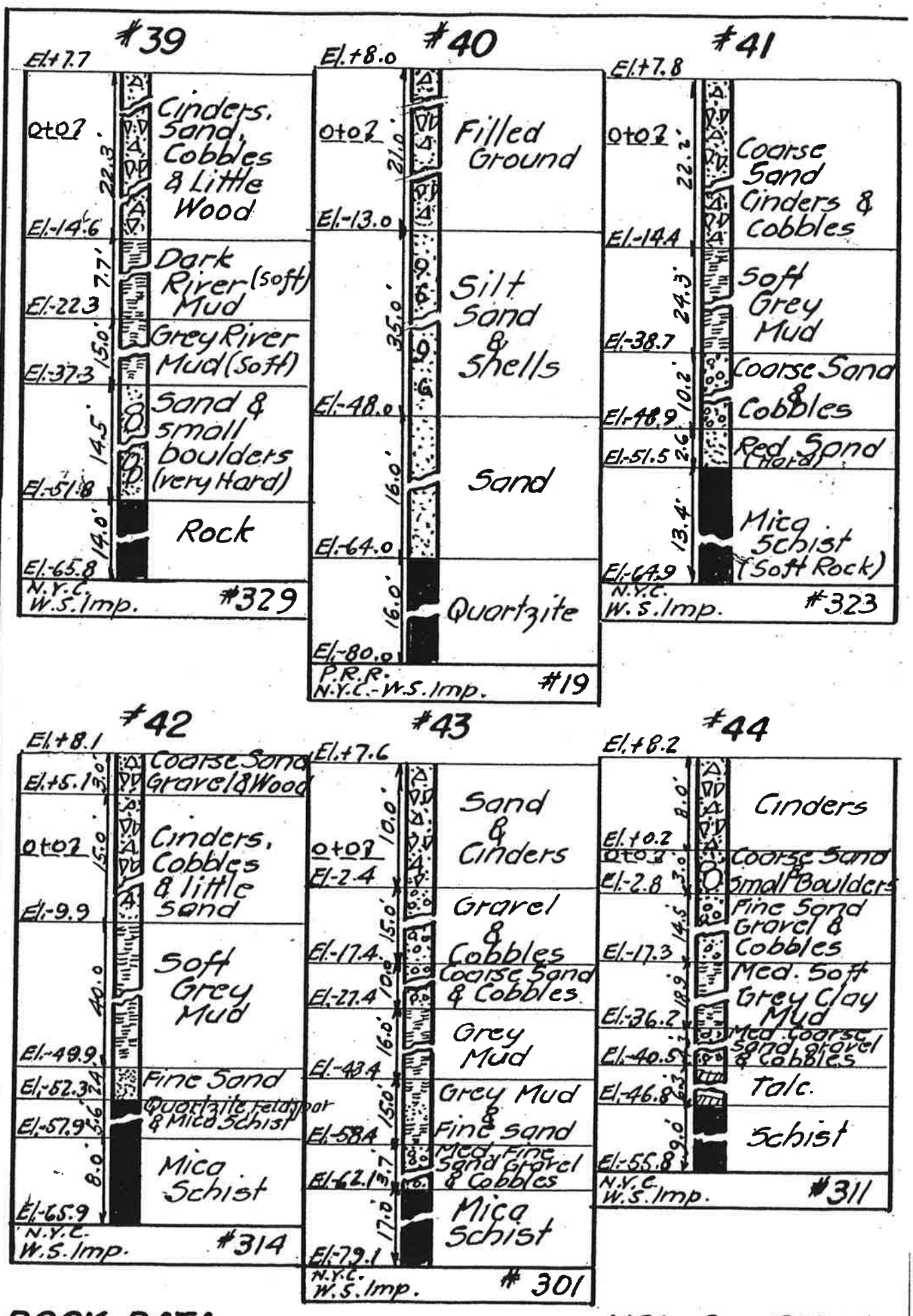
ROCK DATA

VOL. 2 SH. 10



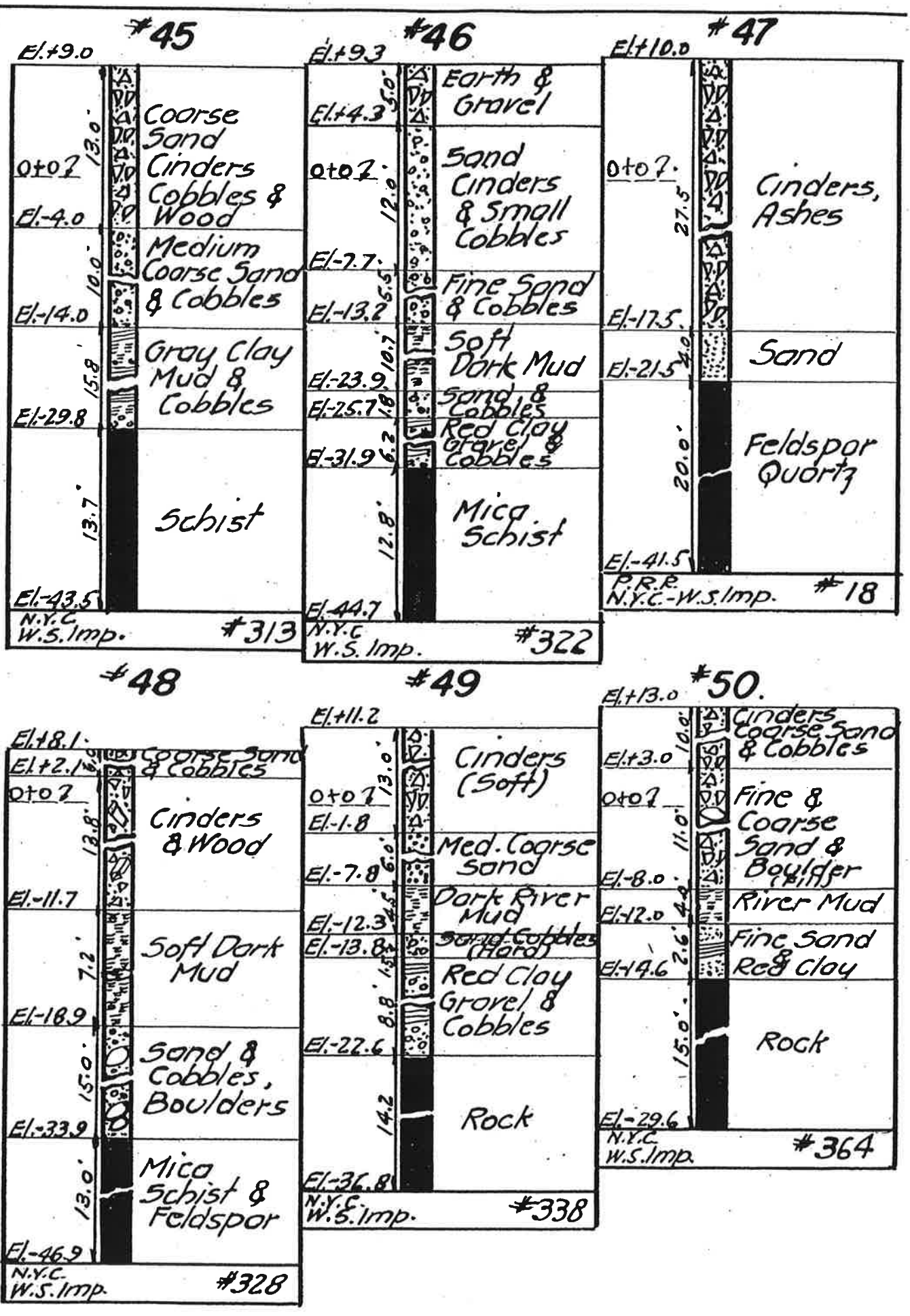
ROCK DATA

VOL 2 SH 10

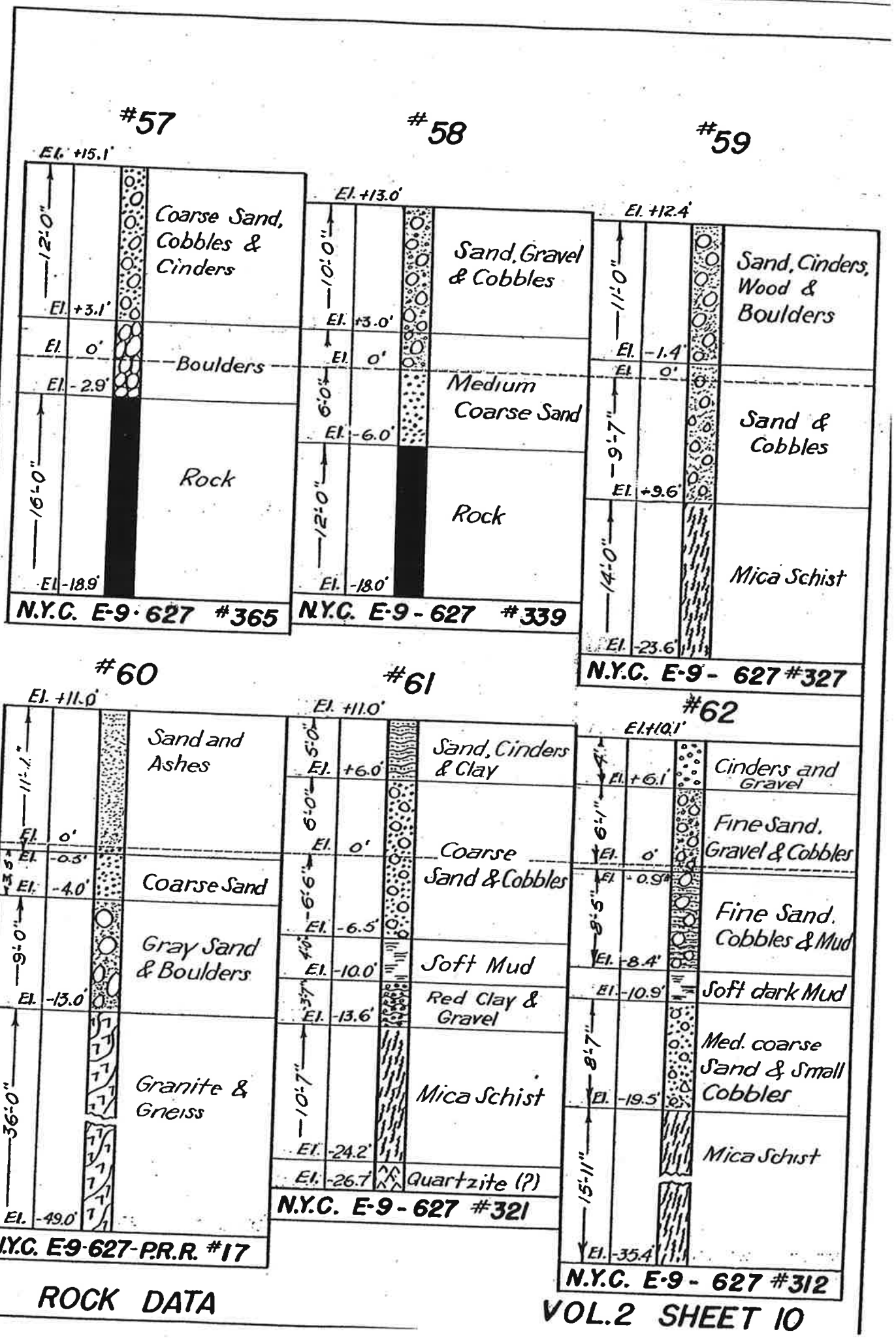


ROCK DATA

VOL. 2 SH. 10

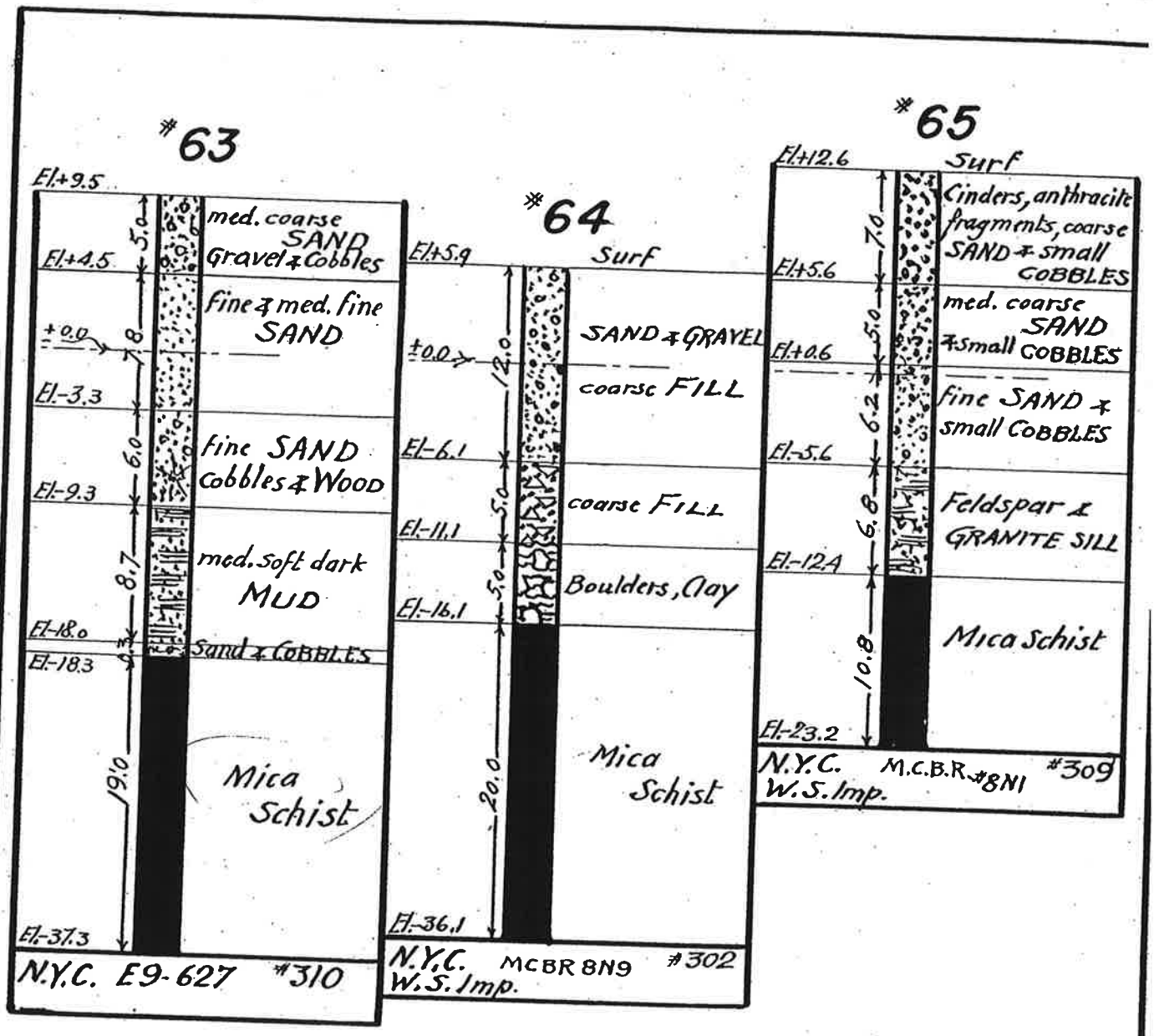

#45
El.+9.0
0 to 7
13.0'
Coorse Sand Cinders Cobbles & Wood
El.-4.0
10.0'
Medium Coarse Sand & Cobbles
El.-14.0
15.8'
Gray Clay Mud & Cobbles
El.-29.8
13.7'
Schist
El.-43.5
N.Y.C W.S. Imp.
#313
#46
El.+9.3
5.0'
Earth & Gravel
El.+4.3
0 to 7'
12.0'
Sand Cinders & Small Cobbles
El.-7.7'
5.5'
Fine Sand & Cobbles
El.-13.2
10.7'
Soft Dark Mud
El.-23.9
1.8'
Sand & Cobbles
El.-25.7
6.2'
Red Clay Gravel & Cobbles
El.-31.9
12.8'
Mica Schist
El.-44.7
N.Y.C W.S. Imp.
#322
#47
El.+10.0
0 to 7.
27.5'
Cinders, Ashes
El.-17.5
4.0'
Sand
El.-21.5
20.0'
Feldspor Quortz
El.-41.5
P.R.R. N.Y.C.-W.S.Imp.
#18
#48
El.+18.1
El.+2.1
6.0'
Coarse Sand & Cobbles
0 to 7
13.8'
Cinders & Wood
El.-11.7
7.2'
Soft Dark Mud
El.-18.9
15.0'
Sand & Cobbles, Boulders
El.-33.9
13.0'
Mica Schist & Feldspor
El.-46.9
N.Y.C. W.S.Imp.
#328
#49
El.+11.2
13.0'
Cinders (Soft)
0 to 7
El.-1.8
6.0'
Med. Coarse Sand
El.-7.8
4.5'
Dark River Mud
El.-12.3
1.5'
Sand Cobbles (Hard)
El.-13.8
8.8'
Red Clay Gravel & Cobbles
El.-22.6
14.2
Rock
El.-36.8
N.Y.C W.S.Imp.
#338
#50.
El.+13.0
10.0'
Cinders Coarse Sand & Cobbles
El.+3.0
0 to 7
11.0'
Fine & Coarse Sand & Boulder
El.-8.0
4.0'
River Mud
El.-12.0
2.6'
Fine Sand & Red Clay
El.-14.6
15.0'
Rock
El.-29.6
N.Y.C W.S.Imp.
#364

ROCK DATA

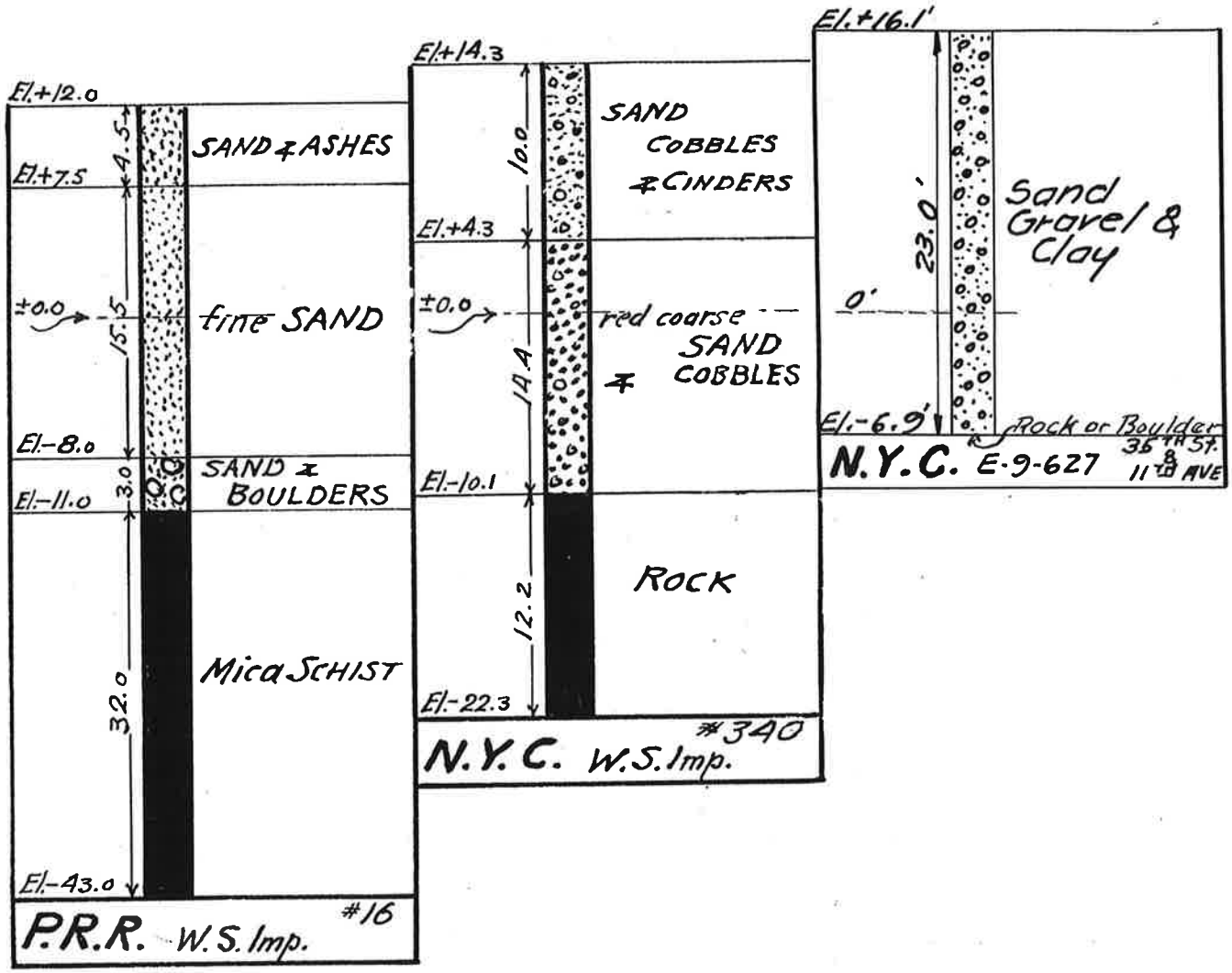


ROCK DATA

VOL. 2 SHEET 10



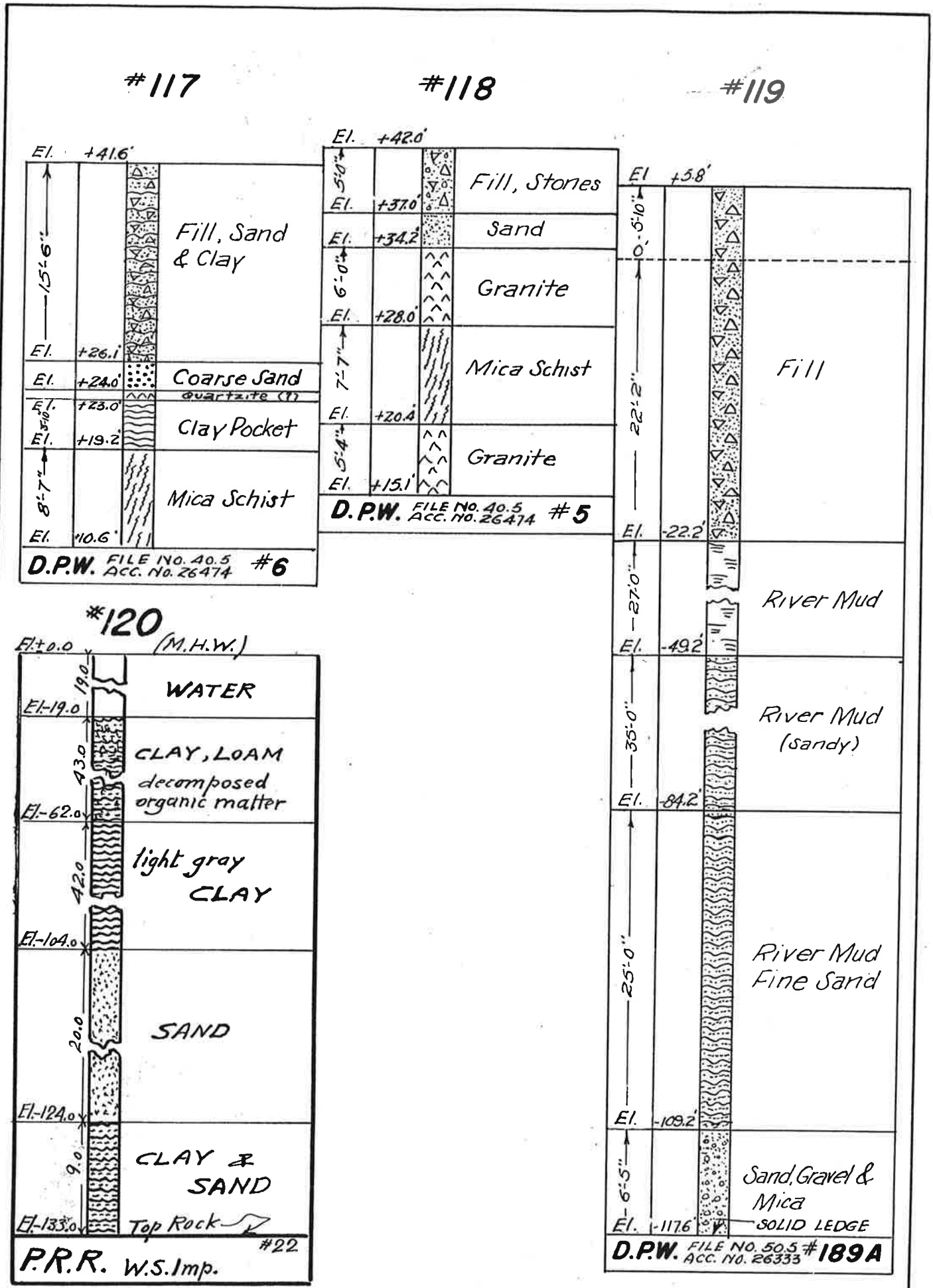
ROCK DATA VOL. 2, SHEET 10



ROCK DATA

VOL. 2 SH. 10

Ch. B 11-19-34



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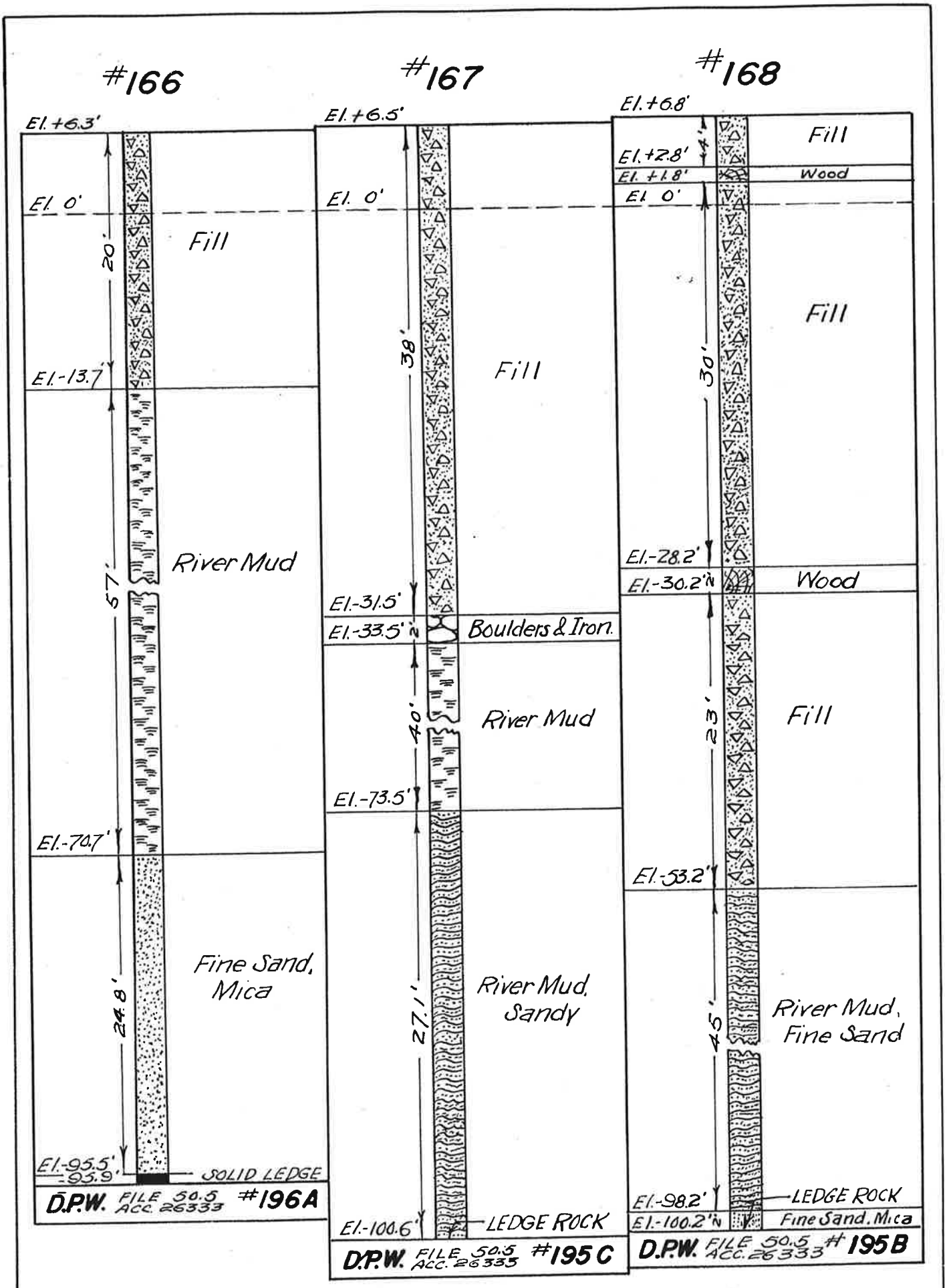
VOL. 2 SHEET 10



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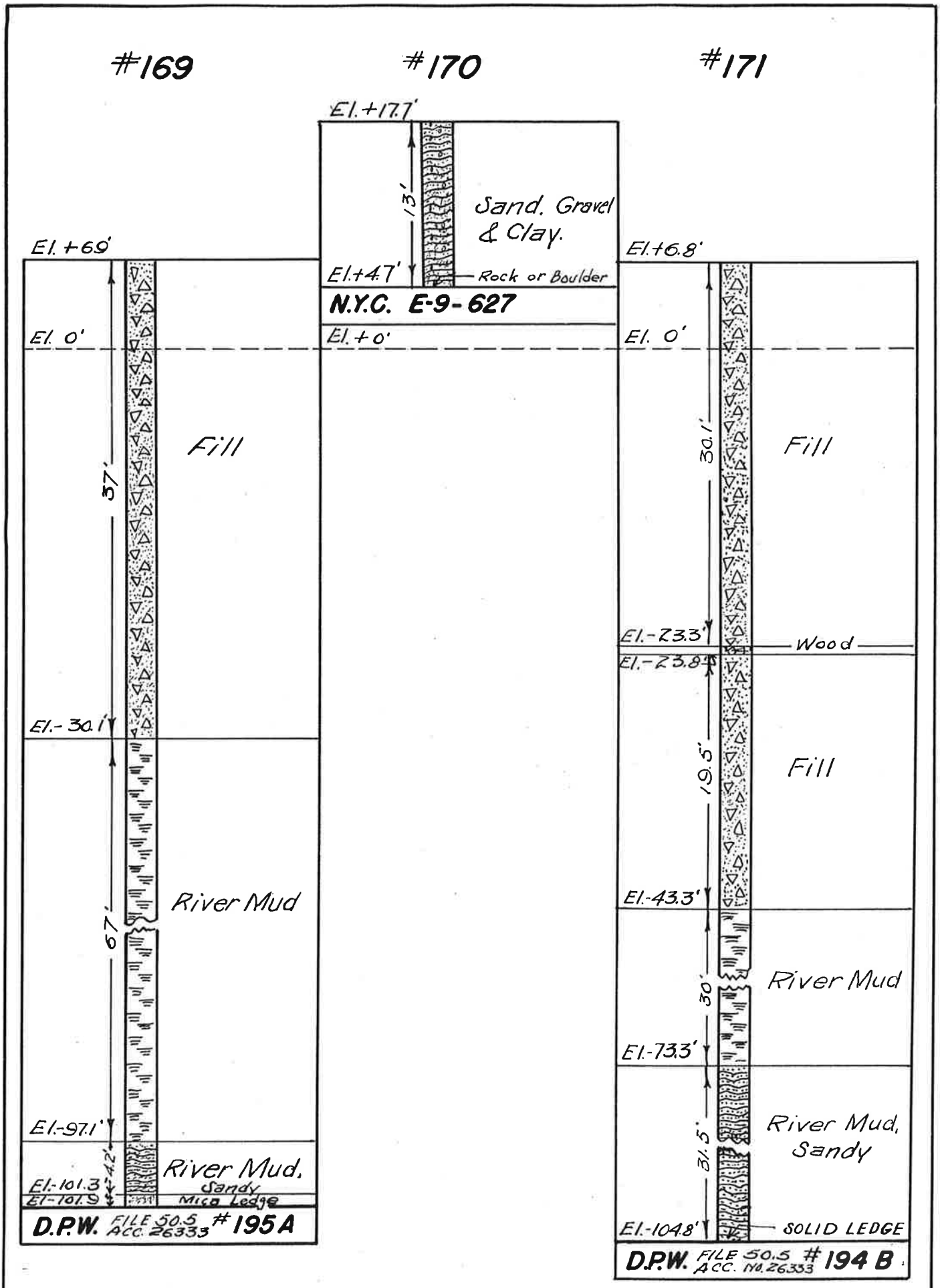
VOL. 2 SHEET 10



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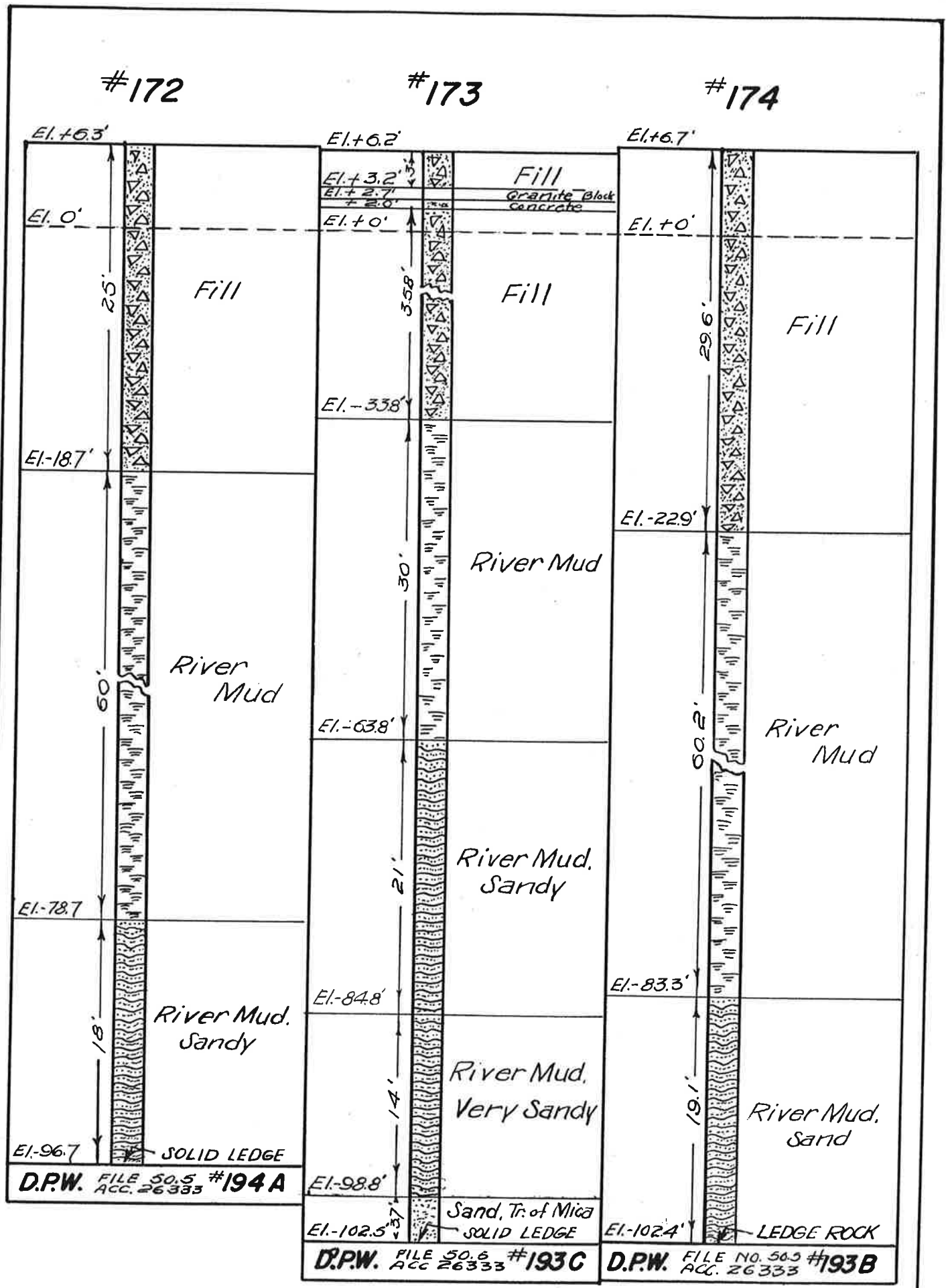
VOL. 2 SHEET 10



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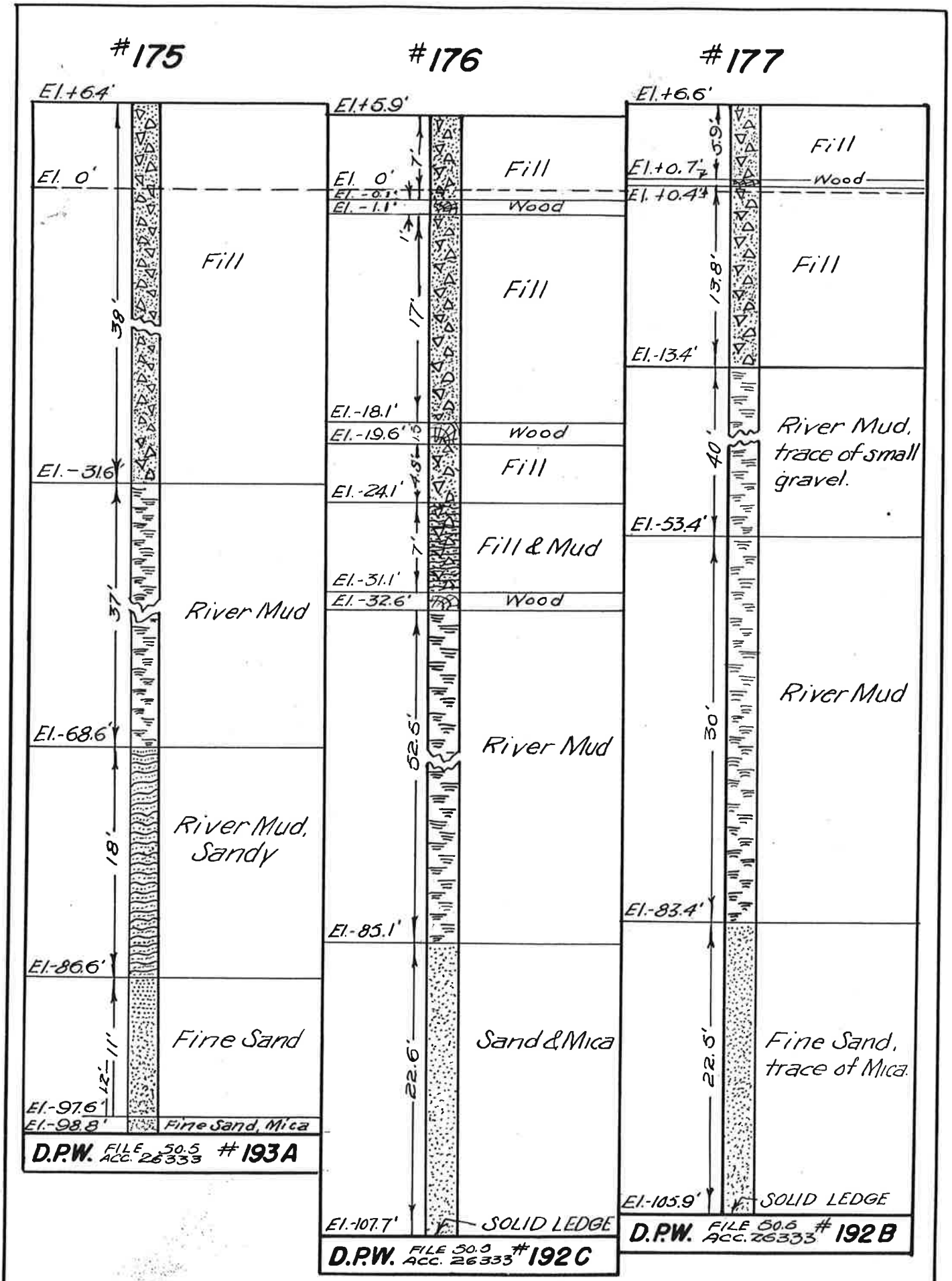
VOL. 2 SHEET 10



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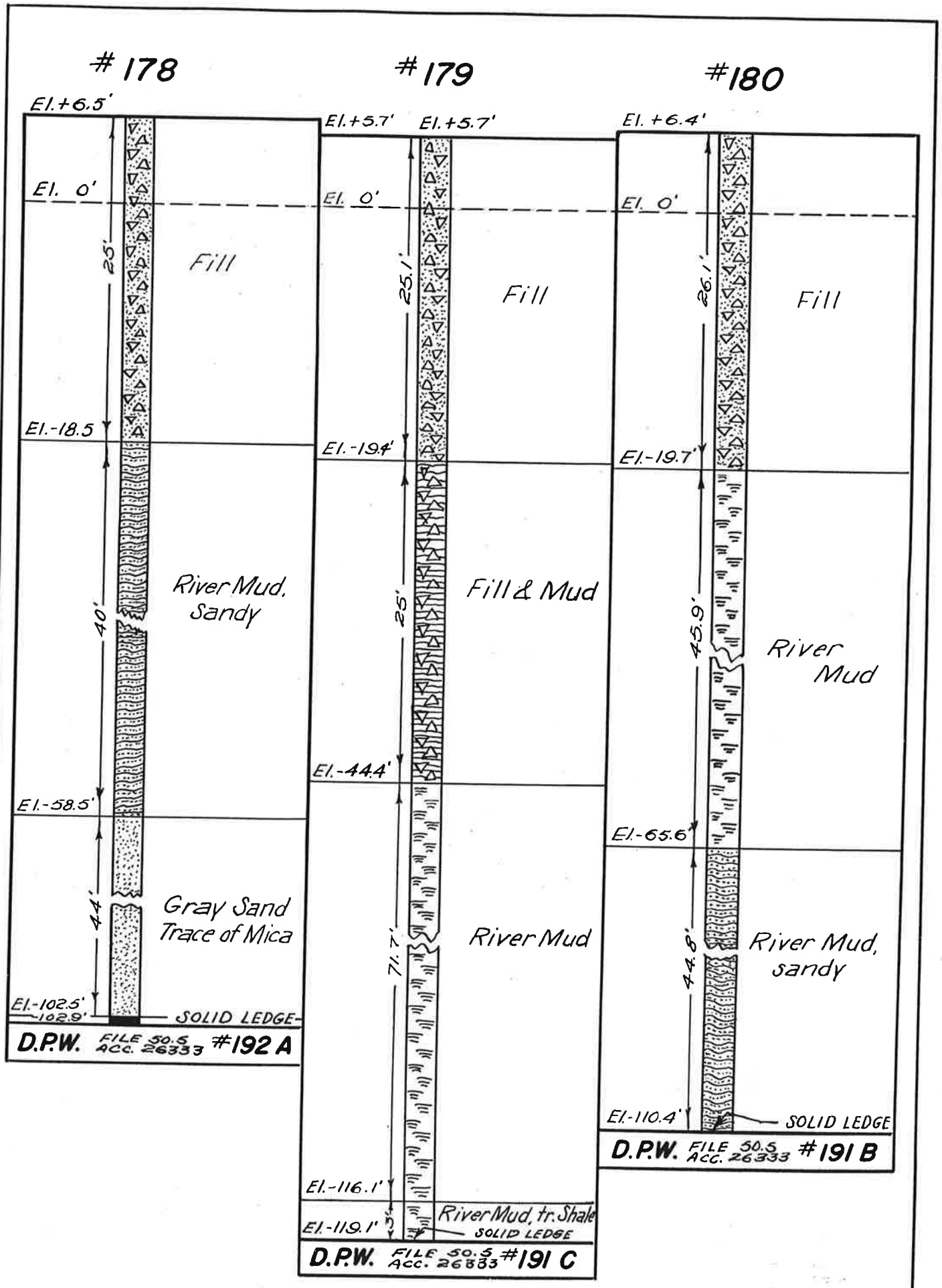

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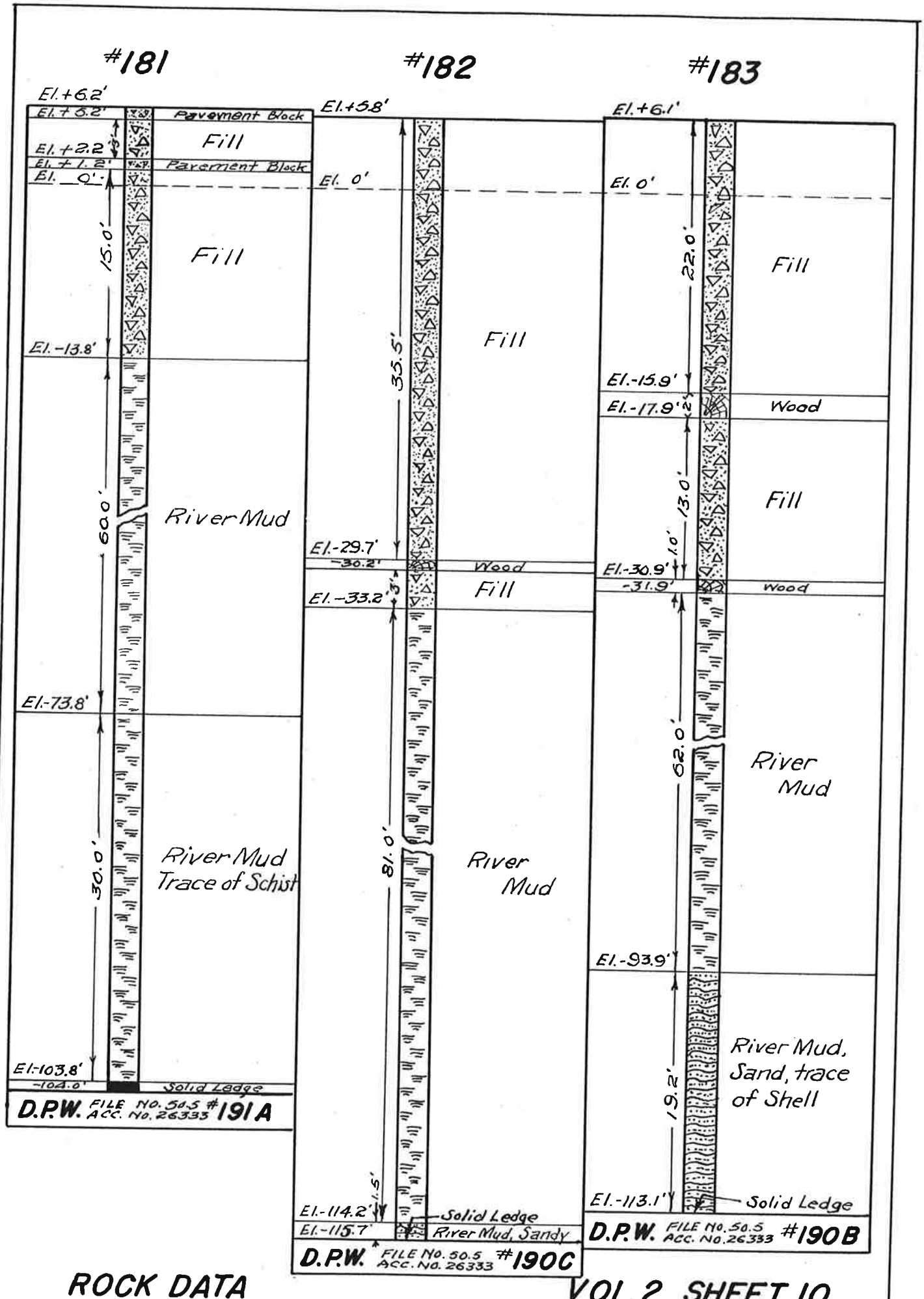

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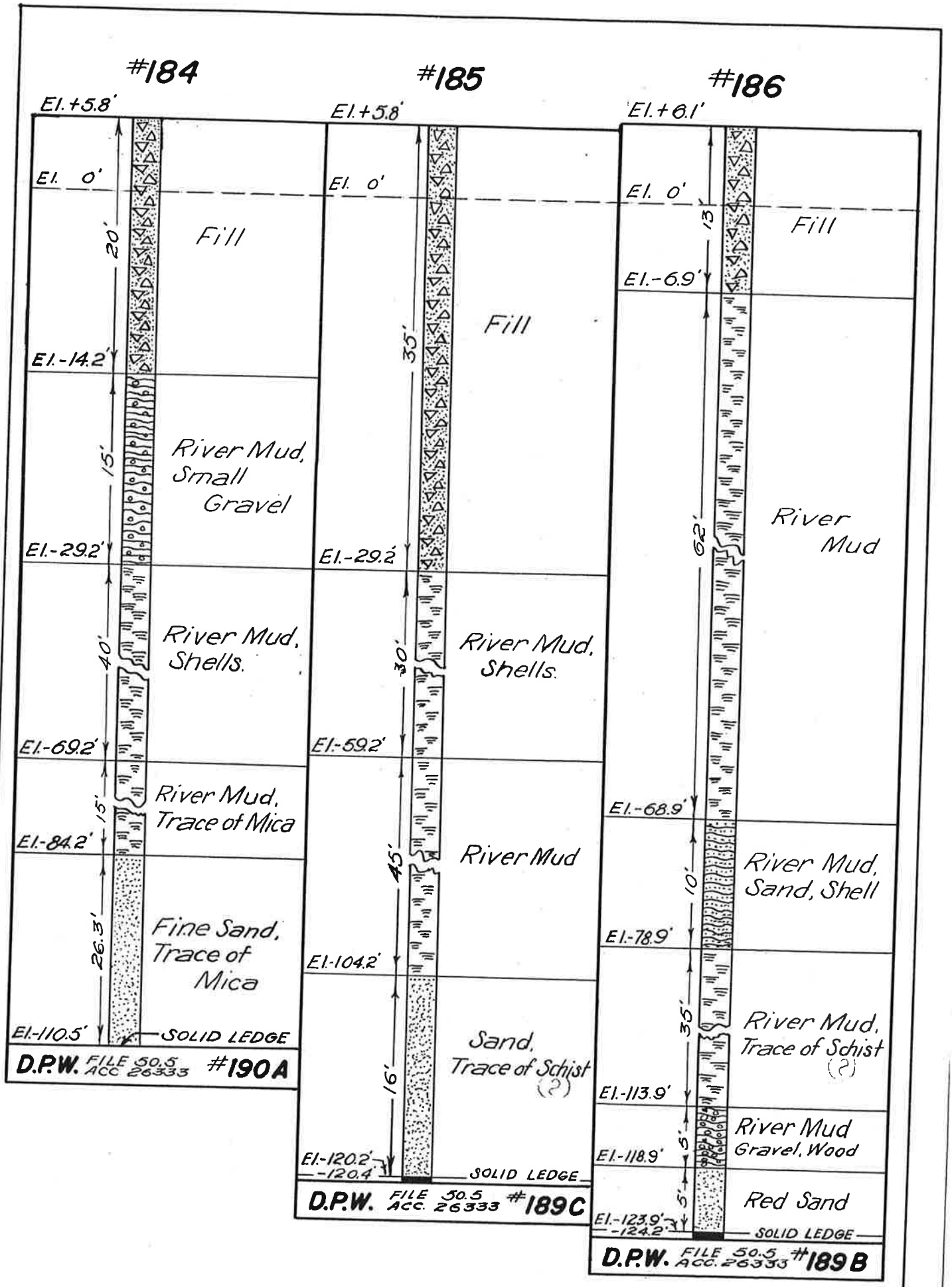

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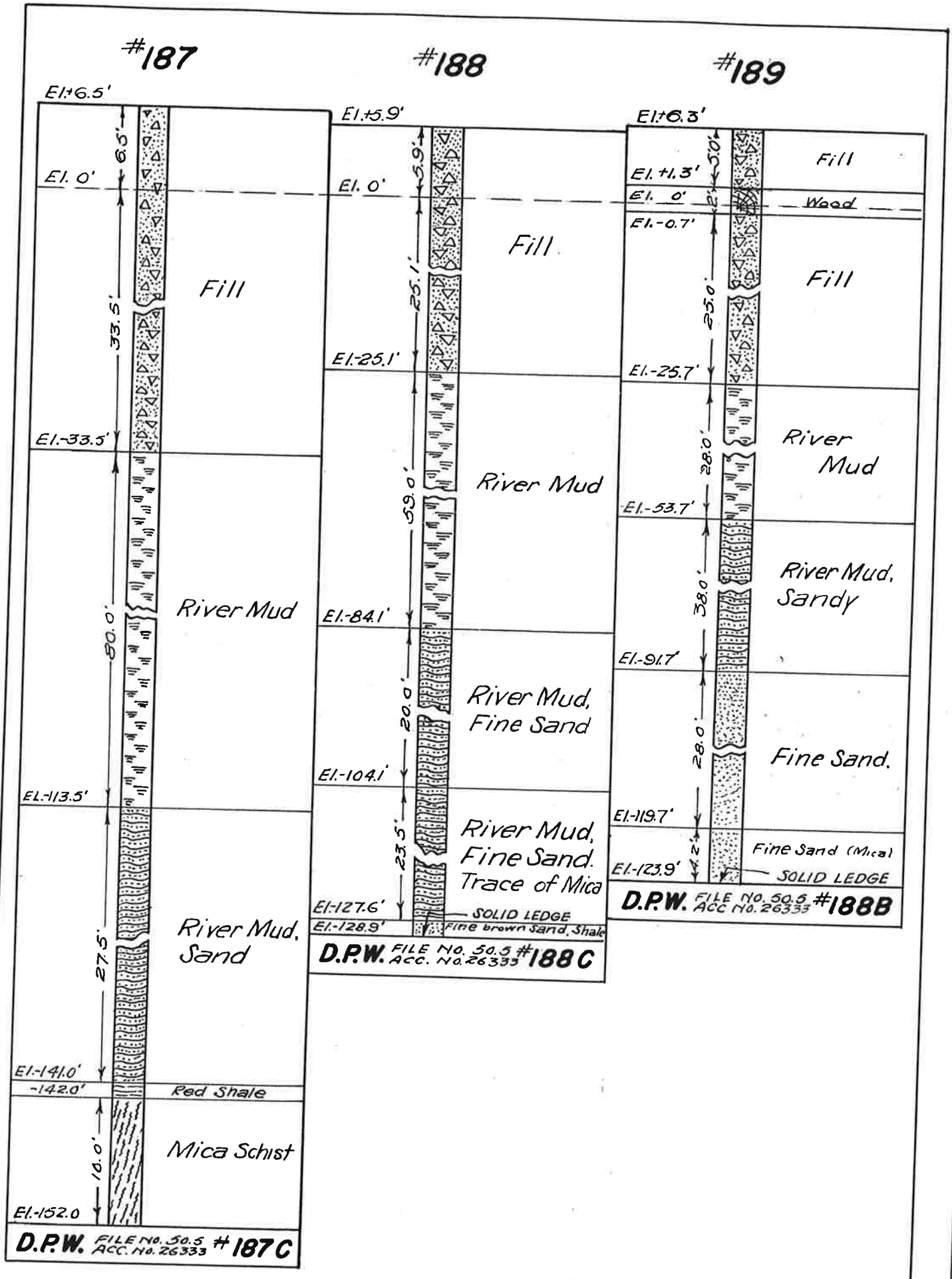
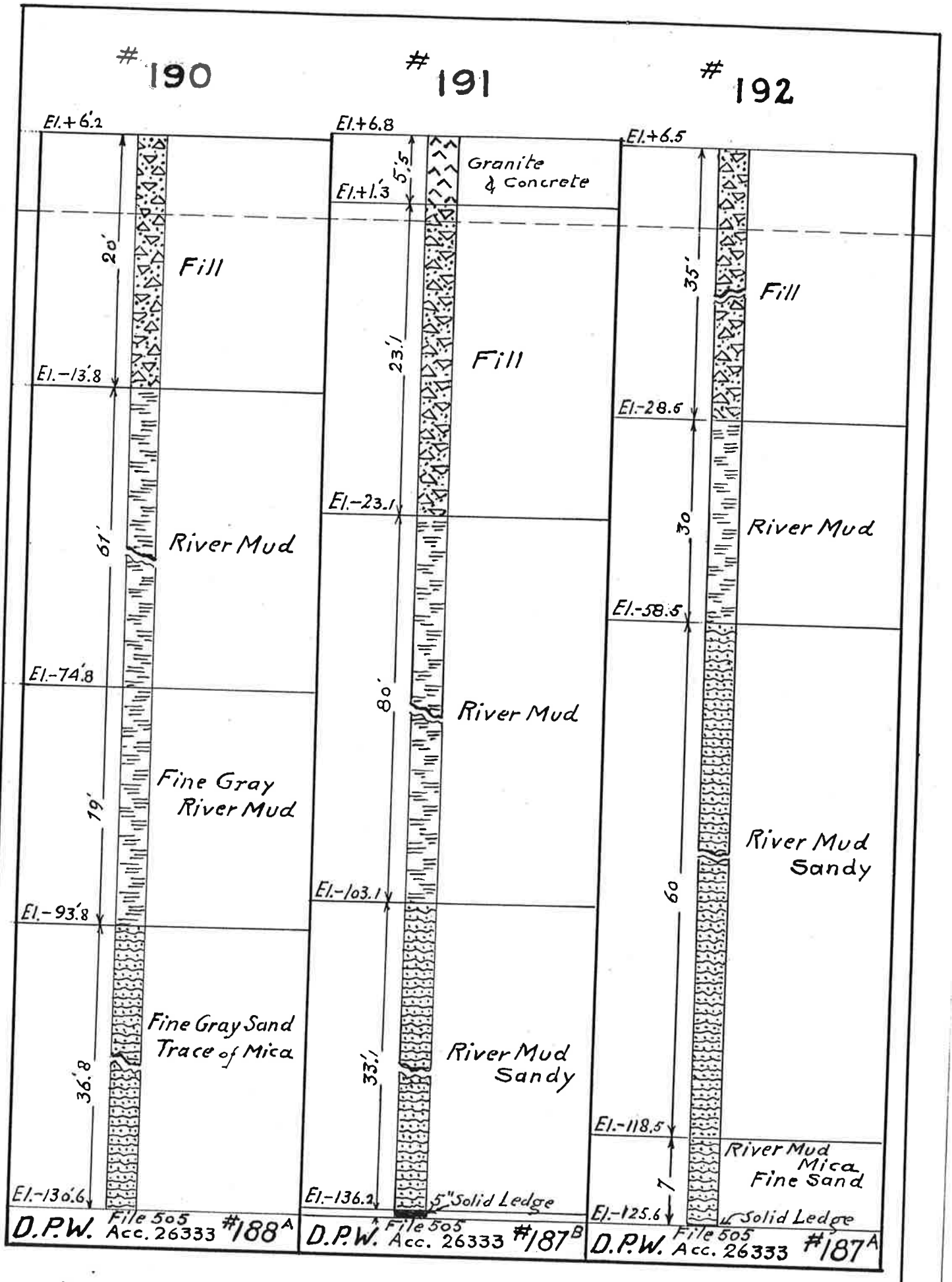
VOL.2 SHEET 10



ROCK DATA

VOL. 2 SHEET 10



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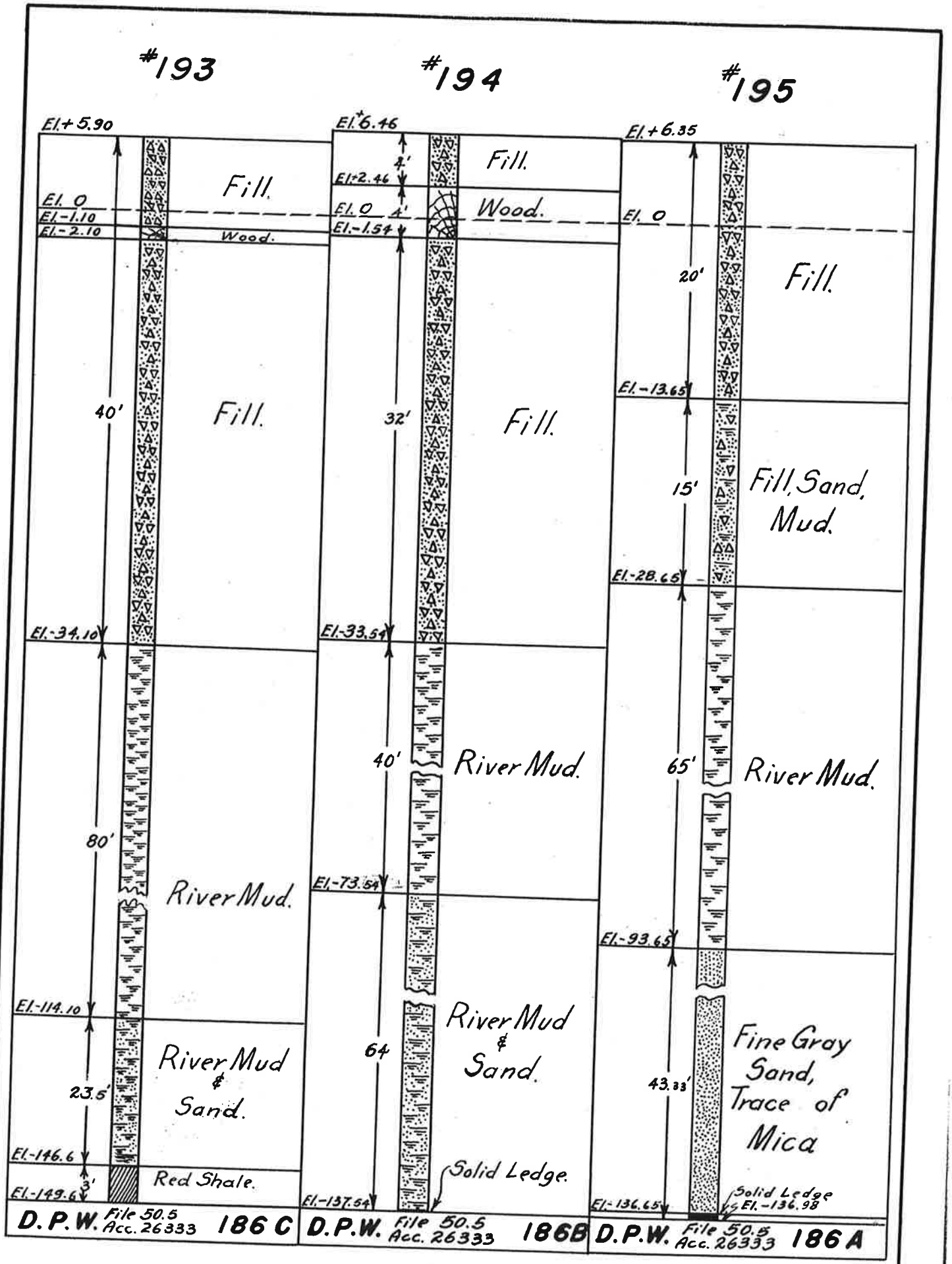
VOL. 2 SHEET 10.



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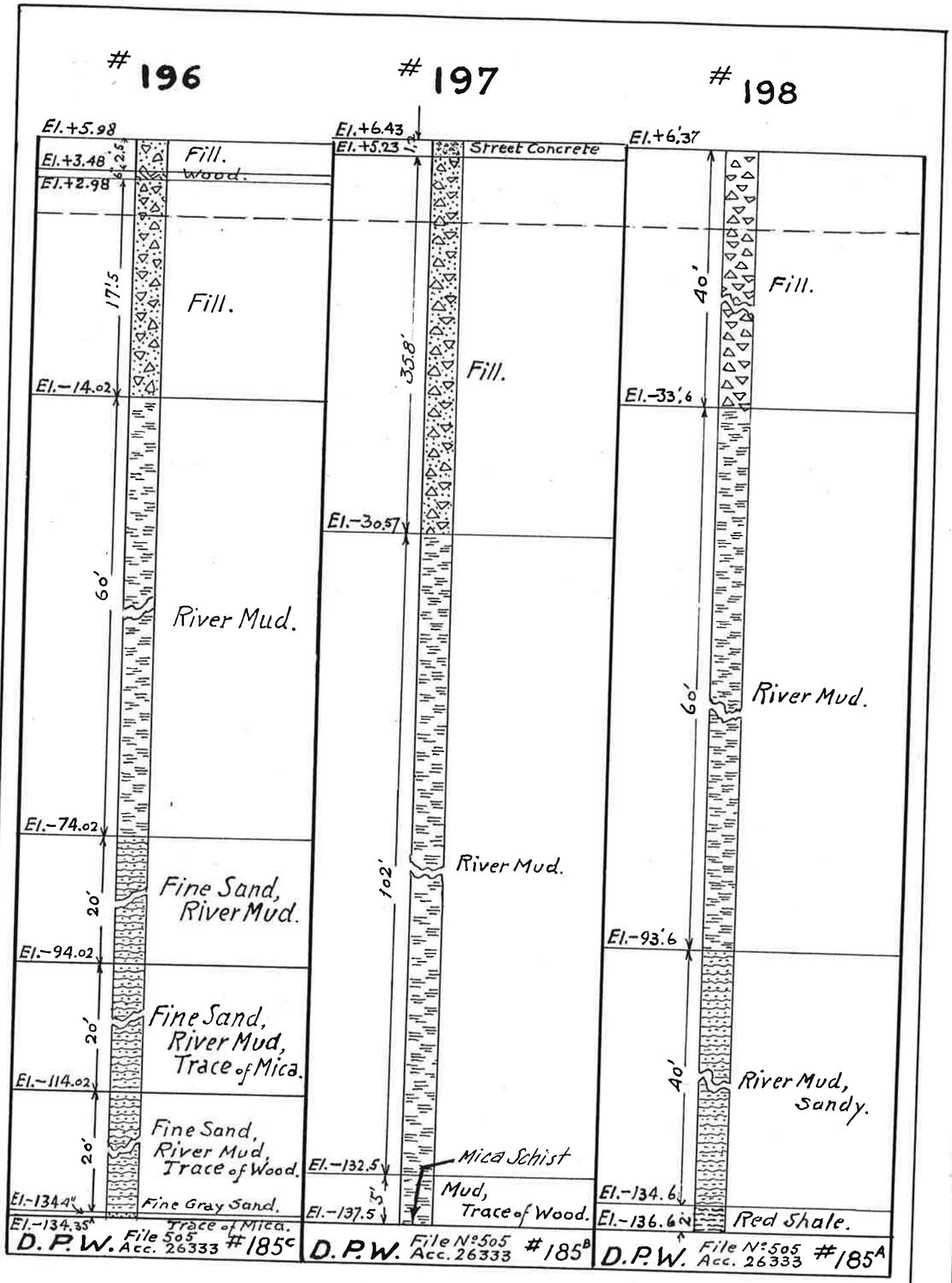

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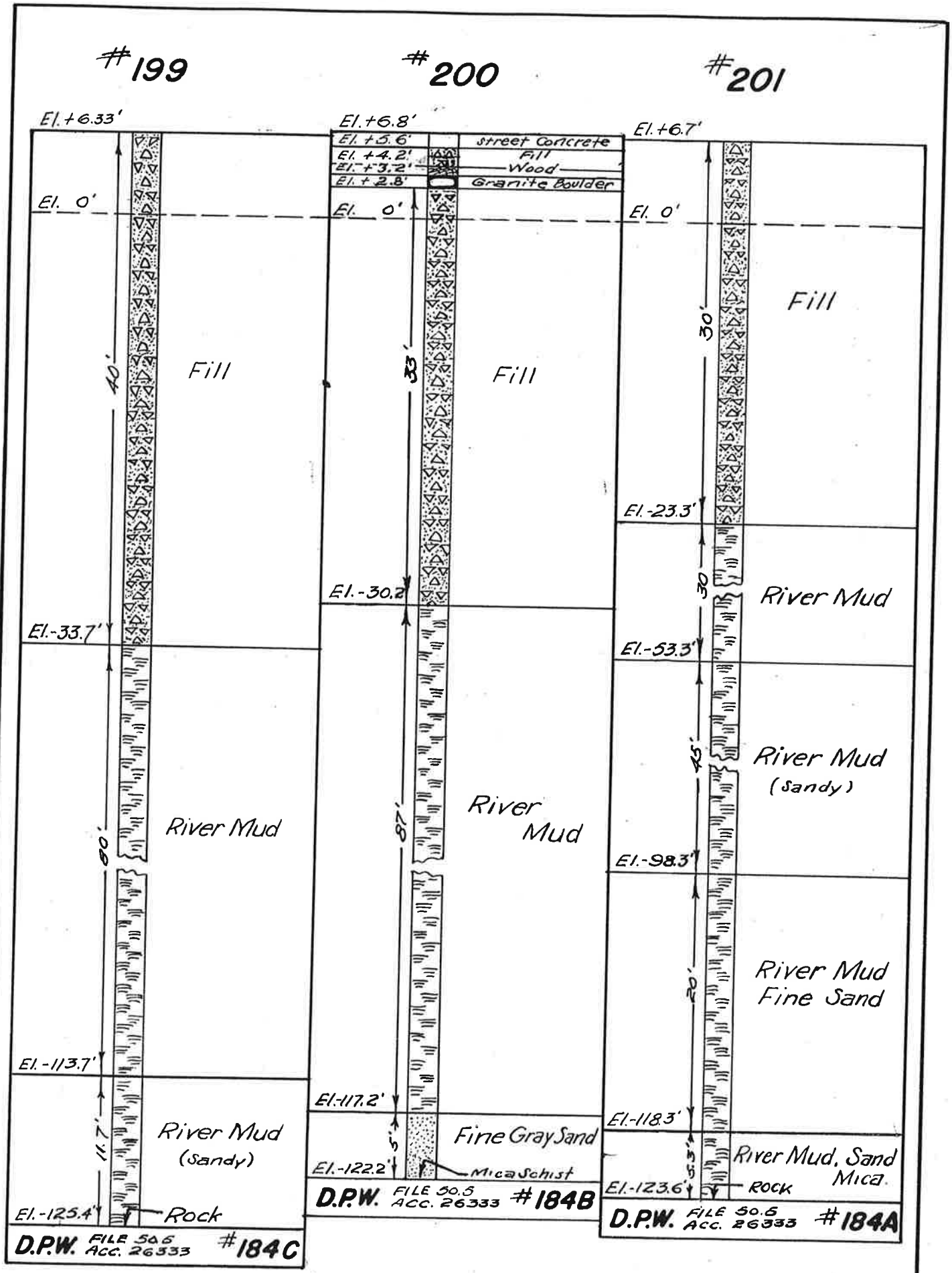

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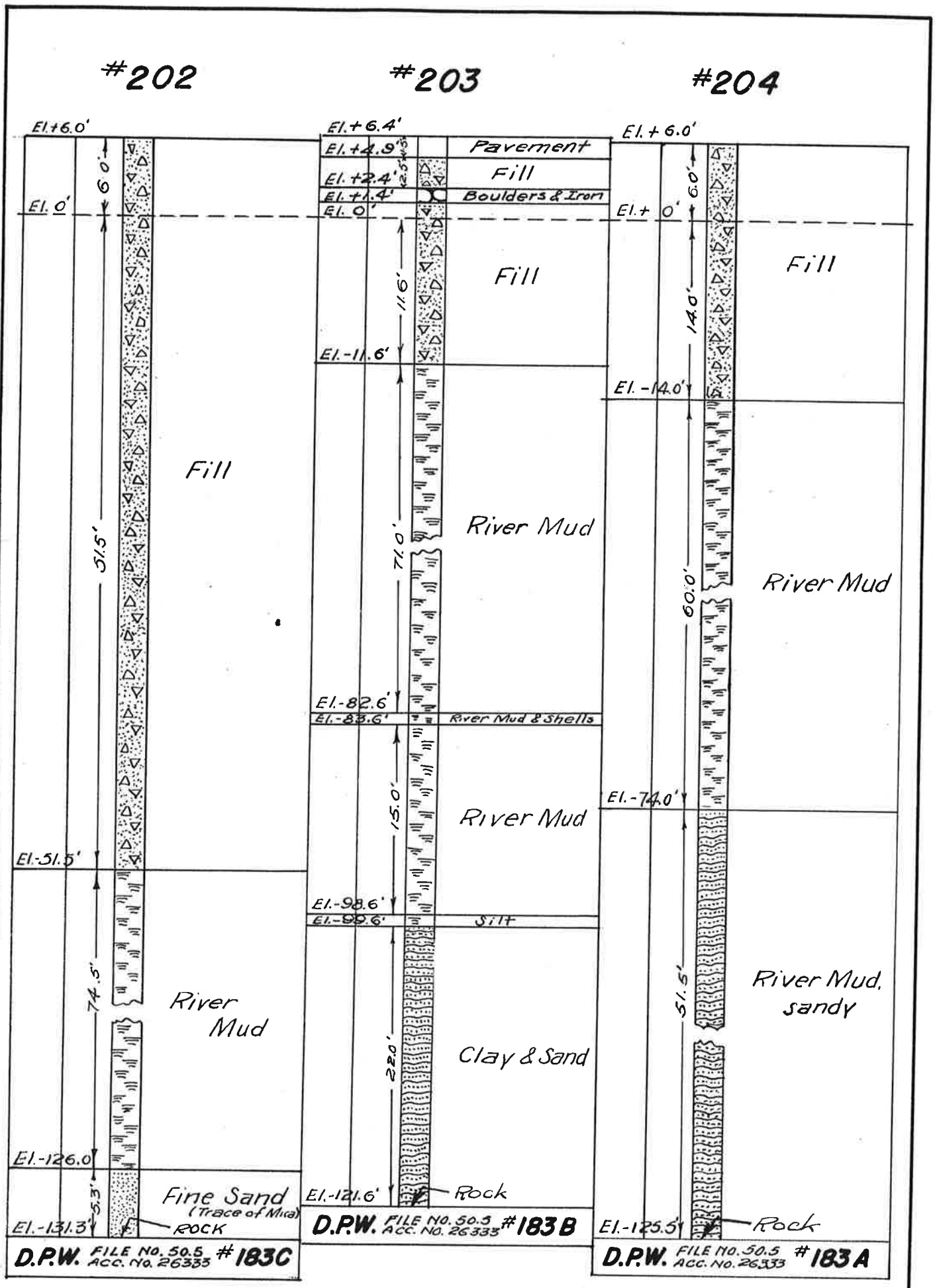
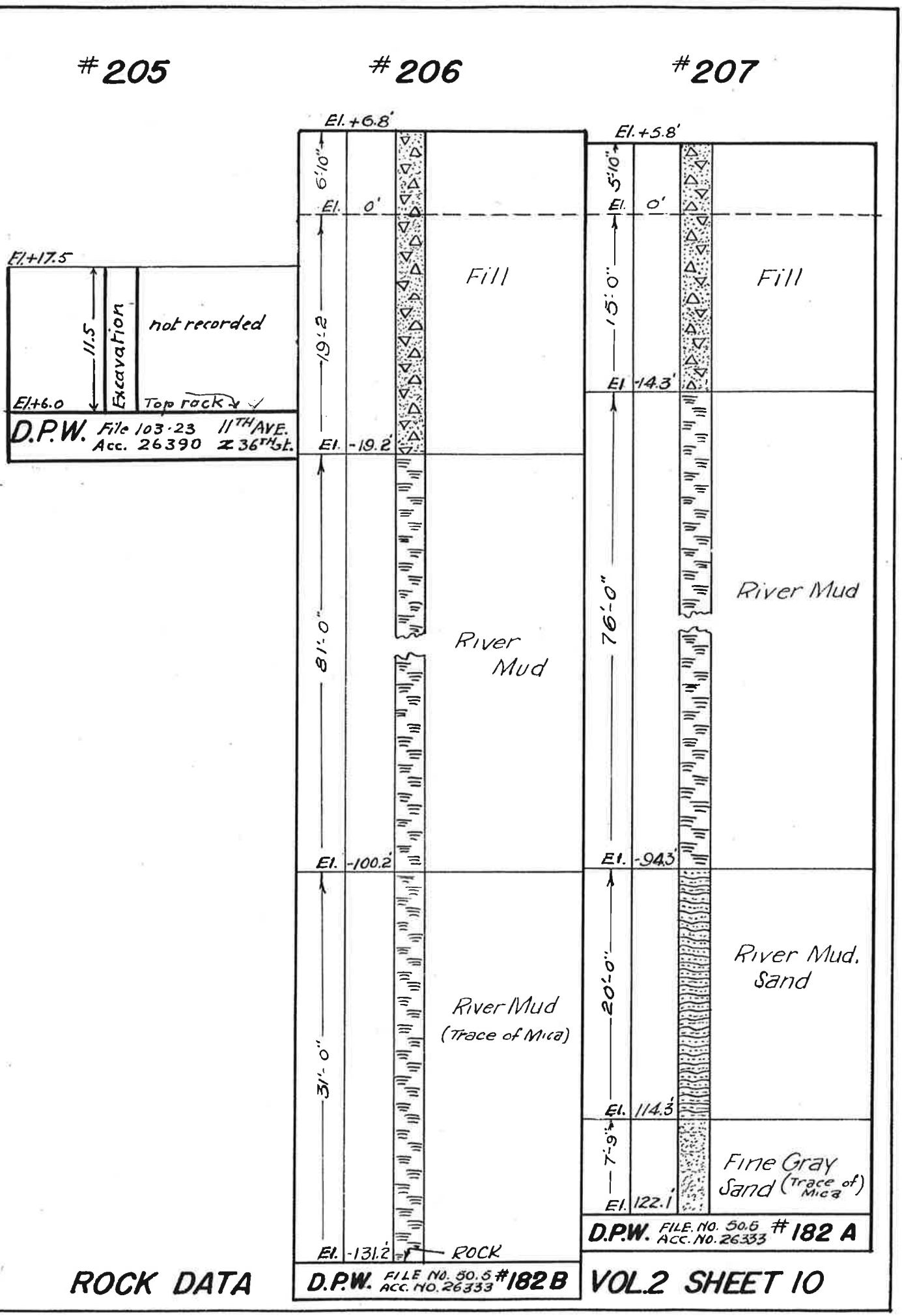
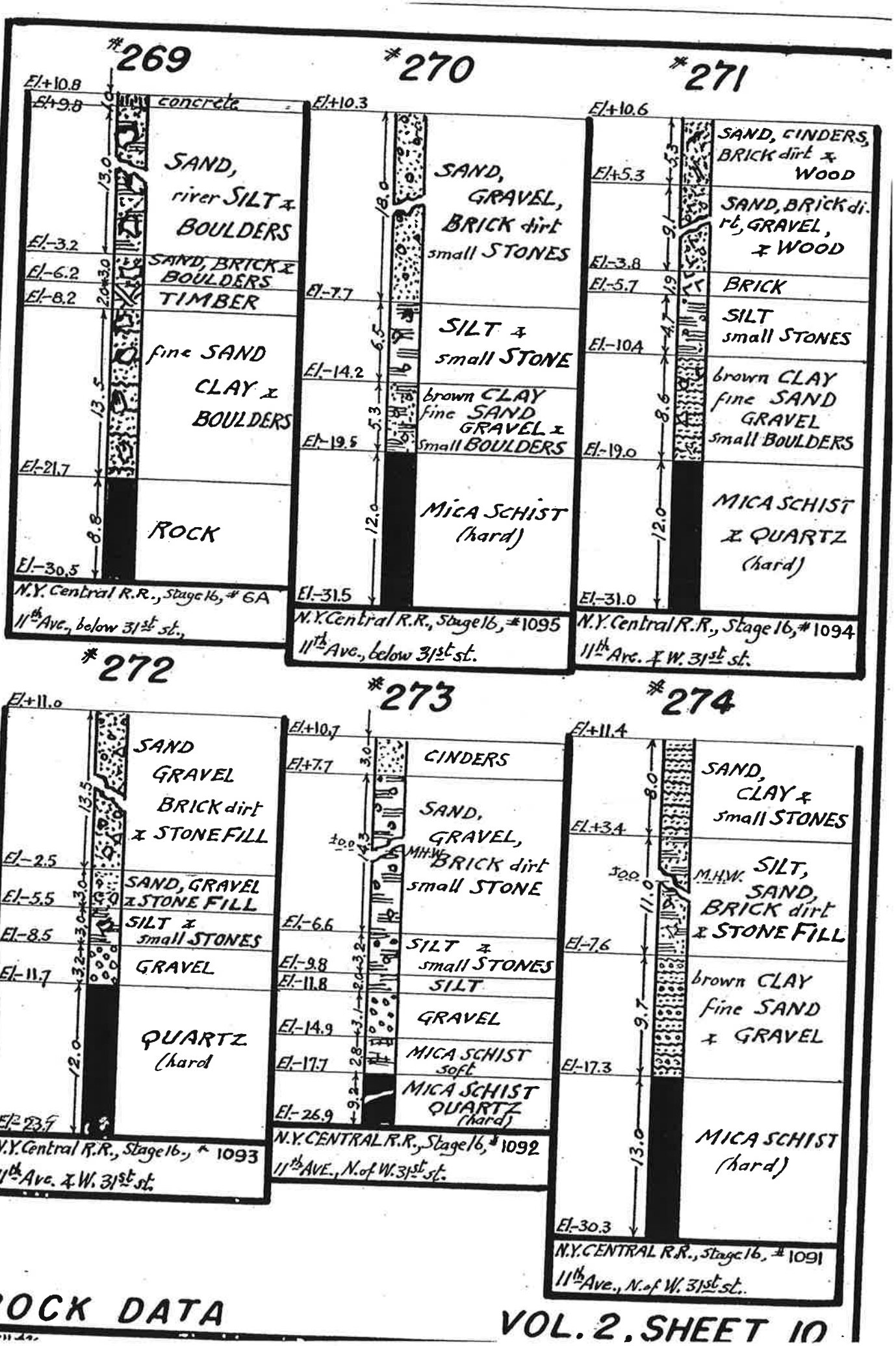


ROCK DATA

VOL. 2 SHEET 10


#205
#206
#207
El. +17.5
11.5
Excavation
not recorded
El. +6.0
Top rock
D.P.W. File 103-23 11TH AVE. Acc. 26390 & 36TH St.
El. +6.8'
6'-10"
El. 0'
19'-2"
El. -19.2'
Fill
81'-0"
El. -100.2'
River Mud
31'-0"
El. -131.2'
River Mud (Trace of Mica)
ROCK
D.P.W. FILE NO. 50.5 ACC. NO. 26333 #182 B
El. +5.8'
5'-10"
El. 0'
15'-0"
El. -14.3'
Fill
76'-0"
El. -94.3'
River Mud
20'-0"
El. 114.3'
River Mud, Sand
7'-9"
El. 122.1'
Fine Gray Sand (Trace of Mica)
D.P.W. FILE NO. 50.6 ACC. NO. 26333 #182 A
ROCK DATA
VOL. 2 SHEET 10



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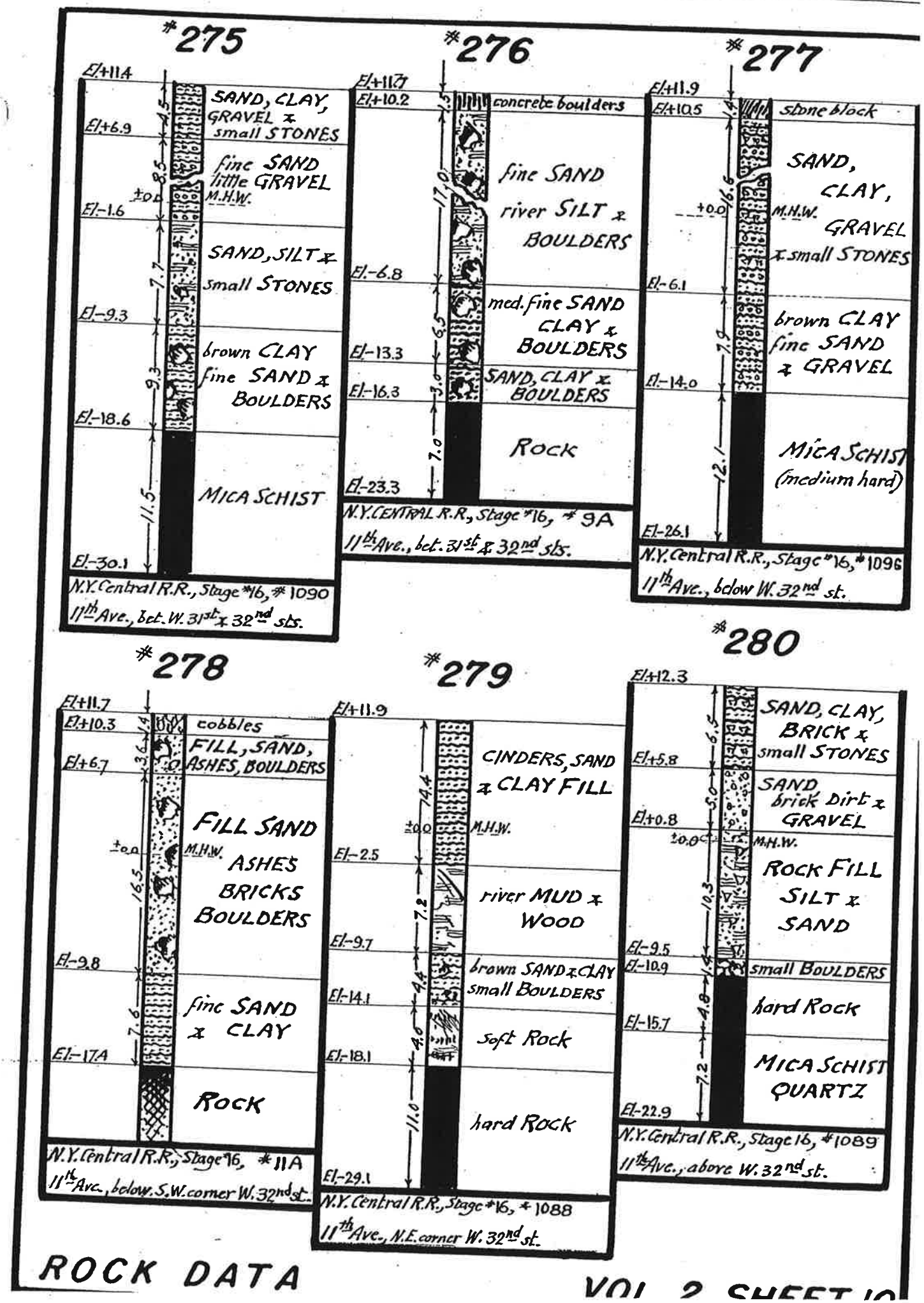
VOL. 2, SHEET 10



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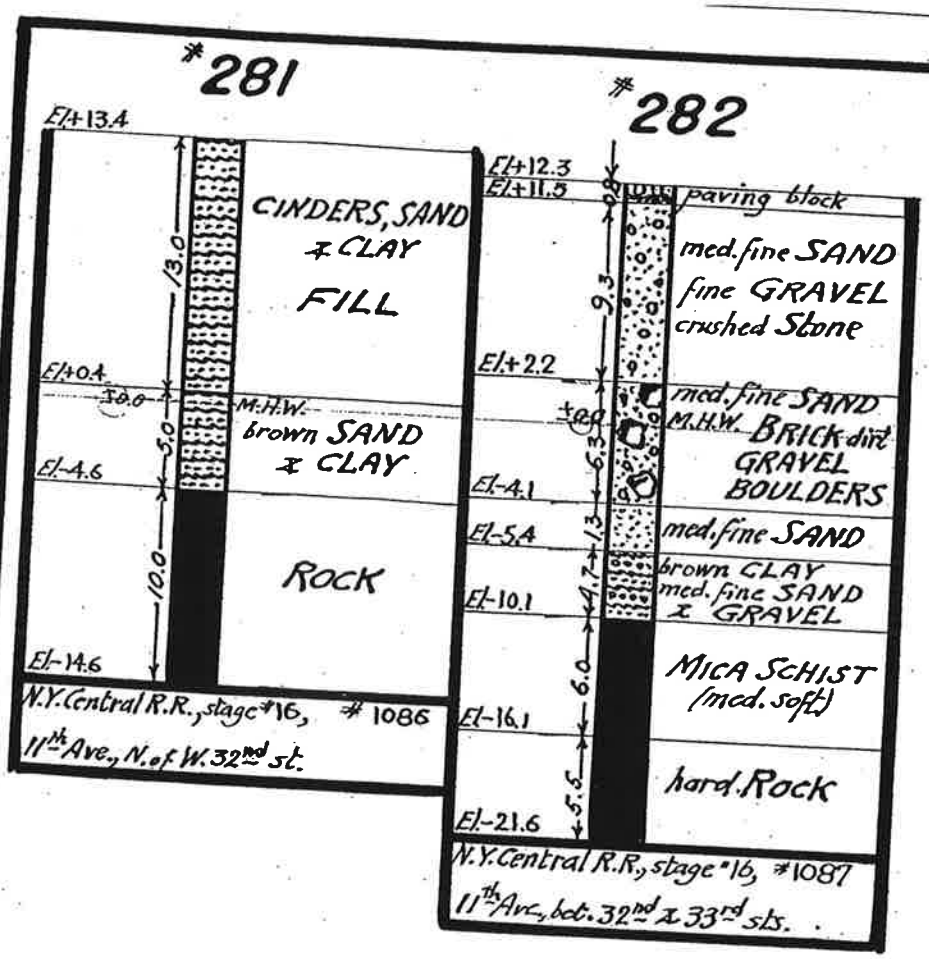
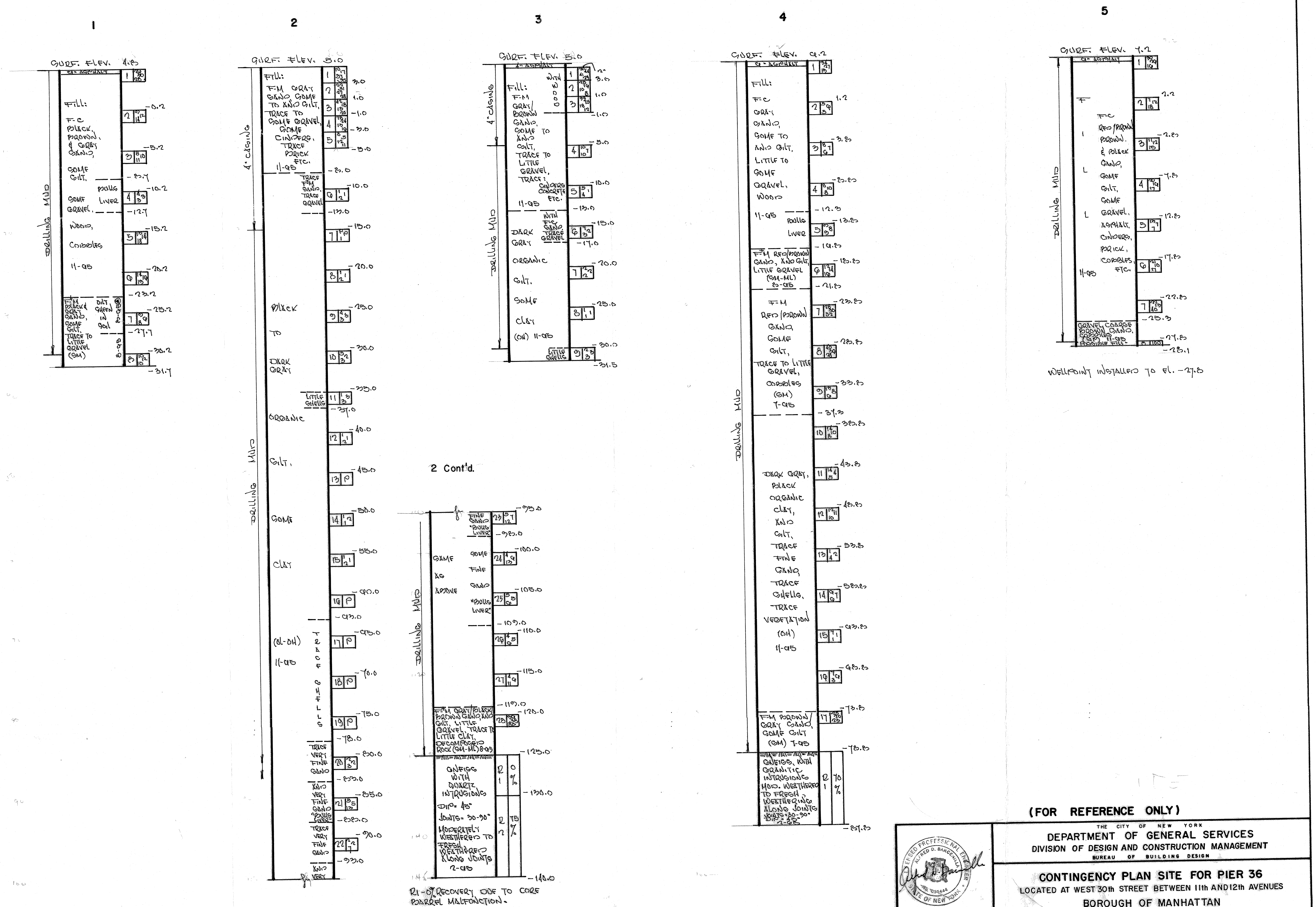
VOL 2 SHEET 10



ROCK DATA

VOL. 2, SHEET 10

MVS 2-11-42



EASI FILE CORP. IRVINE, CA EFH 36

(FOR REFERENCE ONLY)

THE CITY OF NEW YORK
DEPARTMENT OF GENERAL SERVICES
DIVISION OF DESIGN AND CONSTRUCTION MANAGEMENT
BUREAU OF BUILDING DESIGN

CONTINGENCY PLAN SITE FOR PIER 36
LOCATED AT WEST 30th STREET BETWEEN 11th AND 12th AVENUES
BOROUGH OF MANHATTAN

PREPARED BY:
SITE ENGINEERING
SUBSURFACE EXPLORATION SECTION

RE25-001
2500

RECORD OF BORINGS

B- 2

DATE: March 28, 1994 | SCALE: AS SHOWN | SHEET 2 OF 3

LICENSED PROFESSIONAL ENGINEER ALFRED D. BARCENILLA No. 053444 STATE OF NEW YORK

NO.	DATE	DESCRIPTION	APPD.

REVISIONS

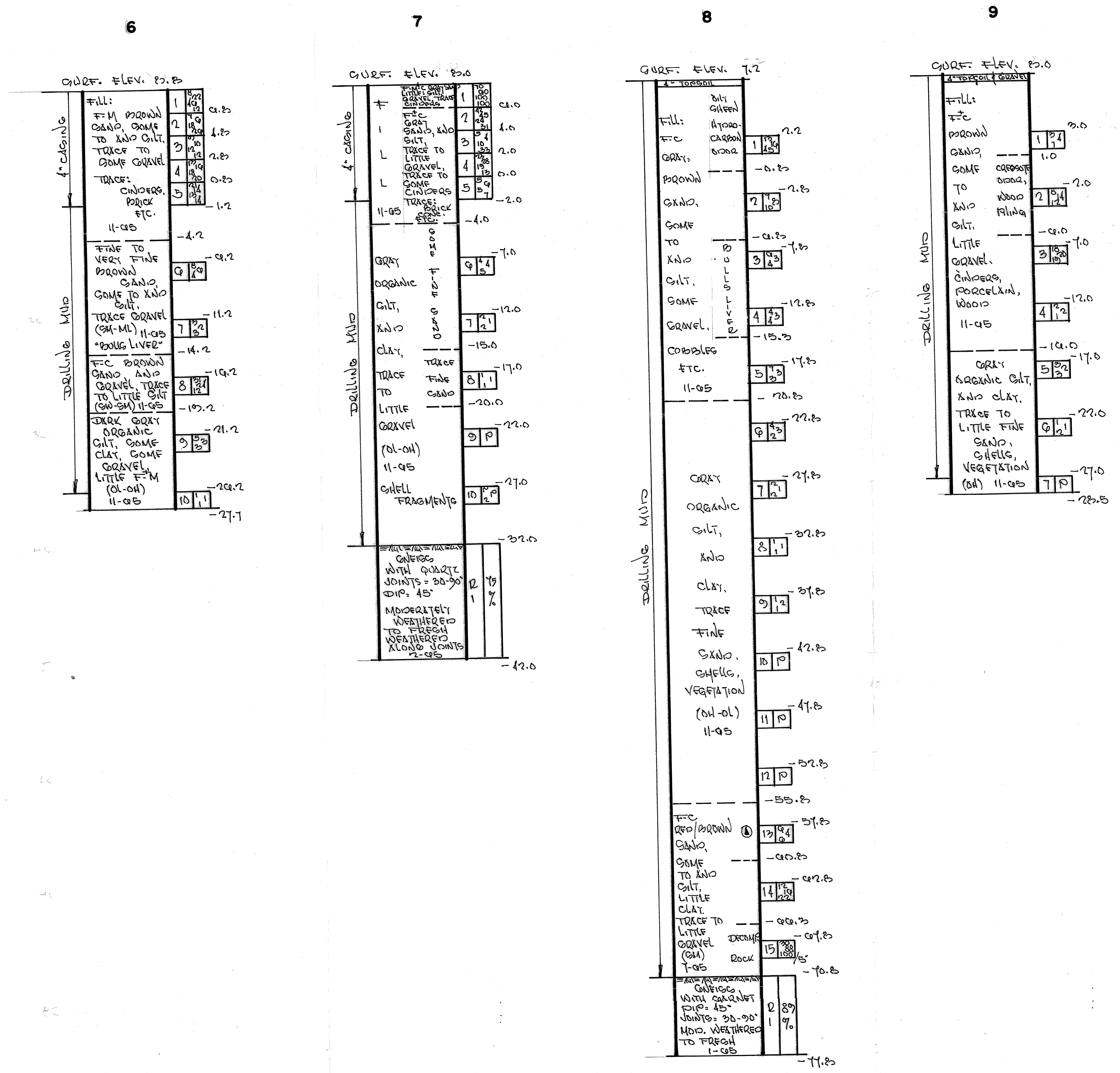
Dr. WEGENER
Ck. M. Greenman
KIRK/SCHWARTZ
SOIL AND ROCK ANALYSIS BY

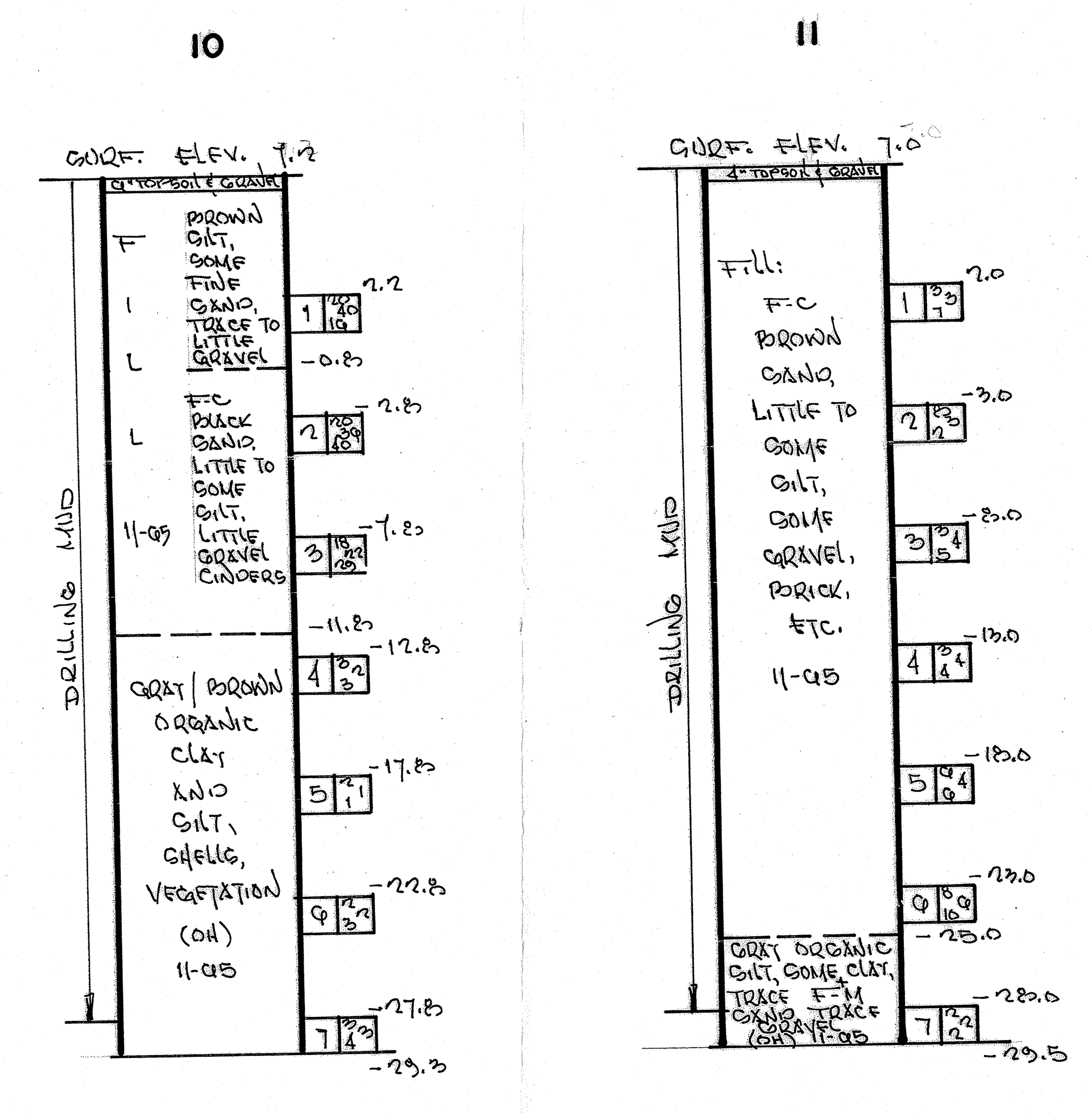
Acting [signature] 3/28/94
CHIEF, SUBSURFACE EXPLORATION SECTION

ALFRED BARCENILLA P.E.& L.S.
ASSISTANT DIRECTOR, BBD

27 X 36

2500





GROUND WATER OBSERVATIONS FOR WELLPOINT #5		
DATE	TIME	ELEV.
3-19-94	11:00 A.M.	2.2
3-21-94	10:00 A.M.	0.2
3-24-94	1:00 P.M.	0.7

GROUND WATER MAY BE TIDALLY AFFECTED.

(FOR REFERENCE ONLY)

THE CITY OF NEW YORK
DEPARTMENT OF GENERAL SERVICES
DIVISION OF DESIGN AND CONSTRUCTION MANAGEMENT
BUREAU OF BUILDING DESIGN

CONTINGENCY PLAN SITE FOR PIER 36
LOCATED AT WEST 30th STREET BETWEEN 11th AND 12th AVENUES
BOROUGH OF MANHATTAN

PREPARED BY:
SITE ENGINEERING
SUBSURFACE EXPLORATION SECTION

RE25-001
2500

RECORD OF BORINGS | B-3

DATE: MARCH 28, 1994 | SCALE: AS SHOWN | SHEET 3 OF 3

NO.	DATE	DESCRIPTION	APPD.
		REVISIONS	

Dr. WEGENER
Ck. M. Greenman
KOKK, SCHWARTZ
SOIL AND ROCK ANALYSIS BY

Acting CHIEF, SUBSURFACE EXPLORATION SECTION 3/28/94

ALFRED BARCENILLA P.E. & L.S.
ASSISTANT, DIRECTOR, BBD

27 X 36

2500

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-206w**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deighart**
INSPECTOR: **C. Burzynski**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-55**

LOCATION: **DEP Tunnel-30th & 11th Ave**
COORD. **N: 213,804.1** **E: 983,369.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **110.0 feet**
DATUM:
START DATE: **6/20/05** TIME: **6:00 am**
FINISH DATE: **6/29/05** TIME: **3:00 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S	U	P	G	C
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
6/27/05	6:00 am	12.0	24.5	113.9

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 6.0							Hand		Auger			Hand Augered 0' to 6'. Brown c-f SAND, some Clayey Silt, some c-f Gravel, (stone and brick), trace of debris(plastic)(FILL), dry. NOTE: Installed a 4" diameter casing 0' to 4'.
5			S	1		6.0 - 8.0	10	21	76	53	14							Gray c-f GRAVEL (stone and brick), some c-f Sand, little Clayey Silt, (FILL), moist.
			S	2		8.0 - 10.0	15	7	6	9	6							Same as above, moist. NOTE: Installed 4" casing from 4' to 9'.
10			S	3		10.0 - 12.0	4	6	16	9	9							Gray and brown c-f SAND, some Silt, little m-f Gravel (stone and brick fragments) (FILL), moist. NOTE: Installed 4" casing 9' to 14'.
15			S	4		15.0 - 17.0	18	11	WOH	WOH	20							S-4A 15.0 to 17.0': (Top 8") (FILL), wet. S-4B- Bottom 12": Black elastic Silty CLAY, little m-f Sand, little roots and wood, wet, slightly organic (MH) Notes: 1) Black wash 16' to 19' 2) Installed 4"casing 14 to 19'.
20			S	5		20.0 - 22.0	20	23	16	14	12							S-5A :(top 6") Dark Gray c-f Gravel, little m-f Sand, little Clay & Silt. S-5B:(bottom 6") Red brown f SAND, little Silt & Clay NOTE: Installed 4" casing 19' to 24'.
			S	6		24.0 - 24.0	100-0										24.8	No Recovery.

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-206w**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deighart**
INSPECTOR: **C. Burzynski**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME-55**

LOCATION: **DEP Tunnel-30th & 11th Ave**
COORD. **N: 213,804.1** **E: 983,369.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **110.0 feet**
DATUM:
START DATE: **6/20/05** TIME: **6:00 am**
FINISH DATE: **6/29/05** TIME: **3:00 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
6/27/05	6:00 am	12.0	24.5	113.9

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						Dark gray to black SCHIST; c-f grains of biotite, quartz, feldspar, muscovite; close to moderate fracture spacing; medium strong to strong; slightly weathered; foliation defined by distinct, wavy schistosity and contorted bands of quartz; foliation dips 40° to 70°; granite/pegmatite with irregular contacts with biotite concentrations from 27.7' to 28.7', near vertical; wavy core sides in schist.	II	R3/R4	30_{MB}	-	-	25.9
									*80	1.5	2.0	27.7
									*70	2.0	2.0	28.2
									*45	1.5	1.0	28.7
									15	1.5	1.0	28.8
30												
		C-1 24.8 - 30.0	62	100	97							
						C-2: 30.0' to 31.4' Dark gray to black SCHIST, as above.	II	R3/R4	5	1.5	1.0	28.9
									20	1.5	1.0	29.4
						31.4 to 35.4': Light to medium gray GRANITE; fine to medium grains of feldspar, quartz, muscovite, sparse black mafic minerals; wide fracture spacing; slightly weathered to unweathered; strong to very strong; contacts with overlying schist is intact, dipping 80° with concentrations of quartz and mica.	I/II	R4/R5	10_{MB}	-	-	30
									10	1.5	1.0	30.8
		C-2 30.0 - 35.4	65	100	100				20	2.0	1.0	31.4
									30	3.0	1.0	32.1
35												
						C-3: 35.4' to 40.5' Medium gray GRANITE; m-f grains of feldspar, quartz, muscovite, sparse black mafic minerals; becoming coarse grained from 39.7' to 40.5'; wide fracture spacing; slightly weathered; strong; faint banding dipping ~80°;	II/I	R4	40	2.0	1.0	35.3
									0_{MB}	-	-	35.4
						40.5' to 45.5: Dark gray to black SCHIST; fine to medium grains of biotite, quartz, feldspar, other black mafic minerals; close to very close fracture spacing, with gravel size pieces at 41.7'; slightly weathered; medium strong to strong; contact with overlying granite is intact but weathered, dips 50° parallel to foliation; foliation defined by distinct schistosity dipping 20° to 50°; core side wavy.			5	3.0	1.0	39
									25	2.0	1.0	39.9
40							II	R3	25_{MB}	-	-	40.3
									*40	1.5	2.0	40.6
									*45	1.0	2.0	40.8
		C-3 35.4 - 45.5	121	100	87				*40	1.5	1.0	41.1
									*30	1.5	1.0	41.4
									20	1.5	1.0	41.6
									20	1.5	2.0	41.7
45									0/20	1.5	1.0	42.4
						C-4: Dark gray to black SCHIST; c-f grains of biotite, quartz, feldspar, other mafic minerals, sparse garnet up to 0.1" across; close to moderate fracture spacing; slightly weathered; medium strong to strong; foliation defined by wavy schistosity dipping 30° to 50°; pegmatite breccia in black, fine grained matrix at 54.2'-54.6'; wavy core sides throughout, especially	II	R3/R4	*35	1.5	1.0	43.4
									30_{MB}	-	-	43.8
									10_{MB}	-	-	44.3
									*40	1.5	1.0	45.15
									*30	1.5	1.0	45.4
									20	1.5	1.0	45.5
									5	1.5	1.0	47.3

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-206w**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deighart**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-4 45.5 - 55.2	115	99	97	noticeable 48.0' to 49.0'.			5_{MB}	-	-	47.5
									20_{MB}	-	-	48.8
									0_{MB}	-	-	49.2
									0_{MB}	-	-	50
									5	2.0	1.0	51
									*50	1.5	1.0	51.6
									*50	2.0	1.0	51.7
									30_{MB}	-	-	52.8
55									20_{MB}	-	-	53.8
		C-5 55.2 - 65.2	120	100	98	C-5: Dark gray to blue gray SCHIST; c-f grains of biotite, quartz, feldspar, cyanite (?) a few garnets, up to 0.2" across; becoming fine grained below 61.5'; moderate to wide fracture spacing; slightly weathered; strong; very dense; foliation defined by faint schistosity, becoming distinct below 61.5'; foliation dips 60° to 90°; 0.5"-thick band of quartz-garnet, dipping 60° at 64.8'. 65.0' to 65.2': Light gray, fine grained GRANITE, contact dips 60°, parallel to foliation in overlying schist.	II	R4	*45/5	1.5	1.0	54.3
									40	1.5	4.0	54.8
									*60	1.5	4.0	55.2
									0/30	3.0	1.0	55.9
									30_{MB}	-	-	57.5
60									25	2.0	1.0	58.9
									20_{MB}	-	-	60.2
									40	1.5	2.0	61.1
									10_{MB}	-	-	61.3
									5	2.0	1.0	62.4
									*60	1.0	1.0	63
									30_{MB}	-	-	64.2
65									20	1.5	1.0	64.5
		C-6 65.2 - 75.3	121	100	80	C-6: 65.2' to 66.7' Medium gray GRANITE/PEGMATITE;c-f grains of quartz, feldspar, muscovite; healed breccia in places, with gray quartz matrix; very close fracture spacing; slightly weathered; strong; upper and lower contacts with schist are intact and parallel to foliation; red iron staining at 66.1'. 66.7' to 74.8': Dark gray to blue-gray to black SCHIST; fine to medium grains of biotite, quartz, feldspar; close to moderate fracture spacing; slightly weathered; strong; foliation defined by wavy schistosity and contorted bands of quartz-feldspar; foliation dips 40° to 70°. 74.8' to 75.3': Light gray GRANITE; fine to medium grains of quartz, muscovite, feldspar; moderate fracture spacing; slightly weathered; very strong; coarse grained pegmatite, same composition below 75.0';	II	R4	*40	1.0	2.0	65
									0_{MB}	-	-	65.2
									0	3.0	1.0	65.8
									35	3.0	1.0	66.1
									10	2.0	1.0	66.3
									10	2.0	1.0	66.4
									10	2.0	1.0	66.5
70									*40	2.0	1.0	67.5
									30	2.0	1.0	68.2
									*50	1.5	1.0	68.6
									10	3.0	1.0	68.9
									0_{MB}	-	-	69.5
									50	1.5	1.0	69.8
									30	1.5	1.0	70.2
									40	1.5	1.0	70.4
									*40	1.5	1.0	71.2
75							II	R5	*50	2.0	1.0	72.2
		C-7 75.3 - 79.3	48	100	100	C-7: Salmon-pink to medium gray PEGMATITE; coarse grains of pink feldspar, quartz, sparse muscovite; pink feldspars up to 3" across; moderate fracture spacing; unweathered to slightly weathered; medium strong; red iron staining at 77.4'.	I/II	R3	*60	1.5	2.0	73.3
									*40	1.5	1.0	73.7
									*40	2.0	2.0	74
									*50	1.5	1.0	74.1
									40_{MB}	-	-	74.2
									40_{MB}	-	-	74.8
80						C-8: Medium gray to salmon-pink PEGMATITE; coarse grains of pink and white feldspar, quartz, biotite, muscovite, soft green mineral; feldspar and quartz up to 1" across; books of biotite up to 2" across; close to moderate fracture spacing, except extremely close spacing from 79.6' to 79.9'; medium strong, except very weak from 79.3' to 80.0'; slightly weathered, with sand coatings at some fractures; mica phenocrystals in fine grained black matrix from	II	R1	$40/0_{MB}$	-	-	76.3
							II	R3	10_{MB}	-	-	76.9
									30	1.5	1.0	77
									30	2.0	1.0	77.4
									0	1.5	1.0	78.3
									10	3.0	2.0	78.4
									10	3.0	1.0	79
		C-8 79.3 - 83.6	51	100	53				40_{MB}	-	-	79.3
							II	R4	0	3.0	1.0	79.6

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-206w**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deighart**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						81.3' to 82.0'; no contact, poor rock fit at 80.5' and 83.0';			20	3.0	3.0	79.7
						C-9: Medium gray to tan GRANITE; fine to medium grains of white feldspar, quartz, muscovite, with			20	3.0	1.0	79.9
		C-9 83.6 - 91.6	96	100	91	black mafic minerals below 87.0'; moderate fracture spacing, except very close spacing at 87.4' to 87.8'; slightly weathered; strong; parallel alignment of			20	3.0	3.0	80.1
									20/0	2.0	6.0	80.5
									40	2.0	3.0	80.7
									20	2.0	3.0	81.1
									30_{MB}	-	-	81.5
						conspicuous muscovite produces foliation from 83.6' to 87.0'; dipping 50° to 60°; red and orange iron			85_{MB}	-	-	81.6
90									20_{MB}	-	-	81.7
						staining on fractures from 87.2' to 89.2'; 1" quartz band dipping 60° across foliation at 84.1'; no			20	2.0	2.0	83
									30	2.0	1.0	83.6
						contact, poor crack fit at 25° fracture at 84.4' (in pure	II	R5	20	1.5	1.0	84.3
						dark gray quartz).			25	3.0	6.0	84.4
		C-10 91.6 - 95.9	51	100	94	C-10: Medium gray GRANITE; fine to medium grains of white and pink feldspar, quartz, muscovite,			20	2.0	1.0	86
									*60	2.0	1.0	87.1
						biotite, and other mafic minerals; close to moderate fracture spacing; slightly weathered; strong; faint			40	2.0	1.0	87.4
95									40	2.0	1.0	87.6
						fabric defined by parallel alignment of platy			20	1.5	3.0	87.7
						minerals, dipping 50° to 60°; healed hairline			40	1.5	1.0	88.5
						fractures parallel to fabric, dipping 50° to 60°, red	II	R4/R5	*50	1.5	1.0	89
						staining on fracture surfaces at 93.6'.			40	1.5	1.0	89.2
						Core bit NQ-6 Series in satisfactory condition.			*60	1.5	1.0	90.6
						Loosing water throughout run.			35	2.0	1.0	91.3
						C-11: Medium to tan GRANITE; fine to coarse grains of feldspar, quartz, muscovite, biotite, other			30_{MB}	-	-	91.4
									30_{MB}	-	-	91.5
100									0_{MB}	-	-	91.6
		C-11 95.9 - 105.9	119	99	97	mafic minerals; moderate to wide fracture spacing, except two extremely close low angle fractures at			40	1.5	1.0	93.1
						103.0' to 103.1'; slightly weathered, except			30_{MB}	-	-	93.2
						moderately weathered at 103.0 to 103.1'; strong to			40	1.5	2.0	93.3
						very strong, except very weak at 103.0' to 103.1';			40	1.5	2.0	93.6
						color change from gray to tan at 102.7' to 103.7'; fine	III	R1	10	1.5	1.0	93.7
						grained from 101.5' to 102.5'; 1-inch wide pegmatite			*40	2.0	1.0	94
						dipping 50° at 103.6'; iron staining on fracture			*40	2.0	2.0	95.3
105						surfaces from 100.6' to 103.6'; thin (<0.1") bands of			$*40_{MB}$	-	-	95.5
						mica dipping 60° to 70°			10_{MB}	-	-	95.8
						from 98.6' to 99.5'; no contact, poor crack fit at low	II	R4/R5	5_{MB}	-	-	95.9
						angle fracture at 103.0'. Loosing water throughout			10_{MB}	-	-	96.5
						run. Rimmed borehole from 95.9' changed bit from			10_{MB}	-	-	96.8
						#6 Series to to #8 series.			10	2.0	1.0	99.3
						C-12: Medium gray to tan GRANITE; fine to			40	1.5	1.0	100.5
						medium grains of feldspar, quartz, muscovite, black			20	1.5	1.0	100.6
110						mafic minerals; moderate fracture spacing; slightly			60_{MB}	-	-	101
		C-12 105.9 - 115.7	118	100	97	weathered, with tan discoloration from 112.0' to			30	2.0	1.0	101.8
						113.5'; strong to very strong; faint foliation from			30	2.0	2.0	101.9
						parallel alignment micas dip 30° to 50°; red staining			30	1.0	1.0	102
						on 40° fractures at 106.4' and 112.8'; coarse grained,			20	2.0	6.0	103
						gray pegmatite 111.7' to 112.2'; core sides are			20	1.5	2.0	103.1
						markedly non-parallel, wavy; 1-inch thick gray			50	2.0	2.0	103.6
						quartz band dipping 70° at 106.6'.			40	2.0	1.0	105.4
									40	1.5	1.0	105.9
115									40	1.5	1.0	106.4
									45	1.5	1.0	106.6
						C-13: 115.7' to 116.5' Medium gray GRANITE; as	II	R4/R5	40	1.5	1.0	108.5
						above, except fine grained.	II	R3/R4	25	1.5	1.0	108.8
						116.5' to 125.7': Dark gray to black SCHIST; fine to medium grains of biotite, quartz, feldspar, mafic			*50	1.5	1.0	109.6
									$10/05_{MB}$	-	-	110.75
						minerals; a few sparse garnets up to 0.1" across;			10_{MB}	-	-	111.5
						close to moderate fracture spacing, except very close			10	2.0	1.0	111.7

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-206w**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deighart**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-13 115.7 - 125.7	120	100	97	spacing from 123.9' to 124.2'; medium strong to strong; slightly weathered; foliation defined by distinct, planar schistosity, dipping 40° to 60°, most fractures along foliation; some fractures have softened mica and clay on surfaces. A few 1/4" to 1" quartz-feldspar bands parallel to foliation; slightly wavy core sides.			10	1.5	1.0	112.4
									40	2.0	3.0	112.8
									*85	3.0	1.0	114.6
									30	2.0	2.0	114.7
									15	2.0	2.0	115.7
									*10	2.0	2.0	117
									*50	1.5	4.0	117.8
									50	2.0	2.0	118.2
125									*50	1.0	2.0	119.2
									*55	1.5	2.0	119.8
		C-14 125.7 - 135.7	120	100	99	C-14: Dark gray to black SCHIST; fine to medium grains of biotite and muscovite, quartz, feldspar, black mafic minerals (amphibole?); numerous garnets up to 0.4" across; moderate fracture spacing; slightly weathered to unweathered; strong; foliation defined by distinct schistosity, undulating only around garnets; foliation dips 40° to 60°; all fractures along foliation; some fracture surfaces have softened mica coatings; slightly wavy core sides 127.5' to 129.0'.	I/II	R4	*40	1.5	1.0	120.4
									40_{MB}	-	-	120.55
									65	2.0	1.0	120.65
									*45	1.0	1.0	121.5
									*55	1.5	4.0	122
									*40	1.0	2.0	122.4
130									*40	1.5	4.0	122.8
									*40	1.0	4.0	122.9
									*40	1.5	4.0	123
									*45	1.0	1.0	124.5
									*40	1.0	1.0	125
									45	3.0	2.0	125.1
									*50	1.5	1.0	125.2
									*50	1.5	1.0	125.4
									*50	1.0	1.0	125.6
135									45	2.0	1.0	125.65
		C-15 135.7 - 141.0	63	100	95	C-15: 135.7' to 138.7': Dark gray SCHIST, as above. 138.7' to 141.0': Medium gray GRANITE, with interlayered SCHIST; alternating layers 1" to 6" thick each; granite is fine to medium grained; muscovite, feldspar, quartz, medium grained garnet; schist is as above; becoming more granitic with depth.	I	R4	*50	1.5	1.0	125.7
									*45	1.0	1.0	126.6
									*45	1.5	1.0	127.5
									*45	1.5	2.0	128.2
									*50	1.0	1.0	129
									*50	1.5	1.0	130
									$*60_{MB}$	-	-	130.8
140									*5	1.5	2.0	131.8
									*45	1.5	4.0	132.2
									*45	1.5	2.0	133.3
									*40	1.5	4.0	133.6
									*45	1.5	2.0	134.7
									*45	1.5	4.0	135.1
									10	2.0	2.0	135.6
									$*50_{MB}$	-	-	135.7
145									*50	1.5	4.0	136.9
									*45	1.5	1.0	138.3
									*45	1.5	4.0	138.7
									*45	1.0	4.0	139.2
									*45	1.5	4.0	139.5
									*40	1.5	4.0	139.65
									20_{MB}	-	-	141
150												
						E.O.B at 141.0'.						

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-208**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Ingersoll Rand A 300**

LOCATION: **W 34th St.-Viaduct**
COORD. **N: 214,583.1** **E: 983,518.6**
STN. NO.: OFFSET:
SURFACE ELEV.: **109.4 feet**
DATUM:
START DATE: **6/2/05** TIME: **8:00 am**
FINISH DATE: **6/9/05** TIME: **3:00 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA				
Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
						0.0 - 6.0		Hand		Auger								Gray asphalt (advanced to 3 feet via Jack Hammer) Grayish-brown c-f SAND, some c-f Gravel (concrete and brick fragments), trace Silt, moist, occasional wood fragments (FILL) Note: Large concrete fragment encountered at 4.0 feet
5			S	1	■	6.0 - 8.0	29	57	22	18	12							Dark brown to black c -f SAND, some c-m Gravel,trace Silt, wet, dense. (SM) (FILL)
			S	2	■	8.0 - 10.0	13	5	6	17	0							No recovery Coarse Gravel (rock fragment) at the tip of spoon.
10			S	3		10.0 - 10.6	8	100/1	-	-	0							No recovery Second attempt
			S	4	■	12.0 - 14.0	9	7	11	12	14							Dark Brown c-f SAND, some m-f Gravel (rock fragment), trace Silt, medium dense (SM) (FILL) 4" casing driven to a depth of 10 depth
15			S	5	■	15.0 - 17.0	11	7	33	26	14							Dark brown to black c-f SAND, and c-f Gravel (rock fragment, brick fragment), trace Silt, medium dense, occasional Shells (SP-SM) (FILL)
20			S	6	■	20.0 - 20.5	50	100/0	-	-	4							Brown m-f SAND, little Silt, trace c Gravel.
																	24.4	Roller bit refusal and begin coring at 24.4'.

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-208**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **Ingersoll Rand A 300**

LOCATION: **W 34th St.-Viaduct**
COORD. **N: 214,583.1** **E: 983,518.6**
STN. NO.: OFFSET:
SURFACE ELEV.: **109.4 feet**
DATUM:
START DATE: **6/2/05** TIME: **8:00 am**
FINISH DATE: **6/9/05** TIME: **3:00 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
25		C-1 24.4 - 29.4	58	97	88	C-1 - 24.4'-27.8': Light gray GRANITE, m-f grains of white feldspar, quartz, muscovite, sparse mafic minerals, sparse medium grained garnet; moderate fracture spacing, except very close fracture spacing at 24.8'-25.0'; slightly weathered; strong to very strong; very faint near vertical banding; 27.8'-29.4': Dark-pink to medium gray GRANITE, medium to coarse grains of quartz, feldspar, biotite and other mafic minerals, muscovite and medium grained garnet; hard pink mineral resembling rose quartz(?); very close to close fracture spacing with sharp, angular fragments below 29.3' , mechanical breaks; slightly weathered; strong to very strong; slight yellow staining on some low angle fractures. Rock stuck in core rock catcher, couldn't retrieve all rock. Hammered hard to take it out. Core Barrel jammed at 26' and at 29.3'. Changed Diamond bit (coring bit). Borehole depth measured using measuring tape at 29.4'.	II	R4/R5	0	1.5	1.0	24.8
									0	1.5	1.0	24.9
									5-10	1.5	1.0	25
									0	1.5	1.0	25.9
									0	1.5	2.0	27
									15	2.0	1.0	27.8
									0	2.0	1.0	28.5
									15	2.0	1.0	28.6
30		C-2 29.4 - 34.4	60	100	85		II	R4	5	1.5	1.0	28.65
									25	2.0	1.0	28.7
									5	1.5	1.0	29.3
									10	1.5	1.0	29.6
									10_{MB}	-	-	29.7
									10_{MB}	-	-	30
									10_{MB}	-	-	30.2
							III	R4	10_{MB}	-	-	30.6
35		C-3 34.4 - 44.4	120	100	82	C-2- Dark pink to medium gray GRANITE; c-f grains quartz, feldspar, muscovite, garnet, sparse mafic minerals; enriched in garnet(?) from 29.8'-32.0'; close to moderate fracture spacing; slightly weathered, with brown staining on fracture surfaces at 34.4'; yellow staining at 33.3'-33.6'; strong to very strong; becoming more coarse grained with depth. Core is overdrilled from 31.6' to 32.6'.	II	R4/R5	15_{MB}	-	-	31.2
									15	1.5	1.0	31.6
									10	1.5	1.0	31.8
									10	1.5	2.0	31.95
									20	1.5	1.0	33.3
									20	2.0	1.0	33.6
									30	1.5	1.0	34.4
									30	1.5	1.0	34.7
40									20	2.0	2.0	34.85
									20	2.0	2.0	34.9
									20	2.0	2.0	34.95
						C-3- Light gray to dark pink GRANITE; c-f grains of white and pink feldspar, quartz, muscovite, garnet, biotite, other sparse mafic minerals; dark pink garnet (?) enriched from 36.6' to 37.2'; moderate to wide fracture spacing except very close fracture spacing from 34.7' to 35.1', with core surface pitted along 20° fractures; strong except very weak from 34.7' to 35.1', where core can be broken with hands, and medium strong from 40.7' to 41.2'; very coarse grained PEGMATITE, with quartz pink and white feldspar, biotite, and garnet at 37.2' to 38.2'; 40.2'-42.2', 43.0'-44.4', in vertical contact with granite; slight yellow staining throughout. No rock wall contact at	II	R4	60	2.0	1.0	35
									35	2.0	1.0	35.1
									10	2.0	2.0	37.6
									35	2.0	2.0	37.8
									50	2.0	1.0	37.9
45							I	R4/R5	40_{MB}	-	-	38.3
									15_{MB}	-	-	38.4
									5	2.0	1.0	38.8
									0	2.0	1.0	39
									0_{MB}	-	-	39.4
									20_{MB}	-	-	40.4
									10	3.0	1.0	40.7
		C-4							35	3.0	1.0	40.8

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-208**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
50		44.4 - 54.1	116	100	92	37.6',37.8' and 37.9'. C-4 - 44.4'-47.0': Light gray to salmon pink PEGMATITE, very coarse grains (up to 2" across) of quartz, pink and white feldspar, biotite, muscovite; close to moderate fracture spacing, except very close from 44.4' to 44.6'; slightly weathered; strong; near horizontal, healed hairline fractures throughout; rock breaks easily along mica concentrations.	I/II	R5	20	1.0	1.0	41
									25	1.0	1.0	41.1
									45	3.0	1.0	41.2
									10_{MB}	-	-	42.1
									20	3.0	1.0	44.4
									90	3.0	1.0	44.45
									10	3.0	1.0	44.5
									20	3.0	1.0	44.8
55		C-5 54.1 - 64.2	121	100	98	47.0'-50.0': Light gray to salmon-pink GRANITE; fine to coarse grains of quartz pik and white feldspar, muscovite and medium to coarse grained garnet; wide fracture spacing; unweathered; strong to very strong; 50.0' to 54.4': Medium gray to dark pink GRANITE; fine to medium grains of feldspar, quartz, muscovite, mafic minerals; medium to coarse grained garnet; garnet enriched (?) red and dark pink in color at 50.6'-52.8' and at 53.0'-54.4'; moderate to wide fracture spacing; unweathered to slightly weathered ; very strong; slight yellow staining at 52.8'; core grinding at 53.4';	I/II	R5	30	3.0	1.0	44.9
									30	3.0	1.0	46
									25	3.0	1.0	46.4
									35_{MB}	-	-	49.1
									30	1.5	1.0	50.3
									50	2.0	1.0	52.2
									20	1.5	1.0	52.8
									15_{MB}	-	-	53.1
60									20	2.0	1.0	53.2
									0_{MB}	-	-	53.4
									5_{MB}	-	-	54.1
									5_{MB}	-	-	54.15
						C-5 - Medium gray to dark pink GRANITE, as above except wide fracture spacing throughout, except for two very close fractures at 60.3'-60.4'; dark-pink garnet (?) and quartz enriched at 54.4'-56.8', 61.3'-62.2' and 63.2'-64.2'; thin (<0.1") biotite seam dipping 60° at 60.1'.			80	3.0	1.0	58
									30_{MB}	-	-	59.1
									35	3.0	1.0	59.4
									20	3.0	1.0	60.3
							I	R5	20	2.0	2.0	60.4
65									20	2.0	1.0	61
									25_{MB}	-	-	64.2
		C-6 64.2 - 69.5	64	100	100	C-6 - Light gray GRANITE; m-f grains of white feldspar, quartz, muscovite, and scattered medium to coarse garnet; wide fracture spacing except two closely spaced 40° fractures at 67.5'; slightly weathered below 67.5'; very strong; very faint banding dipping~80°; vertical, healed hairline fractures at 67.5'-69.0', with yellow stained infilling; white-pink pegmatite in vertical contact with granite from 67.5' to 69.0'; Bottom of the core run (69.3' to 69.5') stuck in the catcher. Hammered very hard to get the core. Retrieved all broken up rock in small pieces.			30	2.0	1.0	64.8
									40	2.0	2.0	67.6
									40	2.0	1.0	67.9
									15	2.0	1.0	68.5
70							II	R4/R5	15_{MB}	-	-	69
									15_{MB}	-	-	69.2
									20_{MB}	-	-	69.5
									0_{MB}	-	-	69.8
		C-7 69.5 - 74.2	56	100	100				80	3.0	2.0	70.9
						C-7 - 69.5'-70.9': Light gray GRANITE; m-f grains of feldspar, quartz, muscovite, garnet; moderate fracture spacing; slightly weathered; very strong; 0.5" thick pegmatite bands dip 70° to 80°; 70.9'-74.2': Salmon-pink PEGMATITE; coarse grains of pink and white feldspar, quartz, muscovite, mafic minerals; medium grained garnet; moderate fracture spacing; slightly weathered; strong; contact with overlying granite along 80° seam at 70.8'; slight yellow staining. Core barrel jammed at 69.8'. Pulled out core barrel and tap the diamond bit and coring resumed. Bottom of borehole measured at 74.2' using measuring tape.			25	3.0	1.0	72.8
									15	3.0	1.0	73.3
									10	3.0	1.0	74
75							II	R5	10	2.0	1.0	74.2
		C-8 74.2 - 77.4	38	100	100							
									35	1.5	2.0	76.6
									15_{MB}	-	-	77
									45_{MB}	-	-	77.1
									70_{MB}	-	-	77.15
									20_{MB}	-	-	77.4
80							II	R4	30	2.0	1.0	78
		C-9 77.4 - 84.2	82	100	98				15	2.0	1.0	78.2
									20	-	-	78.8
						C-8 - 74.2'-74.8': Pink PEGMATITE, as above 74.8'-77.4': Light gray GRANITE; fine to coarse grains of white and pink feldspar, quartz, muscovite, biotite and medium grained garnet from 74.8'-75.6'; wide fracture spacing; unweathered to slightly weathered; very strong; slight yellow staining below			25_{MB}	-	-	83.8

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-208**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
85						75.6'. Core barrel jammed at 77.4'. Pulled out core barrel. Cored rock stuck into the rock catcher. Hammered very hard to take it out. Retrieved rock all broken up into small pieces.	II	R4	10_{MB}	-	-	84.2
							III	R4	25	2.0	3.0	84.4
							II		10	2.0	3.0	85.5
									30	1.5	1.0	85.7
						C-9 - 77.4'-78.5': Pink PEGMATITE, as above			45_{MB}	-	-	86.8
						78.5'-84.2': Medium gray to dark pink GRANITE; c-f grained to 81.5' m-f grained below 81.5'; white and			40_{MB}	-	-	87.95
		C-10 84.2 - 94.1	118	99	96	pink feldspar, quartz, muscovite, sparse mafic			0_{MB}	-	-	88.6
90						minerals; dark pink garnet (?)enriched 81.5'-82.7'; wide fracture spacing except two closely spaced, stained fractures at 78.0'-78.2'; unweathered; very strong; no natural fractures.	I	R5	30	2.0	1.0	89.25
						C-10 - 84.2'-85.1': Medium to light gray GRANITE; m-f grained; two very closely spaced fractures at 84.4' and 84.5'; slightly weathered, except moderately weathered at 84.3'-84.6'; fracture surfaces have sandy			20	2.0	1.0	92.4
									15_{MB}	-	-	93.6
						coatings; light yellow and red staining; 85.1'-89.7':	I	R4	20_{MB}	-	-	94.1
95						White to salmon-pink PEGMATITE, c-m grains of feldspar, quartz, muscovite, biotite, other mafic minerals; wide fracture spacing; slightly weathered; strong; 89.7'-94.1': Medium gray GRANITE;c-f grains of feldspar, quartz, muscovite, mafic minerals; wide fracture spacing; unweathered; very strong;			20	1.5	2.0	94.15
									10-15	2.0	1.0	96.9
		C-11 94.1 - 104.0	119	100	100	bands of salmon-pink pegmatite, 0.5" wide throughout dipping 70° to 80°; some coarse grained garnet in pegmatite; no natural fractures. Possible loss of recovery at 84.4 to 84.6.			25_{MB}	-	-	98.3
									30_{MB}	-	-	98.8
100									10	2.0	1.0	100.3
						C-11 - Medium gray GRANITE, with 0.5" bands of PEGMATITE, as above; pegmatite near vertical; mostly pegmatite below 101.4'; unweathered; strong.			20	1.5	1.0	100.9
									0	2.0	1.0	103.4
						C-12 - Light gray to salmon-pink GRANITE, becoming medium gray below ~109.0'; fine to medium grains of pink and white feldspar, quartz, muscovite, black mafic minerals; few scattered garnets up to 0.2" across; wide fracture spacing; unweathered; very strong; light gray to pink PEGMATITE at 106.3'-107.1'; additional pegmatites 0.5" thick and near vertical throughout.	I	R5	15_{MB}	-	-	103.8
105									$25\text{-}30_{MB}$	-	-	104
									5-10	1.5	2.0	104.1
									50	3.0	2.0	104.15
									25	1.5	2.0	104.2
									30	1.5	1.0	106.1
		C-12 104.0 - 114.0	120	100	98				20	-	-	108.6
110									20	1.5	1.0	110.2
									10	2.0	1.0	112.6
						C-13 - Medium gray to dark pink GRANITE, becoming light gray below 122.3'; near vertical bands of pink PEGMATITE throughout; c-f grains of feldspar, quartz, muscovite, mafic minerals; garnets up to 0.4" across at 119.9'-115.2'; many medium to coarse grained garnets at 119.9'-120.3'; moderate fracture spacing, except two pairs of extremely close, low angle fractures at 121.6'-121.65' and at 122.5'-122.6'; unweathered to slightly weathered;	I/II	R4/R5	15_{MB}	-	-	113.6
115									15_{MB}	-	-	114
									10	1.5	1.0	115.9
									15	2.0	1.0	116.85
		C-13 114.0 -	114	100	98				0_{MB}	2.0	1.0	118.3

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-208**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
120		123.5				strong to very strong.			20_{MB}	-	-	118.9
									0	1.5	1.0	120.3
									10	1.5	1.0	121.6
									0	1.5	1.0	121.65
									5	1.5	1.0	122.5
						C-14 - 123.5'-128.2': Light gray to pink GRANITE,c-f grains of feldspar, quartz, muscovite, some medium grained garnet; moderate to wide fracture spacing; unweathered; strong to very strong; coarse grained, quartz-feldspar PEGMATITE from 125.4'-126.6'; additional 1" to 2" pegmatites, near vertical throughout.	I	R4/R5	5	1.5	1.0	122.6
									15_{MB}	-	-	123.2
125									20_{MB}	-	-	123.5
									10	1.5	1.0	124
									10	2.0	1.0	125.9
									20	3.0	1.0	126.3
		C-14 123.5 - 133.5	120	100	98	128.2'-133.5': Dark to medium gray SCHIST; c-f grains of biotite, quartz, muscovite, feldspar; close to wide fracture spacing; unweathered, except slightly weathered from 128.2'-130.0'; strong; foliation defined by wavy crenulated schistosity and thin (<0.1"), wavy bands of quartz and pink feldspar; foliation dips 50º to 80º; contact with overlying granite dips 70º; intact, with uppermost one foot of schist, coarse grained, mica rich and non-foliated; core sides slightly non-parallel, slightly wavy below ~130';	II	R4	10_{MB}	-	-	128
									0	2.0	1.0	128.4
									35	3.0	1.0	128.9
130									*50	1.5	1.0	129.3
									20	2.0	1.0	129.4
									*60	1.5	1.0	129.9
									55	3.0	1.0	132.75
									15	2.0	1.0	132.8
									*50	2.0	1.0	133.5
135									20	2.0	1.0	133.55
									*50	3.0	1.0	135.3
		C-15 133.5 - 140.8	88	100	100	C-15 - Dark-gray SCHIST; c-f grains of biotite, quartz, muscovite, feldspar; moderate fracture spacing; unweathered to slightly weathered; strong; foliation defined by wavy, discontinuous schistosity, dipping 60º to 90º; 136.9'-137.7' Light gray m-f grained GRANITE; intact contacts parallel foliation; slight waviness of core sides above 136.9'; pink feldspar in schist from 135.0'-136.2';	II	R4	30	2.0	1.0	136.3
									25_{MB}	-	-	137
									*65	1.5	1.0	137.7
									5	3.0	1.0	139
140									10	1.5	1.0	140
						E.O.B at 140.8'.			10_{MB}	-	-	140.1
									10	1.5	1.0	140.8
145												
150												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-4**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Acker 45**

LOCATION: **LIRR yard- Trk 14- viaduct**
COORD. **N: 214,165.4** **E: 983,329.1**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0** +/-
DATUM:
START DATE: **6/6/05** TIME: **6:00 pm**
FINISH DATE: **6/10/05** TIME: **3:30 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
						0.0 - 2.0												Concrete coring. Used Air Compressor up to 10' depth
10			S	1	■	10.0 - 12.0	64	37	19	24	6							Brown c-f SAND, some c-f Gravel, little Silt, very dense occasional plant and mica fragments (FILL) Advanced casing to 14.5'
15			S	2	■	15.0 - 17.0	7	12	7	8	6							Dark gray c-f SAND, some c-f Gravel , little Clayey Silt, medium dense, wet (decomposed mica/ schist fragments)
20			S	3	■	20.0 - 22.0	3	6	6	6	10							Grayish brown f SAND, and Silt, trace m-f Gravel, medium dense, wet (SM)

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/18/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG
(continued)

BORING NUMBER: **FD-4**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S		■	25.0 - 26.3	4	25	100/4	_	10	Brown m-f SAND, some Silt, very dense, wet.
												Hard drilling at 27'
												27.5 Roller bit refusal and begin coring at 27.5'.
30												
35												
40												
45												
50												
55												

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/18/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-4**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **Acker 45**

LOCATION: **LIRR yard- Trk 14- viaduct**
COORD. **N: 214,165.4** **E: 983,329.1**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0** +/-
DATUM:
START DATE: **6/6/05** TIME: **6:00 pm**
FINISH DATE: **6/10/05** TIME: **3:30 am**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						C-1 - Medium gray to dark gray SCHIST, coarse to fine grains of muscovite, biotite, quartz, with many garnets 0.1" to 0.2" across; moderate fracture spacing; slightly weathered; strong; foliation defined by distinct schistosity, with crenulations over 0.5" wave length; foliation dips 60° to 85°.	II	R4	$0/15_{MB}$	-	-	27.5
									*60	1.5	1.0	29
30									*65	1.5	1.0	29.6
		C-1 27.5 - 30.2	32	100	99		II	R3/R4	40	3.0	2.0	29.7
									25_{MB}	-	-	30.2
									10_{MB}	-	-	31.4
						C-2 - Medium gray to dark gray SCHIST, fine to coarse grains of muscovite, biotite, quartz, mafic minerals; many visible garnets 0.1" to 0.2" across; close to moderate fracture spacing except very close spacing from 36.4' to 36.8'; medium strong to strong; slightly weathered with slight yellow staining; foliation defined by distinct crenulated schistosity dipping 60° to 85°. 2-inch wide PEGMATITE at 36.6' to 36.8' dipping parallel to foliation, with coarse grains of quartz and muscovite; white clay along 70° fracture at 36.8'.			85	2.0	2.0	32.8
									60	1.0	2.0	33.1
35									*60	1.0	2.0	34.5
		C-2 30.2 - 38.2	84	88	79				*60	1.0	1.0	35.6
									*50	1.0	1.0	35.7
									*55	1.5	1.0	35.8
									*65	1.0	2.0	35.9
						C-3- Boring intercepted previously drilled, subparallel borehole. RQD shows only natural fractures. Recovery and RQD data incomplete. Only discontinuities transverse to core axis are recorded. Medium gray to dark gray SCHIST, as above, except moderately weathered and medium strong below 39.6'; 1" to 2" pegmatites.	III	R3/R4	15	2.0	2.0	36.4
									50	1.0	2.0	36.55
40									25	3.0	1.0	36.7
									*70	1.5	4.0	36.8
		C-3 38.2 - 43.7	43	65	30				*70	1.5	2.0	37.2
									*60	2.0	1.0	38.3
									*60	1.5	1.0	38.7
									*20	3.0	1.0	39.6
									10	3.0	1.0	40
						C-4 - Dark gray SCHIST, becoming blue-gray below 46.5'; fine to medium grains of biotite, quartz, muscovite, scattered garnets up to 0.1" across, with nodules of hard, blue-gray mineral (cyanite?) 0.1" to 0.2" across; close to moderate fracture spacing; slightly weathered; strong except very strong below 46.5'; foliation defined by indistinct schistosity and faint banding, except distinct schistosity in biotite-rich zone 46.0' to 46.6'; foliation dips 40° to 70°; healed hairline fracture dipping 70° across foliation at 45.6' with light orange infilling;	II	R4	*50	1.5	1.0	40.2
									*60	1.5	1.0	40.7
45									*50	1.5	1.0	40.8
									20	3.0	1.0	41.2
		C-4 43.7 - 48.0	52	100	100				30	2.0	1.0	41.4
							II	R5	85	3.0	2.0	41.5
									$0/10_{MB}$	-	-	43.7
							II	R4	35	2.0	1.0	44.4
									*40	1.5	1.0	44.9
									*50	1.0	2.0	45.9
50									*70	1.5	2.0	46.4
									40	1.5	1.0	47.6
						C-5 - Dark gray SCHISTOSE GNEISS; fine to medium grains of biotite, quartz, muscovite, and sparse garnet; close to moderate fracture spacing;			45	1.0	4.0	48
									50_{MB}	-	-	48.1
									40_{MB}	-	-	49.3

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-4**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-5 48.0 - 58.0	120	100	99	slightly weathered; strong; foliation defined by faint 0.25-inch bands of quartz and mica and indistinct schistosity; foliation dips 50°, increasing with depth to 90° below 57.0'. Several 90° fractures below 56.5', with light orange, soft crystalline mineral coating; pegmatites parallel to foliation, 0.25" to 0.5" wide; dark orange iron staining at 57.5'; Loss of water observed throughout the run.			*60	1.0	2.0	49.6
									*65	1.5	2.0	50.9
									*60	2.0	2.0	51.7
55									*65	1.5	2.0	52.5
									*50	3.0	1.0	53
									5/55	3.0	1.0	53.2
									*70	1.0	1.0	54.5
									*60	1.5	2.0	54.9
									*80	3.0	3.0	57
						C-6 - 58.0' to 63.2': Dark gray to black SCHIST, fine to coarse grains of biotite, quartz, muscovite, feldspar; moderate to wide fracture spacing; slightly weathered; strong; foliation defined by faint foliation and contorted quartz bands 0.1" to 0.25" thick; foliation dips 90° at 58.0', decreasing to 50° at 63.2'; irregular granitic intrusion, 1" thick from 60.5' to 61.5'; near vertical fracture at 61.2' crosses foliation, has orange mineral coating; parallel, healed hairline fractures from 61.6' to 62.7'; light green soft mineral (chlorite) on foliation fracture at 61.6';	II	R4	*85	3.0	3.0	57.2
									60	2.0	3.0	57.5
									35	1.5	2.0	58
60									30_{MB}	-	-	59
									5	2.0	1.0	60.3
									85	3.0	3.0	61.2
									*65	1.5	4.0	61.6
		C-6 58.0 - 68.0	120	100	98		I/II	R4/R5	65	1.5	2.0	62.7
									25_{MB}	-	-	63
									5_{MB}	-	-	63.8
65									70	1.5	2.0	63.85
						63.2' to 68.0': Light gray GRANITE; fine to medium grains of feldspar, muscovite, quartz; wide fracture spacing, except very closely spaced, low angle fractures from 67.8' to 68.0'; unweathered to slightly weathered; strong to very strong; pegmatites, 1" thick with coarse grained quartz and pink feldspar at 63.5' and 67.6'; very faint, near vertical banding.	I/II	R4/R5	30	1.5	3.0	67.8
									15	1.5	2.0	67.9
									30	1.5	2.0	68
70									25_{MB}	-	-	68.1
		C-7 68.0 - 73.4	65	100	100	C-7 - Light gray GRANITE; fine to medium grains of feldspar, quartz, muscovite, sparse medium grained garnet; wide fracture spacing, slightly weathered to unweathered; strong to very strong; near vertical bands of salmon-pink, coarse grained pegmatite~1" inch wide throughout; red staining on 20° fracture at 70.7', with adjacent subparallel healed fractures. Complete loss of drilling fluid - no circulation return throughout the run.			20	1.5	2.0	70.7
									40_{MB}	-	-	71.9
									5_{MB}	-	-	72.7
							I	R4/R5	5/85	2.0	1.0	73.4
									0/5	1.5	1.0	73.5
75									20	3.0	1.0	74.2
		C-8 73.4 - 78.4	60	100	100	C-8 - Light gray to pink GRANITE; fine to coarse grains of white and pink feldspar, quartz, muscovite, sparse medium garnet; wide fracture spacing; unweathered; strong to very strong; 2-inch thick coarse grained pegmatite with quartz, microcline and biotite, near vertical 73.6' to 73.9'. Complete loss of drilling fluid - no circulation return throughout the run.			8_{MB}	-	-	77
									5_{MB}	-	-	77.4
							II	R4/R5	30_{MB}	-	-	77.9
									15_{MB}	-	-	78.2
80									$0/5_{MB}$	-	-	78.4
						C-9 - 78.4' to 82.3': Light gray to tan GRANITE; fine to medium grains of white and pink feldspar, quartz, muscovite, sparse garnet from 81.5' to 82.3'; close to wide fracture spacing; slightly weathered; strong to very strong; several low angle healed hairline fractures from 79.8' to 80.5', subparallel to open fractures; 1-inch horizontal pegmatite at 79.6'. 82.3' to 83.4': Dark gray to black SCHIST; fine to medium grains of biotite, quartz, muscovite, close to very close fracture spacing; slightly weathered; medium strong; foliation defined by distinct schistosity, dipping 50° to 60°; most fractures along foliation; dark gray clay coating at 83.3'.			25	1.5	2.0	80.1
									10	1.0	2.0	80.5
		C-9 78.4 - 86.7	100	100	92		II	R3	*25	2.0	2.0	82.4
									50	2.0	2.0	82.9
							II	R4/R5	*50	1.5	1.0	83.1
85									5	3.0	4.0	83.3
									60	1.0	4.0	83.4
									35	1.5	2.0	83.6
									*60	1.0	1.0	83.8
							II	R4	90	2.0	2.0	83.9

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-4**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						83.4' to 86.7': Light gray GRANITE, as above with schist inclusion 85.1' to 85.2'.			20	1.5	2.0	85
									20	1.5	2.0	86
						C-10 - 86.7' to 90.7': Light-gray GRANITE; fine to medium grains of feldspar, muscovite, close to moderate fracture spacing; slightly weathered;			25	1.5	1.0	86.7
90									30	1.5	1.0	87.7
									30	2.0	1.0	87.9
						strong; tightly healed hairline fractures dipping 70°	II	R3	40	3.0	1.0	87.95
		C-10 86.7 - 96.9	122	100	82	Pure quartz at 90.4' to 90.6', above several low angle fractures with poor crack fit.			40	1.5	1.0	88.2
									55	2.0	1.0	89.3
						90.7' to 92.8': Black SCHIST, with healed brecciated			30	3.0	1.0	90.4
						PEGMATITE; coarse grains of biotite and quartz in	II	R4	*60	1.0	4.0	90.8
						schist, with quartz and feldspar in pegmatite; very			*60	1.0	4.0	91
						close to close fracture spacing; slightly weathered;			70	1.0	2.0	91.1
95						medium strong; foliation defined by distinct			80	1.0	4.0	91.4
						schistosity, dipping 70° to 80°; 80° foliation fracture			70	3.0	1.0	91.7
						at 91.4' has thin (0.1") coating of gray-green clay;			40	3.0	1.0	92.4
						many healed hairline fractures from 92.2' to 92.8';			50	3.0	1.0	92.6
						92.8' to 96.9': Light gray to pink -tan GRANITE; fine	II	R3/R4	*50	2.0	1.0	92.7
						to medium grains of feldspar, quartz, muscovite; very			65	1.5	2.0	93.3
						close to moderate fracture spacing; slightly			80	2.0	2.0	93.4
						weathered with slight iron staining; strong; healed			30	1.5	2.0	93.6
100						fracture dipping 90° has soft, dark-red infilling;			80	2.0	2.0	93.8
						high-angle fractures from 93.4' to 95.0' have thin			20	3.0	1.0	94
		C-11 96.9 - 106.3	113	100	92	(<0.1') coatings of dark red mineralization (Hematite?)			80	3.0	1.0	94.8
									0	1.5	1.0	96
						C-11 - 96.9' to 106.0': Dark-gray to black SCHIST;			5_{MB}	-	-	96.6
						close to moderate fracture spacing, except extremely			50	1.5	1.0	96.8
						close spacing from 97.7' to 98.2'; slightly weathered;			*50	1.5	3.0	97.6
						medium strong to strong; core surface is pitted from			*65	1.0	4.0	97.8
						97.7' to 98.7'; foliation defined by distinct wavy			*65	1.0	4.0	97.85
105						schistosity dipping 50° to 60°, becoming less			*65	1.0	4.0	97.9
						schistose below 102.0" all fractures along foliation;			*50	1.0	4.0	98.1
						several foliation fractures have softened mica on	II	R4	*50	1.5	4.0	98.4
						surfaces; scattered pegmatites, coarse grained	I	R5	*60	1.0	2.0	98.6
						feldspar and quartz, 0.5" to 1.0" thick along foliation.			*60	1.5	1.0	99.9
						106.0' to 106.3': Light gray GRANITE medium to			*50	1.0	1.0	100.4
		C-12 106.3 - 112.2	71	100	100	fine grained.			*60	1.0	1.0	101
									50	1.5	1.0	101.4
110						C-12 - Light gray GRANITE: medium to fine grains			50	1.5	1.0	102.1
						of feldspar, quartz, muscovite, sparse medium			40	2.0	1.0	102.4
						grained garnet and mafic minerals; wide to very wide			*70	1.5	1.0	106
						fracture spacing; unweathered; very strong; no			10_{MB}	-	-	106.3
						natural fractures.	I	R5	$0/5_{MB}$	-	-	108.8
						C-13 - 112.2' to 118.6': Light gray GRANITE, as			15_{MB}	-	-	109.6
						above, except slightly weathered from 116.9' to			15_{MB}	-	-	111.3
						117.1'; less garnet below 114.0';			$0/5_{MB}$	-	-	112.2
115						118.6' to 121.7': Dark gray to black SCHIST;						
						medium to fine grains of biotite, quartz, muscovite,						
						moderate fracture spacing; slightly weathered;			15_{MB}	-	-	115.8
		C-13 112.2 - 121.7	114	100	100	strong; foliation defined by indistinct schistosity			$20/25_{MB}$	-	-	116.1
						dipping 60° to 80°. Intact upper contact with granite.	II	R5	10	3.0	1.0	116.9
							II	R4	5	2.0	1.0	117.1
									0/5	2.0	1.0	118.1
120												
							II	R4	40_{MB}	-	-	120.2
									30_{MB}	-	-	120.9
						C-14 - Dark gray SCHIST, medium to fine grains of	I	R4	30	2.0	1.0	121.1

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-4**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
125		C-14 121.7 - 132.0	122	98	90	biotite, quartz, muscovite, mafic minerals; sparse coarse grained garnet from 130.6' to 131.0'; close to wide fracture spacing, except very close spacing from 131.4' to 131.6'; slightly weathered to unweathered; strong; foliation defined by indistinct, discontinuous schistosity dipping 60° to 90°; quartz pegmatites from 122.6' to 123.6' and 131.2' to 131.4'; fine to medium grained granite from 129.3' to 129.5' with contacts at smooth foliation fractures in adjacent schist; slight iron staining from 129.3' to 129.5'. Possible loss of recovery at 131.5' or at 131.8'.			$5/30_{MB}$	-	-	121.3
									5_{MB}	-	-	121.7
									0	2.0	1.0	122.2
									*70	1.5	1.0	122.7
									5	2.0	1.0	124.3
									10	2.0	1.0	126.7
									30	3.0	1.0	127.1
									20	3.0	1.0	127.15
130									*80	1.5	2.0	129.3
									*65	1.5	2.0	129.5
									30	2.0	1.0	130
									*75	1.5	4.0	131.4
						E.O.B at 132'.			55	2.0	2.0	131.5
									40	1.5	2.0	131.8
									$*50_{MB}$	1.5	1.0	132
135												
140												
145												
150												
155												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-402**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Acker 45**

LOCATION: **Track 26 under 11th Ave**
COORD. **N: 214,296.4** **E: 983,505.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.8 feet**
DATUM:
START DATE: **12/6/05** TIME: **7:00 pm**
FINISH DATE: **12/12/05** TIME: **2:00 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
12/7/05	12:00 am	5.5	16.0	70.6
12/8/05	10:00 pm	6.0	16.0	120.0
12/9/05	8:30 pm	5.6	16.0	125.7

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
																		18" - Concrete Slab Air-Tricone from 1.5' to 10 feet; Brown c-f SAND, some Silt, trace f-Gravel (observed in cuttings)
10			S	1	■	10.0 - 12.0	7	7	4	6	14							Brown m-f SAND, some Silt, medium dense, wet (SM)
15			S	2	▬	15.0 - 15.3	100/3"				3						15.5	Brown m-f SAND, some Silt, little c-f Gravel, very dense, wet (SM) -weathered rock fragments (Pegmatite) at tip of the spoon Roller bit refusal and begin coring at 15'.
20																		

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-402**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **Acker 45**

LOCATION: **Track 26 under 11th Ave**
COORD. **N: 214,296.4** **E: 983,505.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.8 feet**
DATUM:
START DATE: **12/6/05** TIME: **7:00 pm**
FINISH DATE: **12/12/05** TIME: **2:00 am**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
12/7/05	12:00 am	5.5	16.0	70.6
12/8/05	10:00 pm	6.0	16.0	120.0
12/9/05	8:30 pm	5.6	16.0	125.7

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						C-1: Light gray to tan GRANITE; m-f grains of quartz, feldspar, muscovite, and sparse mafic minerals; moderate to wide fracture spacing, except very close spacing from 15.5' to 15.8'; slightly weathered; strong; brick-red hematite on vertical fractures; weathered pieces of schist and quartz; 17.0' - 18.5' : Gray to salmon-pink PEGMATITE; coarse grained; contacts intact, gradational.	II	R4	0_{MB}	-	-	15.8
									0	1.5	1	16.2
									85	1.5	2.0	16.5
									45	1.5	1.0	16.7
									80	2.0	2.0	17
20		C-1 15.5 - 20.0	54	100	85							
						C-2: Light gray to medium gray GRANITE; m grains of quartz, feldspar, muscovite, sparse medium grained garnet; moderate to wide fracture spacing; slightly weathered; strong to very strong; very faint gneissic compositional banding dips ~60 Except: 22.3' - 22.5' and 27.9' - 29.4': dark gray SCHIST; fine to medium grains of biotite, quartz, feldspar, muscovite; close to very close fracture spacing; slightly weathered; medium strong; distinct schistosity dips 60° to 70°; all fractures have orange iron staining; 29.4' - 29.9': light gray PEGMATITE band; coarse grained; contact intact and parallel to schistosity; lower contact with granite is near vertical.	II	R4/R5	0_{MB}	-	-	20
									0	1.5	1.0	20.1
									0	1.5	1.0	22.2
									60	1.5	2.0	22.3
									55	2.0	1.0	23.5
25		C-2 20.0 - 29.9	119	100	100				0_{MB}	-	-	24
									15_{MB}	-	-	24.5
									0_{MB}	-	-	24.9
									0_{MB}	-	-	25.1
									0	2.0	1.0	25.4
									30	1.5	1.0	27.7
									*85	1.0	2.0	28.1
									*60	1.5	3.0	28.3
30									*65	1.5	2.0	29
						C-3: 29.9' - 33.5': Light gray to medium gray GRANITE; m-f grains of quartz, feldspar, and sparse mafic minerals; coarse grained pegmatite band from 29.9' to 30.5', in vertical contact with granite; moderate fracture spacing; slightly weathered; strong; except: 30.6' - 30.7', 31.6' - 33.1', and 33.4' - 33.5': Dark gray SCHIST; fine to medium grains of quartz, biotite, feldspar, muscovite; close to moderate fracture spacing; slightly weathered; strong; faint schistosity dips 45° to 55°; 33.5' - 36.9' Medium gray, almost pure QUARTZ; very coarse grained; 1/2-inch band of mafic minerals at 34.4' dipping 45°, with irregular patches of yellow metallic mineral (gold?) at quartz contact; unweathered to slightly weathered; 36.9' - 38.1': Light to medium GRANITE; as above; 1/4-inch band	II	R4	30_{MB}	-	-	29.9
									*45	1.0	2.0	30.7
									$*50_{MB}$	1.0	1.0	32
									45	1.0	1.0	32.3
		C-3 29.9 - 38.1	98	100	100				35	2.0	1.0	33.4
									0_{MB}	-	-	33.9
35									0_{MB}	-	-	34.9
									20	1.5	1.0	35.6
									40	2.0	1.0	36
									20	1.5	2.0	36.8
									15	1.0	1.0	37.4
		C-4 38.1 - 40.3	26	100	100		I/II	R4/R5	0	2.0	1.0	38
									10_{MB}	-	-	38.1
40									15	2.0	1.0	38.7
									30_{MB}	-	-	39.3

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-402**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						of schist dipping 20° at quartz-granite contact.	I/II	R4/R5	0_{MB}	-	-	39.8
						C-4: Light gray GRANITE m-f grains of quartz, feldspar, muscovite, and scattered medium to coarse grained garnets; moderate fracture spacing; unweathered to slightly weathered; strong to very strong; pegmatite from 39.5' to 40.1'; pure, medium gray quartz from 40.1' to 40.3'; contact dips 50			10_{MB}	-	-	40.3
45		C-5 40.3 - 50.5	122	100	98	C-5: 40.3' - 40.5': Medium gray Quartz, coarse grained;			60_{MB}	3.0	1.0	44.2
						40.5' - 46.1': Light gray GRANITE; c-f grains of quartz, feldspar, muscovite, and scattered medium grained garnets; irregular PEGMATITES, 1/2-inch to 3-inch thick throughout; moderate to wide fracture spacing; unweathered to slightly weathered; strong to very strong; faint banding dips 40 to 60°.			0_{MB}	-	-	44.5
									0_{MB}	1.5	1.0	44.8
							II	R3/R4	80	2.0	2.0	45.2
									40	2.0	1.0	46.8
									30	3.0	3.0	48.6
50						46.1' - 50.0': Dark gray to black SCHIST; fine to coarse grains of biotite, quartz, feldspar and muscovite;			*60	1.0	4.0	49.3
							I/II	R4	10	2.0	1.0	49.4
						moderate fracture spacing; slightly weathered;	II	R4	25_{MB}	-	-	50.2
						medium strong to strong; foliation defined by wavy, contorted schistosity dipping 40 to 90°; band of pure quartz, ~1-inch thick, dips 80 from 49.3' to 50.0';			*40	1.5	1.0	50.5
									*65	2.0	1.0	51.9
									*70	1.0	1.0	53
						50.0' - 50.3': Light gray PEGMATITE, coarse grained;			10_{MB}	-	-	54.2
55		C-6 50.5 - 60.6	121	100	100	50.3' - 50.5': Dark gray SCHIST, as above			35	2.0	2.0	54.9
						C-6: 50.5' - 51.9': Light gray to salmon-pink PEGMATITE; c grains of white and pink feldspar, quartz, muscovite; moderate fracture spacing; slightly weathered; strong; in vertical contact with: light gray GRANITE, fine to medium grains of quartz, feldspar and muscovite; healed hairline fractures along contact;			20_{MB}	-	-	57.2
									40_{MB}	-	-	58.4
									15_{MB}	-	-	59.2
60						51.9' - 60.6': Dark gray to black SCHIST; m-f grains of quartz, biotite, feldspar, muscovite, hornblende;			20	3.0	1.0	59.7
							I/II	R3/R4	20	2.0	1.0	60.1
						moderate to wide fracture spacing; unweathered to slightly weathered; strong; indistinct, crenulated schistosity dips 60 to 90°; near-vertical bands of pegmatite from 52.3' to 52.9' and 59.2' to 59.7'; contorted, 1/2-inch thick quartz bands throughout.			20_{MB}	-	-	60.6
									35	3.0	1.0	62.4
						C-7: Dark gray SCHIST; fine to medium grains of quartz, biotite, muscovite, feldspar; wide fracture spacing; unweathered to slightly weathered; medium strong to strong; crenulated schistosity is near-vertical, except at pegmatite contacts; many jagged mechanical breaks across foliation; pegmatite bands from 65.6' - 66.3' and 67.0' - 67.6'.			30	2.0	1.0	63.9
65		C-7 60.6 - 70.6	120	100	100				30_{MB}	-	-	64.4
									*50	2.0	2.0	65.8
									*60	2.0	1.0	67.7
									15_{MB}	-	-	68.4
									0_{MB}	-	-	68.8
70									25_{MB}	-	-	69
									25_{MB}	-	-	69.8
						C-8: Dark gray SCHIST, as above, except strong throughout; few scattered healed hairline fractures dipping 20° to 30°; no pegmatite; core sides slightly wavy.	I	R4	40_{MB}	-	-	70.6
									10	3.0	1.0	71.3
									0_{MB}	-	-	72.5
75												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-402**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-8 70.6 - 80.6	120	100	100				0_{MB}	-	-	75.8
									15_{MB}	-	-	76.9
80									30	3.0	1.0	79.5
						C-9: Dark gray SCHIST; m-f grains of quartz, biotite, muscovite, feldspar; moderate to wide fracture spacing; unweathered to slightly weathered; strong; indistinct, crenulated schistosity dips 80 to 90°; core sides slightly wavy.	I/II	R4	25	2.0	1.0	80.6
									*80	1.5	2.0	80.9
									20	2.0	1.0	81
									45	2.0	1.0	81.8
									30_{MB}	-	-	82.3
85		C-9 80.6 - 90.7	121	100	100				*80	1.5	2.0	84.6
									20_{MB}	-	-	86.7
									10	2.0	2.0	87.2
									0_{MB}	-	-	87.5
90												
						C-10 - 90.7' - 94.5': Dark gray to black SCHIST; m-f grains of biotite, feldspar, muscovite, black mafic minerals; moderate to wide fracture spacing; unweathered to slightly weathered; strong; schistosity is crenulated, dips 75° to 90°, except at contacts; increased hornblende content below 92.6'; 1/2-inch wide contorted bands of quartz-feldspar at 92.2' - 92.6'; contacts intact dipping 45° to 75°, subparallel to foliation; core sides slightly bulging from 92.6' to 94.5';	I	R4	0_{MB}	-	-	90.7
									50	2.0	1.0	90.8
									*40	2.0	1.0	92.7
95		C-10 90.7 - 100.5	118	100	90				20_{MB}	-	-	94.5
									30	2.0	1.0	95.1
									0_{MB}	-	-	95.6
									20	2.0	1.0	95.8
						94.5' - 96.0': Medium gray GRANITE; c-f grains of quartz, feldspar, muscovite and garnet; slightly weathered; moderate fracture spacing; strong; core is pitted where large muscovite flakes are weathered out; many irregular healed hairline fractures.			*45	1.5	3.0	96.5
									80	2.0	1.0	96.8
									25	2.0	1.0	96.9
									25	2.0	1.0	97.2
100									10	2.0	1.0	97.5
						96.0'-96.5': Dark gray to black SCHIST, as above.			15	2.0	1.0	97.7
						96.5' - 99.3': Medium gray, pure QUARTZ; slightly weathered; close fracture spacing; strong; thin (<0.1") coatings of white soft mineral (calcite?) on most fracture surfaces; most fractures dip 25°, with some open and partly open, near-vertical fractures;	II	R3/R4	80	2.0	2.0	97.9
									10	1.5	1.0	98.2
									10	2.0	1.0	98.4
									10	1.5	1.0	98.8
									40	2.0	2.0	100.3
						99.3' - 100.5': Medium grained GRANITE-PEGMATITE; coarse grains of quartz, and white and pink feldspars in fine to medium grained matrix of muscovite and some garnet; moderate fracture spacing; slightly weathered; strong; faint, near-vertical compositional banding.			40	3.0	2.0	100.5
									*40	1.0	1.0	101.7
105		C-11 100.5 - 110.0	114	100	100				30	3.0	2.0	103.8
									0_{MB}	-	-	104.8
									15_{MB}	-	-	105
									40_{MB}	-	-	105.3
						C-11 - 100.5' - 103.8': Medium gray GRANITE-PEGMATITE; c grains of quartz, feldspar, in fine to medium grained matrix of muscovite and other minerals; coarser grained below 102.0'; moderate fracture spacing; slightly weathered; with some pitting on core surface from 100.5' to			45	3.0	1.0	106
110												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-402**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						102.8'; medium strong to strong; black biotite -hornblende Schist in near-vertical contact from 101.9' - 102.8', with contorted schistosity along contacts; schistosity dips 40° to 90°;	I/II	R4	10_{MB}	-	-	110
									*85	1.5	2.0	110.4
									45	2.0	2.0	110.6
						103.8' - 110.0': Dark gray to black SCHIST; m-f grains of quartz, muscovite, and feldspar; moderate to wide fracture spacing; unweathered to slightly weathered; strong; indistinct, crenulated foliation dips 80° to 90°.			10_{MB}	-	-	113
									10_{MB}	-	-	113.4
115		C-12 110.0 - 120.0	120	100	100				40	1.5	1.0	114
									0_{MB}	-	-	114.9
						C-12 - 110.0' - 117.0': Dark gray to black SCHIST; fine to medium grains of biotite, muscovite, quartz, feldspar, hornblende; moderate to wide fracture spacing; unweathered to slightly weathered; strong; crenulated to wavy schistosity dips 75° to 90°; many jagged, low angle mechanical breaks; slightly bulging core of core sides from 114.0' to 117.0';			20_{MB}	-	-	116
							I/II	R5	10	2.0	1.0	117
120									40	1.5	1.0	119.6
						117.0' - 120.0': Light gray to white GRANITE; fine to medium grains of quartz, white feldspar, and muscovite; few scattered medium grained garnets; wide fracture spacing; unweathered to slightly weathered; very strong; upper and lower contacts are sharp, but intact, dipping 40.	I/II	R4	20	2.0	1.0	120
		C-13 120.0 - 125.7	68	100	99				40	3.0	2.0	120.3
									40	2.0	2.0	120.4
						C-13 - 120.0' - 123.3': Dark gray SCHIST; m-f grains of quartz, biotite, muscovite, feldspar, hornblende; sparse garnet; wide fracture spacing, except for two very close fractures at 120.3'; unweathered, except slightly weathered from 120.0' to 120.5'; strong; crenulated schistosity dips 80° to 90°;			0	1.5	2.0	124.2
125									0_{MB}	-	-	124.9
									0_{MB}	-	-	125.4
									0_{MB}	-	-	125.7
						123.3' - 125.7': Light gray to white GRANITE; m-f grains of quartz, feldspar, muscovite; wide fracture spacing; unweathered to slightly weathered; very strong; upper contact with schist is sharp and intact, dipping ~80°, subparallel to foliation in schist;						
130						E.O.B at 125.7'.						
135												
140												
145												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-403**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-55**

LOCATION: **Track 26 under 11th Ave**
COORD. **N: 214,269.5** **E: 983,554.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.8 feet**
DATUM:
START DATE: **12/6/05** TIME: **7:00 pm**
FINISH DATE: **12/12/05** TIME: **9:30 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA				
Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
																		16-inch concrete slab 4-inch bituminous asphalt Used Air-Tricone Method to bypass utilities to 5 feet- refusal encountered;
5			S	1	■	5.0 - 6.9	75	89	30	100/5"	20							Light brown to gray m-f SAND, little Silt, occasional concrete and wood fragments, very dense, moist (SM) (FILL) (Brown c-f Sand, little Silt, trace f-Gravel observed in cuttings to 10 feet) Continued via Air-Tricone Method to 10 feet
10			S	2	■	10.0 - 11.8	12	18	23	100/4	19							Brown c-f SAND, trace m-f Gravel (rock fragments), trace Silt, dense, wet (SM) Rock fragment at tip of spoon
																	13.5	Roller bit refusal and begin coring at 13.5'.
15																		
20																		

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-403**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME-55**

LOCATION: **Track 26 under 11th Ave**
COORD. **N: 214,269.5** **E: 983,554.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.8 feet**
DATUM:
START DATE: **12/6/05** TIME: **7:00 pm**
FINISH DATE: **12/12/05** TIME: **9:30 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
15		C-1 13.5 - 18.2	56	100	75	C-1: Medium gray to tan PEGMATITE; c-m grains of quartz, feldspar, muscovite, biotite; moderate to very close fracture spacing; slightly weathered, except moderately weathered from 16.6' to 16.9'; weak to medium strong; bands of medium to fine grained, light gray GRANITE, 2- to 6-inches thick; enriched in mafic minerals and mica from 16.0' to 17.4'; iron staining on many fracture surfaces.	II/III	R2/R3	20	3.0	2.0	14.6
									50	2.0	1.0	15
									20	2.0	2.0	15.4
									20	2.0	2.0	16.6
									50	3.0	2.0	16.7
									10	3.0	2.0	16.8
									30	3.0	4.0	16.9
20		C-2 18.2 - 26.1	60	63	28	C-2: Medium gray PEGMATITE; extremely close to moderate fracture spacing; slightly to moderately weathered; weak to medium strong; interlayered dark to brown gray SCHIST from 19.0' to 19.4'; 20.7' to 24.1' and 25.7' - 26.1', with medium to fine grains of biotite, muscovite, quartz; extremely close fracturing to soil-size particles; moderately to highly weathered; extremely weak and friable to medium strong; throughout, core surface is pitted where micas have weathered out; iron staining on many fracture surfaces; -Possible loss of recovery between 21.2' and 24.1'; -Drilling fluid loss, small amount, throughout the run.	II/IV	R0/R3	20	1.5	1.0	17.2
									10	1.5	2.0	17.5
									80	1.5	2.0	17.7
									10	2.0	2.0	17.8
									10	2.0	2.0	18.2
									20	3.0	3.0	18.3
									70	2.0	2.0	18.4
									50	3.0	2.0	18.45
									70	3.0	3.0	18.5
25									80	2.0	2.0	18.7
									50	2.0	2.0	18.8
									70	1.0	4.0	18.9
		C-3 26.1 - 36.1	120	100	100	C-3: Dark gray to tan to black SCHIST; m-f grains of quartz, biotite, feldspar, muscovite, and black mafic minerals; moderate fracture spacing; slightly weathered; strong; foliation defined by indistinct, crenulated schistosity and thin (<0.1") contorted bands of quartz and mica; foliation dips 80° to 90°, except where contorted; light gray quartz-feldspar pegmatites from 28.7' to 29.3' and 30.0' to 31.4'.	II	R4	20	2.0	2.0	19.1
									*90	1.0	4.0	19.15
									*90	1.0	4.0	19.25
									20	2.0	2.0	19.3
									50	2.0	3.0	19.4
									40	3.0	1.0	19.7
30									5	2.0	1.0	19.9
									10	2.0	2.0	20.2
									85	1.5	4.0	20.4
									20	3.0	2.0	20.6
									85	3.0	2.0	20.7
									85	1.5	4.0	20.75
									20	3.0	2.0	20.8
									10	3.0	1.0	20.9
35									20	3.0	1.0	24.1
									30	3.0	1.0	24.3
						C-4: Dark gray SCHIST; m-f grains of quartz, biotite, feldspar, muscovite; moderate to wide fracture spacing; slightly weathered; strong, indistinct schistosity is crenulated to wavy, dipping 70° to 90°;	II	R4	*70	1.5	4.0	25.7
									10	2.0	2.0	25.8
									*75	1.5	2.0	25.9
									*85	2.0	2.0	25.95

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-403**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
40		C-4 36.1 - 46.1	120	100	100	light gray fine to medium grained GRANITE from 37.2' to 38.9'; vertical pegmatite bands; ~ 1/2-inch thick from 41.0' to 42.2' and 42.9' to 43.6'.			*65	2.0	2.0	26
									*20	2.0	2.0	26.1
									20	3.0	1.0	27.1
									*45	2.0	2.0	28.5
									*80	1.5	3.0	29.2
									20	2.0	1.0	29.3
									30	3.0	1.0	30.2
									20	3.0	2.0	30.6
									10_{MB}	-	-	31
									5_{MB}	-	-	31.1
45									30	2.0	1.0	31.6
									20	2.0	1.0	32.5
									15_{MB}	-	-	33.6
		C-5 46.1 - 56.0	119	100	96	C-5, 46.1' - 51.5': Dark gray SCHIST; m-f grains of quartz, biotite, feldspar, muscovite, and hornblende; moderate to wide fracture spacing; slightly weathered; indistinct, wavy schistosity dips 80° to 90°, except at contacts; strong; 51.5' - 56.0: Light to medium gray GRANITE; m-f grains of quartz, feldspar, muscovite and sparse medium grained garnet; close to moderate fracture spacing; slightly weathered; strong; no rock wall contact at near-horizontal joints at 54.4' and 54.7'; core barrel jammed at 53.9', with overdrilling from 53.9' to 54.1'; grinding at 55.5' and 55.6'; inclusion of dark-gray, medium to fine grained SCHIST from 52.6' to 53.1'; upper contact parallel to schistosity, dipping 60°; lower contact near horizontal, with no rock wall contact.	II	R4	40	1.0	2.0	35.1
									20_{MB}	-	-	36.1
									35	2.0	1.0	36.5
									30	3.0	2.0	37.4
									30	2.0	2.0	37.9
50									5-10	3.0	1.0	38.75
									*70	1.5	2.0	39.4
									*75	1.5	1.0	40.4
									$0\text{-}5_{MB}$	-	-	40.5
									$*60_{MB}$	-	-	41
									45_{MB}	-	-	41.1
									$0\text{-}5_{MB}$	-	-	41.15
									45_{MB}	-	-	41.2
									30	2.0	1.0	42.9
55									$0\text{-}5_{MB}$	-	-	44.2
									30	2.0	2.0	44.9
		C-6 56.0 - 66.1	121	100	100	C-6: 56.0'-58.0' Dark gray to black SCHIST, with interlayered 1-inch to 2-inch thick bands of light gray GRANITE; schist has c-f grains of biotite, quartz, hornblende, muscovite; granite has fine to medium grains of quartz, feldspar, muscovite; moderate fracture spacing; slightly weathered; strong; wavy schistosity is contorted around contacts which are mostly near-vertical; schistosity dips 60° to 90°; 58.0' - 60.7' Light gray to dark pink GRANITE; interlayered 1" bands of dark gray SCHIST; granite has m-f grains of feldspar, muscovite, garnet; schist is as above; moderate fracture spacing; slightly weathered with brick red hematite staining on fracture surfaces; strong; contacts and foliation dip 80° to 90°; 60.7' - 63.9' Medium gray pure QUARTZ; coarse grains; moderate fracture spacing; slightly weathered; strong; many healed hairline fractures; light gray granite from 62.5' to 63.3'; irregular veins or inclusions of black mafic minerals or schist, 0.1-inch to 1-inch thick, dip 50° to 90°; 1/4-inch to 1/2-inch patches of yellow metallic mineral (gold?) at quartz-mafic vein contacts at 61.2' and 63.4'; notable bulging in core sides; 63.9' - 66.1' Light gray GRANITE; fine to medium grains of quartz, feldspar, muscovite, garnet; close fracture spacing; slightly weathered; strong; orange iron staining on low-angle fractures at 64.55' and 65.1', with nearby parallel healed fractures.	II	R4	$20\text{-}25_{MB}$	-	-	45.4
									65	1.0	2.0	46.1
									30	1.5	2.0	48.4
									30	1.5	2.0	49.5
									$15\text{-}20_{MB}$	-	-	50.15
60									25	2.0	2.0	50.6
									50	1.5	2.0	51.8
									35	2.0	1.0	52.3
									*50	1.5	2.0	52.7
									5-10	1.0	2.0	53.1
									0	1.5	1.0	53.9
									20	1.5	1.0	54.1
									0	1.0	1.0	54.4
									0	1.0	1.0	54.7
65									0_{MB}	-	-	55.1
									0_{MB}	-	-	55.6
									20_{MB}	-	-	56
		C-7 66.1 - 76.1	120	100	98		II	R3/R4	20	3.0	0.75	56.1
									10_{MB}	-	-	56.3
									10	3.0	1.0	57.2
									10	3.0	1.0	58.2
									30	2.0	1.0	59.5
									0-5	2.0	3.0	59.85
70									10	1.5	1.0	60.9
									10	2.0	1.0	60.95
									15	2.0	1.0	61.9
									*50	1.0	2.0	63.7
									30_{MB}	30	-	64
									10	2.0	2.0	64.55

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-403**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
75						C-7. 66.1' - 71.1' Dark gray to black SCHIST with near-vertical intrusions of light gray GRANITE, 1/2-inch to 1-inch thick; schist has medium to coarse grains of biotite, quartz, muscovite, feldspar, black			5	1.5	2.0	65.1
									*60	2.0	1.0	65.7
									0	2.0	1.0	65.75
									*70	2.0	2.0	66.05
						mafic minerals; granite has fine to medium grains of quartz and feldspar; moderate fracture spacing; slightly weathered; medium strong to strong; fractures and mechanical breaks across foliation are jagged; foliation defined by wavy schistosity and contorted quartz bands; foliation dips 60° to 90°;	I/II	R4/R5	30	3.0	2.0	66.1
									15	3.0	1.0	67.3
									30	3.0	2.0	68
									0-5$_{MB}$	-	-	69.55
									*60	2.0	1.0	69.8
80									30	3.0	2.0	70.2
									60	2.0	1.0	71
		C-8 76.1 - 85.9	118	100	100	pure medium grained QUARTZ from 69.3' to 70.2', with thin (<0.1") mica veins and schist bands; contacts dip 50° to 80°, with 1/4-inch concentrations of mica. 71.1' to 76.1' Light gray GRANITE; fine to medium grains of feldspar, quartz, muscovite, and sparse garnet; moderate fracture spacing; unweathered to slightly weathered; strong to very strong; 1-inch thick band of light gray to salmon pink pegmatite at 73.4' dipping 80°, with coarse grains of quartz, pink and white feldspar and medium grained garnet; additional pegmatites below 74.0' ~ 1/4-inch to 1/2-inch thick, gradational contacts dip 70°			0	3.0	1.0	71.05
									0	1.5	1.0	72
									15	1.5	1.0	72.2
									15	1.5	1.0	73.7
									0-5$_{MB}$	-	-	74.1
									15$_{MB}$	-	-	74.5
									15$_{MB}$	-	-	75.5
85									0-5$_{MB}$	-	-	76.1
									25	1.0	1.0	76.65
							I	R4	20	2.0	1.0	77.1
									25	2.0	1.0	77.6
									0-5	3.0	1.0	78.4
									0-5$_{MB}$	-	-	78.95
									5-10$_{MB}$	-	-	79.1
									0	1.5	1.0	80.6
									5-10$_{MB}$	-	-	81.1
90									20	2.0	1.0	82.1
		C-9 85.9 - 95.9	120	100	100	C-8: Light gray to salmon-pink GRANITE c-f grains of quartz, feldspar, muscovite, and scattered medium grained garnets; moderate fracture spacing; unweathered to slightly weathered; strong to very strong; no rock wall contact at 25° fracture at 76.65'; scattered pegmatites throughout, some with pink feldspars up to 3 inches across; faint banding dips ~ 70° to 90°; inclusions of black schist, each ~1 inch thick and dipping 80° at, 78.3' o 79.7' and 84.2' to 85.3'; notable bulging of core sides from 80.8' to 83.3'; cored rock jammed inside inner barrel; had to hammer hard to take it out.			20	2.0	1.0	82.9
									10$_{MB}$	-	-	83.85
									0	2.0	1.0	84.3
									20$_{MB}$	-	-	84.7
									10	3.0	1.0	85
									5-10$_{MB}$	-	-	85.5
95									25	2.0	1.0	85.9
						C-9: Light gray to dark pink to salmon-pink GRANITE c-f grains of pink and white feldspar, quartz, muscovite, scattered garnets; coarse grained PEGMATITES throughout; moderate to wide fracture spacing; unweathered to slightly weathered; strong; some healed hairline fractures parallel to existing low-angle fractures; all pegmatites from 94.8' to 95.9'; cored rock stuck inside inner barrel; had to hammer hard to take it out.			10$_{MB}$	-	-	86.9
									10$_{MB}$	-	-	87.25
									15$_{MB}$	-	-	87.7
							I/II	R4/R5	20	1.5	2.0	88.3
									5$_{MB}$	-	-	88.9
									10	2.0	1.0	89.4
									5$_{MB}$	-	-	90
									15	3.0	1.0	90.4
100									15$_{MB}$	-	-	91.1
									5-10$_{MB}$	-	-	91.9
									5$_{MB}$	-	-	92.9
									10-15$_{MB}$	-	-	95
									15-20$_{MB}$	-	-	95.9
									0-5$_{MB}$	-	-	97.7
		C-10 95.9 - 105.8	119	100	97	C-10: 95.9' - 103.1 Light gray to salmon-pink GRANITE c-f grains of quartz, white and pink feldspar, muscovite, sparse garnet; light gray to pink pegmatites scattered throughout; wide fracture spacing, except very close spacing from 100.9' to 101.2'; unweathered, except slightly weathered from 100.9' to 101.5'; strong to very strong; increased quartz content from 101.6' to 103.1'; no rock wall contact on 20° fractures from 100.9' to 101.2'; thin silt coatings on sub-parallel healed hairline fractures; 103.1' - 105.8' Dark gray SCHIST; m-f grains of quartz, biotite, feldspar; moderate fracture spacing; slightly weathered; strong; indistinct crenulated			20	2.0	2.0	100.9
									20	1.0	2.0	101
									80	3.0	1.0	101.05
105									20	1.0	2.0	101.1
									10-15$_{MB}$	-	-	102.7
							II	R4	20	2.0	3.0	103.3
									50	2.0	4.0	103.9
									*45	1.0	2.0	104.6
									30-35$_{MB}$	-	-	105.8

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-403**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						schistosity dips 50° to 90°; thin (<0.1") gray clay coating on 50° non-foliation fracture at 103.9'.			45	3.0	1.0	107.6
									*50	1.5	2.0	107.9
110		C-11 105.8 - 116.0	122	100	99	C-11: Dark gray SCHIST; c-f grains of quartz, biotite, muscovite, feldspar and sparse scattered garnets up to 0.2 inches across; moderate to wide fracture spacing; slightly weathered; strong; foliation defined by wavy schistosity and thin (<0.1") contorted bands of quartz; foliation dips 50° to 75°; band of pure quartz from 111.6' to 112.1'; deeper weathering and sand coatings on 30° non-foliation fracture surfaces at 114.8' to 114.9'; rock has spangly appearance.			40	1.5	1.0	109.5
									*85	2.0	1.0	111.1
									20	2.0	2.0	111.2
									20	2.0	1.0	111.9
									5-10$_{MB}$	-	-	112.4
									20$_{MB}$	-	-	112.9
115									20$_{MB}$	-	-	113.5
									30	3.0	3.0	114.8
									10	3.0	3.0	114.85
							I/II	R4	50	2.0	2.0	115.2
									25-30$_{MB}$	-	-	115.25
									20$_{MB}$	-	-	116
									15$_{MB}$	-	-	117.2
									25-30$_{MB}$	-	-	117.5
									*45	3.0	1.0	118.6
120		C-12 116.0 - 125.9	119	100	100	C-12: Dark gray SCHIST m-f grains of quartz, biotite, muscovite, feldspar, and scattered garnets up to 0.2-inch across; wide fracture spacing; unweathered to slightly weathered; strong; indistinct schistosity dips 50° to 80°; thin (<0.1") sandy silt coating on 20° non-foliation fracture at 124.3'; rock has spangly appearance; coring was relatively smooth and easy;			30$_{MB}$	-	-	120.9
									15	2.0	2.0	121.2
125									20	2.0	3.0	124.3
						E.O.B at 125.9'.			5-10$_{MB}$	-	-	125.9
130												
135												
140												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-404**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Acker 45**

LOCATION: **Track 20 under 11th Ave**
COORD. **N: 214,215.6** **E: 983,445.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.7 feet**
DATUM:
START DATE: **11/28/05** TIME: **6:00 pm**
FINISH DATE: **12/2/05** TIME: **6:00 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA				
Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
																		18-inch thick concrete slab - advanced via 6-inch, thin wall, single barrel Advanced to 10 feet via Air-Tricone method - utility clearance
10			S	1	■	10.0 - 12.0	6	20	13	18	8							Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet -occasional concrete and cinder and decomposed mica fragments (FILL)
15			S	2	■	15.0 - 17.0	8	40	27	12	10							Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)
			S	3	■	18.0 - 18.3	100.4"	-	-	-	3						19.8	Gray and Silver Decomposed Mica Schist, very dense Roller bit refusal and begin coring at 19.8'.
20																		

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-404**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **Acker 45**

LOCATION: **Track 20 under 11th Ave**
COORD. **N: 214,215.6** **E: 983,445.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.7 feet**
DATUM:
START DATE: **11/28/05** TIME: **6:00 pm**
FINISH DATE: **12/2/05** TIME: **6:00 am**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-1 19.8 - 23.6	44	96	75	C-1, 19.8' - 20.6': Dark gray to tan SCHIST; m-f grains of quartz, biotite, muscovite, feldspar; close fracture spacing; slightly weathered; medium strong; foliation defined by contorted and folded schistosity and some quartz bands< 1/4-inch thick; foliation dips 60º to 90º; possible recovery loss at 20.4'; contact with interlaying pegmatite is parallel to contorted foliation; 20.6' - 23.6: Light gray to salmon-pink PEGMATITE; medium to coarse grains of quartz, white and pink feldspar, muscovite, sparse medium grained garnet; very close to wide fracture spacing; slightly weathered; strong; orange iron staining on fracture surfaces	II	R3	35	2.0	2.0	20.1
							II	R4	40	2.0	3.0	20.4
									12	3.0	1.0	21
									40	2.0	2.0	21.2
							II	R4	10_{MB}	-	-	23.6
25									0	2.0	1.0	24.9
									25	2.0	1.0	26
									5_{MB}	-	-	27.2
		C-2 23.6 - 33.7	121	100	95	C-2: Medium gray to salmon-pink PEGMATITE c-m grains of quartz, pink and white feldspar, muscovite, mafic minerals, sparse garnet and yellow-green platy mineral (muscovite?); close to wide fracture spacing, except extremely close spacing from 30.2' to 30.35'; slightly weathered; strong; red silt coatings on fractures at 28.6', 30.2' to 30.35' and 31.5'; pure, medium gray QUARTZ from 31.6' to 32.2' and 32.8' to 33.1'; very large pink feldspar crystals (up to 3 inches across) from 25.2' to 26.4', 30.2' to 31.6' and 32.6' to 33.7'			30	1.5	3.0	28.6
30									20_{MB}	-	-	29.8
									10	2.0	3.0	30.2
									25	2.0	3.0	30.25
									20	2.0	3.0	30.3
									15	2.0	2.0	30.35
									30	2.0	3.0	31.5
							II	R4	20	1.5	2.0	32.15
						C-3, 33.7' to 40.0': Light gray to salmon-pink PEGMATITE c-m grains of quartz, white and pink feldspar, muscovite, sparse medium grained garnet and mafic minerals; pink feldspar crystals up to 2 inches across; wide fracture spacing, except extremely close spacing from 36.1' to 36.2' and 39.05' to 39.1'; slightly weathered, strong; 40.0' - 43.7: Dark gray SCHIST; fine to coarse grains of biotite, quartz, muscovite, black mafic minerals; close to moderate fracture spacing; slightly weathered; strong; foliation defined by distinct, contorted schistosity and 1/8-inch thick quartz bands; foliation dips 30º to 50º; red silt on some fracture surfaces; except: 40.8' to 41.3': coarse to medium grained quartz-feldspar 41.8' 43.7: rock is fine to medium grained; medium gray SCHIST, enriched in quartz and muscovite, with			15	2.0	2.0	32.95
									20	2.0	2.0	33.1
35									20	2.0	2.0	33.6
									25	3.0	1.0	33.7
									15	2.0	2.0	36.1
									15	3.0	2.0	36.11
									70	2.0	1.0	36.14
		C-3 33.7 - 43.7	120	100	91				15	2.0	2.0	36.17
									15	2.0	3.0	36.2
40									10	1.5	3.0	38.3
									35	1.5	3.0	38.7
									25	2.0	1.0	39.05
									12	2.0	2.0	39.1
									*45	1.5	2.0	40
									*50	1.5	3.0	40.4
									5-10$_{MB}$	-	-	40.7
							II	R3/R4	*40	2.0	2.0	41.3
									*30	2.0	1.0	41.7

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-404**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						indistinct foliation.			*45	2.0	2.0	41.8
						C-4: Dark gray SCHIST m-f grains of quartz, biotite, muscovite; sparse garnet up to 0.1 inch across; close to moderate fracture spacing, except extremely close spacing from 45.2' to 45.3' and 53.3' to 53.6'; slightly weathered; medium strong to strong; foliation			*60	1.5	2.0	42.6
									*70	2.0	1.0	43.7
									*55	1.0	4.0	45.2
									*55	1.0	4.0	45.3
		C-4 43.7 - 53.7	119	99	92				*60	2.0	1.0	45.8
						defined by indistinct schistosity and planar quartz bands 1/4 inch thick from 43.7' to 45.7' and distinct,			*50	2.0	1.0	46.6
									*40/50	2.0	1.0	47.3
50						wavy schistosity from 45.7' to 53.6'; foliation dips 50° to 70°;			*45	1.5	1.0	47.7
									30	2.0	1.0	48.25
						46.4' to 47.1': rock is enriched in black mafic minerals, with yellow metallic mineral (gold?) in			*65	2.0	1.0	48.4
									20_{MB}	-	-	48.6
						irregular patches up to 0.2 inch across; mostly quartz from from 47.1' to 47.3', also with yellow metallic			35	2.0	2.0	48.8
									30	3.0	1.0	49.3
						mineral; light gray quartz PEGMATITES from 43.7' to 44.2' and 49.9' to 52.1'; contacts parallel foliation;	II	R4	25	3.0	1.0	50.1
									55	1.5	2.0	50.5
55						C-5, 53.7' - 53.9': Dark gray SCHIST, as above.			50	1.5	2.0	50.6
						53.9' - 56.2': Light to medium gray PEGMATITE, c-m grains of quartz and white feldspar with			30	3.0	1.0	51.2
									*70	1.5	4.0	52.2
						inclusions of dark gray SCHIST, as above; from 55.1' to 55.5' very close to moderate fracture spacing;			60	3.0	1.0	53.3
									*70	1.5	3.0	53.4
						slightly weathered; medium strong; 0.1-inch thick			30	1.5	4.0	53.6
		C-5 53.7 - 63.6	112	94	81	veins of soft, white mineral (muscovite?) dip ~ 70° parallel to foliation in schist; schist-pegmatite			40	1.5	2.0	53.7
									25	2.0	1.0	54.1
						contacts dip ~ 70°, parallel to foliation; 56.2' to 61.7': Dark gray to black SCHIST; fine to medium			30	3.0	1.0	54.3
60									*60	1.0	4.0	55.3
						grains of biotite, quartz, feldspar, muscovite; close to moderate fracture spacing, except very close from			*65	2.0	4.0	55.4
									80	1.0	2.0	56.3
						60.4' to 60.7'; slightly weathered; strong; foliation defined by indistinct schistosity, dips 50°to 90°; at			75/80	2.0	1.0	56.5
									45	2.0	2.0	58.4
						59.5' to 60.0', a 1/2-inch thick contorted quartz vein rimmed by concentration of black mafic minerals; at			*60	1.5	2.0	59
							II	R4	0	2.0	2.0	59.1
						60.8' to 60.85' and 61.4' - green-gray micaceous clay GOUGE; contact parallel to contorted foliation; At			*60	2.0	2.0	59.6
65									*60	2.0	2.0	59.85
						60.85' to 61.4' - Possible zone of recovery loss; 61.4' to 63.6': Light to medium gray GRANITE; medium			10	1.5	1.0	59.9
									20	2.0	1.0	60.3
						to coarse grains of quartz, white feldspar and muscovite; close fracture spacing; slightly weathered;			*40	1.5	4.0	60.4
									*50	1.0	6.0	60.7
						strong; muscovite seams 0.1-inch thick dip 30°			20	1.0	6.0	61.3
		C-6 63.6 - 73.3	116	100	91				30	2.0	3.0	62
									35_{MB}	-	-	62.6
						C-6 - 63.6' to 69.6': Medium gray GRANITE c-m grains of white and pink feldspar, quartz, muscovite,			20	1.5	1.0	63.1
70							II	R4/R5	25	2.0	2.0	63.3
						and black mafic minerals; close to moderate fracture spacing, except extremely close spacing from 64.6' to			15	3.0	1.0	63.5
									10	2.0	1.0	63.6
						64.7', 65.7' to 65.8' and 69.4' to 69.45'; slightly weathered; strong; includes 6-inch zones of coarse			20	2.0	1.0	63.9
									30	1.5	1.0	64.6
						grained PEGMATITE throughout; biotite SCHIST at 65. 1' - 65.3', 65.7' -65.8', and 69.2' - 69.5'; pure	I/II	R4/R5	20	1.5	1.0	64.65
									30	1.5	1.0	64.7
						quartz from 66.0' - 66.3'.			25	1.5	2.0	65.1
75						69.6' - 73.3: Light gray GRANITE m grains of quartz, white feldspar, and muscovite; moderate to			40	1.5	2.0	65.4
									*45	1.0	2.0	65.7
						wide fracture spacing; strong to very strong; slightly weathered; 1/4-inch wide quartz bands dip 30° and			10	2.0	2.0	65.8
									25_{MB}	-	-	66.65
						80° in opposite directions; overdrilled from 72.8' to 73.3'.			30_{MB}	-	-	68.2
									40_{MB}	-	-	69.4
		C-7 73.3 - 83.3	120	100	98				10	3.0	2.0	69.45
						C-7 - 73.3' to 82.2': Light gray GRANITE; m grains of quartz, white feldspar and muscovite; sparse			20_{MB}	-	-	70.4

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-404**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						medium grained garnet; light green, platy mineral (muscovite?); close to wide fracture spacing; unweathered to slightly weathered; strong to very strong; 1/2-inch to 1-inch thick pegmatite veins dip 80°; tightly healed hairline fractures dipping 35 throughout, spaced 1-inch to 2 feet; 82.2' to 83.3': Dark gray to black SCHIST; fine to medium grains of biotite, quartz, and black mafic minerals; moderate fracture spacing; slightly weathered; strong; indistinct schistosity dips 30 to 60°; contact with overlying granite is intact, dips 50 parallel to foliation.			5-10	3.0	1.0	72.5
									5-10	3.0	1.0	72.65
									5_{MB}	-	-	73.3
									30	2.0	1.0	74.9
									30	2.0	1.0	75.3
									35	1.5	2.0	76
							II	R4	5_{MB}	-	-	77
									30	2.0	1.0	77.3
85									50	2.0	1.0	77.7
									10_{MB}	-	-	78.3
									15_{MB}	-	-	78.7
									30	2.0	1.0	79.9
									35	1.5	2.0	79.95
		C-8 83.3 - 93.3	120	100	98	C-8: Dark gray to black SCHIST; m-f grains of biotite, quartz, feldspar, black mafic minerals; moderate to wide fracture spacing, except for two closely spaced fractures at 89.3' to 89.4; slightly weathered; strong; foliation defined by contorted, indistinct schistosity dipping 40 to 70°; bands of GRANITE as in run C-7, with contacts dipping 50 to 70° at 83.6' to 83.8', 84.3' to 84.4', 89.4' to 89.6', 90.7' to 92.7' and 93.2' to 93.3'; foliation is subparallel to contacts; scattered healed hairline fractures, iron-stained, dip 50 to 70°, opposite to foliation dip.			35	1.5	1.0	80.5
									25	1.5	1.0	83
									*25	1.5	3.0	83.3
90									*60	1.5	3.0	84.4
									*55	1.5	1.0	85.2
									35_{MB}	-	-	87.6
									20_{MB}	-	-	88.1
									*60	1.0	2.0	88.8
									10	2.0	1.0	89.3
									15	2.0	1.0	89.4
							I/II	R4	*65	1.0	3.0	90.9
									15_{MB}	-	-	92.3
95									25_{MB}	-	-	92.8
									*50	2.0	2.0	93
									25	2.0	2.0	93.1
									90	2.0	1.0	93.2
		C-9 93.3 - 103.4	121	100	100	C-9: Dark gray SCHIST; m-f grains of quartz, biotite, muscovite, feldspar, sparse coarse grained garnet; wide fracture spacing; unweathered to slightly weathered; strong; indistinct schistosity dips 50° to 80°; bands of light gray GRANITE, 1-inch to 2-inch thick, with medium grains of quartz, white feldspar, and muscovite, dipping 60 to 70°, at 93.3' to 93.5', 98.5' to 99.8' and 100.0' to 100.6'; contacts are subparallel to foliation.			25_{MB}	-	-	93.3
									*55	1.5	2.0	96.3
									*50	2.0	2.0	97.1
									40_{MB}	-	-	98.2
100									*60	1.5	1.0	98.5
									30	2.0	1.0	98.6
									25_{MB}	-	-	98.9
									25	3.0	1.0	102
							I/II	R4	30_{MB}	-	-	103.1
									*60	2.0	1.0	103.4
105												
									0-5_{MB}	-	-	106.5
		C-10 103.4 - 112.9	114	100	100	C-10: Dark gray SCHIST; m-f grains of quartz, biotite, muscovite, feldspar, sparse medium grained garnet; wide to very wide fracture spacing; unweathered to slightly weathered; strong; foliation defined by indistinct schistosity dipping 50 to 80°; bands of light gray GRANITE, with medium grains of quartz, white feldspar and muscovite at 106.6' to 108.6', 111.2' to 111.2" and 112.2 to 112.9'; granite has 1/2-inch thick pegmatite bands dipping 70 parallel to contacts; schist-granite contacts are intact, and dip 70°; foliation is subparallel to contacts.			20_{MB}	-	-	108
									30_{MB}	-	-	108.4
110												
									*50	1.5	1.0	111
									15	1.5	1.0	112.35
							I/II	R4/R5	15	2.0	1.0	112.9
						C-11: Light gray GRANITE: m grains of quartz, white feldspar and muscovite; moderate to wide			10	3.0	1.0	113.05

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-404**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Cruz**
INSPECTOR: **J. Thampi**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
120		C-11 112.9 - 122.9	120	100	99	fracture spacing; unweathered to slightly weathered; strong to very strong; a few 1/2-inch thick bands of quartz rich pegmatite, dipping 70°; dark gray SCHIST, with fine to medium grains of biotite, quartz, and muscovite at 117.3' to 119.4', 121.0' to 121.2' and 121.6' to 122.9'; contacts are intact and dipping 40° to 80°, except contact at 117.3' which is along biotite band; most contacts are subparallel to foliation, except from 121.0' to 121.6', where contacts crosscut foliation; weathered, partly open fracture at 115.45', dipping 15°; slightly bulging core sides in schist at 121.6' to 122.9'.			15 20 *25 *25$_{MB}$ *35 45 *30	1.5 1.5 1.5 - 2.0 1.5 1.5	2.0 2.0 3.0 - 1.0 2.0 2.0	115.5 116.5 117.3 117.9 119.3 120.9 121.5
125		C-12 122.9 - 127.9	60	100	97	C-12: Dark gray SCHIST; m-f grains of quartz, biotite, muscovite, feldspar, and garnets up to 0.1-inch across; moderate to wide fracture spacing; unweathered to slightly weathered; strong; Light gray GRANITE with medium grains of quartz, white feldspar and muscovite at 124.2' to 125.6' and 127.0' to 127.9'; 1/2-inch thick band of pegmatite at 124.2', dipping 80°; contacts with schist are intact and dip 50° to 80°; subparallel to foliation; slightly wavy core sides in schist; E.O.B at 127.9'.	I/II	R4	30 5-10 10$_{MB}$ 25 22$_{MB}$ 15 5	3.0 2.0 - 1.5 - 1.5 1.5	1.0 1.0 - 1.0 - 1.0 1.0	122.9 123.1 124.4 126.5 127.1 127.5 127.9
130												
135												
140												
145												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-405**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-55**

LOCATION: **Track 20 under 11th Ave**
COORD. **N: 214,174.3** **E: 983,518.9**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.8 feet**
DATUM:
START DATE: **11/28/05** TIME: **6:00 pm**
FINISH DATE: **12/2/05** TIME: **6:00 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA				
Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
																		0.0'-1.5' - Concrete Slab - Advanced through via 6-inch single barrel thin wall coring adapter.
																		1.5' - 10.0': Advanced through soil-overburden via Air-Tricone method to bypass the utilities (up to 10 feet, as required);
5																		Dark brown c-f SAND, some Silt, little f-Gravel, moist (became wet at 8 feet) (SM) (based on observations in cuttings)
10			S	1	■	10.0 - 12.0	6	5	5	4	2							Dark brown to black c-f SAND, some Silt, little f-Gravel, wet, loose (SM)
15			S	2	■	15.0 - 15.8	23	100/3			6							Dark brown m-f SAND, some Silt, trace f-Gravel, wet, very dense(SM) (Decomposed micaceous rock fragment at tip of spoon)
20																	19.8	Roller bit refusal and begin coring at 19.8'.

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-405**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME-55**

LOCATION: **Track 20 under 11th Ave**
COORD. **N: 214,174.3** **E: 983,518.9**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.8 feet**
DATUM:
START DATE: **11/28/05** TIME: **6:00 pm**
FINISH DATE: **12/2/05** TIME: **6:00 am**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-1 19.8 - 23.2	41	100	93	C-1: Dark gray to tan SCHIST m-f grains of biotite, quartz, muscovite, feldspar; close to moderate fracture spacing; slightly weathered; medium strong; foliation defined by wavy schistosity dipping 70° to 80°; soft mica on foliation fractures.	II	R3	*70	2.0	3.0	20.4
									45	2.0	2.0	21.6
									15	3.0	2.0	21.7
		C-2 23.2 - 31.2	90	94	75	C-2, 23.2' - 31.2': Medium to dark gray SCHIST m-f grains of quartz, biotite, feldspar, muscovite; garnets up to 0.2-inch across from 23.2' to 25.2'; close to moderate fracture spacing, except very close spacing from 23.2' to 24.0'; slightly weathered; medium strong to strong; foliation defined by wavy schistosity dipping 60° to 80°; 1/2-inch thick pegmatites at 26.7' and 28.6'; many fractures are iron stained; 30.8' - 31.2': Medium gray PEGMATITE c-m grains of quartz, feldspar, mafic minerals; contact with overlying schist is along foliation fracture; possible recovery loss at 23.2' to 23.8'.	II	R3/R4	20	3.0	2.0	23
									10	3.0	2.0	23.2
									20	2.0	2.0	23.8
25									90	1.0	4.0	23.9
									30	3.0	2.0	24.1
									45	2.0	2.0	24.5
									45	2.0	1.0	25.3
									20	3.0	3.0	26.2
									*60	2.0	2.0	26.6
									20	2.0	2.0	27.3
									15	3.0	2.0	27.5
30									*70	1.5	3.0	28.1
									*70	1.5	1.0	29.3
									*70	2.0	1.0	29.7
		C-3 31.2 - 41.2	120	100	89	C-3: Dark gray SCHIST: fine to coarse grains of quartz, feldspar, biotite, muscovite, scattered medium to coarse garnets; very close to wide fracture spacing; slightly weathered; medium strong to strong; wavy schistosity dips 30° to 80°; Medium gray to dark pink PEGMATITE from 31.2' to 32.1'; contacts dip 30°, subparallel to foliation; light gray GRANITE from 32.5' to 34.3' and 34.5' to 35.9', with PEGMATITE; contacts dip 30° to 70°, intact; subparallel to foliation.	II	R3/R4	35	3.0	1.0	30.2
									40	1.5	1.0	30.3
									30	1.5	2.0	30.5
									10	2.0	1.0	30.7
									*60	1.0	3.0	30.8
35									10_{MB}	-	-	31.2
									30	2.0	3.0	31.6
									*45	1.5	2.0	32
									30	1.0	1.0	32.4
									30	2.0	1.0	32.5
									20	3.0	1.0	33.3
									30	2.0	2.0	33.5
									30	3.0	2.0	33.6
									*65	1.5	2.0	34.3
40									30	1.5	1.0	34.6
									20	1.0	2.0	35.9
						C-4: Dark gray SCHIST c-f grains of quartz, feldspar, biotite, and muscovite; many garnets, up to 0.3-inch across; close to moderate fracture spacing; slightly weathered, except moderately weathered from 45.4' to 45.8'; medium strong to strong, except weak from 45.4' to 46.5'; distinct wavy schistosity	II	R3/R4	30_{MB}	-	-	36.1
									30	3.0	1.0	36.2
									55	3.0	1.0	37.6
									30_{MB}	-	-	39.5
									45_{MB}	-	-	41.2
									40	3.0	1.0	42.2

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-405**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
50		C-4 41.2 - 51.1	119	100	76	dips 60° to 90° bands of pure quartz from 49.4' to 50.2', with 30° upper contact and 70° lower contact; single near-vertical, wavy foliation fracture extends from 43.1' to 45.6', with clay and soft mica on fracture surface; continuous, slow water loss observed throughout the core run.	III II	R2 R3/R4	70 *80 *90 20 *75 *60 *60 15 25_{MB} *30	1.0 1.0 1.0 1.0 1.5 1.5 2.0 1.5 - 1.0	4.0 3.0 4.0 4.0 2.0 4.0 2.0 2.0 - 2.0	43.1 44 44.5 45.2 45.4 45.6 46 47 48.1 49.4
55		C-5 51.1 - 60.8	116	100	100	C-5: Dark gray to dark blue gray SCHIST m-f grains of quartz, biotite, muscovite and feldspar; many garnets, up to 0.2-inch across; close to wide fracture spacing; slightly weathered; strong; wavy schistosity dips 70° to 90°; all fractures are across foliation; continuous, small water loss observed throughout the core run; depth of the borehole confirmed via measuring tape at 60.8'.	II	R4	10 *70 45_{MB} 40 40 35_{MB} 40 40_{MB}	2.0 1.0 - 2.0 2.0 - 2.0 -	1.0 2.0 - 1.0 1.0 - 1.0 -	50.1 50.2 51.1 53.4 53.9 54.4 55.9 56.3
60												
65		C-6 60.8 - 71.2	125	100	96	C-6: Dark gray SCHIST c-f grains of quartz, muscovite, biotite, feldspar; many garnets up to 0.2-inch across; wide fracture spacing; unweathered to slightly weathered; strong; crenulated schistosity dips 70° to 90°; 1/2-inch thick quartz bands, near-vertical, between 63.3' and 64.3'; schistosity is contorted around quartz bands; slightly wavy core sides from 63.3' to ~65.0'; rock is muscovite-rich with spangly appearance; at the bottom of the rock core was jammed in core barrel; had to hammer hard to take it out; bottom of the borehole confirmed via measuring tape at 72.1';	I/II	R4	15_{MB} 40_{MB} 30_{MB} 60 10	- - - 3.0 2.0	- - - 1.0 2.0	60.8 63.4 65.8 67.6 69.2
70												
75		C-7 71.2 - 81.2	120	100	100	C-7: Dark gray SCHIST c-f grains of quartz, muscovite, biotite, feldspar, and scattered garnets up to 0.3-inch across; wide fracture spacing; unweathered to slightly weathered; strong; crenulated schistosity dips 60° to 90°, except where contorted around quartz nodules and large garnets; slightly wavy core sides; rock is muscovite-rich, with spangly appearance; medium to fine grained below 80.1'.	I/II	R4	*80 60 45 *70 15-20$_{MB}$ *60 30 60_{MB} 40_{MB} 35_{MB}	2.0 2.0 2.0 1.5 - 2.0 3.0 - - -	2.0 2.0 2.0 2.0 - 2.0 1.0 - - -	70.8 70.9 71 71.2 72.45 73.9 74.4 75.4 76.1 78.8

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-405**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
									30_{MB}	-	-	80.2
		C-8 81.2 - 91.2	120	100	100	C-8: Dark gray to medium gray SCHIST m-f grains of quartz, muscovite, feldspar, biotite, and garnets, up to 0.1-inch across; wide fracture spacing; unweathered; strong; crenulated schistosity dips 70 to 90°, contorted in places; irregular bands of granite , ~ 1-inch thick are near-vertical at 87.7' and 94.5'; wavy core sides throughout; all mechanical breaks are across foliation and jagged.	I	R4	25_{MB}	-	-	81.2
									10_{MB}	-	-	81.8
85									40_{MB}	-	-	84.1
									35_{MB}	-	-	84.8
									20_{MB}	-	-	85
									25_{MB}	-	-	85.9
									10_{MB}	-	-	86.2
									15_{MB}	-	-	86.6
									15_{MB}	-	-	88.4
90									20_{MB}	-	-	88.5
									25_{MB}	-	-	89.3
									15_{MB}	-	-	89.5
									40_{MB}	-	-	90
		C-9 91.2 - 96.5	64	100	100	C-9: Dark gray SCHIST m-f grains of quartz, biotite, feldspar, muscovite; scattered garnets, up to 0.1-inch across; moderate to wide fracture spacing; unweathered to slightly weathered; strong; wavy schistosity dips 65° to 80°; irregular contorted quartz bands 1/4-inch thick; near-vertical bands of light gray GRANITE from 93.8' to 94.7', contact intact, with sub parallel foliation; core sides very slightly wavy; pyrite coating on 65° foliation fracture at 93.10;	I/II	R4	20_{MB}	-	-	91.2
									*65	1.0	2.0	93.1
95									20_{MB}	-	-	94.85
									30_{MB}	-	-	96.5
									10_{MB}	-	-	97
									5-10_{MB}	-	-	97.6
									10-15_{MB}	-	-	98
									15	3.0	1.0	98.2
100									10_{MB}	-	-	98.5
									20	3.0	1.0	98.8
									25	2.0	2.0	98.9
									25	2.0	2.0	98.95
									80	1.0	2.0	99.4
									40	2.0	2.0	99.8
									10	2.0	1.0	100.1
									50	2.0	2.0	100.9
105									0_{MB}	-	-	101
									20_{MB}	-	-	101.2
									15	1.5	1.0	104.1
									15_{MB}	-	-	104.3
									15_{MB}	-	-	105.4
									10-15_{MB}	-	-	106
									20	3.0	1.0	108.4
110									10_{MB}	-	-	110.2
									30	2.0	2.0	110.9
									30	2.0	2.0	111.1
		C-10 96.5 - 106.0	105	92	79	96.5' to 98.8': Dark gray SCHIST m-f grains of quartz, biotite, muscovite, feldspar, hornblende, and garnets up to 0.1-inch across; moderate fracture spacing, with numerous near-horizontal mechanical breaks; slightly weathered; strong; wavy contorted schistosity is near-vertical; near-vertical band of light gray GRANITE from 96.9' to 97.5'; 98.8' - 101.1': Black SCHIST c-m grains of biotite, hornblende, quartz, feldspar and yellow metallic flaky mineral (pyrite?) on fracture surfaces and throughout; very closely fractured, with some over coring; slightly weathered; strong; very dense; near-vertical schistosity; probable non-recovery zone from 99.8' to 100.8'; 101.0' - 103.9: Dark gray SCHIST m-f grains of biotite, quartz, muscovite, hornblende and garnets up to 0.1-inch across; wide facture spacing; unweathered; strong; foliation defined by indistinct schistosity and contorted 1/4-inch bands of quartz, both dipping 80° to 90°; core sides are parallel;	II	R4				
		C-11 106.0 - 116.1	121	100	97	103.9 - 106.0': Dark gray to black SCHIST c-m grains of hornblende, biotite, muscovite, quartz, and many scattered 0.1-inch feldspar phenocrystals; moderate fracture spacing; slightly weathered; strong; very dense; faint foliation dips 80° to 90°; a few contorted bands of quartz, near-vertical and 1/4-inch to 1/2-inch thick; wavy, bulging core sides; -drilling was hard; core barrel jammed at ~ 100 feet; rock core catcher was not catching	I/II	R5				

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-405**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						cored rock; redrilled cored-rock observed between 99.0' and 100.0'.			35_{MB}	-	-	114.8
						C-11, 106.0' - 109.1': Dark gray to black SCHIST; as above, except with scattered medium grained garnets and greater number of quartz bands; 109.1' to 116.1' - Dark gray SCHIST; fine to medium grains of quartz, biotite, muscovite, and feldspar; wide fracture spacing, except for two pairs of closely spaced fractures at 110.9' and 115.8'; unweathered to slightly weathered; very strong; foliation defined by indistinct near-vertical schistosity; - bottom of the core run jammed inside the core barrel; had to hammer hard to take it out.	I/II	R4/R5	80	2.0	1.0	115.8
									40	2.0	1.0	115.9
									30_{MB}	-	-	116.1
									20_{MB}	-	-	117.6
120		C-12 116.1 - 126.1	120	100	100				$25\text{-}30_{MB}$	-	-	119
									5-10	2.0	1.0	119.9
									10	2.0	1.0	120.5
									10	2.0	1.0	121.1
						C-12: Dark gray SCHIST m-f grains of quartz, biotite, muscovite, feldspar; moderate to wide fracture spacing; unweathered to slightly weathered; strong to very strong; indistinct foliation dipping 75 to 90°;			10	2.0	1.0	123.8
125									30_{MB}	-	-	124.6
									50	2.0	1.0	125.1
									40_{MB}	-	-	125.15
									$*75_{MB}$	-	-	125.2
									40_{MB}	-	-	125.25
									0_{MB}	-	-	126.1
						122.8' to 123.3' - black SCHIST c-m grains of hornblende, quartz, biotite, with white, 0.1-inch phenocrystals; 123.3' - 123.6': Light gray quartz-feldspar near-vertical band; wavy core sides from 123.3' to 123.6'; - Rock-core was jammed inside core barrel; had to hammer hard to pull it out; - A lot of mechanical breaks between 125.1' and 125.25 due to hammering; E.O.B at 126.1'.						
130												
135												
140												
145												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-406w**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Ingersoll Rand A 300**

LOCATION: **W33rd St & 11th Ave-viaduct**
COORD. **N: 214,423.2** **E: 983,574.5**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.5 feet**
DATUM:
START DATE: **8/15/05** TIME: **1:00 pm**
FINISH DATE: **8/31/05** TIME: **3:30 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/25/05	6:30 am	35.8	12.0	141.4
8/31/05	12:05 pm	32.8	12.0	141.4

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
																		Hand Augered to 6'. 0.0' to 0.4' - Asphalt pavement 0.4' to 6.0' - Dark brown to brown c-f Sand, and m-f Gravel, some Silt, occasional bricks and cobbles (SM) (FILL)
5			S	1	■	6.0 - 8.0	48	20	15	11	14							Dark gray to black c-f SAND, some organic Silt, little c-f Gravel, occasional wood chips, wet, dense (SM) (FILL)
			S	2	■	8.0 - 10.0	11	8	9	17	17							Dark gray to dark brown c-f Sand, some c-f Gravel, some Silt, occasional wood chips, concrete and bricks, wet, medium dense (SM) (FILL)
10			S	3	■	10.0 - 10.4	100/5"				4							Dark brown to brown c-f SAND, and Silt, trace f-Gravel, occasional wood chips at the tip of the spoon, wet (SM) (FILL)
																	12.0	-3-inch casing advanced to 12 feet Roller bit refusal and begin coring at 12'.
15																		
20																		

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-406w**
SHEET NUMBER: **1** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **Ingersoll Rand A 300**

LOCATION: **W33rd St & 11th Ave-viaduct**
COORD. **N: 214,423.2** **E: 983,574.5**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.5 feet**
DATUM:
START DATE: **8/15/05** TIME: **1:00 pm**
FINISH DATE: **8/31/05** TIME: **3:30 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/25/05	6:30 am	35.8	12.0	141.4
8/31/05	12:05 pm	32.8	12.0	141.4

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
15		C-1 12.0 - 22.0	116	97	64	C-1 - Medium gray to yellow-brown to dark pink GRANITE; m-f grains of feldspar, quartz, muscovite, biotite, and garnet; very close to moderate fracture spacing; slightly weathered; strong; rock is dark pink and garnet enriched from 12.3' to 12.9' and 14.6' to 15.3'; rock has yellow-brown iron staining where closely fractured; no rock wall contact at low-angle fractures from 13.0' to 13.6' and 20.3' - 20.6'; salmon-pink, very coarse grained pegmatite from 19.5' to 20.1'; Core barrel was not advancing - changed core bit; took 90 minutes to core first two feet of rock; faster coring rate between 19' and 20.5'; possible loss of recovery between 20.3' and 20.6'.	II	R4	$0\text{-}5_{MB}$	-	-	12.5
									30	2.0	1.0	13
									35	2.0	2.0	13.3
									20	2.0	2.0	13.4
									15	2.0	2.0	13.6
									20	2.0	1.0	13.8
									15	2.0	1.0	14.1
									40	3.0	1.0	15.1
									40	2.0	1.0	16.4
									40	2.0	2.0	16.5
									5_{MB}	-	-	16.9
20									25	2.0	1.0	18.65
									35	1.5	2.0	18.7
									35	1.5	2.0	19.2
									30	3.0	1.0	19.5
									35	3.0	1.0	19.6
		C-2 22.0 - 32.0	120	100	99	C-2 - Medium gray to yellow-brown to dark pink GRANITE; m-f grains of quartz, feldspar; muscovite, biotite, and garnet; moderate to wide fracture spacing, except very close spacing at 23.6' to 23.7'; unweathered, except slightly weathered from 23.4' to 24.2'; very strong, except strong from 23.4' to 24.2'; sparse garnet agglomerates up to 0.3" across; rock is dark pink and garnet enriched from 22.4' to 23.8' and 24.2' to 26.0'; core has yellow-brown iron staining from 23.4' to 24.2'; no rock wall contact at low angle fractures at 23.6' and 28.7'; bottom of the core run jammed in barrel; hammered hard to take rock out of rock catcher; bottom of borehole measured with tape at 32.0'.	I	R5	10	3.0	1.0	19.8
							II	R4	5-10	1.0	3.0	20.3
									25	2.0	3.0	20.6
									30	2.0	3.0	20.7
25									40	1.5	1.0	21.3
									20_{MB}	-	-	21.8
									10_{MB}	-	-	22
									25	2.0	1.0	22.5
									10_{MB}	-	-	23
									70	2.0	1.0	23.5
									80	1.5	2.0	23.55
									20	1.0	2.0	23.6
30									15_{MB}	-	-	25.2
									20_{MB}	-	-	25.9
									10_{MB}	-	-	27
									$5\text{-}10_{MB}$	-	-	27.9
		C-3				C-3 - Medium gray to yellow-brown to dark pink GRANITE m-f grains of feldspar, quartz, muscovite, biotite, and garnet; sparse agglomerates of garnets up to 0.2" across; moderate to wide fracture spacing, except close spacing from 35.3' to 35.9'; unweathered from 32.4' to 34.8'; slightly weathered with iron staining from 34.8' to 42.0';	I	R5	10	1.0	1.0	28.7
									5	1.5	1.0	29.3
									10_{MB}	-	-	31.1
									15_{MB}	-	-	31.7
35									70_{MB}	-	-	31.75
							II	R4	60_{MB}	-	-	31.8
									10_{MB}	-	-	32
									30	2.0	1.0	35.3

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-406w**
SHEET NUMBER: **2** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		32.0 - 42.0	120	100	90	very strong from 32.0' to 34.8', strong from 34.8' to 42.0'; thin (<0.1") coatings of brick-red clay on high angle fractures from 36.2' to 40.2'; rock enriched in medium grained garnets from 39.6' to 41.2'; no rock wall contact at 60° fracture at 35.4'; pegmatite dipping ~60° at 35.0' to 35.4'; loss of water between 35.8' and 37.2'; bottom of borehole measured at 42.0'.			60	3.0	2.0	35.4
									50	2.0	4.0	35.8
									15	2.0	1.0	35.9
									80	3.0	4.0	36.2
40									70	2.0	4.0	36.7
									15	2.0	1.0	37
									20	2.0	1.0	37.2
									5	2.0	1.0	37.8
									40	2.0	1.0	38.6
						C-4 - Medium gray to yellow brown to dark pink GRANITE; m-f grains of feldspar, quartz, biotite, muscovite, and garnet; sparse agglomerates of garnets up to 0.2" across; wide fracture spacing except two extremely close fractures at 42.7' to 42.8', and two close fractures at 49.1' and 49.5'; unweathered, except slightly weathered and iron stained at 42.7' - 42.8' and 47.9' - 49.8'; very strong; rock is dark pink and garnet-enriched at 43.5' to 45.2' and 47.7' to 48.0'; no rock wall contact at low-angle fractures at 42.7' and 49.5'; thin (<0.1") of brick-red clay on low angle fractures at 49.5' and 49.1'; bottom 2" of core run was stuck in rock-catcher; hammered hard to take the core piece out; loss of water at 42.7';	I	R5	40	1.5	1.0	39.1
							II	R5	35	2.0	1.0	40
							I	R5	90	2.0	4.0	40.2
									20	2.0	1.0	40.9
45									20	2.0	1.0	41.4
									60	2.0	2.0	41.5
									30	2.0	1.0	41.6
		C-4 42.0 - 52.0	120	100	98				5-10	2.0	1.0	42
									10_{MB}	-	-	42.2
									20	1.0	2.0	42.7
							II	R5	20	1.0	2.0	42.8
									$5\text{-}10_{MB}$	-	-	46.9
50									25	1.5	2.0	47.9
									5	2.0	4.0	49.1
									15	1.0	4.0	49.5
									20_{MB}	-	-	50.7
						C-5 - Medium gray to yellow brown GRANITE m-f grains of quartz, feldspar, biotite and muscovite; sparse garnet up to 0.1" across; wide to moderate fracture spacing, except extremely close spacing from 59.9' to 60' and 60.75' to 60.8'; unweathered, except slightly weathered with yellow brown staining from 59.5' to 62.0'; very strong, except strong from 59.5' to 62.0'; no rock wall contact at 59.9' and 60.8'; coatings of brick-red silt on fractures at 59.9' and 61.3'; pink, near-vertical pegmatite, 0.5" thick from 60.8' to 62.0'; indistinct, near-vertical lineation throughout; core barrel jammed at 60.8'; possible lost 1-inch of core at the bottom of the run - rock stuck in rock catcher.	I	R5	5_{MB}	-	-	51.85
									10_{MB}	-	-	52
									15	2.0	1.0	52.05
									10-15	2.0	1.0	52.1
55									20_{MB}	-	-	53.1
		C-5 52.0 - 62.0	118	98	97				$5\text{-}10_{MB}$	-	-	57
									25_{MB}	-	-	57.9
							II	R4	10-15	1.5	1.0	59.85
60									5-10	1.0	2.0	59.9
									80	1.0	2.0	59.95
									5-10	2.0	1.0	60
						C-6 - Medium gray to light pink GRANITE c-f grains of quartz, pink and white feldspar, muscovite and biotite; sparse garnets up to 0.3" across; unweathered to slightly weathered; strong; wide to very wide fracture spacing; core barrel jammed at 65.7'.	I/II	R4	20	1.0	2.0	60.75
									15-20	2.0	2.0	60.8
									25	2.0	2.0	61.3
65									10_{MB}	-	-	61.8
									10_{MB}	-	-	61.9
									$5\text{-}10_{MB}$	-	-	62
		C-6 62.0 - 72.0	120	100	100				20	1.5	2.0	63.35
									5	2.0	1.0	65.7
									10_{MB}	-	-	67
70												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-406w**
SHEET NUMBER: **3** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						C-7 - 72.0" - 78.0': Light to medium gray GRANITE m-f grains of feldspar, quartz, biotite and muscovite, with sparse garnet up to 0.1" across; wide fracture spacing; unweathered except slightly weathered adjacent to fracture at 73.8'; strong; no rock wall contact and red silt coating on 10° fracture at 73.8'; 78.0' - 81.0': Light gray to salmon pink PEGMATITE; coarse to very coarse crystals of feldspar, quartz, muscovite; pink feldspar up to 3" across; moderate to wide fracture spacing; unweathered to slightly weathered ; strong; in near-vertical contact with granite above and below; 81.0' - 82.0': Medium gray GRANITE, as above; core barrel jammed at 78.65'; coring was slower between 78.0' and 82.0'; bottom of the borehole measured with tape at 82.0'.	I/II	R4	5_{MB}	-	-	72
									$5\text{-}10_{MB}$	-	-	72.05
									10	1.0	2.0	73.35
							II	R4				
75									10_{MB}	-	-	74.45
		C-7 72.0 - 82.0	120	100	100							
									$15\text{-}20_{MB}$	-	-	76.95
							I/II	R4	5-10	2.0	1.0	78
									$5\text{-}10_{MB}$	-	-	78.65
80									$15\text{-}20_{MB}$	-	-	79.2
									30_{MB}	-	-	79.9
									15_{MB}	-	-	80.65
						C-8 - Medium gray to dark pink GRANITE c-f grains of pink and white feldspar, quartz, biotite, muscovite, with sparse garnet up to 0.1" across; moderate to wide fracture spacing, except two extremely close fractures at 85.5'; unweathered, except slightly weathered near fractures; strong to very strong; no rock wall contact and silt coatings at near-horizontal fractures at 87.9' and 90.6'; rock is dark pink and enriched in medium to coarse grained garnet from 91.4' to 91.6'; scattered near-vertical pegmatites 0.5" to 1.0" thick; complete water loss around 87.9'; never got water back in entire core run; bottom of borehole measured with tape at 92.3'.	I	R4/R5	$5\text{-}10_{MB}$	-	-	81.8
									$5\text{-}10_{MB}$	-	-	82
85												
							II		10	2.0	1.0	85.5
									5-10	3.0	2.0	85.6
		C-8 82.0 - 92.3	124	100	99				$10\text{-}15_{MB}$	-	-	86.3
									20_{MB}	-	-	86.8
							II		0-5	1.0	1.0	87.85
90												
									10	1.0	1.0	90.6
									$0\text{-}5_{MB}$	-	-	91.35
						C-9 - Medium gray to dark pink GRANITE m-f grains of quartz, feldspar, biotite, muscovite, with scattered agglomerates of garnet up to 0.3" across; wide to very wide fracture spacing, except two extremely close fractures at 96.3'- 96.5'; unweathered, except slightly weathered from 96.0' to 97.3'; strong to very strong; rock is dark pink and enriched in medium to coarse grained garnet from 92.3' to 93.2', 98.5' to 99.5'; iron staining, silt coating and no rock wall contact at low-angle fractures at 96.4' - 96.5'; white to salmon pink pegmatite, ~ 2" thick, in near-vertical contact with granite from 93.8' to 96.4'; lost water throughout the core run.	I	R4/R5	$0\text{-}5_{MB}$	-	-	92.3
95									$20\text{-}25_{MB}$	-	-	94.15
		C-9 92.3 - 102.0	116	100	99		II		30	2.0	2.0	96.3
									35	1.0	1.0	96.4
							I		25	1.0	2.0	96.45
									10_{MB}	-	-	96.9
100												
									10_{MB}	-	-	101.3
						C-10 - 102.0' - 106.8': Medium gray GRANITE c-f grains of pink and white feldspar, quartz, biotite, muscovite and sparse garnet up to 0.1" across; wide fracture spacing (no fractures); unweathered; very strong; 106.8' - 110.2': Light gray PEGMATITE; c grains of quartz, feldspar, muscovite, and mafic minerals, with sparse garnet; wide to moderate fracture spacing;	I	R5	5-10	2.0	1.0	102
									$5\text{-}10_{MB}$	-	-	102.1
105												
		C-10							20_{MB}	-	-	106.25

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-406w**
SHEET NUMBER: **4** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		102.0 - 112.2	122	100	100	unweathered; strong; in vertical contact with granite throughout;			$5\text{-}10_{MB}$	-	-	107.4
						110.2' - 112.2': GRANITE, as above except medium gray to light pink and slightly weathered near fracture at 110.4'; thin, yellow silt coating and no rock wall contact at low-angle fracture at 110.4';			10_{MB}	-	-	108.25
110						entire core run was in two pieces, one 8.5' long and remaining was other; had to break the core to fit in the core box; coring was easy and even except harder between 107' and 112'; lost water throughout the core run; core barrel was not advancing at the start of the run; changed core bit.	II	R4	5	1.0	1.0	110.4
									15_{MB}	-	-	110.5
									10_{MB}	-	-	111.25
							II	R4	40_{MB}	-	-	112.2
									25_{MB}	2.0	1.0	112.25
									15	3.0	1.0	113.1
									20	3.0	1.0	113.7
115						C-11 - 112.2' to 113.0: Medium gray GRANITE, as above;			10-15	1.0	1.0	113.8
									10	1.0	2.0	115.1
						113.0' - 116.0': Medium gray to salmon pink PEGMATITE; coarse to very coarse crystals of white and pink feldspar, quartz, muscovite, biotite, and other mafic minerals; pink feldspars up to 2" across; close to moderate fracture spacing; slightly weathered; strong; no rock wall contact at low-angle fractures at 115.1' and 113.8'; some 1" granite interlayers;	I	R5	5_{MB}	-	-	116
		C-11 112.2 - 122.0	118	100	98				30	2.0	1.0	116.4
120						116.0' - 122.0': Medium gray to dark pink GRANITE; fine to coarse grains of quartz, feldspar, biotite and muscovite; sparse garnet up to 0.2" across; wide fracture spacing; unweathered; very strong; rock is dark pink and enriched in medium grained garnet from 118.2' to 118.7' and 120.4' to 120.6'; core barrel was not advancing at 113.7'; lost water throughout the core run.			$5\text{-}10_{MB}$	-	-	121
							I/II	R4/R5	45_{MB}	-	-	122
									5	2.0	1.0	122.2
									5	1.5	1.0	122.4
									5	1.0	1.0	123.3
125									20	3.0	1.0	124.6
						C-12 - Medium gray to pink GRANITE c-f grains of quartz, pink and white feldspar, biotite and muscovite; sparse garnet up to 0.1" across; wide to moderate fracture spacing, except very close spacing from 128.0' to 129.9'; unweathered to slightly weathered; strong to very strong; no rock wall contact at low-angle fractures at 128.2' and 128.5'; pink pegmatite from 127.1' to 129.9'; core surface and some fracture surfaces are polished, with horizontal brass striping on core surface from core barrel; lost water in entire core run; rig was chattering between 127.0' and 130.0'; drilling was very hard between 127' and 130'.			5	1.5	1.0	125.2
									5	2.0	1.0	125.6
		C-12 122.0 - 132.0	120	100	100				5-10	1.5	1.0	125.8
									5-10	1.5	1.0	126.7
									5	1.5	1.0	127.45
									5-10	3.0	1.0	128
									0-5	2.0	1.0	128.1
130									25	1.0	1.0	128.2
									20	3.0	1.0	128.3
									0	1.0	1.0	128.5
									0-5	1.5	1.0	128.7
							I	R5	0-5	1.5	1.0	128.85
									0-5	1.5	1.0	129
									0-5	1.5	1.0	129.2
									0-5	1.0	1.0	129.4
135									0-5	1.0	1.0	129.6
									0-5	1.0	1.0	129.8
									5-10	1.0	1.0	129.9
		C-13 132.0 - 141.4	113	100	100	C-13 - Medium gray to salmon pink GRANITE c-f grains of quartz, pink and white feldspar, biotite, muscovite; sparse garnet up to 0.2" across; very wide fracture spacing; unweathered; very strong; scattered bands of pegmatite, 0.5" to 1.0" thick; core barrel was not advancing at 133.0'; bottom of the core run jammed in rock catcher; had to hammer hard to take it out; lost water throughout the core run; End of boring at 141.4'			15_{MB}	-	-	132
									5_{MB}	-	-	133.05
									75_{MB}	-	-	133.2
									5_{MB}	-	-	133.3
									15_{MB}	-	-	133.75
140									$10\text{-}15_{MB}$	-	-	138.2
									25_{MB}	-	-	140.7
						E.O.B at 141.4'.			20_{MB}	-	-	141.15

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-406w**
SHEET NUMBER: **5** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
									30_{MB}	-	-	141.4
145												
150												
155												
160												
165												
170												
175												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-408**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Ingersoll Rand A 300**

LOCATION: **W34th St & 11th Ave-viaduct**
COORD. **N: 214,485.0** **E: 983,631.1**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.5 feet**
DATUM:
START DATE: **8/22/05** TIME: **12:30 pm**
FINISH DATE: **8/25/05** TIME: **2:00 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S	U	P	G	C
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/25/05	6:35 am	35.5	19.0	141.6

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
						0.0 - 6.0		Hand		Auger								Hand-Augered to 6 feet; 0.0' to 0.4' - asphalt 0.4' to 6.0' Brown c-f SAND and c-f Gravel, some Silt, occasional concrete, brick fragments and wood chips (FILL)
5			S	1		6.0 - 6.1	100/1"				1							Reddish-brown c-f SAND, little Silt, wet (SM)
			S	2		8.0 - 10.0	17	18	26	90	24							Reddish-brown c-f SAND, some Silt, little m-f Gravel, dense (SM) -occasional decomposed rock fragments
10			S	3		10.0 - 11.3	9	30	100/4"		5							Reddish-brown c-f SAND, some Silt, little m-f Gravel, very dense (SM) -decomposed rock at the tip of the spoon
15																	19.0	Roller bit refusal and begin coring at 19'.
20																		

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-408**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **Ingersoll Rand A 300**

LOCATION: **W34th St & 11th Ave-viaduct**
COORD. **N: 214,485.0** **E: 983,631.1**
STN. NO.: OFFSET:
SURFACE ELEV.: **107.5 feet**
DATUM:
START DATE: **8/22/05** TIME: **12:30 pm**
FINISH DATE: **8/25/05** TIME: **2:00 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/25/05	6:35 am	35.5	19.0	141.6

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
										4.0	3.0	19
20									25	2.0	2.0	19.6
									20	2.0	1.0	19.9
									*70	1.5	2.0	20.3
									90	2.0	2.0	20.6
									*60	2.0	2.0	20.9
									35	2.0	1.0	21.4
									40	2.0	1.0	21.7
									30	2.0	1.0	21.8
25									50	2.0	1.0	22.3
									35	3.0	1.0	23.5
									*50	2.0	1.0	23.7
									60	2.0	1.0	23.8
									30	2.0	1.0	24
									70	1.5	1.0	24.4
									50_{MB}	-	-	25.5
									25_{MB}	-	-	26.7
									30_{MB}	-	-	27.4
30									45	2.0	2.0	28
									45	2.0	4.0	28.3
									40	3.0	2.0	28.55
									30	2.0	2.0	28.7
									45	2.0	1.0	29.15
									45	2.0	2.0	29.6
									30	3.0	3.0	29.9
35									20	2.0	1.0	30.25
									*60	1.5	1.0	32.3
									*60	1.5	2.0	33.3
									*60	2.0	1.0	33.8
									40	2.0	1.0	34
									30	2.0	1.0	34.5
									*45	2.0	1.0	34.9
									*50	2.0	1.0	35.5
									30_{MB}	-	-	36.9
40									30_{MB}	-	-	38.2
									10	3.0	1.0	39.3
									30	3.0	1.0	39.85
									70	1.0	4.0	41.9
									10	1.5	4.0	42.1
									20	2.0	4.0	42.2
		C-1 19.0 - 24.0	50	83	50	C-1 - Dark gray to black SCHIST; m-f grains of biotite, quartz, feldspar, amphibole; close to moderate fracture spacing, except extremely close spacing at 19.0' and 20.3'; slightly weathered, except moderately weathered at 20.3'; medium strong; foliation defined by indistinct, wavy schistosity, dipping 60° to 70°; from 20.8' to 22.3', alternating bands of schist and light gray granite all ~1" thick, dipping parallel to foliation; possible loss of recovery between 19.0' - 19.6' and 20.3'-20.6'; borehole depth measured with tape at 24.0'.	II	R3				
		C-2 24.0 - 33.8	118	100	90	C-2 - Dark gray to black SCHIST m-f grains of biotite, quartz, feldspar, amphibole, muscovite; sparse garnets, up to 0.2" across; close to wide fracture spacing, slightly weathered, except moderately weathered 28.3' to 28.7'; strong; foliation defined by indistinct, wavy schistosity dipping 60° to 75°, with sparse irregular bands of quartz/feldspar, 1/2" to 1" wide parallel to foliation; pure quartz from 33.3' to 33.8'.	III	R3				
		C-3 33.8 - 44.0	112	92	82	C-3 - 33.8' to 41.9': Dark gray to black SCHIST m-f grains of biotite, quartz, feldspar, muscovite; sparse garnet up to 0.2" across; moderate to wide fracture spacing; slightly weathered; foliation defined by indistinct, wavy schistosity dipping 50° to 80°; 41.9' to 42.3': Dark gray FAULT GOUGE; dense sandy clay with no visible rock structure; light green, soft mineralization on 70° fracture surface at 41.9'; no contact. 42.3' to 44.0': Dark gray to black SCHIST, as above, except close to extremely close fracturing; medium strong to friable and extremely weak.	II	R3				
							II	R3/R0				

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-408**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
45		C-4 44.0 - 54.0	120	100	48	C-4 - 44.0' to 51.6': Dark gray to brown SCHIST c-f grains of biotite, quartz, feldspar, muscovite; very close to moderate fracture spacing, except extremely close spacing from 47.2' to 49.7'; moderately weathered, except only slightly weathered from 44.0' to 47.2'; medium strong, except very weak to extremely weak and friable from 47.3' to 49.7'; foliation defined by indistinct, crenulated schistosity, with contorted quartz bands 1/2" thick, dipping 70 to 90°; core has orange-brown iron staining between 47.2' and 49.7';	II	R3	30	1.5	4.0	42.4
									*70	2.0	3.0	42.6
									20	3.0	3.0	43.1
									20	2.0	3.0	44.5
									*70	3.0	2.0	45.2
							III	R1/R0	30	3.0	2.0	45.4
									25	1.0	3.0	46.7
									40	3.0	3.0	46.9
									40	3.0	3.0	47.2
50									50	1.0	3.0	47.4
									50	1.0	3.0	47.7
						51.6' to 54.0': Dark gray SCHIST m-f grains of biotite, quartz, feldspar, muscovite; moderate fracture spacing; slightly weathered; strong; foliation defined by near vertical schistosity; in vertical contact from 51.6' to 52.9' with m-f grained granite; slight iron staining on some fracture surfaces; rock core was stuck inside core barrel; had to hammer the rock very hard to take it out.			50	1.0	4.0	47.9
							II	R4	90	1.0	4.0	48.2
									90	1.0	4.0	48.4
									80	1.0	4.0	48.8
									*85	1.0	4.0	49.2
									*75	2.0	3.0	49.5
55							I/II	R4	*80-90	1.5	4.0	50.2
									*75-90	2.0	4.0	51.2
									*80	3.0	1.0	52.2
									*85/60	2.0	1.0	53.1
									25	3.0	2.0	54
									25	1.5	1.0	55.3
									30	1.5	1.0	56.4
		C-5 54.0 - 63.7	116	100	100	C-5 - Dark gray to black SCHIST c-f grains of biotite, quartz, feldspar, muscovite; moderate to wide fracture spacing; unweathered to slightly weathered; strong; foliation defined by indistinct, wavy schistosity dipping 70 to 90°; non-vertical contorted aplite bands, 1" thick between 55.0' and 58.4'.			20_{MB}	-	-	57.1
									25	1.5	2.0	57.8
60									40_{MB}	-	-	58.5
									15_{MB}	-	-	58.9
									50	2.0	1.0	60.6
									45_{MB}	-	-	62.4
							I/II	R4	30_{MB}	-	-	63.7
65									40	1.5	2.0	64.85
									45_{MB}	-	-	66.8
		C-6 63.7 - 73.9	122	100	92	C-6 - Dark gray to dark blue-gray SCHIST c-f grains of quartz, biotite, feldspar; moderate to wide fracture spacing, except closely spaced from 73.4' to 73.6'; unweathered to slightly weathered; strong; foliation defined by indistinct, wavy schistosity dipping 80 to 90°, locally 60; a few contorted coarse grained quartz-feldspar bands less then 0.5" thick; no rock wall contact at 73.7'; cored rock was stuck inside the core barrel; had to hammer hard to take out the rock; Bottom of the borehole measured with tape at 73.9'.			30_{MB}	-	-	68.1
									35_{MB}	-	-	68.6
70									25_{MB}	-	-	69.1
									*80	1.5	2.0	70.3
									70	1.0	3.0	70.5
									30_{MB}	-	-	72.45
									*60	-	-	72.95
							II/I	R4	20	1.5	1.0	73.4
75									90	1.5	1.0	73.45
									10	2.0	1.0	73.5
									35	2.0	1.0	73.55
									25	2.0	2.0	73.7
									10_{MB}	-	-	73.9
									15_{MB}	-	-	74.25
		C-7				C-7- 73.9' to 82.7': Dark gray m-f grained SCHIST, interlayered with medium gray , fine grained GRANITE; schist minerals: biotite, quartz, feldspar; granite minerals: feldspar, quartz, muscovite; close to moderate fracture spacing; slightly weathered to unweathered; strong; foliation in schist defined by crenulated, near vertical schistosity; faint banding in granite dips 60 to 80°; schist-granite contacts are			20	1.5	1.0	75.7
									40_{MB}	-	-	75.8

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-408**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
80		73.9 - 83.9	120	100	87	intact and gradational; thin coating of black clay on 70° fracture at 82.7'; wavy core sides from 76.8' to 78.3'. 82.7' to 83.9': light gray PEGMATITE; c grains of quartz, feldspar, garnet; very close to moderate fracture spacing; slightly weathered; medium strong; 1/4" near-vertical black schist inclusions; possible mylonitic texture below 83.6'; coring very slow between 82.0'-83.9'; depth of borehole measured with tape at 83.9'.	II	R3	30	2.0	1.0	76.55
									35	2.0	1.0	77.55
									35_{MB}	-	-	78.5
									35_{MB}	-	-	79
									20	3.0	1.0	79.5
									30	1.5	1.0	80.1
									20	3.0	1.0	80.5
									15_{MB}	-	-	81.35
							II	R4	35	3.0	1.0	81.55
85									15_{MB}	-	-	81.9
									20	1.5	1.0	82.2
									*60	1.5	1.0	82.5
									*70	1.5	4.0	82.7
									20	1.5	1.0	83.2
									*80	1.5	2.0	83.5
		C-8 83.9 - 93.9	120	100	87	C-8 - Medium gray GRANITE, with schist and pegmatite m-f grains of feldspar, quartz, muscovite, and sparse garnets up to 0.2" across; close to moderate fracture spacing, except very close spacing from 90.9' to 91.2'; strong, except medium strong from 90.9' to 91.2'; slightly weathered, except moderately weathered from 90.9' to 91.2', no rock wall contact on any fractures from 90.9' to 91.2', with slight iron staining and rounded core pieces; also iron staining and and no contact at 85.6' and 86.4'; black schist inclusions from 84.0' to 84.4', 86.7' to 88.3' and 92.1' to 92.2', with contorted schistosity dipping ~70°, parallel to contacts; pegmatite with coarse grains of white and pink feldspar, quartz, and garnet from 85.6' to 86.3' and 89.5' to 91.5', with vertical contacts; biotite seams in pegmatite from 90.5' to 91.5'.			45	1.5	1.0	83.7
									10	1.5	1.0	83.9
									90	3.0	1.0	84
90									*50	1.5	2.0	84.05
									20	1.5	2.0	84.15
							III	R3	30	1.0	4.0	84.25
							II	R4	35	1.5	4.0	84.85
									20	1.5	1.0	85.1
									15	1.0	4.0	85.6
									25	1.0	1.0	86.4
							I/II	R5	35	3.0	1.0	87
95									45	3.0	1.0	88
									10	1.5	1.0	88.5
									20	2.0	1.0	89.9
									20	2.0	1.0	90.6
									5	1.0	1.0	90.95
									80	3.0	2.0	91
		C-9 93.9 - 103.9	120	100	98	C-9 - Medium gray to yellow brown to dark pink GRANITE m-f grains of feldspar, quartz, muscovite, garnet; moderate to wide fracture spacing, except close to very close spacing from 98.2' to 99.8'; very strong , except strong from 98.2' to 99.8'; unweathered to slightly weathered; rock is dark pink and garnet enriched from 95.5' to 97.3' and 99.8' to 100.4'; rock has yellow-brown iron staining from 98.0' to 99.0'; no rock wall contact at low angle fractures at 98.6' and 99.7'; scattered near-vertical pegmatite, 1" thick, with coarse grains of quartz and white and pink feldspar; all fractures and breaks dip ~35°; core barrel was not advancing at 99.7'; changed core bit after finishing the run.	I/II	R4	5-10	1.0	2.0	91.1
									15	1.0	2.0	91.15
									45	1.0	2.0	91.2
100									15	1.0	2.0	91.4
									20	1.5	2.0	92.05
									$5\text{-}10_{MB}$	-	-	92.7
									$0\text{-}5_{MB}$	-	-	93
									55	1.5	1.0	93.85
									10-15	1.5	1.0	93.9
							I/II	R5	5	1.5	1.0	94.15
105									15	1.5	1.0	94.3
									30	2.0	1.0	94.7
									$15\text{-}20_{MB}$	-	-	95.6
									10_{MB}	-	-	96.5
									5	1.5	1.0	96.8
									25	2.0	1.0	97.45
		C-10 103.9 - 114.0	121	100	97	C-10 - Medium gray GRANITE m-f grains of quartz, feldspar, biotite, muscovite, sparse medium grained garnet with sparse agglomerates up to 0.4" across; wide fracture spacing, except for pairs of very close fracture spacing at 106.3' - 106.5', 108.7' -108.9', and 110.1' - 110.3'; unweathered, except slightly weathered at very close fractures; very strong; many 0.1" garnets from 112.4' to 112.7'; no rock wall contact and thin silt coatings on 5 fractures at 110.3' and 110.1'; all fractures are low angle; 0.5" near-vertical pegmatite at 112.4' and 113.1'; drilling very slow between 108.0' and 110.0' - took over 35 min/ft; core barrel was jammed at the beginning of the run; core bit was changed at the end of the core run.			20_{MB}	-	-	97.85
									20	2.0	1.0	98.25
									35	1.0	2.0	98.6
110									15	1.5	1.0	99
									25	1.5	1.0	99.6
									5	1.0	1.0	99.7
									5	1.5	1.0	99.75
									15	1.5	1.0	100.75
									15	1.5	1.0	101.1
									0	1.5	1.0	101.7

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-408**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **N. Shah**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
115		C-11 114.0 - 124.0	120	100	100	C-11 - 114.0' - 116.8': Medium gray GRANITE m-f grains of quartz, feldspar, muscovite, biotite, with coarse grained garnet from 114.7' to 114.9'; close to moderate fracture spacing; unweathered to slightly weathered; very strong; no rock wall contact at 5° fracture at 116.2'; 116.8' - 124.0': Medium gray to salmon-pink GRANITE c-f grains of pink and white feldspar, quartz, biotite; medium to coarse grained garnet below 122.7'; wide fracture spacing; unweathered, very strong; 1" pegmatite bands dipping 70° at 123.2 - 124.0'; no rock wall contact at 10° fracture at 117.0'; Put a new core bit; lost water along entire core run; could not retreive entire run at first attempt; about 2.5' long rock core piece was left in the borehole; picked up rock core at second retrieval attempt.	I/II	R5	5	1.5	1.0	102.25
									10-15$_{MB}$	-	-	102.8
									0	2.0	1.0	103
									5	1.5	1.0	103.5
									10$_{MB}$	-	-	103.9
									10-15$_{MB}$	-	-	104.2
									25	2.0	1.0	106.35
									20	1.5	1.0	106.5
									20	1.5	1.0	106.9
120									5-10$_{MB}$	-	-	107.35
									5-10$_{MB}$	-	-	107.65
									0-5$_{MB}$	-	-	108.1
									30	1.5	1.0	108.7
									15	1.5	1.0	108.9
									5	1.0	2.0	110.15
									5	1.0	2.0	110.3
									10$_{MB}$	-	-	112.6
125		C-12 124.0 - 133.8	118	100	100	C-12 - Medium gray to salmon pink GRANITE; as above, with scattered medium grained garnets and a few garnet agglomerates up to 0.2" across; unweathered throughout; wide fracture spacing; scattered 70° pegmatite bands 1" thick; lost water along entire core run; drilling was harder compared to previous run; bottom 1" rock core piece was stuck in to rock catcher.	I	R5	10$_{MB}$	-	-	114
									30	1.5	1.0	114.65
									15	1.5	1.0	114.85
									5	1.0	1.0	116.25
									10	1.0	1.0	117
									5-10$_{MB}$	-	-	117.5
									15$_{MB}$	-	-	119.9
									20	2.0	1.0	121.05
130									25$_{MB}$	-	-	121.65
									15$_{MB}$	-	-	122.3
									25$_{MB}$	-	-	122.5
									5$_{MB}$	-	-	124
									10$_{MB}$	-	-	124.1
									-$_{MB}$	-	-	127.9
									30$_{MB}$	-	-	132
									15	1.5	1.0	132.6
135		C-13 133.8 - 141.6	94	100	100	C-13 - Medium gray to salmon pink GRANITE c-f grains of quartz, white and pink feldspar, biotite, muscovite, sparse garnet from 134.0' to 137.0'; wide fracture spacing; unweathered; very strong; lost water along entire core run.	I	R5	10$_{MB}$	-	-	133.7
									20$_{MB}$	-	-	133.8
									10	2.0	1.0	135.55
140												
						E.O.B at 141.6'.			10$_{MB}$	-	-	141.6
145												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-5**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME 55**

LOCATION: **Track 14 under 11th-Bridge**
COORD. **N: 214,106.2** **E: 983,437.5**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0**+/-
DATUM:
START DATE: **6/6/05** TIME: **7:15 pm**
FINISH DATE: **6/10/05** TIME: **2:00 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▭
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	140 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA				
Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
						0.0 - 1.5		Hand		Auger								Hand Augered through railroad ballast 0' to 1.5'
																		Tri cone roller bit with air hose 1.5' to 6.0' through concrete footing Grayish-blue stone chips evident within concrete matrix 6.0' to 10.0': Dark gray, GRAVEL and c-f SAND NOTE: spun 3" diameter casing 0' to 10'.
5																		
10			S	1		10.0 - 12.0	16	17	12	16	12							Gray m-f SAND, some c-m Gravel, little Silt, medium dense, wet (SM) NOTE: Spun 3" casing 10' to 15'
15			S	2		15.0 - 17.0	37	18	23	27	2							Black c Gravel, and m-f Sand, trace Silt, dense (GP) NOTE: Spun 3" casing 15' to 20'.
20			S	3		20.0 - 21.3	87	25	100/4	-							22.0	Yellow brown m-f SAND, some c-f Gravel, little Clayey Silt, very dense (Decomposed SCHIST) NOTE: Spun 3" casing 20' to 22'. Roller bit refusal and begin coring at 22'.

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Boring No. **FD-5** Sheet **1** of **1**

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-5**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME 55**

LOCATION: **Track 14 under 11th-Bridge**
COORD. **N: 214,106.2** **E: 983,437.5**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0**+/-
DATUM:
START DATE: **6/6/05** TIME: **7:15 pm**
FINISH DATE: **6/10/05** TIME: **2:00 am**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						C-1 - Dark-gray to black SCHIST, c-m grains of muscovite, quartz, biotite other black mafic minerals; many garnets, up to 0.2" across; close to moderate fracture spacing; slightly weathered, medium strong to strong; foliation defined by wavy, crenulated, distinct schistosity, dipping 50 to 70°, fracture surfaces across foliation are jagged and irregular, poor crack fit and clay coatings at 24.6'-24.65', probable zone of non-recovery.	II	R3/R4	*60	1.5	2.0	22.2
									*70	1.5	1.0	24
25		C-1 22.0 - 27.3	63	98	98				50	1.5	1.0	24.6
									*70	3.0	4.0	24.65
									*70	1.0	3.0	25.1
									40	3.0	4.0	26
									10	-	-	26.9
						C-2- Dark-gray to black SCHIST, c-m grains of muscovite, quartz, biotite other black mafic minerals; many garnets, up to 0.2" across; close to moderate fracture spacing; slightly weathered, medium strong to strong; foliation defined by wavy, crenulated, distinct schistosity, dipping 80 to 90°, fracture surfaces across foliation are jagged.	II	R3/R4	40	3.0	2.0	27.3
									20	3.0	2.0	29
30		C-2 27.3 - 32.3	60	100	95				50	3.0	4.0	29.6
									50	3.0	1.0	30.7
									10	3.0	1.0	31
									50	2.0	3.0	31.7
						C-3 - Dark-gray to black SCHIST, c-f grains of muscovite, quartz, biotite other black mafic minerals; garnets, up to 0.1" across; close to moderate fracture spacing; unweathered to slightly weathered, strong; foliation defined by wavy, distinct schistosity and few thin (0.1") quartz bands; foliation dips 70 to 90°; 39.0' to 40.3': Medium-gray fine to coarse grained GRANITE, in near vertical contact with schist, with bands of quartz and muscovite dipping ~ 85° contact parallel to foliation. Slight iron staining below 40.3'; Bulging core sides through most of the run.	II/I	R4	30_{MB}	-	-	32.3
									10	3.0	1.0	32.6
35									10_{MB}	-	-	33.2
									10	2.0	3.0	33.6
									50	1.5	4.0	35.4
									40	1.5	2.0	35.8
									40	1.5	2.0	36.4
									*70	1.5	1.0	36.5
									*70	1.0	1.0	37.2
									40	3.0	1.0	38.3
									*90	1.5	2.0	39
40		C-3 32.3 - 42.3	120	100	92				50	1.0	2.0	39.5
									*85	1.0	2.0	39.8
									0	3.0	3.0	40
									20	3.0	2.0	40.5
									10_{MB}	-	-	41.5
						C-4 - 42.3' to 43.2': Medium gray GRANITE, c-f grains of feldspar, quartz, muscovite; slightly weathered; strong; faint banding of quartz and muscovite; core surfaces pitted; banding and contacts both dip 60°, parallel to foliation in underlying schist. 43.2' to 45.5': and 48.2' to 52.3': Dark-gray to black		R4	10	1.5	1.0	41.7
									*85	2.0	4.0	42.1
									10	2.0	1.0	42.2
45									*90	1.5	2.0	42.3
									70	1.5	4.0	42.4
									20	1.5	1.0	42.7
									50	2.0	1.0	44.1

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-5**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
50		C-4 42.3 - 52.3	118	98	73	SCHIST, fine to medium grains of muscovite, quartz, biotite and garnet up to 0.1" across; close to moderate fracture spacing; slightly weathered; strong; foliation defined by wavy schistosity, thin (0.1") contorted quartz bands, and discontinuous quartz nodules; foliation dips 60 to 90°; some fractures along foliation have softened, weathered muscovite on surfaces; slightly bulging core sides.			*70	1.5	4.0	44.3
									20	3.0	3.0	44.7
									*70/75	1.5	4.0	45.4
									10	2.0	1.0	45.6
									*80	1.5	4.0	45.8
									10	1.5	1.0	46.2
									10	1.5	1.0	46.3
									10	1.5	1.0	46.5
									10	2.0	1.0	46.8
55		C-5 52.3 - 61.0	104	100	81	45.2' to 48.2': Medium-gray GRANITE, mostly pure quartz; close to very close fracture spacing; slightly weathered; strong; upper and lower contacts with schist are irregular, with Schist inclusions; contacts dip 60° to 90°, very faint, near vertical banding; near vertical, healed hairline fractures; numerous horizontal fractures in quartz rich zones.	II/I	R4	0	1.5	1.0	47.4
									0	3.0	1.0	47.6
									*70	1.5	4.0	48.2
									50	1.5	2.0	49.2
									20	1.5	3.0	49.3
									0	3.0	1.0	49.9
						C-5 - Dark-gray to black SCHIST, c-f grains of biotite, muscovite, quartz, biotite, with sparse garnets up to 0.1" across; very close to wide fracture spacing; unweathered to slightly weathered, strong; foliation defined by crenulated schistosity dipping 80 to 90°; 59.5' to 60.6': Medium-gray GRANITE, fine to coarse grains of feldspar, muscovite, quartz; close to moderate fracture spacing; contact is dipping 80 to 90°.			0	1.0	1.0	50
									10	3.0	1.0	50.7
									0_{MB}	-	-	51.1
									30	2.0	3.0	51.8
									*60	1.5	3.0	51.9
									*40	2.0	2.0	52.1
60									60	1.5	2.0	52.2
									30	1.5	2.0	52.3
		C-6 61.0 - 71.2	122	100	83	C-6 - Dark-gray to black SCHIST, m-f grains of biotite, muscovite, quartz; close to moderate fracture spacing; slightly weathered, medium strong to strong; foliation defined by indistinct schistosity and contorted bands of quartz-feldspar 0.1" to 1.0"thick, with ptygmatic folds; foliation dip 45 to 70°; softened mica on some foliation fractures; Iron staining on fractures from 70.7' to 71.2'; Medium-gray medium to fine grained GRANITE at, 63.2' to 63.7', 63.8'-63.9' and 64.1'-65.4'; contacts contorted and irregular but intact.	II	R4	*80	1.5	1.0	52.6
									10	3.0	1.0	53.1
									30	3.0	2.0	53.2
									10	1.5	3.0	53.3
									50	3.0	1.0	54
									40	3.0	1.0	55.9
65									0_{MB}	-	-	56
									*0	3.0	1.0	56.2
									10	3.0	2.0	57.9
									*50	2.0	2.0	58.4
									*80	1.5	4.0	60.6
									40	3.0	1.0	60.8
									10_{MB}	-	-	61
									5	2.0	1.0	61.6
									50	3.0	2.0	62.4
70									*60	1.5	4.0	63.2
									30	1.5	2.0	63.4
		C-7 71.2 - 80.7	114	100	84	C-7 - 71.2' to 76.0': Dark-gray to black SCHIST m-f grains of biotite, quartz, muscovite, sparse garnet; close to moderate fracture spacing; slightly weathered; strong; foliation defined by wavy schistosity and contorted bands of quartz 0.1" to 0.75"thick; foliation dips 70 to 90°. 76.0' to 80.0': Intermixed fine to medium black gneissic SCHIST and QUARTZ and GRANITE inclusions in black, fine grained matrix; moderate to wide fracture spacing; unweathered to slightly weathered; quartz-granite fragments are 0.5" to 4.0"; gold metallic mineral at quartz-matrix contacts from 77.5' to 79.7'; bands in schist dip 60 to 90°. 80.0' to 80.7': Dark-gray to black SCHIST as above.	II	R4	*60	1.5	3.0	64.2
									30	3.0	1.0	65.2
									50	3.0	1.0	65.6
									0_{MB}	-	-	66
									*50	1.5	1.0	66.1
									40	2.0	2.0	67
75									60_{MB}	-	-	67.7
									5	2.0	1.0	68.3
							I/II	R4	*80	1.5	4.0	68.6
									*70	1.5	4.0	69.1
									40	3.0	1.0	69.2
									40	3.0	1.0	69.9
									*80	1.5	4.0	70.6
									5	1.5	1.0	70.7
80									*80	1.5	3.0	71
									5	1.5	1.0	71.2
						C-8 - Dark-gray to black SCHIST m-f grains of biotite, quartz, muscovite, other black mafic minerals,	II	R4	*85	1.5	4.0	71.3
									60	3.0	1.0	71.4

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-5**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						sparse garnet, except fine grained from 84.8' to 89.2' and medium gray from 88.5' to 89.2'; close to moderate fracture spacing; slightly weathered, except moderately weathered from 88.5' to 89.2'; strong, except very weak from 88.5' to 89.2', where intact core can easily be broken with the hands; foliation defined by faint schistosity and thin (<0.1') banding below 84.8'; foliation dips 40° to 80°; near vertical quartz inclusions from 81.4' to 82.2', with gold metallic mineral at edges.			10	3.0	1.0	72.1
									40	3.0	1.0	72.9
									10	2.0	1.0	73.7
									40_{MB}	-	-	74.3
85		C-8 80.7 - 89.2	102	100	80				30	3.0	1.0	75.2
									*$50/20_{MB}$	-	-	75.5
									*50	1.5	1.0	75.7
									*70	1.5	2.0	75.9
									30	3.0	2.0	77.9
									40	3.0	1.0	78.1
									30	3.0	1.0	78.8
							III	R1	40	1.5	2.0	80.3
90		C-9 89.2 - 98.4	110	100	94	C-9 - Dark-gray to black SCHIST m-f grains of biotite, quartz, muscovite, other black mafic minerals, sparse coarse grained garnet; moderate to wide fracture spacing except close to very close spacing at 92.9' to 93.7'; unweathered to slightly weathered; strong; foliation defined by indistinct, discontinuous schistosity; foliation dips 50° to 75°.	I/II	R4	5	1.5	1.0	80.7
									20	3.0	1.0	80.8
									40	1.5	1.0	81.4
									40	3.0	1.0	82.2
									20	3.0	1.0	82.5
									40	2.0	1.0	82.8
									10_{MB}	-	-	84
									30_{MB}	-	-	84.6
									*45	1.5	1.0	85.3
95									40	2.0	1.0	86.4
									20	2.0	1.0	87.4
									10_{MB}	-	-	88.1
									30	1.5	2.0	88.3
									*40	1.5	4.0	88.5
									20	2.0	4.0	88.7
						C-10 - Dark-gray to black SCHIST m-f grains of biotite, quartz, muscovite, other black mafic minerals, sparse coarse grained garnet; moderate fracture spacing except very close to extremely close spacing from 100.6' to 101.1', with gravel size pieces, from 100.9' to 101.1'; slightly weathered to unweathered, except moderately weathered from 100.6' to 101.1'; strong, except medium strong from 100.6' to 101.1'; foliation defined by faint schistosity and thin (<0.1') quartz bands; foliation dips 50° to 60°; from 101.3' to 104.8', almost pure quartz, with black schist inclusion from 101.7' to 102.5'; From 100.6' to 101.5', enriched in garnets, bulging core sides, healed hairline, 60° fractures with calcite infill.	I/II	R4	20	1.0	4.0	88.9
									50	2.0	4.0	89.2
100									50	3.0	1.0	91.8
									20	3.0	4.0	92.8
							III	R3	20	1.5	3.0	92.9
							I/II	R4	20	3.0	3.0	93.1
									30	3.0	1.0	93.3
		C-10 98.4 - 107.7	110	99	84				45	3.0	1.0	93.7
									*50	2	2	94
									30-40	2.0	1.0	95
105									30	1.5	1.0	97.7
									45	3.0	1.0	97.9
									*60_{MB}	-	-	98.4
									*60	1.5	4.0	99.7
									*40	1.5	2.0	100
									60	1.5	2.0	100.6
						C-11 - 107.7' to 108.5': Dark-gray to black SCHIST, as above.	I/II	R4	90	2.0	2.0	100.7
						108.5' to 115.2': Light to medium gray PEGMATITE c-m grains of feldspar, quartz, muscovite, sparse garnet; very close to moderate fracture spacing; unweathered to slightly weathered; strong to very strong; inclusions of dark-gray schist and light-gray granite, 6" to 12" long, with near vertical contacts; slight orange iron staining 110.8' to 111.1'. 115.2' to 117.7': Medium gray to black SCHIST, as above	I/II	R4/R5	30	2.0	2.0	100.75
									30_{MB}	-	-	100.8
110									80	1.5	4.0	100.9
									60	1.5	1.0	101
									30	3.0	2.0	101.05
		C-11 107.7 - 117.7	120	100	91				85	2.0	2.0	101.1
									10	2.0	1.0	101.15
									50	1.5	1.0	101.3
									50	3.0	1.0	102.5
									0_{MB}	-	-	103.1
115									40	3.0	1.0	104.3
							I/II	R4	10	2.0	1.0	104.35
									40	1.0	1.0	105.2
									30	2.0	1.0	106.2

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-5**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
									40	3.0	1.0	107.1
						C-12 - Medium-gray to black SCHIST m-f grains of biotite, muscovite, quartz, other mafic minerals, with scattered garnets up to 0.1" across; unweathered, moderate to wide fracture spacing; strong; foliation defined by faint schistosity, dipping 40 to 60°.	I	R4	*60	1.0	1.0	107.4
									50_{MB}	-	-	107.7
									*60	1.5	1.0	108.2
120		C-12 117.7 - 124.0	75	100	97				20	2.0	1.0	108.9
									20	2.0	1.0	110
									30	2.0	1.0	110.2
									50	3.0	1.0	110.6
									50	1.0	3.0	111
									50	1.5	4.0	111.1
									5	3.0	1.0	112
									60	3.0	1.0	112.7
						E.O.B at 124.0'.			5	1.5	1.0	112.8
125									30	3.0	1.0	112.9
									40	2.0	1.0	113.7
									*50	2.0	1.0	115.4
									*40	1.0	1.0	116.3
									*50	1.5	1.0	116.8
									20	1.5	1.0	117.4
									30	1.5	1.0	117.7
									40	2.0	2.0	118
130									*60	1.5	1.0	118.9
									30_{MB}	-	-	120.3
									*40	1.5	1.0	121.1
									30_{MB}	-	-	121.8
									*40	2.0	1.0	123
									35	3.0	1.0	123.6
									10_{MB}	-	-	124
135												
140												
145												
150												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **FD-6**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-55**

LOCATION: **Track 21-40' W of 11th Ave**
COORD. **N: 214,261.2** **E: 983,394.5**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0**+/-
DATUM:
START DATE: **5/31/05** TIME: **8:30 pm**
FINISH DATE: **6/4/05** TIME: **2:30 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
																		Concrete cored via thin wall adapter to 1.6 feet
																		Forced Air-Tricone method used to clear utilities to 10 feet
			G	G-1		1.6 - 3.0	-	-	-	-								Brown m-f SAND, little m-f Gravel, moist (SM) (FILL)
5																		Dark-gray c-f SAND, some f-Gravel, little Silt & Clay, occasional wood fragments (SM) (FILL)
			G	G-2		3.0 - 10.0	-	-	-	-								
10			S	S-1		10.0 - 12.0	2	10	20	27	8							(Top 6 inches) Gray c-f SAND, little c-f Gravel, dense (SM) (FILL)
																		(Bottom 2 inches) Gray SILT & CLAY, slightly organic (OH)
15			S	S-2		15.0 - 17.0	4	2	11	51	20							Gray CLAY & SILT, some f- Sand, little c-f Gravel, slightly organic, stiff. (CL)
20			S	S-3		20.0 - 22.0	65	20	8	12	6							Gray CLAY & SILT, some m-f Gravel, little f Sand, very stiff (CL)

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG
(continued)

BORING NUMBER: **FD-6**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S	S-4		25.0 - 25.0	100/0	-	-	-	0	No recovery
												29.0 Hard drilling 24.5' to 29'. 3-inch casing advanced to 27'. Roller bit refusal and begin coring rock at 29'.
30												
35												
40												
45												
50												
55												

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **FD-6**
SHEET NUMBER: **1** of **3**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME-55**

LOCATION: **Track 21-40' W of 11th Ave**
COORD. **N: 214,261.2** **E: 983,394.5**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0**+/-
DATUM:
START DATE: **5/31/05** TIME: **8:30 pm**
FINISH DATE: **6/4/05** TIME: **2:30 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
30		C-1 29.0 - 37.2	98	100	97	C-1 - 29.0' to 31.5': Dark-gray to black SCHIST c-m grains of biotite, quartz, other black mafic minerals, very close to moderate fracture spacing; slightly weathered, medium strong; foliation defined by wavy contorted schistosity and thin (<0.1") discontinuous quartz bands; foliation dips 75 to 90°; 1"-inch thick intrusions of light-gray, fine grained GRANITE at 29.0' -29.1' and 29.5' - 29.6'; from 31.5' to 37.2': Light-gray GRANITE, f- grains of probable muscovite, quartz and feldspar; close to moderate fracture spacing, lightly weathered, except moderately weathered at 36.9'-37.2', strong, except medium strong at 36.9'-37.2'; light-gray to salmon-pink, c- grained PEGMATITE from 34.0' to 34.7' and 35.3' to 36.1'; contacts with granite steeply dipping; white clay on mica-rich fracture surface at 33.3'; red clay on steep fractures at 36.9'-37.2'.	II	R3	5	2.0	2.0	29
									25	1.5	1.0	29.1
									*60	1.5	1.0	29.2
									*70	1.5	2.0	31.1
							II	R4	*75	1.0	2.0	31.5
									5	2.0	1.0	32.1
									5	2.0	1.0	32.3
									5	1.5	1.0	32.8
									70	1.5	4.0	33.3
35									5_{MB}	-	-	33.8
									20	1.5	2.0	34.4
									30	1.5	2.0	34.7
									5	3.0	3.0	35.7
							II	R3	20	2.0	1.0	36.1
							II	R4	5	2.0	2.0	36.4
									70	1.0	4.0	36.9
							III/II	R3	80	1.0	4.0	37
40		C-2 37.2 - 47.2	120	100	84	C-2 - 37.2' to 38.7': Medium-gray GRANITE, f- grains of probable quartz, feldspar, muscovite, in vertical contact with gray to salmon-pink PEGMATITE, with coarse grains of feldspar, quartz and medium grained garnet; dark-gray biotite SCHIST from 37.2' to 37.4'; very close to moderate fracture spacing; slightly weathered, strong; foliation in schist dips 50°, parallel to contact with granite. 38.7' to 43.0': Dark-gray to black SCHIST, medium to coarse grains of biotite, quartz, muscovite, other mafic minerals; close to moderate fracture spacing; slightly to moderately weathered, medium strong; foliation defined by wavy schistosity dipping 80 to 90°; light-gray PEGMATITE in vertical contact from 41.1' to 46.0'; quartz-PEGMATITE at 39.2'-39.5' has pitted core surface with numerous healed, partly open fractures, most dipping 20. 43.0' - 45.0' and 45.8'-46.4' Medium-gray GRANITE, as above, except wide fracture spacing. 45.0' - 45.8' and 46.4'-47.2': Dark-gray to black SCHIST, as above except extremely close fracturing at 47.0'-47.2'			10	1.0	1.0	37.2
									20	1.5	2.0	37.3
									*50	1.0	4.0	37.4
									45	2.0	1.0	37.6
									5_{MB}	-	-	38.8
									5	1.5	1.0	39.1
							II	R4	5	1.5	1.0	39.2
									40	1.0	4.0	39.3
45									20	1.5	1.0	39.4
									20	2.0	1.0	39.6
									*85	1.0	4.0	39.8
							II	R3	75	1.5	1.0	40.3
									45	2.0	1.0	41
							II	R3/R4	*75-85	2.0	1.0	42.4
									10	3.0	1.0	42.9
									5_{MB}	-	-	43.4
									30	2.0	1.0	45.3
50									5	3.0	1.0	45.8
									20	1.5	1.0	46.3
									*40	1.0	1.0	47.05
									30	1.5	1.0	47.1
		C-3 47.2 - 57.2	120	100	98				20	1.0	1.0	47.2
									60	1.0	1.0	48.2
						C-3 - 47.2' to 53.4': Dark-gray to black SCHIST c-f grains of biotite, quartz, feldspar, muscovite, other	II	R4/R5	5	3.0	2.0	48.5

Parsons Brinckerhoff Quade & Douglas, Inc. — 100 YEARS

CORING LOG
(continued)

PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)
55–57.2					
57.2–67.2		C-4 57.2 - 67.2	120	100	90
67.2–77.2		C-5 67.2 - 77.2	120	100	68
77.2–87.2		C-6 77.2 - 87.2	120	100	93

DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)
* - Denotes discontinuity along foliation
MB - Denotes mechanical break

black mafic minerals, very close to moderate fracture spacing; slightly weathered, medium strong to strong, rock breaks easily along 1/4-inch thick biotite seams; wavy, contorted foliation defined by schistosity and thin (<0.1") ptygmatically folded quartz bands; foliation dips 40° to 90°. 53.4' - 57.2': Light gray GRANITE, uniform, fine to medium grains of white feldspar, quartz and muscovite; slightly weathered, moderate fracture spacing; strong to very strong; high angle fractures parallel foliation in schist;

C-4 - 57.2' to 61.5': Light-gray GRANITE, as above, except unweathered wide fracture spacing. 61.5' TO 66.7': Light to medium-gray GRANITIC GNEISS, c-f grains of feldspar, quartz, muscovite; moderate fracture spacing, except very closely spaced fractures from 64.1' to 64.6'; slightly weathered, strong; faint foliation defined by indistinct compositional banding dipping 70°; c grained, pink-white PEGMATITES, 1" to 4" thick throughout, parallel to banding; 66.7' to 67.2': Black SCHIST, medium grains of biotite and quartz, very close fracture spacing to crushed; weak to extremely weak, friable; foliation defined by schistosity, dipping 70°; contact Dips 70°.

C-5 - 67.2' to 71.8': Dark-gray to black SCHIST m-f grains of quartz, biotite, other mafic minerals, very close to moderate fracture spacing, except extremely close from 70.15' to 70.4'; foliation defined by, wavy discontinuous quartz bands and irregular schistosity dipping 50° to 90°; fine grained quartz band from 69.2' to 70.15'; dark-gray, sandy clay FAULT GOUGE from 70.2' to 70.3'; 75° healed fracture at 68.1';
71.8' to 77.2': Medium-gray PEGMATITE, medium to coarse grains of quartz, feldspar, muscovite, garnet, black mafic minerals; close to moderate fracture spacing, except very closely spaced from 75.2' to 75.4'; slightly weathered, strong; bands of fine grained gray rock (mostly quartz ?) from 72.1' to 73.1', 73.7' to 74.6' and 75.9' to 76.5', with near vertical, 70° to 90° contacts;
black schist inclusion from 73.9' to 74.3'; healed hairline fractures dipping 60° to 70° and 20° to 30°, with many crisscrossing from 74.5' to 75.3'; core sides bulge at schist inclusion.

C-6 - 77.2' to 87.2': Medium-gray PEGMATITE c-m grains of quartz, feldspar, muscovite, garnet, some epidote (?) along fractures; moderate fracture spacing, except very close spacing from 77.7' to 78.0' and 79.5' to 79.9'; slightly weathered, except moderately weathered from 79.5' to 79.9'; medium strong to strong; banded inclusions of black schist 77.7' -78.0', 79.4'-79.5', 79.8'-77.9' and 80.1'-80.5, with contacts parallel to foliation, dipping 50°; 6" to 12" wide bands of fine grained quartz-muscovite rock in vertical contact with pegmatite.
83.3'-87.2': Dark-gray to black SCHIST m-f grains of quartz, biotite, muscovite; close to wide fracture spacing; slightly weathered, medium strong to strong;

WEATHERING	STRENGTH
I	R4/R5
II	R2/R1
II	R4/R3
II	R0/R2
II	R4
II	R3/R4
III	R3/R4
II	R4

DISCONTINUITY DATA

ANGLE (deg)	Jr	Ja	DEPTH (feet)
5	1.5	2.0	49.1
5	2.0	2.0	49.2
*55	1.5	2.0	51.4
*45MB	-	-	52.2
*50	1.0	1.0	52.4
55	1.5	2.0	53.7
60	1.5	1.0	54.2
20	2.0	1.0	55.9
20MB	-	-	57.2
20	2.0	1.0	57.9
20	2.0	1.0	60.5
5	1.5	1.0	61.6
5	3.0	2.0	62
*70	1.5	2.0	62.1
25	2.0	1.0	62.2
25	3.0	1.0	62.9
5MB	-	-	63.3
35	1.5	3.0	64.1
40	1.5	1.0	64.3
20	1.5	1.0	64.35
20	1.5	1.0	64.5
20	1.5	4.0	66.4
*70	1.0	1.0	66.7
5	1.5	2.0	66.8
30	1.5	2.0	67
*80	1.0	4.0	67.1
10MB	-	-	67.2
*65	1.0	4.0	67.4
*60	1.5	1.0	67.7
5	3.0	1.0	68.35
55	1.5	3.0	68.6
*60	1.5	1.0	68.9
55	1.5	4.0	69
*50	1.0	4.0	69.05
15	1.5	2.0	69.5
20	1.5	2.0	69.7
50	1.0	3.0	69.9
5	1.0	2.0	70
5	1.5	6.0	70.15
5	1.5	4.0	70.4
5	1.5	4.0	70.45
20	2.0	4.0	70.6
40	2.0	1.0	71.4
10	1.5	1.0	71.5
10	3.0	1.0	72
20	3.0	1.0	72.2
55	1.5	1.0	73.2
5	1.5	2.0	73.8
5	1.5	2.0	74.6
30	1.5	2.0	74.9
10	2.0	1.0	75.3
70	2.0	3.0	75.4
*70	2.0	1.0	76
5MB	-	-	77.2
5	1.5	1.0	77.7
5	1.5	3.0	77.9

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **FD-6**
SHEET NUMBER: **3** of **3**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **C. Deigert**
INSPECTOR: **C. Burzynski**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
90						foliation defined by wavy, discontinuous quartz bands and faint schistosity; foliation dips 60° to 80°.			60	2.0	1.0	78.7
						C-7 - Dark-gray to black SCHIST m-f grains of quartz, biotite, other mafic minerals; moderate to wide fracture spacing; slightly weathered to unweathered, strong; foliation defined by faint schistosity and a few thin (<0.1") contorted quartz bands; foliation dips 50° to 70°, bands of fine grained quartz, 1-inch thick, at 92.0' and 92.5' and from 93.5' to 95.2'; bands parallel to foliation; numerous subparallel, healed 60° fractures from 93.5'-95.2', in quartz band.			5	2.0	1.0	79.4
									30	2.0	3.0	79.5
									5	2.0	3.0	79.55
									5	2.0	3.0	79.6
		C-7 87.2 - 97.2	120	100	98				5	2	3.0	79.65
									*35	1.0	1.0	79.9
									*50	1.0	1.0	80.2
									5	2.0	2.0	81.8
95									30	3.0	2.0	81.9
									90	2.0	2.0	82.1
									10	3.0	1.0	82.2
									50	3.0	2.0	82.7
									*60	1.0	1.0	83.6
						C-8 - Dark-gray to black SCHIST, as above, except closely spaced fractures from 101.2' to 101.8'; f-grained quartz -muscovite band parallel to foliation from 98.4' to 99.7' and 101.8' to 102.2'; becomes more gneissic with depth.	II	R4	*50	1.5	2.0	85.2
									20	2.0	2.0	85.8
									50	3.0	2.0	87.2
		C-8 97.2 - 102.2	60	100	95				*65	2.0	1.0	88.3
100									20	3.0	1.0	90.8
									5_{MB}	-	-	91.4
									40	1.5	1.0	92
									40_{MB}	-	-	92.2
						C-9 - Medium to dark gray SCHISTOSE GNEISS, medium fine grains of quartz, biotite and other mafic minerals, muscovite; garnets up to 0.1" across; close to moderate fracture spacing; slightly weathered; strong to very strong; foliation defined by contorted bands and nodules of quartz and faint schistosity; foliation dips 60° to 90°; medium to fine grained granitic bands from 104.3' to 107.9' to 110.1'; non-foliated; irregular 1" to 3" quartz xenoliths in black fine grained matrix from 102.5' to 104.0'; with 0.1" garnets and 0.1" to 0.3" nodules of gold metallic mineral at quartz contacts; wavy core sides throughout mafic zones.	II	R4/R5	*60	1.5	1.0	92.4
									*50	1.5	3.0	92.7
									*50	1.5	1.0	93.2
									*40	1.0	2.0	94.8
105									*50	1.0	1.0	95.2
									40	3.0	1.0	96.7
									30_{MB}	-	-	97.7
		C-9 102.2 - 112.1	119	100	97				*60	1.5	1.0	98.4
									*55	1.5	2.0	99.2
									*50	1.5	1.0	100.2
									*50	1.5	1.0	101.2
									5	1.5	1.0	101.4
110									30	1.0	1.0	101.8
									5_{MB}	-	-	102.2
									40	1.0	1.0	103.3
									5	3.0	1.0	104.5
									15	1.5	4.0	106.3
						C-10 - Medium to dark-gray GNEISS SCHIST, c-f grains of quartz, biotite, muscovite, other mafic minerals; scattered garnet up to 0.2" across; moderate to wide fracture spacing, except very close fracture spacing from 113.3' to 113.7'; unweathered except slightly weathered from 113.3' to 113.7'; strong; indistinct foliation defined by thin (0.1") contorted + folded quartz bands and faint schistosity; foliation dips 60° to 90°; slickensides on polished 70° foliation fracture at 113.4', with thick(>0.1") gray sandy clay GOUGE; poor crack fit; concentration of weathered garnet crystals within 1" of fracture.	I	R4	20	2.0	2.0	106.55
							II	R4	5_{MB}	-	-	107.2
							I	R4	50	2.0	1.0	108.2
									5_{MB}	-	-	108.7
115									20	2.0	1.0	109
									5	2.0	3.0	109.6
									5	1.5	1.0	110.15
									*50	1.5	4.0	110.8
									*75	1.5	1.0	111
									35	2.0	2.0	111.6
		C-10 112.1 - 120.3	98	100	96				80	2.0	1.0	112.3
									5	1.5	1.0	112.4
120									70	0.5	4.0	113.4
						E.O.B at 120.3'.			*60	1.5	2.0	113.6
									25	2.0	1.0	114
									5_{MB}	-	-	117.1
									10_{MB}	-	-	117.4
									30	3.0	1.0	120.2
									10	2.0	1.0	120.3

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 1 of 2
BORING NO. MG-819
FILE NO. 4840

BORING LOG

PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +16.3	
COORDINATES: N 192230.6	E 1998879.2	DATUM: Manhattan	
BORING LOCATION: MTA Yard, MABSTOA Garage		DATE STARTED: 04/01/82	
INSPECTOR: B. Mukherjee (MRJD)		DATE COMP.: 04/01/82	
CONTRACTOR: Warren George, Inc.			
DRILLER: J. Stevenson	HELPER: C. Soto		
TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐			
CASING: DIA. 4 IN. FROM 0.0 TO 34.5 FT.; DIA. IN. FROM TO FT.			
DRILLING MUD UTILIZED: MUD TYPE		ROTARY BIT DIA. 3 3/4 IN.	
SAMPLING EQUIPMENT, (TYPE & SIZE)	D–SAMPLER: Split Spoon, 2" O.D.	DRILL ROD BW	
	U–SAMPLER: DIA. IN.: TYPE		
	CORE BIT Diamond, NX	CORE BARREL Double Barrel	
FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐			
SAMPLER HAMMER: WEIGHT (LBS) 140	AVG. FALL 30 IN.		
CASING HAMMER: WEIGHT (LBS) 300	AVG. FALL 18 IN.		
NO. OF U–TUBES – NO. OF VANE TESTS –	DEPTH TO ROCK 33.0 FT.	DEPTH TO COMP. 47.2 FT.	

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/01/82	1400	47.2	34.5	11.7		At completion of rock drilling.
04/01/82	1410	47.2	29.5	12.9		
04/01/82	1420	–	0.0	12.9		

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0715	–					*	0	*Concrete
	5	1D	1.5	4-3	Dk gray c-f sand, sm gvl, cndrs silt (Fill)(SM)	0.7		W = Water content in %
	9		3.5	5-4				
	8							
	11							
	13	2D	5.0	3-5	Do 1D, tr brick (Fill)(SM)		5	
	14		7.0	3-3				
	34							
	25							
	12							
	4	NR	10.0	6-4			10	
	6		12.0	4-4				
	8	3D	12.0	3-2	Brn silty m-f sand, trace gvl (Fill)(SM)			
	7		14.0	2-2				
	25							
	10	4D	15.0	6-3	Brn f-c sand, sm silt, tr gvl (Fill)(SM)		15	
	6		17.0	1-1				
	5							
	4							
	20							
	27	5D	20.0	17-13	Top: Do 4D (Fill)(SM)	Loose to med cpt brn c-f sand, sm silt, tr-sm gvl, trace brick (Fill)	20	
	19		22.0	7-5	Bot: Lt brn m-f sand, sm silt (SM)			
	17					21.0		
	13					Med cpt, brn m-f sa, sm si tr org silt (Fill)		
	12							
	22	6D	25.0	11-13	Brown m-f sand, sm organic silt, trace gravel (SM)		25	26.0'-27.0' Organic silt, mixture.
	22		27.0	2-3		27.0		***Med cpt red-brn silt, sm fine sand
	24					***		
	25						30	
	24							

Sunny 04/01/82

BORING NO. MG-819

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 2 of 2
BORING NO. MG-819
FILE NO. 4840

BORING LOG

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
	44	7D	30.0	3-10	Top:Red-brn silt, sm mic fine sand (ML)	7D Top 31.5*	30	W = 24 (Top) *Decomposed mica schist 34.5
	46		32.0	7-11				
	131				Bot: Lt gray micaceous f-m sand (SP)			
	125							
	125/6"							
		1C	34.5	Rec=100%	Lt gray garnite mica schist, tr quartz inclusions, mdjtd, UnWIncJts	Lt gry grt mica schist, sm qtz veins, tr qtz inclusions, mdjtd to jtd, UnWIncJts to UnWExJts	35	
			39.5	RQD=92%				
		2C	39.5	Rec=100%	Light gray mica schist, sm quartz veins, jtd, UnWExJts		40	Core barrel blocked in run 2C.
			43.5	RQD=80%				
		3C	43.5	Rec=100%	Do 1C		45	
			47.2	RQD=100%		47.2		
1500							50	
							55	
							60	
							65	
							70	
							75	
							80	
							85	

BORING NO. MG-819

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 1 of 2
BORING NO. MG-820
FILE NO. 4840

BORING LOG

PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +9.1	
COORDINATES: N 192373.6	E 1999022.8	DATUM: Manhattan	
BORING LOCATION: MTA Yard, MABSTOA Garage		DATE STARTED: 03/16/82	
INSPECTOR: B. Mukherjee (MRJD)		DATE COMP.: 03/18/82	
CONTRACTOR: Warren George, Inc.			
DRILLER: J. Stevenson	HELPER: J. Bowen		

TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐

CASING: DIA. 4 IN. FROM 0.0 TO 10.0 FT.; DIA. 3 IN. FROM 0.0 TO 23.2 FT.

DRILLING MUD UTILIZED: MUD TYPE — ROTARY BIT DIA. 3 3/4 IN.

SAMPLING EQUIPMENT, (TYPE & SIZE): D–SAMPLER: Split Spoon, 2" O.D. — DRILL ROD BW
U–SAMPLER: DIA. IN.: TYPE
CORE BIT Diamond, NX — CORE BARREL Double Barrel

FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐

SAMPLER HAMMER: WEIGHT (LBS) 140 AVG. FALL 30 IN.

CASING HAMMER: WEIGHT (LBS) 300 AVG. FALL 18 IN.

NO. OF U–TUBES – NO. OF VANE TESTS – DEPTH TO ROCK 23.5 FT. DEPTH TO COMP. 33.7 FT.

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
03/18/82	0730	22.0	20.0	4.1		Overnight. Drill rods in hole.
03/18/82	1030	33.7	23.2	9.0		At completion of rock coring.
03/18/82	1045	33.7	10.0	6.9		After 3" dia casing completely withdrawn
03/18/82	1100	–	0.0	6.5		After all casing completely withdrawn

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
03/16/82 Cloudy	1300 –						0	
	18	1D	1.5	3-10	Gray c-f sand, sm cndrs,gvl, brk, silt (Fill) (SM)	* 0.3		*Asphalt
	23		3.2	12-62/3"				
	64							
	1500 12						5	
	0700 43	2D	5.0	7-20	Gray gvl, sm c-f sand, tr silt (Fill)(GP)	Med cpt to v cpt, gry gvl,sm c-f sand, tr silt, cndrs,wood, bricks, (Fill)		
	77		6.0					
	69							
	83							
	95						10	
03/17/82 Light Rain	DRILLED	3D	10.0	46-76	Pieces of gravel, trace coarse to fine sand (Fill)(GP)			Drilled ahead of casing 15.0'-23.0'. Wash water color red-brown at 18.0' Telescoped 3" casing in 4" casing at 10.0'.
			12.0	29-18				
	14	4D	15.0	15-38	Pieces of wood (Fill)			
	26		17.0	18-25				
	20							
	28							
	60							
	44	5D	20.0	53-41	Top: Red-brn m-f sand,sm gvl silt (SM) Bot: Brn gravelly f-c sand,tr silt (SP-SM)	18.0	20	
	1300 49		22.0	48-81		V cpt,red-brn to brn c-f sand,sm gvl silt		
	0700 107							Piece of diabase gravel in wash at 23.0'.
	45/2"							
03/18/82 Sunny		1C	23.7	Rec=96%	Top: Lt gry garnet mica schist cljtd, UnWExJts	23.5	25	
			28.7	RQD=80%				
					Bot: Lt gry garnet mica schist blky,UnW	1C Top cljtd-blky UnWExJts		
		2C	28.7	Rec=100%	Lt gry garnet mica schist, mdjtd, UnWExJts		30	
			33.7	RQD=88%				

BORING NO. MG-820

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 2 of 2
BORING NO. MG-820
FILE NO. 4840

BORING LOG

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
Same as Above 1100						1C Bottom cljtd to blky UnWExJts 33.7	30	
							35	
							40	
							45	
							50	
							55	
							60	
							65	
							70	
							75	
							80	
							85	

BORING NO. MG-820

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 1 of 2
BORING NO. MG-824
FILE NO. 4840

BORING LOG

PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +5.7	
COORDINATES: N 192491.8	E 1998852.4	DATUM: Manhattan	
BORING LOCATION: MTA Yard, Ramps		DATE STARTED: 04/07/82	
INSPECTOR: Y.K. Chan (MRJD)		DATE COMP.: 04/08/82	
CONTRACTOR: Warren George, Inc.			
DRILLER: J. Farrell	HELPER: G. Mccartar		
TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐			
CASING: DIA. 4 IN. FROM 0.0 TO 5.0 FT.; DIA. 3 IN. FROM 0.0 TO 29.5 FT.			
DRILLING MUD UTILIZED: MUD TYPE Quick-Gel		ROTARY BIT DIA. 3 7/8 IN.	
SAMPLING EQUIPMENT, (TYPE & SIZE) D–SAMPLER: Split Spoon, 2" O.D.		DRILL ROD NW	
U–SAMPLER: DIA. IN.: TYPE			
CORE BIT Diamond, NX		CORE BARREL Double Barrel	
FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐			
SAMPLER HAMMER: WEIGHT (LBS) 140	AVG. FALL 30 IN.		
CASING HAMMER: WEIGHT (LBS) 300	AVG. FALL 18 IN.		
NO. OF U–TUBES – NO. OF VANE TESTS –	DEPTH TO ROCK 27.7 FT.	DEPTH TO COMP. 39.5 FT.	

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/08/82	0730	20.0	5.0	0.0		Overnight – mud in hole.
04/08/82	1120	39.5	29.5	5.0		At completion. Water in hole.

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
1300	10	1D	0.0	6-8	Dark brown f-c sandy gravel, some silt, trace glass (Fill) (GM)	Loose Med cpt dk brn, f-c sand & gvl, sm silt, tr brick, glass (Fill)	0	W = Water content in %
	15		2.0	9-8				
	17						5	
	31							
	17							
	D							
	E	NR	5.5	6-8				
	R		7.5	5-6				
	E	2D	7.5	9-9	Dark brown f-c sand, sm silt, trace brick (Fill) (SM)	3D 12.0 (Fill)	10	
			9.5	16-13				
	O	NR	10.0	3-3				
	L		12.0	3-4				
		3D	12.0	5-3	Black organic clayey m-f sand (Fill) (SC)			
			14.0	4-6				
		4D	15.0	1-1	Medium dark gray organic silty clay, tr fine sand, decomposed wood (OH)	15.0	15	W = 72
1530			17.0	1-1				
0700								
		5D	20.0	1/12"	Do 4D, trace vegetation (OH)	4D, trace vegetation	20	W = 57
			22.0	2-2				
						24.0		
		6D	25.0	6-5	Red-brn silty f-m sand, sm silty clay layers, tr gravel, mica (SM)	6D Med cpt	25	Decomposed rock fgmts, in wash at 27.5'.
			27.0	5-6		27.5		
						Dec. Rock	30	
04/07/82 Sunny, Windy								
04/08/82 Sunny								

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 2 of 2
BORING NO. MG-824
FILE NO. 4840

BORING LOG

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
04/08/82 Sunny 1200		1C	29.5	Rec=98%	Green to light gray hornblende mica schist, tr quartz veins & mica schist, jtd, UnWExJts.	1C	30	
			34.5	RQD=84%		34.5		
		2C	34.5	Rec=96%	Light gray mica schist, trace quartz inclusions, mdjtd, UnWExJts	2C	35	
			39.5	RQD=84%		39.5	40	
							45	
							50	
							55	
							60	
							65	
							70	
							75	
							80	
							85	

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 1 of 2
BORING NO. MG-825
FILE NO. 4840

BORING LOG

PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +6.2	
COORDINATES: N 192600.2	E 1998598.9	DATUM: Manhattan	
BORING LOCATION: MTA Yard, MABSTOA Garage		DATE STARTED: 04/02/82	
INSPECTOR: B. Mukherjee		DATE COMP.: 04/05/82	
CONTRACTOR: Warren George, Inc.			
DRILLER: J. Stevenson	HELPER: C. Soto		

TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐

CASING: DIA. 4 IN. FROM 0.0 TO 35.0 FT.; DIA. 3 IN. FROM 0.0 TO 49.5 FT.

DRILLING MUD UTILIZED: MUD TYPE Zeogel

SAMPLING EQUIPMENT, (TYPE & SIZE)		
	D-SAMPLER: Split Spoon, 2" O.D.	ROTARY BIT DIA. 3 3/4, 2 15/16 IN
	U-SAMPLER: DIA. IN.: TYPE	DRILL ROD BW
	CORE BIT Diamond, BX	CORE BARREL Double Barrel

FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐

SAMPLER HAMMER: WEIGHT (LBS) 140 AVG. FALL 30 IN.

CASING HAMMER: WEIGHT (LBS) 300 AVG. FALL 18 IN.

NO. OF U–TUBES -- NO. OF VANE TESTS - DEPTH TO ROCK 49.5 FT. DEPTH TO COMP. 68.0 FT.

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/05/82	0715	60.0	49.5	3.0		Over weekend
04/05/82	1430	68.0	49.5	4.9		At completion of rock coring
04/05/82	1440	68.0	35.0	9.0		
04/05/82	1500	68.0	20.0	4.5		
04/05/82	1510	-	0.0	5.2		

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0700	-	1D	0.5	12-12	Dk gry c-f cinders, sm silt (Fill)(SM)	*	0	*Asphalt
	16		2.5	8-9		0.3		W = Water content in %
	14							
	31							
	32							
	14	2D	5.0	7-4	Dk gray c-f cinders, some organic silt (Fill)(SM)			
	11		7.0	4-5				
	14							
	13							
	18							
	11	3D	10.0	2-1	Gray fine sand, sm organic silt (Fill)(SM)			Lost all drilling water at 12.0'.
	16		12.0	1-2				
	82							
	87							
	45							
04/02/82 Sunny	28	4D	15.0	12-11	Dk gray c-f sand, sm silt, gvl (Fill)(SM)			
	30		17.0	30-32				
	62							
	45							
	46							
	30	NR	20.0	15-21				
	56		22.0	6-3				
	42	5D	22.0	5-12	Gry mic silty f-c sand, some rock fragments (Fill)(SM)			
	44		24.0	17-20				
	48							
	26	6D	25.0	14-19	Gray mic f-c sand, sm silt (Fill)(SM)			
	51		27.0	3-21				
	113							
	276							
	82							

Loose to compact, dark gray fine to coarse sand, some cinders, silt, trace gravel, rock fragments. (Fill)

5 10 15 20 25 30

BORING NO. MG-825

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 2 of 2
BORING NO. MG-825
FILE NO. 4840

BORING LOG

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
	46	7D	30.0	WR/12"	Top: Soft blk org silty clay, tr mica (OH)	*	30*	*7D Top
	30		32.0	4-4	Bot: Med gry org silty clay, sm shells, fine sand (OH)	31.0		Top: W = 52
	39							Bot: W = 55
	36							
	39							
		8D	35.0	1-1	Medium gray organic silty clay, some shells, trace fine sand (OH)	Med gry org silty clay, some shells, trace fine sand, fine sand partings, vegetation	35	W = 48
	M		37.0	2-2				
	U							
	D							
	U	9D	40.0	1/12"	Med gry org silty clay, tr fine sand partings, veg (OH)		40	W = 53
	S		42.0	2-2				
	E							
	D							
Sunny		10D	45.0	WH-1	Top: Do 9D (OH)		45	Top: W = 34
			47.0	1-2	Bot: Gray f-m sand, sm organic silt, trace peat, shells (SM)	46.0		
						10D Bottom		
						49.5		
		1C	50.0	Rec=94%	Lt gry to white granitic pegmatite, cljtd, UnW to SlW		50	
			55.0	RQD=46%				
04/02/82								
		2C	55.0	Rec=98%	Do 1C		55	New diamond bit at 55.0'.
			60.0	RQD=26%				
1530								
0700		3C	60.0	Rec=93%	Do 2C, trace quartzite		60	Core barrel blocked at 63.0'
			63.0	RQD=50%				
04/05/82 Sunny		4C	63.0	Rec=98%	Lt gray to white quartzite and granitic gneiss, jtd, UnW	Light gray to white granitic pegmatite, trace quartzite, jtd, UnW to SlW	65	
1530			68.0	RQD=84%		68.0		
							70	
							75	
							80	
							85	

BORING NO. MG-825

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

BORING LOG

SHEET 1 of 2
BORING NO. MG-826
FILE NO. 4840

PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +5.7	
COORDINATES: N 192690.5	E 1998436.2	DATUM: Manhattan	
BORING LOCATION: MTA Yard, MABSTOA Garage		DATE STARTED: 04/01/82	
INSPECTOR: Y. K. Chan		DATE COMP.: 04/02/82	
CONTRACTOR: Warren George, Inc.			
DRILLER: J. Farrell	HELPER: G. McCartar		

TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐

CASING: DIA. 4 IN. FROM 0.0 TO 11.0 FT.; DIA. 3 IN. FROM 0.0 TO 71.0 FT.

DRILLING MUD UTILIZED: MUD TYPE Quick Gel ROTARY BIT DIA. 3 7/8 IN.

SAMPLING EQUIPMENT (TYPE & SIZE): D-SAMPLER: Split Spoon, 2" O.D. DRILL ROD NW
U-SAMPLER: DIA. IN.: TYPE
CORE BIT Diamond, NX CORE BARREL Double Barrel

FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐

SAMPLER HAMMER: WEIGHT (LBS) 140 AVG. FALL 30 IN.

CASING HAMMER: WEIGHT (LBS) 300 AVG. FALL 18 IN.

NO. OF U-TUBES -- NO. OF VANE TESTS --- DEPTH TO ROCK 69.0 FT. DEPTH TO COMP. 82.0 FT.

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/02/82	0710	82.0	71.0	6.2		Overnight
04/02/82	0815	82.0	0.0	6.9		

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0700	-					*	0	*Asphalt
		1D	1.0	23-16	Gray c-f sand, sm gravel, trace silt (Fill)(SP)	0.3		W = Water content in %
			3.0	14-11		Loose to compact gry to blk f-c sand, sm silt, tr gvl, sls, dec wood (Fill)	5	
		2D	5.0	6-8	Gray silty fine to medium sand (Fill)(SM)			
			7.0	7-7				
		*NR	10.0	7-5			10	**Tried for sample twice. No recovery.
			12.0	3-3				
		3D	12.0	3-3	Black c-f sand, sm silt, tr gravel (Fill)(SM)			
			14.0	13-17				
Sunny		4D	15.0	3-3	Blk f-c sand, sm silt, tr gvl decomposed wood, sls(Fill) (SM)		15	
04/01/82			17.0	3-3				
		5D	20.0	6-3	Gray-brn clayey fine to medium sand, trace gravel (Fill)(SC)		20	
			22.0	3-4				Color of mud was black at 23.0'.
						23.0		
		6D	25.0	2-2	Soft black organic silty clay, trace fine sand (OH)	6D	25	W = 72
			27.0	3-3				*Soft-med,dk gry org silty clay, tr f sa, f sa seams,sls, veg.
						28.0 *	30	

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

BORING LOG

SHEET 2 of 2
BORING NO. MG-826
FILE NO. 4840

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
		7D	30.0	WH/12"	Soft dark gray organic silty clay, tr fine sand seams (OH)	Soft to medium dark gray organic silty clay, tr fine sand seams, shells, vegetation.	30	W = 69
	M		32.0	2-3				
	U							
	D							
	U	8D	35.0	WH-1	Do 7D, trace shells, veg (OH)		35	W = 46
	S		37.0	1-2				
	E							
	D							
		9D	40.0	1/12"	Do 8D (OH)		40	W = 52
			42.0	WH/12"				
		10D	45.0	2-2	Do 8D (OH)		45	W = 52
			47.0	2-2				
		11D	50.0	1-2	Medium dark gray organic silty clay, trace fine sand (OH)		50	W = 57
			52.0	2-3				
		12D	55.0	WR/24"	Do 11D, some fine sand, trace shells (OH)		55	W = 35
			57.0					
		13D	60.0	WH/12"	Medium dark gray organic silty clay, tr fine sand, shells, veg (OH)		60	W = 41
04/01/82			62.0	3-3				
		14D	65.0	WH/18"	Medium dark gray organic silty clay, tr fine sand, veg (OH)		65	W = 33
			67.0	3				
								Telescoped 3" casing inside 4" casing to 72.0'
						69.0 *	70	*Possible decomposed rock
		1C	72.0	Rec=98%	Top: Gray garnet mica schist, jtd, UnWExJts	72.0 Gry grt mica schist to wht quartzite, jtd to mdjtd,UnWExJts	75	Mica schist is very micaceous.
			77.0	RQD=88%	Bot: White quartzite, mdjtd. UnW.			
		2C	77.0	Rec=98%	Top: White quartzite, mdjtd, UnW		80	
			82.0	RQD=96%	Bottom: Gray garnet mica schist, mdjtd, UnWExJts	82.0	85	
1530								

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 1 of 3
BORING NO. MG-827
FILE NO. 4840

BORING LOG

PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +5.5	
COORDINATES: N 192663.3	E 1998186.4	DATUM: Manhattan	
BORING LOCATION: MTA Yard, Ramps		DATE STARTED: 04/07/82	
INSPECTOR: B. Mukherjee (MRJD)		DATE COMP.: 04/09/82	
CONTRACTOR: Warren George, Inc.			
DRILLER: J Stevenson	HELPER: C. Soto		

TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐

CASING: DIA. 4 IN. FROM 0.0 TO 40.0 FT.; DIA. 3 IN. FROM 0.0 TO 115.3 FT.

DRILLING MUD UTILIZED: MUD TYPE

SAMPLING EQUIPMENT, (TYPE & SIZE)		
	D–SAMPLER: Split Spoon, 2" O.D.	ROTARY BIT DIA. 3 3/4 IN.
	U–SAMPLER: DIA. IN.: TYPE	DRILL ROD BW
	CORE BIT Diamond, NX	CORE BARREL Double Barrel

FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐

SAMPLER HAMMER: WEIGHT (LBS) 140 AVG. FALL 30 IN.

CASING HAMMER: WEIGHT (LBS) 300 AVG. FALL 18 IN.

NO. OF U–TUBES – NO. OF VANE TESTS – DEPTH TO ROCK 115.3 FT. DEPTH TO COMP. 135.0 FT.

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/08/82	0730	62.0	40.0	4.6		Overnight
04/09/82	0715	115.3	115.3	6.0		
04/09/82	1430	135.0	115.3	2.0		At completion at rock coring
04/12/82	0730	–	15.0	5.7		Over the weekend
04/12/82	0800	–	0.0	5.0		

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0830	—	1D	0.75	32-19	Brown cinders, sm c-f sand, silt, tr gravel (Fill) (SM)	* 0.2	0	*Asphalt W = Water content in %
	28		2.75	10-30				
	48							
	37							
	56							
	31	2D	5.0	9-16	Gry-brn silty f-m sand, tr gvl cndrs, brick, mica (Fill) (SM)	Medium compact to loose gray-brown silty fine to coarse sand, trace gravel, cinders, brick, mica (Fill)	5	
	27		7.0	9-10				
	34							
	21							
	13							
	29	3D	10.0	11-17	Top: 18" Do 2D (Fill) (SM)		10	
	25		12.0	12-8	Bot: 6" Red-brn silt, sm fine sand (Fill) (ML)			
	38							
	29							
	17							
	15	4D	15.0	1-3	Dark gray c-f sand, sm gravel, silt, tr cndrs, mica (Fill)(SM)		15	
	15		17.0	3-5				
	16							
	18							
	16							
	*19	5D	20.0	WR-13	Med black organic silty clay, tr fine sand, wood, bricks (OH)	20.0	20	W = 58 *20.0'–25.0' drilled ahead of casing.
	18		22.0	9-6		5D Medium		
	12							
	26							
	27							
	28	6D	25.0	30-19	Gray-brn mic silty f-m sand, sm rock fragments (SM)	25.0 6D Med compact (Fill)	25	6D rock fgmts are decomposed mica schist. (Fill)
	43		27.0	12-13				
	80							
	69							
	90							
04/07/82 Partly Cloudy, Cold							30	

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 2 of 3
BORING NO. MG-827
FILE NO. 4840

BORING LOG

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
	44	NR	30.0	100/4"		Same as above	30	
	22		30.3					
	32							
	34							
	35							
	* 42	7D	35.0	10-14	Stiff black organic clay, trace vegetation (OH)	35.0 Stiff blk org clay	35	W = 64 *35.0'–40.0' drilled ahead of casing.
	26		37.0	8-9				
	26							
	25							
	25							
		8D	40.0	1-1	Medium gray organic silty clay, trace shells (OH)	40.0	40	W = 69
			42.0	2-4				
Partly Cloudy, Cold		9D	45.0	1-1	Medium gray organic silty clay, trace shells (OH)		45	W = 53
			47.0	1-1				
		10D	50.0	1-1	Do 9D, some fine sand (OH)		50	W = 47
			52.0	1-1				
		11D	55.0	1-1	Medium gray organic silty clay, trace shells (OH)		55	W = 47
			57.0	2-2				
1530		12D	60.0	2-2	Do 11D (OH)		60	W = 53
0700			62.0	3-4				
		13D	65.0	1-WH	Medium gray organic silty clay, tr shells, fine sand partings (OH)		65	W = 57
			67.0	WH-1				
Sunny		14D	70.0	WH-1	Do 13D (OH)		70	W = 34
			72.0	1-2				
		15D	75.0	1-1	Do 13D (OH)	Medium gray organic silty clay, trace fine sand partings, shells	75	W = 50
			77.0	2-2				
04/08/82		16D	80.0	2-3	Do 13D (OH)		80	W = 39
			82.0	4-2				
							85	

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

BORING LOG

SHEET 3 of 3
BORING NO. MG-827
FILE NO. 4840

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
		17D	85.0	2-2	Medium gray organic silty clay,		85	W = 59
			87.0	6-5	some fine sand (OH)			
		18D	90.0	WH-6	Medium gray organic silty clay,		90	W = 39
			92.0	3-2	trace fine sand partings (OH)			
Sunny		19D	95.0	WH-1	Medium gray organic silty clay,		95	W = 40
			97.0	5-9	some fine sand (OH)			
		20D	100.0	WR-2	Medium gray organic silty clay,		100	W = 45
04/08/82			102.0	2-11	trace fine sand partings, peat (OH)			
		21D	105.0	5-11	Medium gray organic silt, sm		105	W = 32
			107.0	16-16	fine sand and clay (OL)			
		22D	110.0	2-5	Stiff gray organic clay, some		110	W = 52
			112.0	7-10	peat, trace decomposed wood (OH)			W = 73 (Peat portion of the sample)
1500								
0700		23D	115.0	100/4"	Light gray micaceous f-m sand,	Dec Rock	115	* Decomposed mica schist.
			115.3		tr c sand, silt (SP)*			
		1C	116.0	Rec=88%	Light gray garnet mica schist,		118.0	
			121.0	RQD=12%	broken, SlW to HiW		120	
Cloudy,		2C	121.0	Rec=82%	Light gray garnet mica schist,			Run #2C Core barrel blocked.
			125.0	RQD=25%	trace quartz veins, cljtd, UnWExJts.		125	
04/09/82		3C	125.0	Rec=92%	Top: Light gray mica schist, tr			
			130.0	RQD=30%	quartz veins, broken, UnWExJts		130	
					Bot: White mic quartzite, cljtd, UnWExJts			
		4C	130.0	Rec=100%	Light gray mica schist & mic	Lt gry mica schist & grt mica schist, mic quartzite, tr qtz veins, bkn to mdit, UnWExJts		
			135.0	RQD=88%	quartzite, mdjtd, UnWExJts		135	
1430							140	

BORING NO. MG-827

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

BORING LOG

SHEET 1 of 2
BORING NO. MG-827P
FILE NO. 4840

PROJECT: WEST SIDE HIGHWAY | DOT. CONTR. NO.: D 250002 | ELEVATION: +5.5
COORDINATES: N 192674 E 1998158 | DATUM: Manhattan
BORING LOCATION: MTA Yard, MABSTOA Garage | DATE STARTED: 04/12/82
INSPECTOR: B. Mukherjee (MRJD) | DATE COMP.: 04/12/82
CONTRACTOR: Warren George, Inc.
DRILLER: J. Stevenson | HELPER: C. Soto
TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐
CASING: DIA. 4 IN. FROM 0.0 TO 20.0 FT.; DIA. IN. FROM TO FT.
DRILLING MUD UTILIZED: MUD TYPE | ROTARY BIT DIA. 3 3/4 IN.
SAMPLING EQUIPMENT, (TYPE & SIZE): D–SAMPLER: Split Spoon, 2" O.D. | DRILL ROD BW
U–SAMPLER: DIA. IN.: TYPE
CORE BIT | CORE BARREL
FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☐ OTHER ☐
SAMPLER HAMMER: WEIGHT (LBS) 140 AVG. FALL 30 IN.
CASING HAMMER: WEIGHT (LBS) 300 AVG. FALL 18 IN.
NO. OF U–TUBES – NO. OF VANE TESTS – DEPTH TO ROCK – FT. DEPTH TO COMP. – FT.

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/12/82	1000	20.0	20.0	2.0		
04/12/82	1300	15.5	15.0	3.9		Inside piezometer

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0700	13						0	
	18							
	16							
	34						5	
	12							
	20							
	110						10	
	88							
	19							
	10						15	
	25							
Partly Sunny	20							
	20							
	18						20	
04/12/82	12							
	11	1D	15.0	3-3	Gray-brown medium to fine	(Fill)		
	11		17.0	4-5	sand, trace gravel (Fill)(SP)			
	13						25	
	12							
1300	12						30	
						20.0		

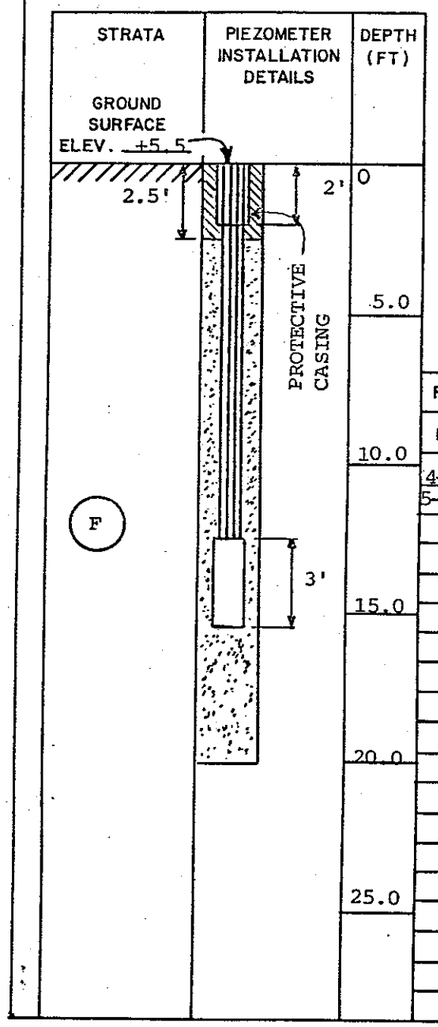
BORING NO. MG-827P

SHEET 2 OF 2
FILE NO. 4840
SUBCODE SMBST

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT WEST SIDE HIGHWAY - CONTRACT 5 — PIEZOMETER NO. MG-827 P
LOCATION MABSTOA GARAGE
PIEZOMETER LOCATION 12th AVE & W 30th STREET — DATE OF INSTALLATION 4-12-82
☐ SEE SKETCH ON BACK — RES. ENG. B. Mukherjee



PIEZOMETER TYPE DOUBLE TUBE POROUS PLASTIC

INTAKE POINT
depth to bottom, ft = 15.5
depth to top, ft = 12.5
length, ft = 3' = L
diameter, in = 1.5, ft = 0.125 = 2R

STANDPIPE/RISER (DOUBLE TUBE)
elevation of rim, ft = +5.5
diameter, in = 3/8, ft = 0.031 = 2r

READING TIME DATE	READING TIME CLOCK	DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
4-12-82	1300	3.9	1.6	High Tide 1220
5-10-82	1503	4.7	0.8	High Tide 1115

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. +5.5

PIEZOMETER NO. MG-827P

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

SHEET 1 of 3
BORING NO. MG-828
FILE NO. 4840

BORING LOG

PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +5.3
COORDINATES: N 192784.1	E 1998289.0	DATUM: Manhattan
BORING LOCATION: MTA Yard, Ramp		DATE STARTED: 04/02/82
INSPECTOR: Y. K. Chan (MRJD)		DATE COMP.: 04/07/82
CONTRACTOR: Warren George, Inc.		
DRILLER: J Farrell	HELPER: Mr. G. McCartar	

TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐
CASING: DIA. 4 IN. FROM 0.0 TO 10.0 FT.; DIA. 3 IN. FROM 0.0 TO 105.0 FT.
DRILLING MUD UTILIZED: MUD TYPE Quick Gel — ROTARY BIT DIA. 3 7/8 IN.
SAMPLING EQUIPMENT, (TYPE & SIZE): D-SAMPLER: Split Spoon, 2" O.D. — DRILL ROD NW
U-SAMPLER: DIA. IN.: TYPE
CORE BIT Diamond, NX — CORE BARREL Double Barrel
FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐
SAMPLER HAMMER: WEIGHT (LBS) 140 AVG. FALL 30 IN.
CASING HAMMER: WEIGHT (LBS) 300 AVG. FALL 18 IN.
NO. OF U-TUBES – NO. OF VANE TESTS – DEPTH TO ROCK 103.0 FT. DEPTH TO COMP. 115.0 FT.

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/05/82	0750	57.0	10.0	4.4		Over weekend with drilling mud inside the hole
04/07/82	0800	105.0	105.0	4.5		At start of drilling w/water inside the hole
04/07/82	1045	115.0	10.0	4.5		

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0830	–					*	0	*Asphalt
	21	1D	0.5	10-8	Dark gray c-f sand, sm cinders, silt, tr gvl (Fill)(SM)	0.3		W = Water content in %
	17		2.5	6-5				
	22							
	13							
	21	2D	5.0	22-17	Black c-f sandy gravel, trace silt (Fill)(GP)		5	
	30		7.0	6-13				
	26							
	30							
	28							
Windy		3D	10.0	17-13	Dark brown c-f sand, some cinders, trace gvl (Fill)(SP)		10	
			12.0	9-5				
Sunny,		**NR	15.0	5-3			15	**Attempted sample twice. No recovery. Sample 4D is probably wash.
			17.0	1-3				
		4D	17.0	5-5	Black c-f sand, sm cndrs, tr silt, gvl (Fill)(SP)	Medium compact dark gray to brown coarse to fine sand, some cinders, gravel, trace silt (Fill)		
			19.0	8-9				
04/02/82		5D	20.0	4-1	Black c-f sand, sm cndrs, tr organic silty clay, gravel (Fill)(SP)		20	
			22.0	2-4				
	23	6D	25.0	2-1	Medium black organic silty clay, trace fine sand, veg, wood (OH)	Med blk org silty clay, tr fsa, wood, veg	25	W = 71
			27.0	1-2				
							30	

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.
BORING LOG

BORING NO. MG 828
FILE NO. 4840

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
		7D	30.0	1-WH	Med dark gray organic silty clay, tr fine sand, sls (OH)	Medium dark gray organic silty clay, trace fine sand, fine sand partings, shells	30	W = 62
			32.0	2-2				
		8D	35.0	1-WH	Do 7D, trace veg. (OH)		35	W = 69
			37.0	1-2				
		9D	40.0	5-4	Do 7D (OH)		40	
			42.0	1-1				
04/02/82 Sunny		10D	45.0	1-WH	Do 7D, tr fine sand partings (OH)		45	W = 53
			47.0	3-4				
		11D	50.0	1-WH	Do 7D, tr fine sand partings (OH)		50	W = 54
			52.0	5-4				
1500		12D	55.0	WR - WH	Do 7D, tr fine sand partings (OH)		55	W = 53
0700			57.0	2-4				
		13D	60.0	2-3	Do 7D, tr fine sand partings (OH)		60	
			62.0	5-7				
		NR	65.0	9-7			65	
			67.0	7-10				
		14D	67.0	7-2	Med dk org silty clay, sm fine sand, tr sls, gvl, veg (OH)			W = 36
			69.0	5-4				
04/05/82 Sunny, Windy		15D	70.0	WR/24"	Med dk gray org silty clay, tr fine sand, sls (OH)		70	W = 39
			72.0					
		16D	75.0	WR/24"	Do 15D, tr fine sand partings (OH)		75	W = 34
			77.0					
		17D	80.0	WR - 1	Med dk gray org silty clay, tr m-f sand, fine sand partings, shells (OH)		80	W = 41
			82.0	6-9				
							85	

BORING NO. MG-828

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.
BORING LOG

BORING NO. MG-828
FILE NO. 4840

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
		NR	85.0	5-12		Med dk gry org si cl, sm m-f sa tr shells	85	
			87.0	11-14				
		18D	87.0	9-6	Med dark gray organic silty clay, sm m-f sand, tr shells (OH)			
			89.0	11-14				
04/05/82 Sunny, Windy		19D	90.0	WR - 6	Med dark gray organic silty clay, some m-f sandy silt lyrs (OH)		90	W = 43
			92.0	6-9		93.0		
		20D	95.0	11-18	Dark gray silty fine to medium sand, tr mica (SM)	Cpt dk gry si f-m sa tr mica	95	3" dia casing was placed inside hole.
			97.0	22-25		99.0		
		21D	100.0	2-6	Stiff dark gray organic silty clay, tr f-m sand, veg (OH)	21D	100	W = 53
			102.0	8-11		103.0		
1530						*		
0700		1C	105.0	Rec=100%	Light gray garnet mica schist, jtd, UnWExJts	105.0	105	*Possible decomposed rock.
			110.0	RQD=84%		Light gry garnet mica schist, jtd UnWExJts		
04/07/82 Windy		2C	110.0	Rec=96%	Do 1C		110	Highly micaceous rock.
			115.0	RQD=80%				
1130						115.0	115	
							120	
							125	
							130	
							135	
							140	

BORING NO. MG-828

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

BORING LOG

BORING NO. MG-831
FILE NO. 4840

PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +10.8	
COORDINATES: N 192313.3	E 1998985.3	DATUM: Manhattan	
BORING LOCATION: MTA Yard, MABSTOA Garage		DATE STARTED: 04/09/82	
INSPECTOR: Y.K. Chan (MRJD)		DATE COMP.: 04/12/82	
CONTRACTOR: Warren George, Inc.			
DRILLER: J. Farrell	HELPER: G McCartar		

TYPE OF RIG: TRUCK ☒ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐

CASING: DIA. 4 IN. FROM 0.0 TO 5.0 FT.; DIA. 3 IN. FROM 0.0 TO 33.5 FT.

DRILLING MUD UTILIZED: MUD TYPE Quick-Gel ROTARY BIT DIA. 3 7/8 IN.

SAMPLING EQUIPMENT, (TYPE & SIZE): D-SAMPLER: Split Spoon, 2" O.D. DRILL ROD NW; U-SAMPLER: DIA. IN.: TYPE; CORE BIT Diamond, NX CORE BARREL Double Barrel

FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐

SAMPLER HAMMER: WEIGHT (LBS) 140 AVG. FALL 30 IN.

CASING HAMMER: WEIGHT (LBS) 300 AVG. FALL 18 IN.

NO. OF U–TUBES – NO. OF VANE TESTS – DEPTH TO ROCK 33.0 FT. DEPTH TO COMP. 44.0 FT.

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/12/82	0800	27.0	5.0	5.8		Over weekend. Drilling mud in hole
04/12/82	1410	44.0	5.0	11.5		At completion Water in hole
04/12/82	1445	44.0	0.0	7.5		

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
1215		1D	0.5	12-11	Dark brown f-c sand, sm silt, gravel, cinders (Fill) (SM)	0.*	0	*Concrete W = Water content in %
	4		2.5	6-4				
	8							
	7							
	6							
		2D	5.0	4-3	Gray-brown f-m sand, sm silt, tr decomposed wood (Fill)(SM)	Med cpt to loose dark brn f-c sand, sm silt, tr gvl, cndrs, decomposed wood (Fill)	5	
	D		7.0	3-3				
	E							
	R							
	E							
	W	3D	10.0	7-1	Gray-brown f-m sand, sm silt, tr gravel (Fill)(SM)		10	
	O		12.0	12-15				
	L							
Snow								
							15	
04/09/82		4D	15.0	4-4	Top: Do 3D (Fill)(SM)			4D Bot: W = 58
			17.0	4-2	Bot: Soft black organic silty clay, tr fine sand (OH)	16.5 4D Bottom		
		NR	20.0	7-14		20.0	20	
			22.0	17-23				
		5D	22.0	29-29	Brown silty f-m sand, tr gravel (SM)	Cpt red-brn f-c sand, sm silt, gravel		
			24.0	38-44				
							25	
		6D	25.0	28-36	Red-brown f-c sand, sm silt, gravel (SM)			
			27.0	32-41				
							30	

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.

BORING LOG

BORING NO. MG-831
FILE NO. 4840

DAILY PROGRESS	CASING BLOWS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
		7D	30.0	24-36	Brown f-c sand, sm silt, gravel (SM)	7D	30	
			32.0	62-37		V cpt 33.0		
						* 34.0		*Decomposed rock
		1C	34.0	Rec=98%	Light gray-white micaceous quartzite blocky, UnW	Lt gry mica schist quartzite mass, UnW	35	Core barrel was blocked at 35.5.
			39.0	RQD=98%				
		2C	39.0	Rec=100%	Do 1C		40	
			44.0	RQD=96%		44.0		
04/12/82 Sunny 1530							45	
							50	
							55	
							60	
							65	
							70	
							75	
							80	
							85	

FED. ROAD REG. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
1	N.Y.	I-478-11)17		

INTERSTATE ROUTE CONNECTION 518
BROOKLYN BATTERY TUNNEL TO LINCOLN TUNNEL

DESIGNED BY ____ DATE ____ REVIEWED BY ____ DATE ____
CHECKED BY ____ DATE ____
IN CHARGE OF ____

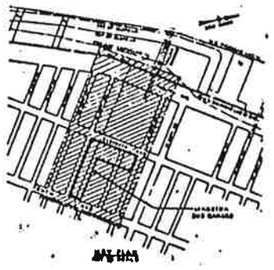
HUDSON RIVER
U.S. BULKHEAD LINE OF 1941
PIER 72
AMTRAK TUNNELS
12TH AVENUE
11TH AVENUE
WEST STREET
33RD STREET
32ND STREET
31ST ST.
30TH STREET
29TH STREET
MABSTOA BUS GARAGE
RAMPS LT2, LT11 & LT12
GRID NORTH
N-193,400
N-193,000
N-192,000
N-191,600
E-1,998,000
E-1,997,800
E-2,000,000

NOTES

1. For General Notes see Figure No. 3.1.
2. Contours shown are necessary interpolations between borings and may not represent actual subsurface conditions.
3. 400 series borings shown on Figure No. 3.1 but not shown on this drawing did not define bedrock and were not used for contouring.

LEGEND

- Borings made in 1982 under Westway Boring Contracts Nos. 2,4&5.
- MG series borings made by others for MABSTOA Garage.
- Previously made borings providing reliable, detailed information.
- Previously made borings providing limited information.
  A - Elevation of top of bedrock.
- Piezometer installed in 1982. (Does not extend to bedrock.)



GRAPHIC SCALE
0 40' 80' 160'

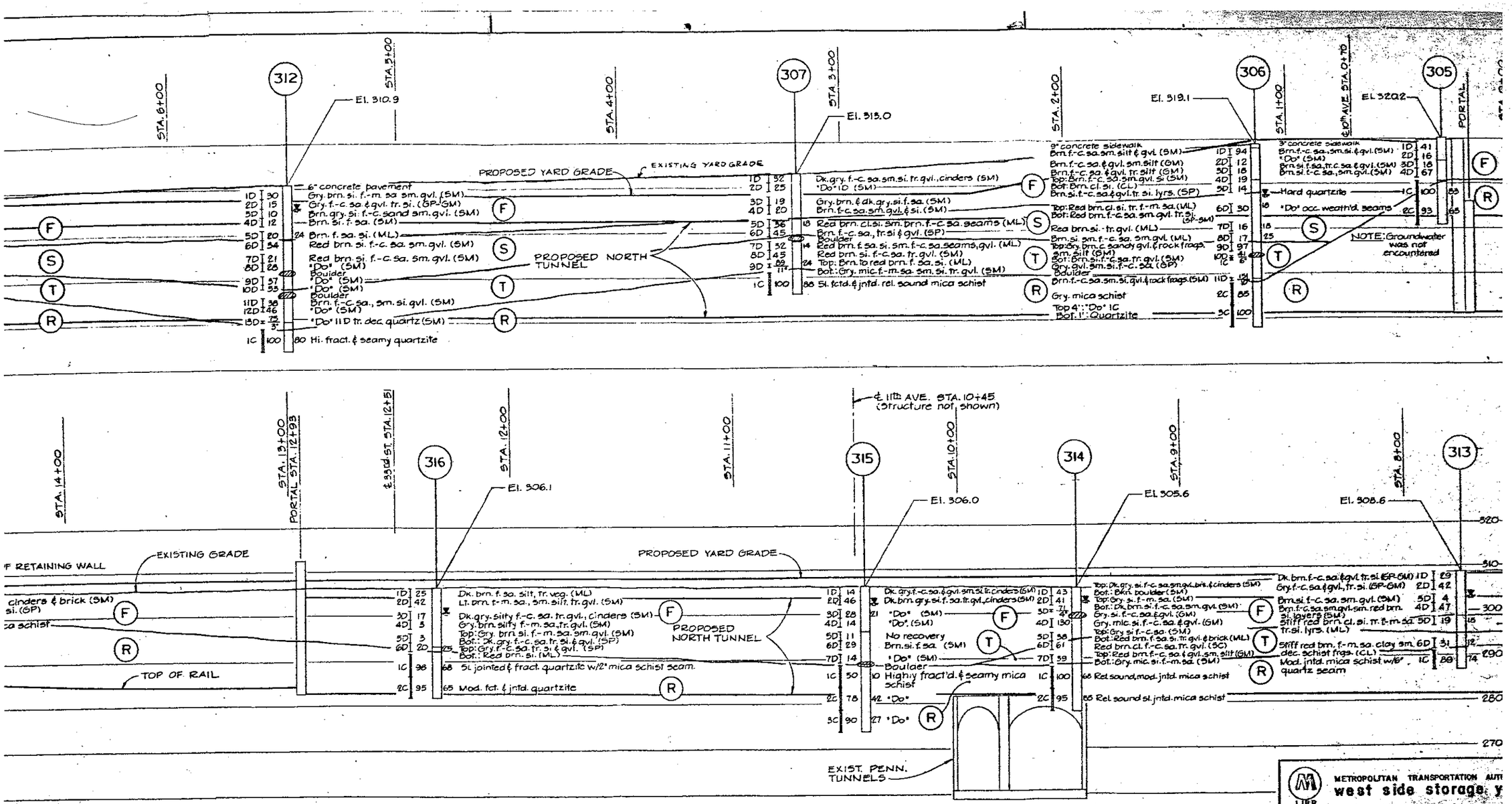
FIGURE NO. 4.6

INTERSTATE ROUTE CONNECTION 518
WEST SIDE HIGHWAY PROJECT

CONTOURS OF BEDROCK SURFACE
MABSTOA GARAGE

DRAWING NO.	DATE	SCALE	SHEET NO.
C-MG-1		GRAPHIC	

MUESER · RUTLEDGE · JOHNSTON & DESIMONE
WOODWARD – CLYDE CONSULTANTS, INC.



DATA DESCRIPTIONS

se to compact gray-brown
oarse sand and gravel, some silt with
brick and concrete.

Silt: Medium compact to compact red-brown
layey silt with layers of silty fine sand to
e to coarse sand, some gravel.

ill: Very compact red-brown silty fine to coarse
me gravel with boulders.

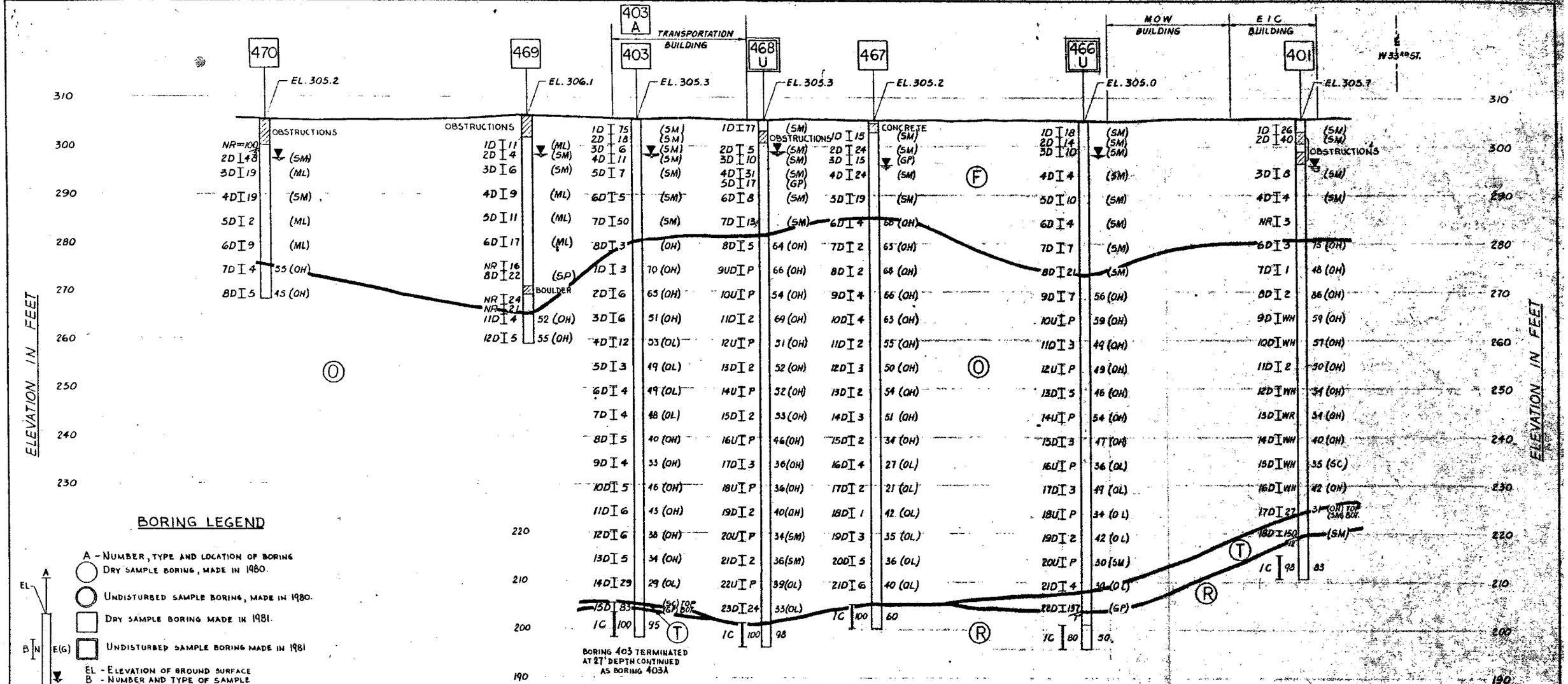
Moderately jointed and fractured
hist with quartz tic seams.

SECTION C-C

NOTE: For Boring Legend, General Notes and Soil Sample Abbreviations see Drawing No. 65-1.
Tunnel and existing structure profiles were taken from S&V & K's Drawing titled North-Connection Plan.

GRAPHIC SCALE
HORIZONTAL 0 20' 40' 60'
VERTICAL 0 10' 20' 40'

METROPOLITAN TRANSPORTATION AUTH
LIRR
west side storage y
SEELYE STEVENSON VALUE & KNECH
NEW YORK, N.Y.
MUESER-RUTLEDGE-JOHNSTON & DESI
CONSULTING ENGINEERS
415 MADISON AVE., NEW YORK N. Y. 10017
SCALE GRAPHIC | DRAWN BY J.V. DATE 6-11-80
CHECKED BY J.F.G. DATE 6-11-80
GEOLOGIC SECTION C-C



BORING 403 TERMINATED AT 27' DEPTH CONTINUED AS BORING 403A

BORING LEGEND

A - NUMBER, TYPE AND LOCATION OF BORING

- DRY SAMPLE BORING, MADE IN 1980.
- UNDISTURBED SAMPLE BORING, MADE IN 1980.
- DRY SAMPLE BORING MADE IN 1981.
- UNDISTURBED SAMPLE BORING MADE IN 1981

EL - ELEVATION OF GROUND SURFACE

B - NUMBER AND TYPE OF SAMPLE
- D - DRY SAMPLE TAKEN WITH 2" O.D SPLIT SPOON
- U - UNDISTURBED SAMPLE TAKEN WITH 3" O.D PISTON TYPE SAMPLER.
- UD - UNDISTURBED SAMPLE EXTRUDED IN FIELD AND PLACED IN JAR DUE TO POOR RECOVERY.
- NR - NO RECOVERY

I - LOCATION AND LENGTH OF SAMPLE

N - STANDARD PENETRATION RESISTANCE - NUMBER OF BLOWS FROM 140LB. HAMMER FREE FALLING 30" REQUIRED TO DRIVE 2" O.D. SPLIT SPOON SAMPLER ONE FOOT UNLESS A SPECIFIC PENETRATION IS INDICATED
- P - PRESSED OR PUSHED SAMPLE.
- WR - SAMPLER ADVANCED UNDER WEIGHT OF RODS
- WH - SAMPLER ADVANCED UNDER WEIGHT OF RODS AND HAMMER

BOULDER OR OBSTRUCTION

E - AVERAGE NATURAL WATER CONTENT OF SAMPLE IN PERCENT OF DRY WEIGHT.

GROUND WATER LEVEL OBSERVED IN LAND BORINGS. (IMMEDIATELY AFTER COMPLETION OF BORING)

C - ROCK CORE

II - LENGTH OF CORE RUN.

F - LENGTH OF CORE RECOVERED EXPRESSED AS A PERCENT OF THE LENGTH OF CORE RUN

R - ROCK QUALITY DESIGNATION - LENGTH OF RECOVERED CORE CONSISTING OF PIECES 4" OR MORE IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF CORE RUN

G - UNIFIED SOIL CLASSIFICATION SYMBOL

GENERAL NOTES

1. 400 SERIES BORINGS WERE MADE BY WARREN GEORGE, INC BETWEEN APRIL 13 AND JUNE 5, 1981 UNDER THE CONTINUOUS INSPECTION OF MUESER, RUTLEDGE, JOHNSTON AND DE SIMONE
2. 300 SERIES BORINGS WERE MADE BY WARREN GEORGE, INC BETWEEN MAY 5 AND 22 1980 UNDER THE CONTINUOUS INSPECTION OF MUESER, RUTLEDGE, JOHNSTON AND DE SIMONE.
3. CLASSIFICATIONS SHOWN WERE MADE BY MUESER, RUTLEDGE, JOHNSTON AND DE SIMONE AND MAY NOT AGREE WITH THE DRILLERS' CLASSIFICATIONS.
4. STRATIFICATIONS SHOWN ARE NECESSARY INTERPOLATIONS BETWEEN BORINGS AND MAY OR MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS
5. ELEVATIONS REFER TO L.I.R.R. DATUM, ON WHICH ELEVATION 300 IS EQUAL TO ELEVATION -0.025 ON THE BOROUGH OF MANHATTAN DATUM.
6. LOCATIONS AND GROUND SURFACE ELEVATIONS OF BORINGS WERE DETERMINED BY SEELYE, STEVENSON, VALUE AND KNECHT, INC.

GRAPHIC SCALES

HORIZONTAL: 0' 15' 30' 60' 120'

VERTICAL: 0' 10' 20' 40'

SECTION D-D

GENERAL STRATA DESCRIPTIONS

(F) – FILL: LOOSE TO COMPACT GRAY - BROWN FINE TO COARSE SAND AND GRAVEL, SOME SILT WITH CINDERS, BRICK AND CONCRETE.

(O) – ORGANIC: SOFT TO MEDIUM DARK GRAY ORGANIC SILTY CLAY TO CLAYEY SILT WITH FINE SAND SEAMS.

(S) – SAND AND SILT: MEDIUM COMPACT TO COMPACT RED-BROWN SILT OR CLAYEY SILT WITH LAYERS OF SILTY FINE SAND TO SILTY FINE TO COARSE SAND, SOME GRAVEL.

(T) – GLACIAL TILL: VERY COMPACT RED-BROWN SILTY FINE TO COARSE SAND, SOME GRAVEL WITH BOULDERS.

(R) – BEDROCK: MODERATELY JOINTED AND FRACTURED MICA SCHIST WITH QUARTZITE SEAMS.

REV. NO.	DESCRIPTION	DATE

SEELYE STEVENSON VALUE & KNECHT, INC.
ENGINEERS & PLANNERS
99 PARK AVENUE NEW YORK, N.Y. 10016
MUESER·RUTLEDGE·JOHNSTON & DESIMONE
CONSULTING ENGINEERS
415 MADISON AVE., NEW YORK, N.Y. 10017

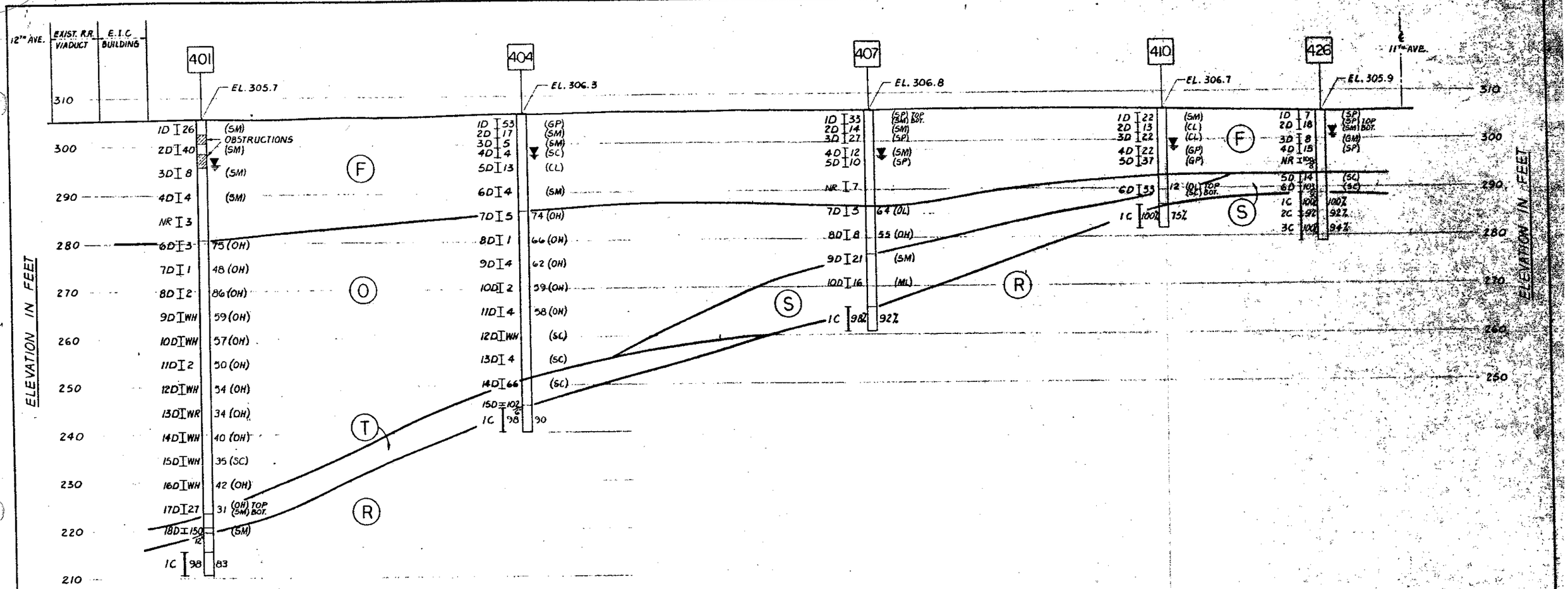
L.I.R.R. LONG ISLAND RAIL ROAD

Metropolitan Transportation Authority

WEST SIDE STORAGE YARD COMPLEX

GEOLOGIC SECTION D-D

CONTRACT NO. 5385
DATE JULY 16, 1981
SCALE GRAPHIC
DRAWING NO. GS-3
SHEET 5 OF 12



SECTION E-E

GENERAL STRATA DESCRIPTIONS

(F) – FILL: LOOSE TO COMPACT GRAY - BROWN FINE TO COARSE SAND AND GRAVEL, SOME SILT WITH CINDERS, BRICK AND CONCRETE.

(O) – ORGANIC: SOFT TO MEDIUM DARK GRAY ORGANIC SILTY CLAY TO CLAYEY SILT WITH FINE SAND SEAMS.

(S) – SAND AND SILT: MEDIUM COMPACT TO COMPACT RED - BROWN SILT OR CLAYEY SILT WITH LAYERS OF SILTY FINE SAND TO SILTY FINE TO COARSE SAND, SOME GRAVEL.

(T) – GLACIAL TILL: VERY COMPACT RED-BROWN SILTY FINE TO COARSE SAND, SOME GRAVEL WITH BOULDERS.

(R) – BEDROCK: MODERATELY JOINTED AND FRACTURED MICA SCHIST WITH QUARTZITE SEAMS.

GRAPHIC SCALES

Horizontal: 0' 15' 30' 60' 120'

Vertical: 0' 10' 20' 40'

SEELYE STEVENSON VALUE & KNECHT, INC.
ENGINEERS & PLANNERS
99 PARK AVENUE NEW YORK, N.Y. 10016

MUESER RUTLEDGE JOHNSTON & DESIMONE
CONSULTING ENGINEERS
415 MADISON AVE., NEW YORK, N.Y. 10017

L.I.R.R.
LONG ISLAND RAIL ROAD

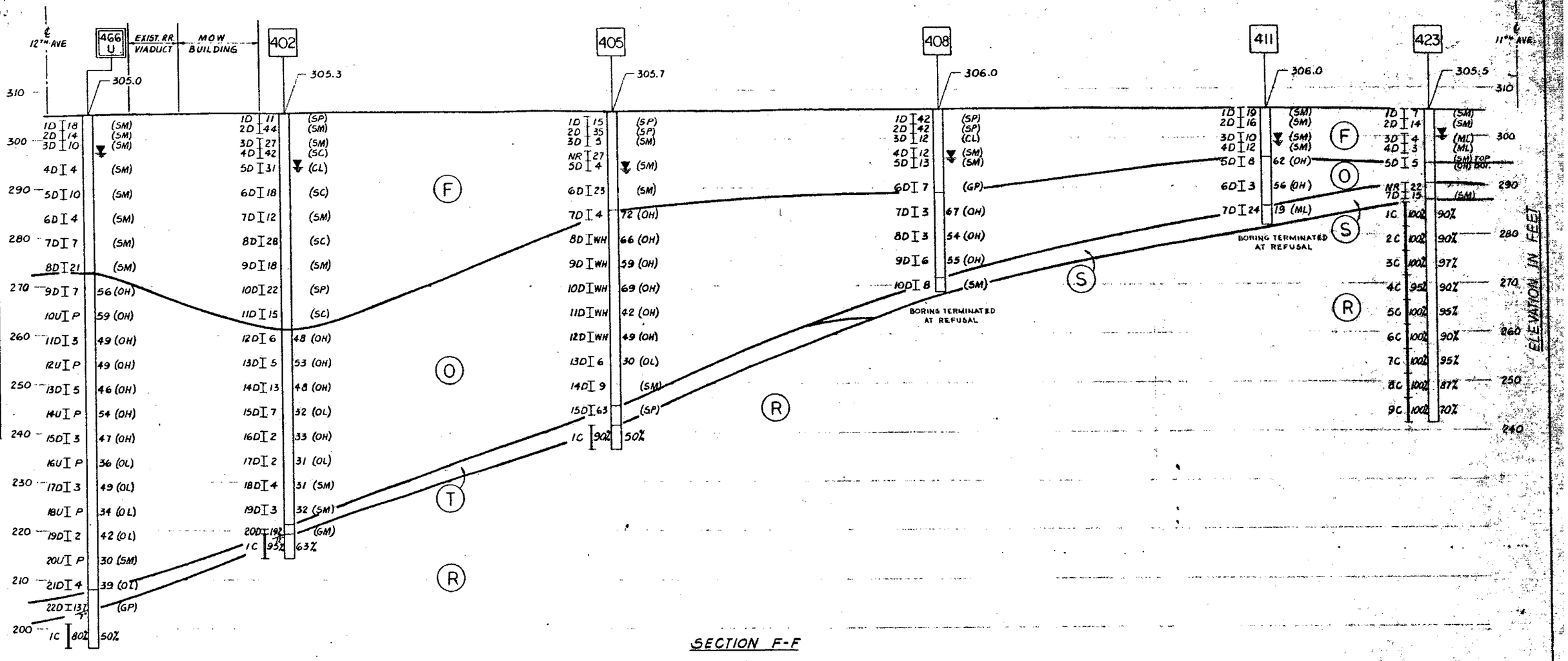
Metropolitan Transportation Authority

REV NO	DESCRIPTION	DATE

WEST SIDE STORAGE YARD COMPLEX

GEOLOGIC SECTION E-E

CONTRACT NO. 5386
DATE JULY 16, 1981
SCALE GRAPHIC
DRAWING NO. GS-4
SHEET 9 OF 12



SECTION F-F

GENERAL STRATA DESCRIPTIONS

(F) – FILL: LOOSE TO COMPACT GRAY - BROWN FINE TO COARSE SAND AND GRAVEL, SOME SILT WITH CINDERS, BRICK AND CONCRETE.

(O) – ORGANIC: SOFT TO MEDIUM DARK GRAY ORGANIC SILTY CLAY TO CLAYEY SILT WITH FINE SAND SEAMS.

(S) – SAND AND SILT: MEDIUM COMPACT TO COMPACT RED-BROWN SILT OR CLAYEY SILT WITH LAYERS OF SILTY FINE SAND TO SILTY FINE TO COARSE SAND, SOME GRAVEL.

(T) – GLACIAL TILL: VERY COMPACT RED-BROWN SILTY FINE TO COARSE SAND, SOME GRAVEL WITH BOULDERS.

(R) – BEDROCK: MODERATELY JOINTED AND FRACTURED MICA SCHIST WITH QUARTZITE SEAMS.

GRAPHIC SCALES

HORIZONTAL : 0' 30' 60' 120'

VERTICAL : 0' 10' 20' 40'

RECORD SET

REV NO	DESCRIPTION	DATE

SEELYE STEVENSON VALUE & KNECHT, INC.
ENGINEERS & PLANNERS
99 PARK AVENUE NEW YORK, N.Y. 10016
MUESER·RUTLEDGE·JOHNSTON & DESIMONE
CONSULTING ENGINEERS
415 MADISON AVE. NEW YORK, N.Y. 10017

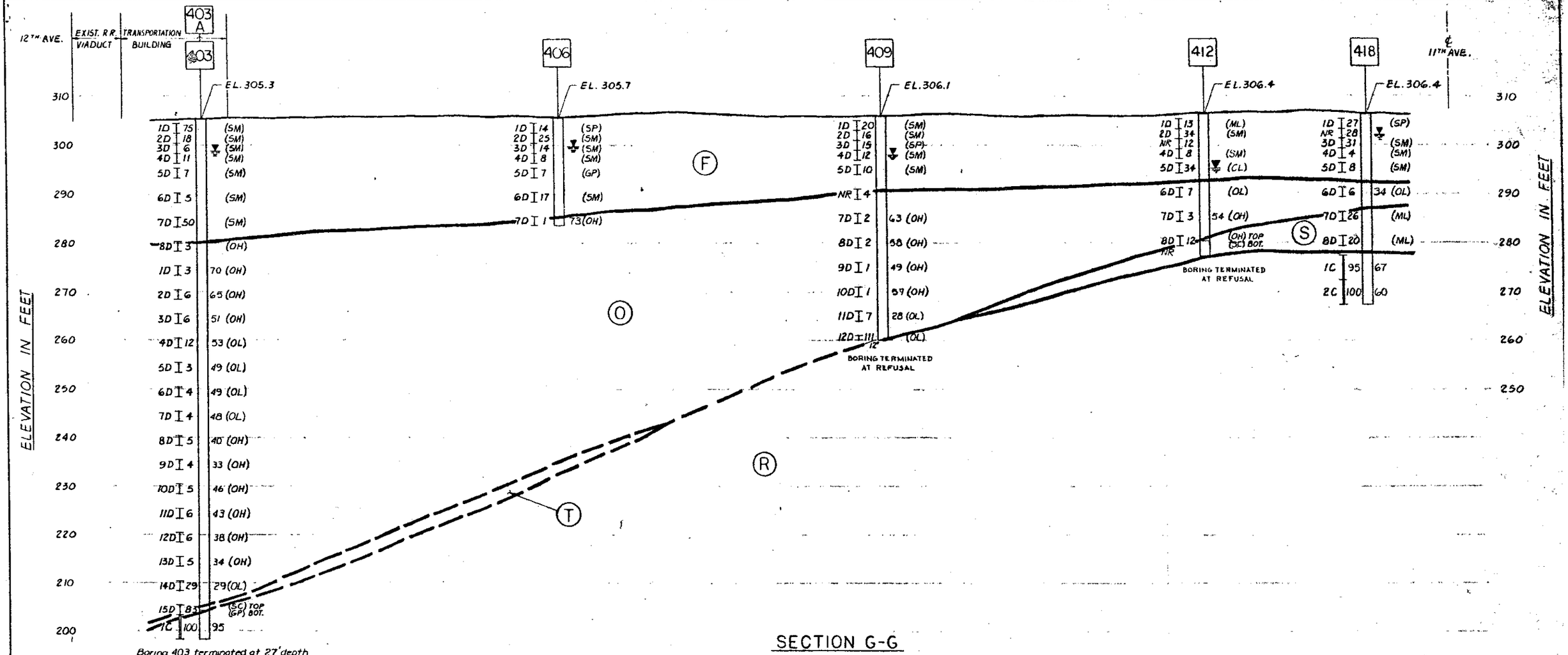
L.I.R.R.
LONG ISLAND RAIL ROAD

M
Metropolitan Transportation Authority

WEST SIDE STORAGE YARD COMPLEX

GEOLOGIC SECTION F-F

CONTRACT NO. 5385
DATE JULY, 16, 1981
SCALE GRAPHIC
DRAWING NO. GS-6
SHEET 7 OF 12



SECTION G-G

GENERAL STRATA DESCRIPTIONS

(F) – FILL: LOOSE TO COMPACT GRAY - BROWN FINE TO COARSE SAND AND GRAVEL, SOME SILT WITH CINDERS, BRICK AND CONCRETE.

(O) – ORGANIC: SOFT TO MEDIUM DARK GRAY ORGANIC SILTY CLAY TO CLAYEY SILT WITH FINE SAND SEAMS.

(S) – SAND AND SILT: MEDIUM COMPACT TO COMPACT RED - BROWN SILT OR CLAYEY SILT WITH LAYERS OF SILTY FINE SAND TO SILTY FINE TO COARSE SAND, SOME GRAVEL.

(T) – GLACIAL TILL: VERY COMPACT RED-BROWN SILTY FINE TO COARSE SAND, SOME GRAVEL WITH BOULDERS.

(R) – BEDROCK: MODERATELY JOINTED AND FRACTURED MICA SCHIST WITH QUARTZITE SEAMS.

GRAPHIC SCALES

Horizontal: 0' 15' 30' 60' 120'

Vertical: 0' 10' 20' 40'

REV NO	DESCRIPTION	DATE

SEELYE STEVENSON VALUE & KNECHT, INC.
ENGINEERS & PLANNERS
99 PARK AVENUE NEW YORK, N.Y. 10016
MUESER RUTLEDGE JOHNSTON & DESIMONE
CONSULTING ENGINEERS
415 MADISON AVE., NEW YORK, N.Y. 10017

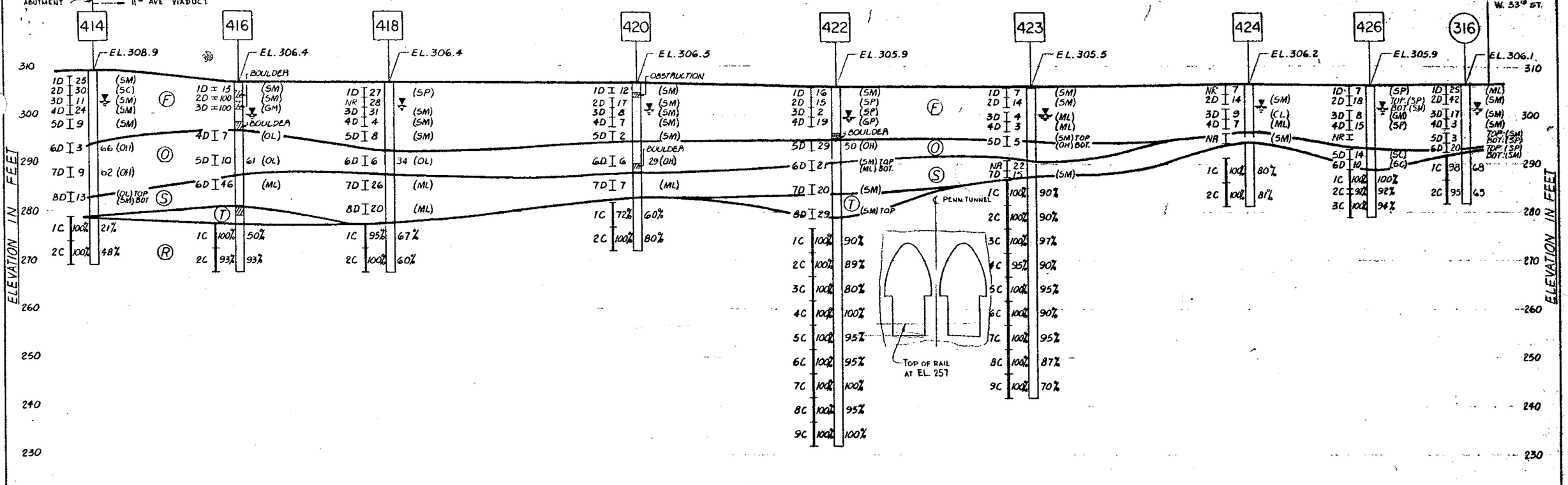
L.I.R.R. LONG ISLAND RAIL ROAD

M Metropolitan Transportation Authority

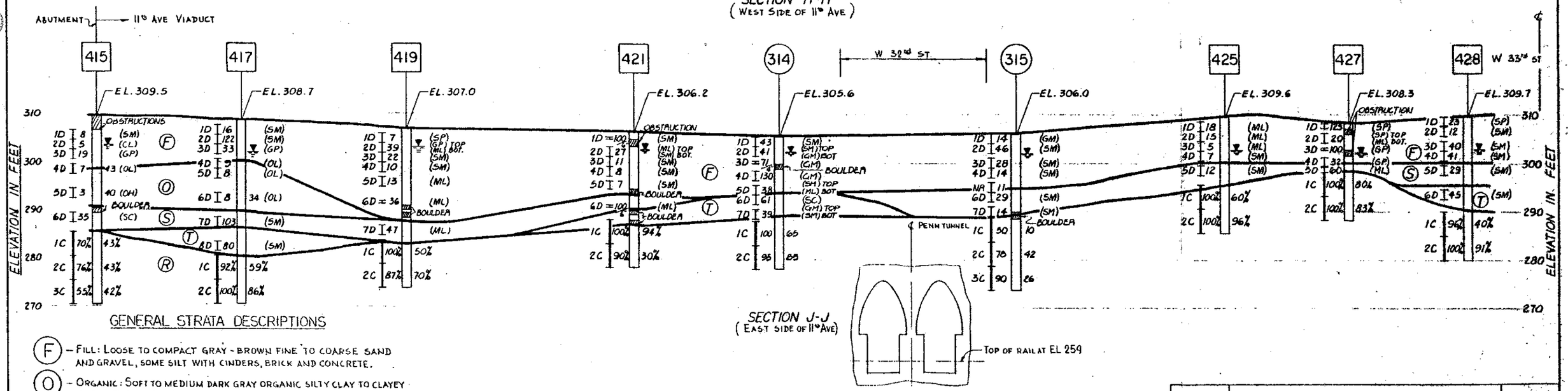
WEST SIDE STORAGE YARD COMPLEX

GEOLOGIC SECTION G-G

CONTRACT NO 5385
DATE JULY, 16, 1981
SCALE GRAPHIC
DRAWING NO GS-6
SHEET 8 OF 12



SECTION H-H
(WEST SIDE OF 11th AVE)



SECTION J-J
(EAST SIDE OF 11th Ave)

GENERAL STRATA DESCRIPTIONS

(F) – FILL: LOOSE TO COMPACT GRAY-BROWN FINE TO COARSE SAND AND GRAVEL, SOME SILT WITH CINDERS, BRICK AND CONCRETE.

(O) – ORGANIC: SOFT TO MEDIUM DARK GRAY ORGANIC SILTY CLAY TO CLAYEY SILT WITH FINE SAND SEAMS.

(S) – SAND AND SILT: MEDIUM COMPACT TO COMPACT RED-BROWN SILT OR CLAYEY SILT WITH LAYERS OF SILTY FINE SAND TO SILTY FINE TO COARSE SAND, SOME GRAVEL.

(T) – GLACIAL TILL: VERY COMPACT RED-BROWN SILTY FINE TO COARSE SAND, SOME GRAVEL WITH BOULDERS.

(R) – BEDROCK: MODERATELY JOINTED AND FRACTURED MICA SCHIST WITH QUARTZITE SEAMS.

HORIZONTAL 0' 20' 40'

VERTICAL 0' 10' 20'

SEELYE STEVENSON VALUE & KNECHT, INC.
ENGINEERS & PLANNERS
99 PARK AVENUE, NEW YORK, N.Y. 10016

MUESER·RUTLEDGE·JOHNSTON & DESIMONE
CONSULTING ENGINEERS
415 MADISON AVE., NEW YORK, N.Y. 10017

L.I.R.R.
LONG ISLAND RAIL ROAD

M
Metropolitan Transportation Authority

REV NO	DESCRIPTION	DATE

WEST SIDE STORAGE YARD COMPLEX

11TH AVENUE VIADUCT SUBSURFACE PROFILES

GEOLOGIC SECTION H-H & J-J

CONTRACT NO. 5385
DATE JULY, 16, 1981
SCALE GRAPHIC
DRAWING NO. GS-7
SHEET 9 OF 12

JOB LOCATION:
AMTRAK North Access
Connection Tunnel
New York City

WARREN GEORGE. INC.

FOOT OF JERSEY AVENUE
P. O. BOX 413
JERSEY CITY, N.J. 07303

FOR: Parsons Brinckerhoff

SHEET 1 OF 1
LOCATION New York City
HOLE NO. B-1
N 19921.73
W 15120.80

DEPTH _____ FT. ___ FT. CASING OUT DATE: _____
DEPTH _____ FT. ALL CASING OUT DATE: _____

DATE, START: 9/2/86
DATE, FINISH: 9/13/86

GROUND ELEVATION 306.7
GROUND WATER ELEVATION 299.4

CASING O.D. NW I.D. _____
SAMPLER O.D. 2" I.D. 1-3/8"
DIAMOND BIT SIZE NX

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

BELOW SURFACE	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOILS REMARKS
0		SS-1	0'-1.1'	4"	5-	15-	50/1"		SS-1	Brown Sandy medium to coarse GRAVEL, very dense dry (FILL+ BALLAST)
		SS-2	5'-6'	3"	3-	3-	50/0"		SS-2	Brown medium to fine SAND, some Gravel, little Clay very dense wet (fill)
									0'-12.5'	Gray coarse to fine SAND, little fine Gravel, trace Silt, medium dense, very moist
10		SS-3	10'-12'	10"	5-	10-	10-4		SS-3	
									12.5'-13'	Soft rock
		R1	13'-18'	4.75'	RQD=84%				13'-35'	Manhattan Schist Formation, dark gray Mica Schist. 13.0'-13.5', Highly to moderately weathered low to moderate hardness
		R2	18'-19.5'	1.1'	RQD=53%					13.5'-35.0' Slightly weathered, moderate hardness, close to wide fracture spacing.
20		R3	19.5'-24.8'	5.3'	RQD=100%					
		R4	24.8'-30'	5.2'	RQD=100%					
30		R5	30'-35'	4.9'	RQD=84%					
										Note: Pressure test at 14.0'-19.6', 1 gpm at 24 psi, Piezometer installed at 23'
40										

Soils Engineer: _____ Driller: Greg Marney
Drilling Inspector: Peter Tani Helper: Norman Burgess

JOB LOCATION:
AMTRAK North Access
Connection Tunnel
New York City

WARREN GEORGE, INC.
FOOT OF JERSEY AVENUE
P. O. BOX 413
JERSEY CITY, N.J. 07303

FOR: Parsons Brinckerhoff

SHEET 1 OF 1
LOCATION New York City
HOLE NO. B-2
N 19986.60
W 15104.10

DEPTH ____ FT. ____ FT. CASING OUT DATE: ____
DEPTH ____ FT. ALL CASING OUT DATE: ____
DATE, START: 9/10/86
DATE, FINISH: 9/10/86
GROUND ELEVATION 306.2
GROUND WATER ELEVATION 301.3

CASING O.D. NW I.D. ____
SAMPLER O.D. 2" I.D. 1-3/8"
DIAMOND BIT SIZE NX
WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.
HAMMER FALL
CASING 24" SAMPLER 30"

DEPTH BELOW SURFACE	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOILS REMARKS
		SS-1	0'-2'	11"	4-	13-	15-26		0'-8.5'	SS-1 Black brown coarse/fine SAND and coarse/medium GRAVEL, little CLay, slightly moist, very slightly plastic, very stiff, (Fill & Ballast)
		SS-2	5'-7'	4"	3-	5-	7-14		SS-2	Black brown coarse/medium GRAVEL, some medium/fine Sand, wet, stiff(Fill & Ball ast)
10		R1	9'-14'	4.6'	RQD=92%				8.5'-9'	Decomposed rock
		R2	14'-19'	4.9'	RQD=91%				9'-29'	Manhattan Schist Formation, light gray quartz pegmatite coarse to medium-grained, slightly weathered, hard to very hard moderately close to wide fracture spacing
20		R3	19'-24'	5'	RQD=100%					
		R4	24'-29'	5'	RQD=94%					
30										Note: Pressure test at 10.1'-15.7' no take at 30 psi
40										

Soils Engineer: ____
Drilling Inspector: Peter Tani
Driller: Greg Marney
Helper: NOrman Burgess

JOB LOCATION: AMTRAK North Access Connection Tunnel, New York City

WARREN GEORGE, INC.

FOOT OF JERSEY AVENUE
P. O. BOX 413
JERSEY CITY, N.J. 07303

FOR: Parsons Brinckerhoff

SHEET 1 OF 1
LOCATION New York City
HOLE NO. B-3
N-20094.56
W 15078.41

DEPTH _____ FT. ____ FT. CASING OUT DATE: _____
DEPTH _____ FT. ALL CASING OUT DATE: _____

DATE, START: 9/11/86
DATE, FINISH: 9/11/86

GROUND ELEVATION 306.3
GROUND WATER ELEVATION 300.5

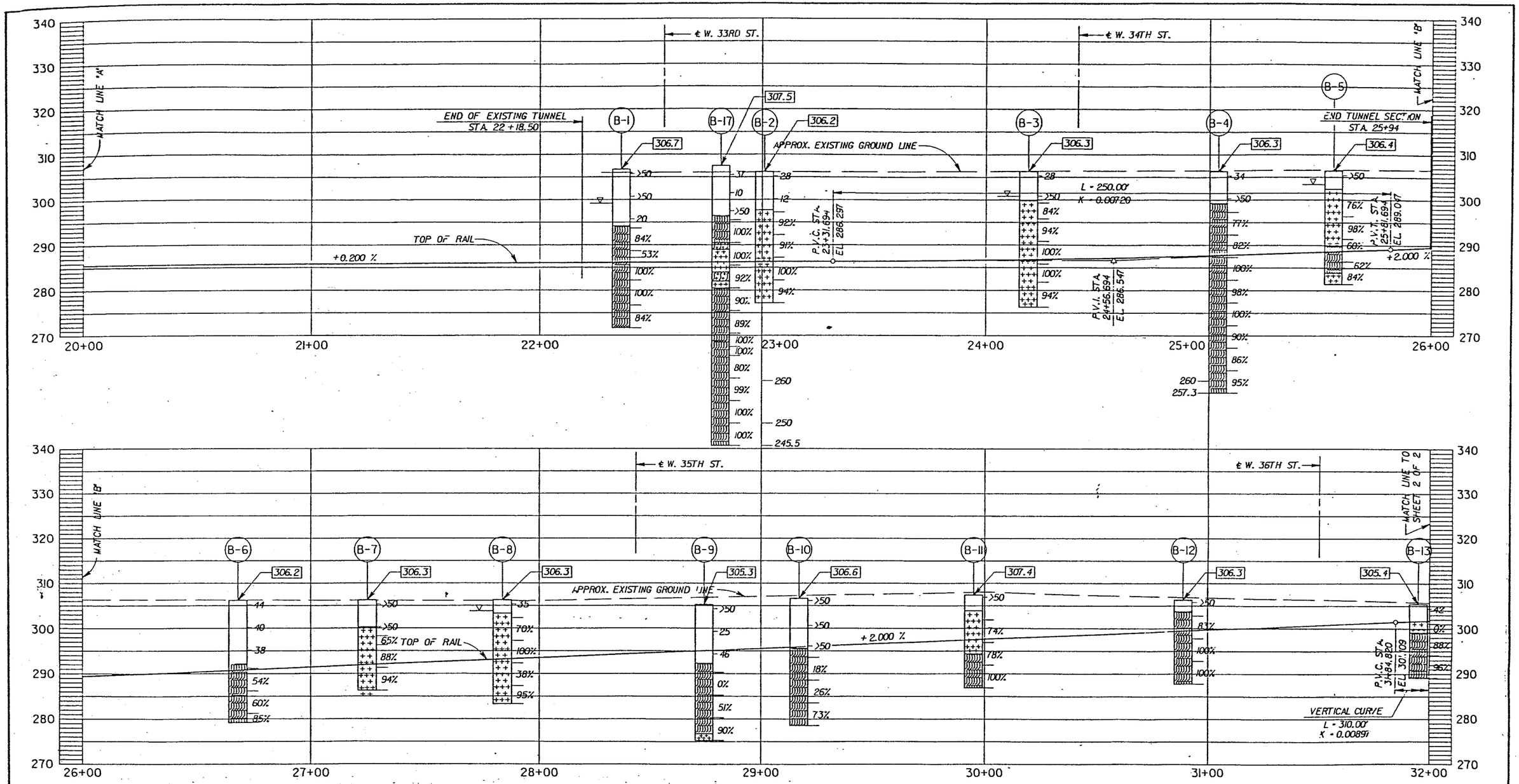
CASING O.D. NW I.D. _____
SAMPLER O.D. 2" I.D. 1-3/8"
DIAMOND BIT SIZE NX

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

DEPTH BELOW SURFACE	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOILS. REMARKS
		SS-1	0'-2'	1"	12-	14-	14-8		SS-1: 0'-6.25'	Light brown coarse GRAVEL, and SILT, dry, medium dense (Ballast & Fill)
		SS-2	5'-6.25'	13"	11-	19-	28/3"		SS-2 6.25'-30'	Light brown SILT, little coarse/medium Sand, trace Gravel, Wet, Dense, decomposed Rock
		R1	6.5'-10'	3'	RQD=84%					
		R2	10'-15'	4.8'	RQD=94%					
		R3	15'-20.3'	5.3'	RQD=100%					Manhattan Schist Formation, Light gray quartz pegmatite, slightly weathered, hard to very hard, moderately close fracture spacing
		R4	20/3'-24.2'	3.9'	RQD=100%					
		R5	24.2'-30'	5.7'	RQD=97%					
										Note: Pressure test at 14.4'-20.0' 4.5 gpm at 20 psi Piezometer installed at 30'

Soils Engineer: _____ Driller: Greg Marney
Drilling Inspector: Peter Tani Helper: Norman Burgess



LEGEND:

OVERBURDEN

TRACK BEDDING AND FILL MATERIALS. GENERALLY CONSISTING OF MEDIUM TO VERY DENSE COARSE TO FINE SAND & GRAVEL.

BEDROCK (MANHATTAN SCHIST FORMATION)

MICA SCHIST

QUARTZ PEGMATITE INTRUSIONS

SCHIST/PEGMATITE TRANSITION ZONE

IN OVERBURDEN, NUMBERS GIVEN ARE STANDARD PENETRATION TEST N-VALUES. IN BEDROCK, NUMBERS GIVEN ARE ROCK QUALITY DESIGNATION (RQD) INDEX VALUES.

▽ WATER LEVEL READING TAKEN IN OBSERVATION WELL.

HORIZONTAL
0 20 40 60
GRAPHIC SCALE (FEET)

VERTICAL
0 10 20 30
GRAPHIC SCALE (FEET)

NORTH ACCESS TUNNEL
WEST 33RD. STREET TO WEST 38TH. STREET

SUBSURFACE INFORMATION

FIGURE 1

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **PE-23**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME 55 (High Rail)**

LOCATION: **LIRR-Trk 26-11th Ave (40'E)**
COORD. **N: 214,249.0** **E: 983,592.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0 feet**
DATUM:
START DATE: **8/26/03** TIME: **11:30 am**
FINISH DATE: **9/9/03** TIME: **4:00 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
9/8/03	9:00 am	20.0	17.0	138.5

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
						0.0 - 6.0		Hand		Auger								Hand Augered Material: 0' to 1.1' - Concrete 1.1' to 1.5' - Asphalt 1.5' to 2' - Coarse Gravel 2' to 4' - Light brown m-f SAND, some Silt 4' to 6' - Brown/reddish m-f SAND
5			S	1	■	6.0 - 8.0	10	23	29	25	24							A. (top 14") Brown m-f SAND, little Silt, moist, dense (SP) B. (bottom 10") Brown/goldish m-f SAND, trace Silt, dense (Pyrite) (SP)
10			C	1	▤	10.0 - 12.6	31	31	100									White/reddish Granitic GNEISS (boulder)
			S	2	■	13.0 - 14.0	32	100/6"	-	-	12							Brown c-f SAND, little Silt, little m-f decomposed Pegmatite, moist, very dense
15			S	3	■	15.0 - 15.8	40	100/3"	-	-	5						16.0	White and brown m-f decomposed rock, some c-f Sand, little f- Gravel, very dense Roller bit refusal and begin coring at 16.'
20																		

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/22/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **PE-23**
SHEET NUMBER: **1** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME 55 (High Rail)**

LOCATION: **LIRR-Trk 26-11th Ave (40'E)**
COORD. **N: 214,249.0** **E: 983,592.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0 feet**
DATUM:
START DATE: **8/26/03** TIME: **11:30 am**
FINISH DATE: **9/9/03** TIME: **4:00 pm**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
9/8/03	9:00 am	20.0	17.0	138.5

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						Pink/light gray Granitic GNEISS, slightly weathered, sound, wide fracture spacing, very strong rock, m-f grained	II	R5	10	1.5	1	16.2
						-Scattered Garnets up to 3/8"			0	1.5	1	16.4
						-Foliation faint, dips 70°			10_{MB}	-	-	16.6
									10_{MB}	-	-	18
20		C-2 16.0 - 24.3	100	100	96	19.7' to 24.3' - Pink/light gray PEGMATITE, c-grained, slightly weathered, wide fracture spacing, strong, some iron staining 23' to 36.5'	II	R4	5_{MB}	-	-	20
									5_{MB}	-	-	20.6
									15	1.5	1.0	21.4
									20	1.5	1	21.5
									20	1.5	2.0	22.9
									0	2.0	2.0	23.3
25						24.3' to 25.3' - Pink/light gray PEGMATITE, unweathered to slightly weathered, sound, wide fracture spacing, very strong rock, c- grained	I/II	R5	20	1.0	1.0	24.3
						25.3' to 33.1' - Pink/light gray Granitic GNEISS, c-f grained, wide fracture spacing, unweathered, very strong, foliation dips 70°	I	R5	0_{MB}	-	-	25.25
		C-3a 24.3 - 33.1	106	100	100	-Pegmatite 1" wide at 29.7', 30.2', 30.7'			0_{MB}	-	-	27.7
30									20	1.5	1.0	30.1
									0_{MB}	-	-	30.9
									0_{MB}	-	-	32.6
		C-3b 33.1 - 33.9	10	100	100	C-3 continued - Gray/pink Granitic GNEISS, unweathered, strong rock - rock recovered from top of C-4 core run	I	R5	20_{MB}	-	-	33.1
							I	R5	0_{MB}	-	-	33.9
35		C-4 33.9 - 38.6	56	100	100	Gray/pink Granitic GNEISS, unweathered, very strong rock, medium to fine grained						
						-Faint banding dips 70-80°			0_{MB}	-	-	37.3
									0_{MB}	-	-	37.9
						Gray/pink Granitic GNEISS, slightly weathered, medium to fine grained, few brown Garnet aggregate present	II	R4	0_{MB}	-	-	38.6
40						Except: 41' to 47.7' - unweathered			5	1.5	1.0	39.2
									5	1.5	3.0	39.6

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-23**
SHEET NUMBER: **2** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
45		C-5 38.6 - 48.0	113	100	95	44.1' to 44.4', 45' to 45.4', and 46.1' to 46.4' - Pink PEGMATITE -46.1' to 46.4' contact with Gneiss near vertical -Drill locked up after first 0.6 ft, core stuck in barrel, pulled rock and continued drilling -Lost entire tub of drilling fluid, rig chatter when drilling continued -No rock wall contact at 39.2', 39.6', and 40.8' -Break along Quartz vein with sand particles at 40.5' -Frequent staining on joint walls 39' to 41' (yellow and red)	I	R4	20 0 0 30_{MB}	1.5 1.5 1.5 -	2 3.0 3.0 -	40.5 40.8 41 42.8
50		C-6 48.0 - 58.0	120	100	98	Light gray Granitic GNEISS, very strong rock, slightly weathered to unweathered, medium to fine grained, foliation dip 75-80° -Rock is light red Garnet rich or Hematite stained -51.4' to 51.7', 52.1' to 52.6', and 54.2' to 54.5' - m-grained Garnets constitute 10% of rock -57.1' to 58' - 1/8" wide bands of Garnet parallel to foliation, spaced approx. 2" apart -Lost entire tub of drilling fluid three times Note: Depth of 48' was measured using drill rods (tape was sticking to side of boring wall and could not be used)	II	R5	0 0 20 0 5 5 5 0_{MB} 30 5	1.5 1.5 1.5 1.5 1.5 1.5 1.5 - 1.5 1.5	3.0 2.0 2.0 2.0 1 2.0 2 - 3.0 3.0	47.7 47.8 48 49.7 50.4 50.6 51 51.1 51.8 53.1
55									10 10_{MB} 0_{MB} 10_{MB} 0_{MB}	1.5 - - - -	1.0 - - - -	55.1 55.8 55.9 56.4 56.6
60		C-7 58.0 - 66.5	102	100	99	Pink/gray Granitic GNEISS, slightly weathered, sound, wide fracture spacing, very strong rock, c-m grained -58.2' to 59.8' and 65.2' to 65.5' - Pink/white PEGMATITE, coarse to very coarse grained -Lost two tubs of water	II	R5	20 20_{MB} $-_{MB}$ 10 20 15 5 10_{MB} 0_{MB}	1.5 - - 1.5 1.5 1.5 1.5 - -	1.0 - - 1 1 1 1.0 - -	57.1 57.4 58 60.1 60.2 61.1 61.4 62 63.3
65									20_{MB}	-	-	65.2
70		C-8 66.5 - 70.2	44	100	100	Pink/gray Granitic GNEISS, unweathered, sound, wide fracture spacing, very strong rock, c-f grained, foliation dips 50-60° -Garnets up to 3/4" -Scattered Pegmatite 1" wide parallel to foliation -Stopped drilling at 70.2' due to need for new coring bit	I	R5	0 0 10 5_{MB} 5_{MB} 5_{MB}	1.0 1.0 1.0 - - -	1.0 1.0 1.0 - - -	66.5 66.6 66.8 67.2 68.9 69.5
75		C-9 70.2 - 80.4	122	100	100	Pink/gray Granitic GNEISS, slightly weathered to unweathered, sound, very wide fracture spacing, very strong rock, m-f grained, foliation dips 50° -White/pink Pegmatite, 1" to 2" wide, at 75.5', 76.1', 76.9', and 77.8' parallel to foliation -Quartz enriched 78.5' to 80.4' -Lost two tubs of water	I/II	R5	0_{MB} 0_{MB} 10_{MB}	- - -	- - -	70.2 71.3 72.3

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/22/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-23**
SHEET NUMBER: **3** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
									10	1.5	1.0	76.3
									0_{MB}	-	-	76.9
									0	1.5	1	77.7
80												
						Pink/light gray Granitic GNEISS, unweathered, sound, very wide fracture spacing, very strong rock, m-f grained, foliation dips 40-50	I	R5	0_{MB}	-	-	80.4
						-Scattered Garnets to 3/8"			0	1.5	1.0	80.5
						-Pink/white, m-c grained PEGMATITE from 80.4' to 80.9', 82.5' to 85.6', and 87.5' to 88'						
						-Loss of water			0_{MB}	-	-	83.9
85		C-10 80.4 - 89.8	113	100	100							
									0_{MB}	-	-	85.4
									40_{MB}	-	-	86.1
90						Light gray Granitic GNEISS, as above	I	R5	0_{MB}	-	-	89.8
						Except: 92' to 92.4' - Black SCHIST, foliation 40 degrees						
						-Contacts concordant with Gneiss foliation			0_{MB}	-	-	91.3
						-Pink/white PEGMATITE from 92.6' to 94', 95.5' to 96.2', 97.5' to 97.6', and 99' to 99.6'			30	1.5	3.0	92.1
									10_{MB}	-	-	92.8
									0_{MB}	-	-	93.5
95		C-11 89.8 - 99.9	121	100	100				0_{MB}	-	-	94.7
									20	1.5	1.0	96.6
									10_{MB}	-	-	96.9
									10_{MB}	-	-	97.9
									15	1.5	2.0	98.8
100									5_{MB}	-	-	99.6
						Pink/light gray Granitic GNEISS, unweathered, sound, very wide fracture spacing, very strong rock, c-f grained, foliation dips 50	I	R5	15_{MB}	-	-	99.9
						-Pink/white PEGMATITE from 101.8' to 102.1'. 102.8' to 103.1', and 104.2' to 104.3'			0_{MB}	-	-	100.1
									10_{MB}	-	-	100.7
		C-12 99.9 - 106.1	74	100	100				25_{MB}	-	-	101.9
									0_{MB}	-	-	102.9
105									0_{MB}	-	-	104.4
									0_{MB}	-	-	105.3
						Pink/gray Granitic GNEISS, unweathered, sound, wide fracture spacing, very strong rock, m-f grained	I	R5	5_{MB}	-	-	106.1
		C-13 106.1 - 109.2	37	100	100	Except: 107' to 108.5' - Black SCHIST, foliation 50 degrees, contacts contorted						
						-Rig blocked up			30_{MB}	-	-	108.6
						-Bit shoe broke off	I	R5	0_{MB}	-	-	108.7
110						Pink/gray Granitic GNEISS, unweathered, sound, very wide fracture spacing, very strong rock, m-f			0_{MB}	-	-	109.1
									0_{MB}	-	-	109.2

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-23**
SHEET NUMBER: **4** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-14 109.2 - 114.7	66	100	100	grained, foliation dips 40-60° (faint banding)			30_{MB}	-	-	109.6
						Except:			20	1.5	1.0	110.5
						111' to 111.3' - Pink/gray PEGMATITE						
						-Roller bit before coring this run due to problem with bit in previous run			25_{MB}	-	-	112.8
									20_{MB}	-	-	114.2
115						114.7' to 121.6' - Pink/gray Granitic GNEISS, unweathered, sound, very wide fracture spacing, very strong rock, m-f grained, foliation dips 60-70°	I	R5	25_{MB}	-	-	114.7
						-1/8" thick Mica seam dipping 70° at 120.7'			15_{MB}	-	-	116.5
						-30° fracture at 122.6' cuts across foliation						
		C-15 114.7 - 124.0	112	100	100				0	1.5	2.0	118.3
120									0_{MB}	-	-	119
						121.6' to 124' - Dark gray to black, Biotite-amphibole SCHIST, slightly weathered, wide fracture spacing, strong rock, c-f grained, wavy foliation dips 60°	II	R4	0	1.5	4	121.6
									30	1.5	4.0	122.6
						-Friable at upper contact with Gneiss						
						Dark gray to black Biotite-amphibole SCHIST, slightly weathered, sound, wide to moderate fracture spacing, medium strong to strong, foliation is wavy (crenulated in places) and dips 60-80°	I	R3/R4	15	1.5	1.0	124
125									20	1.5	4.0	124.6
						-Irregular xenoliths of light gray Gneiss and pink Pegmatite, 2" to 6" across, with healed contacts, some parallel to schistosity			10_{MB}	-	-	126.5
									30	1.5	3.0	127.7
		C-16 124.0 - 134.1	121	100	93	128.5' to 134.1' - Light gray Granitic GNEISS, slightly weathered, sound, close to wide fracture spacing, strong to very strong rock, f-c grained, faint banding dips 60°	Ii	R4/R5	20_{MB}	-	-	128.9
130									25	1.5	1.0	129.4
									0	1.5	1.0	129.9
						-Near vertical Mica seam, 1/2" wide, 130.5' to 131.2'						
						-Mica-chlorite seam, approx. 1/2" wide, at 133.1', dips 70°			25_{MB}	-	-	131.3
									10_{MB}	-	-	131.8
						-Broken up rock from 133.7' to 134', angular fragments, extremely close fracture spacing			20	1.5	2	132.8
									60	1.5	4.0	133.1
						Pink/gray Granitic GNEISS, slightly weathered, sound, moderate to wide fracture spacing, very strong rock, c- grained	II	R5	70-30	1.0	1.0	133.7
135									60	4	1	134
		C-17 134.1 - 138.5	53	100	68	-2 long vertical fractures: (1) 136.5' to 137' (2) 137.2' to 138'			$40\text{-}30_{MB}$	-	-	134.1
									25	1.5	1.0	135.8
						-5" wide band of pink Pegmatite 134.3' to 134.7'	II	R4	20	1.5	1.0	136.2
						-1/8" wide band of Garnet, dipping 60° from 135.8' to 136.5'			80	1.5	1	136.7
									25_{MB}	-	-	137
		C-18 138.5 - 140.6	25	100	100	136.7' to 138.5' - White/gray/pink PEGMATITE, coarse to very coarse grained, moderate to extremely close fracture spacing, slightly weathered, strong, Quartz rich	III	R3	80	1.5	1	137.6
140									20	1.5	1.0	138.5
									80	1.5	1.0	138.6
									20	1.5	1.0	138.7
							II	R5	5	1.5	1.0	139
						Pink/gray PEGMATITE, moderately weathered, close fracture spacing, medium strong rock, c- grained			25	1.5	1.0	139.6
		C-19 140.6 - 145.2	55	100	96				25_{MB}	-	-	140.4
									25_{MB}	-	-	140.6
						Pink/gray PEGMATITE, slightly weathered, moderate fracture spacing, strong rock, c- grained			20	1.5	1.0	140.9
									15_{MB}	-	-	141.3
						Except: 143.7' to 144.9' - Light gray Granitic			10_{MB}	-	-	141.5
145						GNEISS, m-f grained			10_{MB}	-	-	141.7
									15	1.5	1.0	141.9

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-23**
SHEET NUMBER: **5** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						-Mica seam at 142.3'			20	1.5	2.0	142.1
						-144.9' to 145.2' - Concrete with piece of tie rod			0	1.5	1	142.2
						E.O.B. at 145.2'.			10_{MB}	-	-	142.8
									0_{MB}	-	-	143.4
									35	1.5	1.0	144.3
									5	1.5	2	144.9
150												
155												
160												
165												
170												
175												
180												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/22/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **PE-24**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME 55 (High Rail)**

LOCATION: **LIRR-Trk 11-11th Ave(45'W)**
COORD. **N: 214,120.0** **E: 983,309.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0 feet**
DATUM:
START DATE: **8/18/03** TIME: **9:00 am**
FINISH DATE: **8/26/03** TIME: **10:30 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S	U	P	G	C
I.D.	4"	1.375"	2.938"	2.938"		2"
O.D.	4.5"	2"	3"	3"		3"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		(2.938")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/21/03	8:30 am	5.0	27.5	74.5
8/25/03	9:00 am	5.0	27.5	165.2

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
						0.0 - 6.0		Hand		Auger								Hand Augered Material: 0 to 1.1' - Concrete 1.1' to 1.5' - Asphalt 1.5' to 2' - Coarse Gravel 2' to 4' - Light brown m-f SAND, trace Silt 4' to 6' - Brown m-f SAND, trace Silt, moist
5			S	1		6.0 - 8.0	11	10	4	4	18							Brown/dark gray c-f SAND, some Silt, little m-f Gravel, m-dense (SM)
10			S	2		10.0 - 12.0	2	1	2	2	9							Dark gray c-f SAND, trace f-Gravel, trace Silt, moist, loose (plant debris)
15			S	3		15.0 - 17.0	4	5	3	3	14							Black Organic CLAY and SILT, trace SAND, stiff (OH).
20			S	4		20.0 - 22.0	2	11	11	19	15							A. (top 8") Black m-f SAND, some Clayey Silt, dense, moist B. (bottom 7") Brown m-f SAND, trace Silt, dry, m-dense

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/22/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG
(continued)

BORING NUMBER: **PE-24**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S	5		25.0 - 25.0	100/0"	-	-	-		26.0 No recovery
												Roller bit refusal and begin coring at 26'.

30
35
40
45
50
55

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/22/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **PE-24**
SHEET NUMBER: **1** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **CME 55 (High Rail)**

LOCATION: **LIRR-Trk 11-11th Ave(45'W)**
COORD. **N: 214,120.0** **E: 983,309.0**
STN. NO.: OFFSET:
SURFACE ELEV.: **108.0 feet**
DATUM:
START DATE: **8/18/03** TIME: **9:00 am**
FINISH DATE: **8/26/03** TIME: **10:30 am**

CORE BARREL DATA:
TYPE: NX
CORE SIZE: 2"
O.D.: 3"
I.D.: 2"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/21/03	8:30 am	5.0	27.5	74.5
8/25/03	9:00 am	5.0	27.5	165.2

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
30		C-1 26.0 - 35.3	112	100	100	Dark gray to black Biotite/Amphibole/Quartz SCHIST, slightly weathered, sound, moderate to wide fracture spacing, strong rock, c-f grained Except: 26.8' to 27.4' and 29.5' to 30.8' - White Muscovite PEGMATITE, m-c grained -Abundant Garnets (1/8" to 3/8") -Foliation 50 to 65 degrees -27.5' - Yellow stain on joint wall -31.4' - Red stain on joint wall	II	R4	40	1.5	1.0	26.5
									*60	1.5	4.0	26.8
									*40	3.0	2.0	27.5
									*50	1.5	4.0	27.9
									*60	1.5	1.0	28.4
									0_{MB}	-	-	28.7
									55_{MB}	-	-	30
									50_{MB}	-	-	30.7
									*55	1.5	4.0	31.2
									0	1.5	1.0	31.4
									15_{MB}	-	-	32
									$*40_{MB}$	-	-	33
									$*45_{MB}$	1.5	1.0	33.4
35									40	1.5	4.0	34
									*50	1.5	1.0	34.7
		C-2 35.3 - 44.9	115	100	98	Dark gray to black Biotite/Amphibole SCHIST, slightly weathered, sound, wide to moderate fracture spacing, strong rock, c-f grained -Abundant Garnets (1/8" to 3/8") constituting up to 5% of rock core -Wavy foliation, dipping 60-90 -44' - Yellow joint stained -Rock breaks easily along foliation in Amphibole rich zones	II	R4	*60	1.5	4.0	35.3
									60_{MB}	-	-	35.9
									*55	1.5	4.0	37.5
									*55	1.5	4.0	37.9
									45	1.5	2.0	38.3
40									35	1.5	2.0	40.1
									30	1.5	1.0	40.9
									40	1.5	1.0	41.9
									5	1.5	1.0	43.8
45									0	1.5	1.0	43.9
						Dark gray to black SCHIST, slightly weathered, sound, wide to very wide fracture spacing, strong rock, c-f grained -Abundant Garnets (1/8" to 3/8") above 49.8', no Garnets below 49.8' -Wavy foliation from 44.9' to 49.8' , near vertical -49.8' to 53' - 60 degree foliation, planar Except: 51.5' to 52.4' and 53' to 54.4' - Light gray Granitic GNEISS, faint banding dips 70, f-c grained	II	R4	15	1.5	1.0	44
									$0\text{-}40_{MB}$	-	-	44.4
									$0\text{-}40_{MB}$	-	-	44.9
									30_{MB}	-	-	46.5
									20	1.5	2.0	48.6
50		C-3 44.9 - 55.1	122	100	96				$*45_{MB}$	-	-	49.8
									20_{MB}	-	-	50.2

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-24**
SHEET NUMBER: **2** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
									0	1.5	2.0	50.5
									*55	1.0	4.0	50.9
									$*40_{MB}$	-	-	52.7
									50_{MB}	-	-	53.4
									45	1.5	4.0	53.6
55									0	1.5	1.0	53.8
						55.1' to 56.5' - Dark gray SCHIST, slightly weathered, sound, wide to moderate fracture spacing, strong rock, c-f grained, foliation dips 50°	II	R4	*50	1.0	4.0	54.3
									10_{MB}	-	-	54.4
						56.5' to 64.7' - Light gray to pink Granitic GNEISS, slightly weathered to unweathered, wide fracture spacing, strong to very strong rock, m-f grained	I/II	R4/R5	50	1.5	1.0	55.1
									40	1.5	1.0	55.6
									25	1.5	2.0	55.8
									*55	1.5	2.0	56.4
						-Faint Gneissic banding dips 70-80°			35	1.5	3.0	56.5
60		C-4 55.1 - 64.7	115	100	97	-Friable at 56.5' (Schist/Gneiss contact)			20	1.5	1.0	56.9
									15	1.5	2.0	57.1
									60	1.5	2.0	57.8
									30_{MB}	-	-	58.4
									10_{MB}	-	-	58.9
									10_{MB}	-	-	59.3
									20_{MB}	-	-	59.7
									10_{MB}	-	-	60.1
									50_{MB}	-	-	60.4
65						Light gray Granitic GNEISS, unweathered, sound, very wide fracture spacing, very strong rock, m-f grained, foliation dips 60-80°	I	R5	10_{MB}	-	-	60.9
									70	1.5	1.0	61.5
									15	1.5	1.0	61.9
						-1" wide PEGMATITE running throughout run			65	1.5	1.0	63.3
						Except: 73.6' to 74.5' - Dark gray to black Biotite/Amphibole SCHIST, foliation dips 60-90°, upper contact along foliation			20_{MB}	-	-	64.1
									0_{MB}	-	-	64.7
									10_{MB}	-	-	65.9
		C-5 64.7 - 74.5	118	100	97				55	1.5	3.0	67.8
70									10	1.5	2.0	68
									20	1.5	1.0	68.3
									0_{MB}	-	-	68.9
									20_{MB}	-	-	71.85
									20	1.5	1.0	71.9
									65	1.5	2.0	73
									20	1.5	2.0	73.5
75						Dark gray to black Biotite/Amphibole SCHIST, slightly weathered, sound, wide to very wide fracture spacing, strong rock, c-f grained	II	R4	20	1.5	2.0	73.6
									70	1.5	2.0	74
									30_{MB}	-	-	74.5
						-Wavy Foliation - 50 to 60 degrees			*50	1.5	2.0	74.8
						-Quartz veins, ductile folded, 1" wide at 79.7' to 80.5'			$*50_{MB}$	-	-	75.4
						-Rock breaks easily along foliation in Amphibole rich zone (75.5' to 77.2')			50	1.5	2.0	76.6
									25_{MB}	-	-	77.1
		C-6 74.5 - 84.5	120	100	98				30	1.5	2.0	78.2
80									*45	1.5	3.0	79.4
									25_{MB}	-	-	79.9
									*45	1.5	4.0	80.4
									35_{MB}	-	-	81.4
									40	1.0	1.0	83
									*45	1.5	1.0	83.4
85						Dark gray SCHIST, slightly weathered, c-f grained, foliation 60°	II	R4	30	1.5	2.0	83.9
									40	1.5	1.0	84.5
									0-45	1.5	1.0	84.8

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/22/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-24**
SHEET NUMBER: **3** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						87.4' to 90.6' - Light gray to pink Granitic GNEISS, f-m grained, foliation dips 60°			*60	1.0	4.0	85.2
									*60	1.0	4.0	85.3
									20	1.5	3.0	86.9
									25_{MB}	-	-	87.8
		C-7 84.5 - 94.3	118	100	90				30	1.5	1.0	88.4
									20	1.5	3.0	88.6
90									0	1.5	2.0	89.1
									10_{MB}	-	-	89.2
									25	1.5	2.0	89.9
									50	1.5	3.0	91
									*40	1.5	4.0	91.2
									*50	1.0	4.0	92.6
									45	1.0	4.0	92.7
									30	1.0	2.0	93.3
						Dark gray SCHIST, as above	I/II	R4	*45	1.5	2.0	93.6
95						94.5' - Light gray to pink Granitic GNEISS, unweathered to slightly weathered, sound, wide to close fracture spacing, strong rock, m-f grained, faint foliation dips 50°			0_{MB}	-	-	94.3
									25	1.5	1.0	94.9
									45	1.0	3.0	96.2
									40	1.5	3.0	96.3
						96.4' to 96.5', 99.1' to 99.2', and 102.4' to 102.8' - c-grained PEGMATITE			40	1.5	3.0	96.4
		C-8 94.3 - 103.6	112	100	95				50	1.5	1.0	96.6
									10_{MB}	-	-	97.2
100									20_{MB}	-	-	98.6
									10	1.0	1.0	98.8
									0_{MB}	-	-	99.1
									0	1.0	2.0	99.45
									45	1.5	2.0	100.7
									0_{MB}	-	-	101.5
									15	1.5	1.0	101.6
						103.6' to 106.9' - Light gray/pink Granitic GNEISS, unweathered to slightly weathered, sound, moderate to wide fracture spacing, strong to very strong rock, m- grained, foliation dips 50°	I/II	R4/R5	40-45_{MB}	-	-	102.1
									10_{MB}	-	-	103.5
105		C-9 103.6 - 107.7	49	100	94				60	1.5	1.0	103.6
									70	1.5	1.0	105.3
						-Pink Pegmatite, 1" wide, parallel to foliation at 103.9' and 106.8'			55	1.5	1.0	105.6
									10_{MB}	-	-	105.8
						-70° fracture at 105.3' cross cuts foliation	II	R2/R3	25	1.5	1.0	105.9
						106.9' to 107.7' - Dark gray to black SCHIST, slightly weathered, moderate fracture spacing, weak to medium strong rock, c-f grained	I	R4	10_{MB}	-	-	106.6
									*55	1.0	4.0	106.9
									*40	1.5	4.0	107.5
110						Dark gray to black SCHIST, unweathered, sound, wide fracture spacing, strong rock, c-f grained			0	1.5	3.0	107.7
									25_{MB}	-	-	110.1
		C-10 107.7 - 115.9	98	100	100	-Wavy Foliation 40 to 50 degrees			40	1.5	3.0	110.5
						-1/2" to 1" wide bands of white Quartz ptygmatically folded at 108.2', 112.3', 113', and 115.2'			30_{MB}	-	-	111.4
									40	1.5	1.0	112.6
									20	1.5	2.0	113.5
115												
						115.9' to 117.3' - Dark gray to black SCHIST, unweathered, sound, wide fracture spacing, strong rock, m-f grained, planar foliation dips 45°	I	R4	30	1.5	2.0	115.9
									10_{MB}	-	-	116.4
						117.3' to 125.5' - White/pink Granitic GNEISS, unweathered, sound, wide to very wide fracture spacing, strong to very strong rock, c-f grained	I	R4/R5	5	1.5	1.0	117.8
						Except:			10	1.5	1.0	119.2
120		C-11 115.9 -	115	100	100	121.1' to 121.9' and 123.2' to 125.5' - Pink/gray			10	1.5	2.0	120.4

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-24**
SHEET NUMBER: **4** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		125.5				PEGMATITE, coarse to very coarse grained, Quartz and Feldspar			20	1.5	1.0	120.7
									20	1.5	1.0	121
									20	1.5	1.0	122.8
									15	1.5	1.0	123
125												
									20	1.5	1.0	125
						125.5' to 127' - Dark gray to black SCHIST, slightly weathered, sound, moderate fracture spacing, strong rock, m-f grained, foliation dips 50°	II	R4	0	1.5	2.0	125.4
									40	1.5	4.0	125.5
						127' to 135.5' - Pink/light gray Granitic GNEISS, unweathered, sound, wide fracture spacing, strong to very strong rock, c-m grained, faint Gneissic banding dips 50°	I	R4/R5	10	1.5	1.0	126.1
									*50	1.5	4.0	127
									*45	1.5	4.0	127.9
130		C-12 125.5 - 135.5	120	100	100	Except: 128.4' to 129.5', 130.4' to 130.5', and 131.6' to 131.7' - Pink/gray PEGMATITE, coarse to very coarse grained			20_{MB}	-	-	130.1
									0	1.5	1.0	131.1
135												
									30_{MB}	-	-	134.8
						135.5' to 139' - Dark gray SCHIST, unweathered, sound, wide fracture spacing, strong rock, c-f grained, foliation dips 40°	I	R4	20	1.5	2.0	135.4
									20	1.5	1.0	135.5
									*45	1.5	1.0	136.2
						139' to 145.6' - Light pink to gray Granitic GNEISS, unweathered, sound, wide fracture spacing, very strong rock, m-f grained, faint foliation dips 40°	I	R5	40_{MB}	-	-	138.9
140		C-13 135.5 - 145.6	121	100	100	-Black Schist xenoliths 1" x 2" at 141.2' and 141.6'			50_{MB}	-	-	139.2
									15_{MB}	-	-	140.2
									15_{MB}	-	-	140.6
									10_{MB}	-	-	141
									0	1.5	1.0	141.1
									35	1.5	1.0	141.5
									20_{MB}	-	-	143.9
145												
									50_{MB}	-	-	145
						145.6' to 146' - Granitic GNEISS, as above	II	R2/R4	40_{MB}	-	-	145.6
						146' - Dark gray to black SCHIST, slightly weathered, moderate fracture spacing, weak to strong rock, c-f grained			30_{MB}	-	-	146
									$*50_{MB}$	-	-	146.7
		C-14 145.6 - 150.7	61	100	74	147.2' to 147.9' - White Quartz PEGMATITE, possible healed breccia			*50	1.5	1.0	148.1
									*50	1.5	4.0	149
150						148.2' to 149' - Light gray Granitic GNEISS	II	R2	*60	1.5	4.0	149.4
						149.5' to 150.7' - White PEGMATITE, slightly weathered, close fracture spacing, weak rock, c-f grained			*50	1.5	4.0	149.5
							II	R4	*50	1.5	1.0	149.8
						-150' - Yellow stained joint wall (Micaceous seams)			*50	1.5	3.0	150
		C-15 150.7 - 155.4	56	100	79	-150.2' - Red stained joint (Micaceous seams)			30	1.5	2.0	150.2
						-150.4' to 150.7' - Rock broken up			45	1.5	2.0	150.4
						-Rig jammed at 150.7'			*50	1.5	4.0	150.7
									*50	1.5	2.0	151.3
155						Dark gray to black SCHIST, slightly weathered, moderate fracture spacing, strong rock, c-f grained			35	1.5	1.0	151.4
						Foliation: planar to 153', wavy below 153' dipping	II	R4	*50	1.5	4.0	151.6

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-24**
SHEET NUMBER: **5** of **5**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **D. Keith**
INSPECTOR: **A. Zabala**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
160		C-16 155.4 - 165.2	118	100	99	40-70º -154.5' to 155.4' - Rock is black, Amphibole rich and friable along foliation -Slickensides at 152.2' -Extremely close fracturing 155' to 155.4' Dark gray SCHIST, slightly weathered, sound, moderate to wide fracture spacing, strong rock, c-f grained, wavy foliation 40 to 80 degrees Except: 159' to 160.8' - Pink/white PEGMATITE, mostly c- grained Quartz			*60 10_{MB} *65 30 45 50 60 50 30_{MB} 40_{MB} 20 40 0 0 5_{MB} 20_{MB} 65 30 0 40	0.5 - 1.5 1.5 1.5 1.5 1.5 1.5 - - 1.5 1.5 1.5 3.0 - - 1.5 1.5 1.5 1.5	4.0 - 4.0 1.0 4.0 4.0 2.0 4.0 - - 1.0 1.0 3.0 2.0 - - 4.0 2.0 2.0 4.0	152.2 153.1 153.5 154.1 154.4 154.6 155.1 155.4 156.3 156.7 158.1 159.3 160.8 160.9 161.2 161.5 162.4 162.6 162.8 165.2
165						E.O.B. at 165.2'.						
170												
175												
180												
185												
190												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/22/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **PE-25**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **G. Marney**
INSPECTOR: **R. Jeremic**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Acker ADII Truck Mounted**

LOCATION: **30th St. & 11th Ave (SE)**
COORD. **N: 213,651.8** **E: 983,250.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **115.1 feet**
DATUM:
START DATE: **7/22/03** TIME: **11:00 am**
FINISH DATE: **8/5/03** TIME: **3:00 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol		S ■	U ▯	P ▨	G ☒	C ▤
I.D.	4"	1.375"	2.938"	2.938"		
O.D.	4.5"	2"	3"	3"		5"
Length		24"	24"	24"		
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size			
Hammer Fall	24"	30"	I.D. (O.D.)			

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
7/29/03	7:30 am	18.0	34.0	137.2
7/30/03	7:15 am	16.1	34.0	150.0
7/31/03	7:30 am	16.0	34.0	150.0

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
						0.0 - 6.0		Hand		Auger								Hand Auger Material from 0' to 6'. 0' to 0.5', concrete sidewalk 0.5' to 3.0', brown cm SAND, some Gravel, little cobbles 3.0' to 6.0', cm SAND, some m-f Gravel, occasional large pieces of brick.
5			S	1	■	6.0 - 8.0	17	5	5	3	12							Light brown, m-f SAND, some Silt, trace c-f Gravel, medium dense (SM)
			S	2	■	8.0 - 10.0	4	3	9	14	11							Grayish brown, m-f SAND, little m-f Gravel, little Silt, medium dense (SM)
10			S	3	■	10.0 - 12.0	8	12	13	15	10							Reddish Brown, m-f SAND, some c-f Gravel, little Silt, medium dense (SM) -Rig chatters with Rollerbit (37/8-inch) -Wash is brown
15			S	4	■	15.0 - 17.0	7	3	1	1	1							Reddish Brown m-f GRAVEL, some c-f Sand, trace Silt, loose (GP) -Rig chatter with Rollerbit -Wash is brown
20			S	5	■	20.0 - 22.0	8	4	4	9	5							Grayish brown c-f SAND, little m-f Gravel, little Clayey Silt (SM) -Rig chatter with Rollerbit -Wash is grayish-brown

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG
(continued)

BORING NUMBER: **PE-25**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **G. Marney**
INSPECTOR: **R. Jeremic**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			S	6		25.0 - 27.0	2	3	3	4	18							Gray silty CLAY, little m-f Sand, stiff, occasional shell fragments, medium plasticity (CL)
																		-Smooth drilling -Wash is gray
30			S	7		30.0 - 30.5	100/6	-	-	-	5							Silver and gold c-f SAND, some Silt, very dense, decomposed Schist (SM)
																	33.5	Roller bit refusal and begin coring at 33.5'.
35																		
40																		
45																		
50																		
55																		

BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **PE-25**
SHEET NUMBER: **1** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **G. Marney**
INSPECTOR: **R. Jeremic**
DRILLING METHOD: **Diamond drilling with double core barrel**
RIG TYPE: **Acker ADII Truck Mounted**

LOCATION: **30th St. & 11th Ave (SE)**
COORD. **N: 213,651.8** **E: 983,250.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **115.1 feet**
DATUM:
START DATE: **7/22/03** TIME: **11:00 am**
FINISH DATE: **8/5/03** TIME: **3:00 pm**

CORE BARREL DATA:
TYPE: HQ
CORE SIZE: 2.5"
O.D.: 5"
I.D.:
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
7/29/03	7:30 am	18.0	34.0	137.2
7/30/03	7:15 am	16.1	34.0	150.0
7/31/03	7:30 am	16.0	34.0	150.0

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
35		C-1 33.5 - 38.3	58	100	95	Dark gray to dark green SCHIST, foliated 50° to 60°, slightly weathered to unweathered, sound, wide fracture spacing, strong, fine to medium grained -Occasional Garnets present (1/8" to 3/8") throughout the run -Weak, friable along schistosity	I/II	R4	*50 0-30 *50	1.5 1.5 1.5	2.0 2.0 2.0	35.2 35.9 36.2
40		C-2 38.3 - 48.0	116	100	87	Dark gray to green SCHIST, foliated 45° to 70°, slightly weathered, sound to moderate fracture spacing, strong, fine to coarse grained -Light gray Granite xenoliths at 39.4' to 36.6' and 43.2' -Close fracture spacing 43.4' to 44.0', friable -Breaks easily along schistosity -Possible slickensides at 44.0' -Abundant garnets throughout the run (1/8" to 3/8")	II	R2/R4	*60 40$_{MB}$ *45 *55$_{MB}$ *60 60 15 *60$_{MB}$ 40 *75 *45$_{MB}$ *60 0	1.5 - 1.5 1.5 1.5 1.5 1.5 - 1.5 0.5 - 1.5 1.5	1.0 - 1.0 1.0 1.0 4.0 2.0 - 2.0 2.0 - 4.0 2.0	38 38.3 39.3 40.5 41 41.2 42.5 43.2 43.4 44 44.4 45.4 46
45									*60	1.5	4.0	47.2
50		C-3 48.0 - 58.3	124	100	96	Dark gray SCHIST, foliated, slightly weathered, sound, moderate to wide fracture spacing, fine to coarse grained -Close fracture from 48.6' to 49.4' -Abundant garnets (1/16" to 3/8") throughout the run -Foliation dip angle: 48.0' to 49.8' - 50° to 55° 49.8' to 58.3' - wavy 75° to 90° -Foliation is ptygmatically folded in places with fold amplitudes up to 1/2" -Light green platy mineral on fracture surfaces at 48.6', 49', 49.4', and 54.9'	II	R4	35$_{MB}$ *50 55 *50 *55 -$_{MB}$ 5$_{MB}$ 0 0$_{MB}$ 50$_{MB}$ 0-10 25 30$_{MB}$	- 1.5 1.5 1.5 1.5 - - 1.5 - - 1.5 1.5 -	- 4.0 4.0 4.0 4.0 - - 1.0 - - 1.0 1.0 -	48 48.6 49 49.3 49.4 50.7 53 53.3 53.6 54.9 55.4 55.5 56.8
55												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-25**
SHEET NUMBER: **2** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **G. Marney**
INSPECTOR: **R. Jeremic**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
60		C-4 58.3 - 68.3	120	100	100	Dark gray SCHIST, wavy foliated, unweathered to slightly weathered, sound, wide fracture spacing, strong, fine to coarse grained -Garnets (1/8" to 3/8") present throughout the run -3/8" Garnets abundant -Quartz and Feldspar vein 67.8' to 68.3' -Schistosity dip 60-90°, crenulated with 1/4" amplitude -MB across foliation at 61.6', 63.2', and 64.5' 67.8' - 68.3' - Light gray PEGMATITE, c-m grained, contacts concordant with foliation	I/II	R4	30 MB *70 40 MB 0-20 MB 25 MB 70 MB 45 50	- 1.0 - - - - 1.5 1.5	- 4.0 - - - - 2.0 4.0	58.3 58.7 61.6 63.2 64.5 64.8 65.9 67.4
70		C-5 68.3 - 77.3	108	100	97	Dark gray SCHIST, foliated 50° to 60° (crenulated), slightly weathered, sound, moderate fracture spacing, strong, fine grained -Close fracture spacing from 74.3' to 74.5' -Numerous Garnets (1/8" to 3/8") present throughout the run -Soft Chlorite/light green talc on fractures at 69.5', 71.4', 74.3', 74.5', and 75.9'	II	R4	40 MB 30 *75 *55 *60 MB *10-55 MB *60 *60 *60 50 *55	- 1.5 1.5 1.5 - - 1.5 1.5 1.5 1.5 1.5	- 2.0 4.0 4.0 - - 4.0 4.0 2.0 1.0 4.0	68.3 69.4 69.5 71.4 71.6 72.4 73.1 74.3 74.5 74.9 75.9
80		C-6 77.3 - 87.2	119	100	100	Dark gray SCHIST, wavy foliated, unweathered, sound, wide fracture spacing, strong, fine to coarse grained, foliation dip 60-80° -Garnets present (1/8" to 3/8") -Ptygmatically folded Quartz veins (up to 1/2" thick) concordant with foliation -77.4' to 78.5' - Light gray Gneiss xenolith -Chlorite/talc on fracture surface at 81'	I	R4	0-10 MB *50 40 30 MB *65 45 MB 0-10 MB *60 MB 40 MB	- 1.5 1.5 - 1.5 - - - -	- 1.0 2.0 - 4.0 - - - -	76.9 77.3 78.4 80.3 81 82.2 83.1 84.3 85
90		C-7 87.2 - 89.2	24	100	100	87.2' to 87.8' - Gray SCHIST, same as C-6 87.8' to 89.8' - Light gray and white pure QUARTZ, unweathered, sound, extremely strong, very coarse grained 89.8' to 90.8' - Gray QUARTZ, unweathered, sound, extremely strong, very coarse grained 90.8' to 91.4' - Healed breccia-Quartz xenoliths with black Biotite/Amphibole matrix -Mica seam dipping 75° at 90.2'	I I I I	R4 R6 R6 R4	10 MB 20 0 MB 0 MB 75 *30	- 1.5 - - 1.5 1.5	- 2.0 - - 1.0 4.0	87.2 87.8 88.8 89.2 90.2 91.2
		C-8	96	100	100	91.4' to 97.2' - Gray SCHIST, wavy foliated,			40 MB 20	- 1.5	- 1.0	92 92.2

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-25**
SHEET NUMBER: **3** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **G. Marney**
INSPECTOR: **R. Jeremic**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		89.2 - 97.2				unweathered, sound, strong, wide fracture spacing, f-m grained, foliation dip 50-60			*55	1.5	1.0	93.2
95									50	1.5	1.0	94.9
						Dark gray SCHIST, wavy foliated (crenulated in places), unweathered, sound, wide fracture spacing, strong, fine to coarse grained, foliation dip 60-70	I	R4	40_{MB}	-	-	97.2
100						-Fine to medium grained below 101.5'						
						-Scattered Garnet crystals to 1/4"						
						-Ptygmatically folded Quartz veins up to 2" thick			20_{MB}	-	-	100.3
		C-9 97.2 - 107.2	120	100	100	-Orange iron staining at 103.4'						
						-Quartz & Feldspar inclusions from 103.8' to 104.3'			35_{MB}	-	-	101.5
									25_{MB}	-	-	102.2
									0-10	4.0	2.0	103.4
105												
									*55	1.5	4.0	106.2
						Dark gray SCHIST, wavy foliated, unweathered, sound, wide fracture spacing, strong, fine to medium grained, foliation dip 60-75	I	R4	20_{MB}	-	-	107.2
									$0\text{-}20_{MB}$	-	-	107.9
						-Fine to coarse grained below 116.8'						
110						-Scattered Garnets crystals up to 1/4"			*75	1.5	2.0	109.5
						-All MB cross cut foliation			35_{MB}	-	-	110.4
		C-10 107.2 - 117.2	120	100	100	-Quartz vein (1.5" thick) congruent to foliation from 117.4' to 118.3'						
									0_{MB}	-	-	112.1
115												
						Dark-gray SCHISTOSE GNEISS, unweathered, foliated 50° to 75°, sound, wide fracture spacing, strong, fine to coarse grained	I	R4	0_{MB}	-	-	117.1
									30_{MB}	-	-	117.2
						EXCEPT: Slightly weathered, sound, moderate fracture spacing from 125.0' to 127.3'						
120						-Quartz veins congruent to foliation @ 119.7' to 120.7', 121.8' to 123.6'			0_{MB}	-	-	120.1
									30	1.5	1.0	120.8
		C-11 117.2 - 127.3	121	100	100	-Clay coated joint walls @ 126.5'						
						-Chlorite coatings on some fracture surfaces			30	1.5	1.0	122.2
									*55	1.0	4.0	123.7
									*50	1.0	1.0	124.1
125							II	R4	*55	1.5	4.0	125
									*55	1.5	2.0	125.6
									45	1.5	4.0	126.5
						127.3' to 128.6' - Dark gray SCHIST, foliated 55 slightly weathered, strong, sound, wide fracture	II	R4	50_{MB}	-	-	127.3

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **PE-25**
SHEET NUMBER: **4** of **4**
PROJECT NUMBER:

PROJECT: **No 7 Subway line Extension**
LOCATION: **Manhattan**
CLIENT: **MTA**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **G. Marney**
INSPECTOR: **R. Jeremic**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-12 127.3 - 130.9	43	100	93	spacing, fine to coarse grained from 128.6' to 130.9' - Light gray speckled pink Granitic GNEISS, mostly Quartz, sound, very strong, m-f grained	I	R5	$*55_{MB}$	-	-	128.6
									40	1.5	1.0	129
130									50	1.5	1.0	129.2
									20	1.5	1.0	129.3
		C-13 130.9 - 132.2	16	100	100	-Mechanically broken from 129.0' to 129.2' (core stones)	I/II	R5/R6	0_{MB}	-	-	130.9
									35	1.5	2.0	131.3
						-Fractures at 129.2' and 129.3' - concentration of Muscovite and Epidote	II	R5	35	1.5	2.0	131.5
						128.6' to 132.2' - Gneissic banding dips 50-70°			40_{MB}	-	-	132
						130.9' to 132.2' - Light gray, speckled granitic GNEISS, slightly weathered to unweathered, slightly fractured, very strong, coarse to very coarse grained			40	1.5	2.0	132.2
									75	1.5	2.0	132.7
135												
						-Iron staining on joint wall at 131.5'			75	1.5	2.0	135.1
		C-14 132.2 - 141.8	115	100	86				40	1.5	2.0	136.4
						132.2' to 138.2' - Light gray, speckled Granitic GNEISS, slightly weathered, sound, very strong, m-f grained, foliation dips approx. 70°			45	1.5	2.0	136.5
									30	1.5	1.0	137.4
							II	R4/R3	90	1.5	2.0	137.8
						-Minor Pyroxene and Muscovite			*75	1.5	4.0	138
						-Quartz bands 135.2' to 135.3' and 136.75' to 136.8'			50	1.5	4.0	138.7
140						138.2' to 141.8' - Dark gray SCHIST, foliated 50° to 60°, slightly weathered, slightly to moderately fractured, close fracture spacing, strong to medium strong, fine to coarse grained			0	1.5	2.0	139.2
									45	1.5	4.0	139.4
									0-20	4.0	2.0	139.5
							II	R4	0-40	1.5	-	139.8
						-At upper contact of Schist with Gneiss, schistosity is contorted and irregular following contact			*50	1.5	4.0	140.4
									90	1.5	4.0	140.6
						-2" wide band of Gneiss dipping 60° at 139.2', concordant with schistosity			60	1.5	4.0	140.9
									30	1.5	2.0	141.2
145						-Chlorite and clay coated joint walls @ 138.0', 138.7' and 140.4'			*55	1.5	2.0	141.5
									30	1.5	2.0	141.6
		C-15 141.8 - 151.1	112	100	94	-No rock wall contact @ 132.2'	II	R5	0_{MB}	-	-	141.8
						-New bit used			65	1.5	2.0	142.2
						-Re-healed Joints @ 136.8' and 137.6' (Pegmatite)	II	R4	0-10	1.5	2.0	142.6
						-Very closely fractured 140.4' to 141.6'			30	1.5	2.0	142.7
						-Rehealed joint @ 142.2' (Schist) (incipient)			*50	1.5	1.0	143
						Dark gray SCHIST, wavy foliated 50° to 90°, slightly weathered, sound, moderate to wide fracture spacing, strong, fine to coarse grained			45-60	1.5	2.0	145.7
150									*70	1.5	4.0	145.9
									20_{MB}	-	-	146.5
						-Quartz &Feldspar vein congruent to foliation at 144.9' to 145.3'			0-20	1.5	1.0	147
									*55	1.5	4.0	147.4
						146.0' to 147.3' - Light gray to pink Granitic PEGMATITE, sound, very strong, coarse grained			0	1.5	2.0	147.7
									60	1.5	2.0	147.9
						-Loss of rock wall contact (mechanical) @ 147.7 & 149'			55	1.5	1.0	148.6
									55	1.5	4.0	148.7
155						-Re-drilled (drilling marks) at 149.0'			0_{MB}	-	-	149
						-Chlorite and clay coated joint walls @ 148.7'			60	1.5	4.0	149.1
						-Very closely spaced fractures 148.7' to 149.2', all with thin clay coatings			60	1.5	4.0	149.2
						E.O.B. at 151.1'.			*55	1.5	4.0	151.1
160												

NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06

THE PARTNERSHIP BORING LOG

BORING NUMBER: **PE-273**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **New York, New York**
CLIENT: **NJ Transit**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**
DRILLING METHOD: **Rotary Wash; Diamond Coring**
RIG TYPE: **CME-75, Truck-mounted, Automatic Safety Hammer**

LOCATION: **11th Ave at 30th St, NW corner**
COORD.: **N: 699,757.3 E: 629,565.0**
SURFACE ELEV.: **318.5 feet**
DATUM: **Horizontal: NJ State Plane Vertical: NYCT datum-200 ft**
START DATE: **4/15/08** TIME: **7:00 am**
FINISH DATE: **4/18/08** TIME: **11:00 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S	U	P	G	C
I.D.	4"	1.375"	2.938"	2.938"		1.875"
O.D.	4.5"	2"	3"	3"		3"
Length	60"	24"	24"	24"		120"
Hammer Wt.	300 lbs.	140 lbs.	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 0.5 0.5 - 6.0											Hand augered from 0.0' to 6.0'. 0-0.5': Asphalt 0.5-6.0': Brown, c-f SAND, trace m-f Gravel, trace Silt, brick & concrete pieces. (FILL)
5			S	2		6.0 - 8.0	7	7	5	2	12						Brown, c-f SAND, trace (+) m-f Gravel, trace Silt, concrete. (FILL)
			S	3		8.0 - 10.0	3	5	5	4	6						Brown, c-f SAND, little m-f Gravel, trace Silt. (FILL)
10			S	4		10.0 - 12.0	2	4	29	71	5						Black and white, c-f GRAVEL, some c-f Sand, trace Silt with mica. (GP)
15			S	5		15.0 - 17.0	2	2	6	3	8						Brown, SILT, some f Sand, trace c-f Gravel. (ML)

PARTNERSHIP BORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE LAND (FINAL) 11-07-08.GLB 11/11/08

BORING LOG
(continued)

THE PARTNERSHIP

BORING NUMBER: **PE-273**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	FIELD CLASSIFICATION AND REMARKS
			S	6		20.0 - 22.0	1	WOH	WOH	20	4						Red & gray, c-f SAND, some c-f Gravel, trace (+) Silt. (SP)
25			S	7		25.0 - 27.0	24	9	11	15	11						Red brown, c-f SAND, some m-f Gravel, trace Silt. (SP)
30			S	8		30.0 - 32.0	2	1	1	2	18						Dark gray, CLAY & SILT, trace f Sand with marine shells. (CL)
35			S	9		35.0 - 37.0	WOH	1	2	9	4						Dark gray, c-f GRAVEL, trace Silt . (GP) Note: Gravel is stuck in tip. Hard drilling at 39.0'.
40			S	10		40.0 - 40.3	100/3"				3						Dark gray, m-f SAND, little m-f Gravel, trace Silt with mica. (SM) (Decomposed Rock)
																	41.5' Roller-bit to 41.5' depth and start rock coring.

THE PARTNERSHIP CORING LOG

BORING NUMBER: **PE-273**
SHEET NUMBER: **1** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **New York, New York**
CLIENT: **NJ Transit**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**
DRILLING METHOD: **Rotary Wash; Diamond Coring**
RIG TYPE: **CME-75, Truck-mounted, Automatic Safety Hammer**

LOCATION: **11th Ave at 30th St, NW corner**
COORD.: **N: 699,757.3 E: 629,565.0**
SURFACE ELEV.:**318.5 feet**
DATUM: **Horizontal: NJ State Plane**
Vertical: NYCT datum-200 ft
START DATE: **4/15/08** TIME: **7:00 am**
FINISH DATE: **4/18/08** TIME: **11:00 am**

CORE BARREL DATA:	NOTES:
TYPE: Double Barrel, solid inner barrel with wireline	
CORE SIZE: NQ	
O.D.: 3"	
I.D.: 1.875"	
CASING SIZE: 4" (4.5")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA: ANGLE (deg)	Jr	Ja	DEPTH (feet)
45	4	C-1 41.5 - 46.6	61	100	70	C-1: 41.5-45.8': Dark gray SCHIST; f-c grains of biotite, quartz, muscovite, feldspar, and sparse garnet; close to moderate fracture spacing, except extremely close at 42.3-42.4'; slightly weathered; medium strong to strong; distinct wavy and crenulated schistosity dips 50-80 deg; orange iron staining on some fracture surfaces; no rock wall contact at horizontal fracture at 44.1'; 1/2-inch thick quartz-feldspar pegmatites; parallel to schistosity at 43.6', 44.4', and 44.6'.	II	R3/R4	*70	2.0	2.0	41.5
									30	2.0	2.0	42.3
									30	2.0	2.0	42.4
									*60	2.0	2.0	42.8
									*80	1.5	1.0	43.4
									*50	2.0	1.0	43.6
									0	1.0	6.0	44.1
									5	2.0	2.0	44.6
									*70	1.5	1.0	44.8
									15	3.0	2.0	45.4
						45.8-46.3': Medium gray GRANITE; medium grains of mostly quartz, with some muscovite and white feldspar; moderate fracture spacing; unweathered; strong; upper contact is parallel to foliation in schist.	I	R4	10	3.0	2.0	45.6
									*70	1.5	1.0	46.3
50	5	C-2 46.6 - 56.1	114	100	95	C-2: Dark gray SCHIST, with interlayered medium to light gray to light red GRANITE; alternating schist and granite bands are 1/4" to 8" thick; schist has f-c grains of biotite, quartz, muscovite, feldspar, and sparse garnet; granite has f-m grains of quartz, feldspar, and muscovite, with hematite at 53.8-54.3' and 55.7-56.1'; moderate to wide fracture spacing, except close at 55.6-56.1'; unweathered to slightly weathered; strong; schist has distinct planar schistosity dipping 50-70 deg; schist-granite contacts are intact and parallel to schistosity; pure QUARTZ at 55.5-55.6'; pink PEGMATITE at 51.0-51.1'.	I/II	R4	*70	1.5	1.0	47
									25	3.0	1.0	49.7
									*70	2.0	1.0	51.2
									*50	1.5	1.0	53.3
55									*50	1.0	1.0	54.6
									30	1.0	6.0	54.8
									30	3.0	1.0	55.5
						C-3: 56.1-61.0': Light red to light gray GRANITE	I	R4	*50	2.0	1.0	55.6

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-273**
SHEET NUMBER: **2** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						with interlayered dark gray SCHIST; alternating granite and schist bands are 1/4" to 10" thick; granite has f-m grains of quartz, feldspar, muscovite, and sparse garnet, with hematite at 56.1-59.0'; schist has f-c grains of biotite, quartz, muscovite, and feldspar; moderate to wide fracture spacing; unweathered; strong; distinct planar schistosity in schist dips 50-60 deg; granite-schist contacts are intact and parallel to schistosity.			20	1.0	6.0	56
									25	1.5	1.0	56.1
									0	MB	MB	59.4
60									20	2.0	2.0	60
	5	C-3 56.1 - 66.0	119	100	97	61.0-66.0': Dark gray SCHIST; f-c grains of biotite, quartz, muscovite, and feldspar; moderate fracture spacing; slightly weathered; strong; distinct wavy and crenulated schistosity dips 60-80 deg; no rock wall contact at 60 deg foliation fracture at 62.0', with smooth, polished surfaces and thin coating of brown clay; light gray granite intrusion along foliation at 63.3-63.8'; black, f-grained, and biotite-rich at 65.4-66.0'.	II	R4	*50	1.5	2.0	61.3
									60	1.0	6.0	62
									40	MB	MB	63.4
									10	MB	MB	64.4
65									*60	1.5	1.0	65
									60	1.0	1.0	65.6
						C-4: Dark to medium gray SCHIST; f-c grains of quartz, biotite, muscovite, feldspar, and scattered garnets, up to 1/8" across; close to wide fracture spacing, except extremely close at 70.6-71.0'; slightly weathered; strong; wavy to crenulated schistosity dips 60-80 deg; strike-slip slickensides on 70 deg foliation fracture at 70.9', with thin (<0.1") coating of brown clay; near-vertical cross foliation fracture at 70.0-70.8' has thin coating of gray clay; thin brown clay coating also on smooth 70 deg foliation fracture at 71.0'; calcite coatings on fractures at 72.4-74.3'; orange iron staining on fractures at 75.3-76.0'; white near-vertical hairline veins of calcite, partly weathered out, at 72.4-76.0'; medium gray GRANITE at 71.0-72.4', with medium grains of quartz, feldspar, and muscovite and faint near-vertical banding; upper and lower granite contacts are along smooth foliation fractures.	II	R4	*60	MB	MB	66
									5	2.0	1.0	66.5
									20	2.0	1.0	66.8
									35	2.0	1.0	67.3
70									80	1.5	4.0	70
									90	1.5	4.0	70.2
	5	C-4 66.0 - 76.0	118	98	86				85	1.5	4.0	70.8
									*70	0.5	4.0	70.9
									*70	1.0	4.0	71
									*60	2.0	1.0	72.4
									*60	1.0	1.0	73
75									90	3.0	2.0	74.3
									60	3.0	1.0	74.35

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-273**
SHEET NUMBER: **3** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
									10	3.0	2.0	74.4
									20	3.0	2.0	75.3
						C-5: Medium to dark gray SCHIST; f-m grains of biotite, muscovite, quartz, feldspar, calcite, and garnets up to 1/4" across; moderate to wide fracture spacing; slightly weathered; strong; crenulated schistosity dips 50-70 deg; enriched in biotite at 82.1-82.3'; pure QUARTZ at 80.6-80.8'; scattered hairline calcite veins parallel to foliation; all fractures are along foliation, most with thin (<(0.1") calcite coatings.	II	R4	80	1.5	1.0	76
									*60	1.5	1.0	78.4
									30	2.0	2.0	79.3
80												
									*50	1.5	2.0	80.5
	5	C-5 76.0 - 86.1	121	100	100				*50	MB	MB	80.8
									20	3.0	1.0	81.6
									*50	1.0	1.0	82.2
									*50	1.5	1.0	84.5
85												
									*50	2.0	2.0	85.3
									*70	2.0	1.0	85.7
						C-6: Medium to dark gray SCHIST; f-m grains of biotite, quartz, muscovite, feldspar, calcite, and scattered garnets, up to 1/4" across; rock is f-c grained below 90.7'; moderate fracture spacing; unweathered; strong; planar to crenulated schistosity dips 50-80 deg, becoming near-vertical below 93.6'; contorted quartz-feldspar band, 1/2" thick, at 89.2'; thin (<0.1") calcite coatings on most fractures; scattered hairline veins of white calcite parallel to schistosity; core sides are slightly bulging at 92.0-93.5'.	I	R4	30	2.0	1.0	86.9
									*60	1.0	1.0	88.6
90												
									*50	1.0	1.0	90.2
	5	C-6 86.1 - 96.1	120	100	100				10	3.0	1.0	91.9
									*60	1.5	2.0	93.6

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-273**
SHEET NUMBER: **4** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
95									15	MB	MB	95.1
									20	3.0	1.0	95.6
						C-7: Dark gray SCHIST; f-c grains of biotite, muscovite, quartz, feldspar, calcite, and many garnets, up to 1/4" across; moderate to wide fracture spacing, except close at 105.1-105.8'; unweathered; strong; crenulated schistosity dips 50-80 deg, near-vertical at 96.1-97.2'; thin (<0.1") calcite coatings on some foliation fractures; no rock wall contact at near-horizontal fractures at 100.9', with rough, unweathered fracture surfaces.	I	R4	50	MB	MB	96.1
									30	3.0	1.0	98.1
100									40	MB	MB	99.7
									*60	1.0	1.0	100.2
	5	C-7 96.1 - 105.8	116	100	95				10	1.0	6.0	100.9
									*60	1.5	1.0	103.6
105									0	2.0	1.0	104.7
									*60	1.5	1.0	105.1
									*50	2.0	1.0	105.4
						C-8: Dark to medium gray SCHIST; f-m grains of muscovite, biotite, quartz, feldspar, calcite, and scattered garnets, up to 1/4" across; close to moderate fracture spacing; unweathered; strong; planar to crenulated schistosity dips 50-70 deg; thin (0.1") calcite coatings on many fractures; medium gray, pure QUARTZ at 112.9-114.1'.	I	R4	40	2.0	1.0	105.8
									*60	1.0	1.0	107.2
									*60	2.0	1.0	107.7
									40	2.0	1.0	108.6
									*70	1.5	1.0	109.2
110									*70	2.0	1.0	109.3
									35	2.0	1.0	109.9
	5	C-8 105.8 - 115.4	115	100	93				*50	1.5	1.0	110.1
									15	3.0	1.0	111.3
									0	2.0	1.0	112.1

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-273**
SHEET NUMBER: **5** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
									*50	1.0	1.0	112.2
									*60	1.5	1.0	112.8
									10	3.0	1.0	114.1
115									*40	1.5	1.0	114.2
						C-9: 115.4-121.3' and 124.0-125.4': Medium to dark gray SCHIST; f--m grains of quartz, biotite, muscovite, feldspar, calcite, and sparse garnet; close to moderate fracture spacing, except two very close foliation fractures at 121.1-121.3'; unweathered; strong; indistinct schistosity is wavy to crenulated, dips 60-80 deg; calcite coatings on many fracture surfaces; QUARTZ band parallel to schistosity at 124.9-125.35'; core sides bulging at 119.5-120.4'.	I	R4	30	3.0	1.0	115.4
									40	2.0	1.0	116.1
									30	3.0	1.0	116.6
									0	MB	MB	117
									*70	1.5	1.0	117.3
									5	3.0	1.0	118.4
120	5	C-9 115.4 - 125.4	120	100	94	121.3-124.0': Light gray GRANITE; indistinct f-m grains of quartz, feldspar, and muscovite, with some pink orthoclase; moderate fracture spacing; unweathered; strong; faint near-vertical banding; near-vertical inclusion of dark gray schist at 122.5-123.0'.			*60	1.5	1.0	120.5
									*70	1.5	1.0	121.1
									*80	1.0	1.0	121.3
									90	2.0	1.0	122.5
									50	1.5	1.0	122.55
									*65	1.0	1.0	122.7
125												
						C-10: 125.4-132.4': Black and white pinstriped SCHIST; f-m grains of biotite, amphibole (?), quartz, feldspar, and calcite; close to moderate fracture spacing; slightly weathered; strong; distinct planar schistosity and wavy banding dip 70-90 deg; planar bands of white calcite and quartz parallel to schistosity are hairline to 1/2" thick; some contorted bands of quartz-feldspar; thin (<0.1") coating of gray clay on 80 deg foliation fracture at 128.4'; calcite on most fracture surfaces.	II	R4	40	2.0	1.0	125.4
									10	MB	MB	126.1
									50	2.0	1.0	126.5
									30	3.0	1.0	127
									20	3.0	2.0	127.5
									*80	1.5	4.0	128.4
									5	3.0	2.0	128.6
130						132.4-135.7': Light gray GRANITE; m grains of feldspar, quartz, muscovite, and sparse garnet; close to moderate fracture spacing, except extremely close at 135.0-135.6' (may be mechanical); unweathered; very strong; calcite on some fracture surfaces			30	3.0	2.0	129.7
	5	C-10 125.4 - 135.7	124	100	81	inclusion of dark gray schist at 133.1-133.4'.			30	3.0	1.0	130.3
									10	3.0	1.0	130.7

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-273**
SHEET NUMBER: **6** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
									*80	1.5	4.0	131.2
									10	3.0	1.0	131.3
							I	R5	5	2.0	2.0	131.4
									*90	2.0	2.0	131.6
									50	2.0	2.0	131.8
									80	1.5	2.0	132
									60	1.0	1.0	133.1
									40	2.0	1.0	133.9
									40	2.0	1.0	134.4
135									20	2.0	1.0	134.8
									30	2.0	1.0	135.1
									60	3.0	1.0	135.3
						C-11: 135.7-141.5': Light gray GRANITE; f-m grains of feldspar, quartz, muscovite, and garnet; close to moderate fracture spacing, except very close low-angle fractures at 139.5-139.9'; unweathered to slightly weathered; very strong; becoming f-grained below 139.9', with faint banding dipping 50 deg; slight iron stains on fracture surfaces at 139.5-139.7' and at lower contact at 141.5'; calcite on some fracture surfaces; black schist inclusion at 136.3-136.9'.	I/II	R5	90	3.0	1.0	135.5
									10	2.0	1.0	135.7
									50	2.0	1.0	135.8
									30	1.5	1.0	137.2
									10	1.5	1.0	137.6
									5	2.0	1.0	138.3
									10	1.5	1.0	139.5
140									5	1.5	1.0	139.6
									10	1.5	1.0	139.7
									15	2.0	1.0	139.9
	4	C-11 135.7 - 145.6	119	100	94	141.5-145.6': Black to dark gray SCHIST; f-m grains of biotite, quartz, feldspar, and muscovite; close to moderate fracture spacing; unweathered to slightly weathered; strong; planar schistosity dip 50 deg; calcite on all fracture surfaces; no rock wall contact and softened biotite on horizontal fracture at upper contact with granite; pure QUARTZ at 142.7-143.2'.			50	MB	MB	140.5
							I/II	R4	0	1.0	6.0	141.5
									*50	1.0	1.0	142.4
									*40	MB	MB	143.9
145									*50	1.5	1.0	144.6
									*50	MB	MB	144.9
						C-12: Medium to dark gray SCHIST; f-m grains of quartz, biotite, feldspar, muscovite, calcite, and scattered garnets, up to 1/8" across; moderate fracture spacing, except very close foliation fractures at 150.1-150.7'; unweathered; strong; planar schistosity dips 50-60 deg; calcite on most fracture surfaces; pure QUARTZ at 149.0-149.7' and 155.1-155.5', light gray APLITE at 149.8-149.9', 150.1-150.3', and 148.1-148.5, with some orange potassium feldspar.	I	R4	*50	1.0	1.0	145.7
									55	1.5	1.0	146.4
									*50	1.0	1.0	147.8
									*60	1.5	1.0	148.5
150									*40	1.0	1.0	149.8

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-273**
SHEET NUMBER: **7** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-12 145.6 - 155.6	120	100	94				*50	1.5	1.0	150.1
									*50	1.5	1.0	150.3
									*50	1.5	1.0	150.5
									*50	1.0	1.0	150.7
									*60	1.0	1.0	152.3
									0	3.0	1.0	152.9
									*60	1.0	1.0	154
155									*50	1.5	1.0	155.1
									45	2.0	1.0	155.2
						C-13: Medium to dark gray SCHIST; f-c grains of quartz, biotite, muscovite, feldspar, calcite, and scattered garnets, up to 1/4" across; moderate fracture spacing, except for two extremely close foliation fractures at 165.4-165.45'; unweathered; strong; planar to slightly crenulated schistosity dips 50-60 deg; most fractures are along schistosity; calcite on most fracture surfaces; irregular white granitic intrusions, 1" thick and near-vertical, at 160.0', 161.3', and 162.1'; 1/2" of adjacent schist is enriched in biotite.	I	R4	15	2.0	1.0	155.6
									30	2.0	1.0	157.5
									*70	1.0	1.0	159.1
160												
	5	C-13 155.6 - 165.6	120	100	97				*50	1.5	1.0	160.6
									*60	1.5	1.0	161.4
									*50	1.0	1.0	163.3
									*50	1.0	1.0	164.2
165												
						C-14: Medium gray SCHIST; f-m grains of muscovite, biotite, quartz, feldspar, and scattered garnets, up to 1/8" across; very close to moderate fracture spacing, except extremely close at 172.8-172.9' and 175.2-175.6'; slightly weathered; medium strong to strong; distinct wavy to planar schistosity dips 50-70 deg; clay and softened mica on fractures at 167.9', 172.9' and 173.1'.	II	R3/R4	*50	1.0	1.0	165.4
									*50	1.0	1.0	165.45
									*50	1.5	1.0	165.6
									*60	1.0	1.0	166.4
									*50	1.0	1.0	167
									*60	1.0	MB	167.05
									15	3.0	1.0	167.5
									*50	1.0	4.0	167.9
									*70	1.0	4.0	168.2

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-273**
SHEET NUMBER: **8** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
170		C-14 165.6 - 175.6	120	100	72	169.9-172.6': Rock is gneissic, with irregular bands of quartz and orange potassium-feldspar; core surfaces is pitted; no rock wall contact at 170.8'; hard, green epidote (?) on weathered fracture surfaces at 170.8' and 171.6'.			*70	1.5	1.0	169.1
									*60	1.5	4.0	169.3
									*50	1.0	1.0	169.5
									30	2.0	2.0	170.05
									15	3.0	1.0	170.2
									10	1.0	6.0	170.8
									15	3.0	1.0	171
									*60	2.0	2.0	171.5
									20	3.0	2.0	171.6
									*40	1.5	1.0	172
									*50	1.5	2.0	172.8
									80	2.0	4.0	172.9
									*50	1.5	1.0	173
									80	3.0	4.0	173.1
									10	3.0	1.0	173.4
175									0	MB	MB	174.6
									*50	1.5	1.0	175.2
						C-15: 175.6-181.6': Dark gray SCHIST; f-m grains of biotite, muscovite, quartz, feldspar, and garnet; close to moderate fracture spacing, except for 2 extremely close intersecting high-angle fractures at 179.8-180.0'; slightly weathered; strong; planar to crenulated schistosity dips 50-70 deg; high angle cross-foliation fractures at 178.9-179.8 have orange and red iron staining, softened mica, and sandy clay coatings; softened mica on some foliation fractures; calcite on fracture surfaces at 176.8-178.1'.	II	R4	*50	1.0	1.0	175.3
									*50	1.5	1.0	175.35
									*40	2.0	1.0	175.5
									*50	1.5	1.0	175.6
									20	3.0	2.0	175.7
									*50	1.5	1.0	176.8
180		C-15 175.6 - 185.3	116	100	89	181.6-183.4': Light gray GRANITE; f-c grains of white and pink feldspar, quartz, and muscovite; moderate fracture spacing; unweathered; very strong; healed hairline fracture dips 70 deg.			*30	1.0	1.0	177.9
									*60	1.0	1.0	178.3
									25	3.0	2.0	178.6
									90	2.0	4.0	178.9
									40	3.0	1.0	179.2
									80	2.0	4.0	179.8
									*70	1.5	1.0	180
									60	2.0	4.0	180.3
									15	3.0	2.0	180.9
						183.4-185.3': Medium gray, pure QUARTZ; close to moderate fracture spacing; unweathered; very strong; few small (<0.1") inclusions of white feldspar.	II	R5	20	2.0	1.0	181.6
							I	R5				
									20	1.5	1.0	183.8
									20	3.0	1.0	184.6
185									10	1.5	1.0	185.1
						C-16: 185.3-185.5': Medium gray QUARTZ, as above.	II	R4	40	3.0	1.0	185.3
									*40	3.0	2.0	185.6
						185.5-188.0': Light gray GRANITE; f-c grains of feldspar, quartz, and muscovite; close to moderate fracture spacing; slightly weathered; strong; coarse			80	2.0	1.0	185.9
									30	1.5	1.0	186
									90	3.0	2.0	186.5
									70	3.0	1.0	186.9

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-273**
SHEET NUMBER: **9** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NW corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **R. Sidorski/M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						grained at 186.1-187.4', with muscovite seams dipping 30 deg spaced 1/8" to 1/2" apart; vertical fracture at 186.5' has rough, orange iron-stained surface.	I/II	R4	*60	1.5	1.0	188
									*50	1.0	1.0	188.7
									*45	1.5	1.0	189
190		C-16 185.3 - 195.2	119	100	82	188.0-195.2': Dark gray SCHIST; f-m grains of biotite, muscovite, quartz, feldspar, calcite, and sparse garnet; close to moderate fracture spacing, except very close at 194.6-195.2'; unweathered to slightly weathered; strong; planar to wavy schistosity dips 50-60 deg; most fractures along foliation, many with calcite on surface; light gray granitic intrusions at 189.5-190.0', 190.5-190.8', 191.2-191.5', and 192.3-192.9'; schistosity is contorted around granite contacts.			50	3.0	1.0	189.8
									*60	1.0	2.0	191.7
									*60	1.0	1.0	192.4
									*50	1.0	1.0	193.5
									*50	1.0	1.0	194.2
195									*50	1.0	1.0	194.6
									30	3.0	1.0	194.7
						End of Boring at 195.2'			40	3.0	1.0	195
									40	2.0	1.0	195.2
200												
205												

THE PARTNERSHIP BORING LOG

BORING NUMBER: **PE-274**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **New York, New York**
CLIENT: **NJ Transit**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**
DRILLING METHOD: **Rotary Wash; Diamond Coring**
RIG TYPE: **CME-75, Truck-mounted, Automatic Safety Hammer**

LOCATION: **11th Ave at 30th St, NE corner**
COORD.: **N: 699,717.1 E: 629,641.9**
SURFACE ELEV.: **318.6 feet**
DATUM: **Horizontal: NJ State Plane Vertical: NYCT datum-200 ft**
START DATE: **4/15/08** TIME: **10:00 am**
FINISH DATE: **4/24/08** TIME: **11:30 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S	U	P	G	C
I.D.	4"	1.375"	2.938"	2.938"		1.875"
O.D.	4.5"	2"	3"	3"		3"
Length	60"	24"	24"	24"		120"
Hammer Wt.	300 lbs.	140 lbs.	Drill Rod Size		NWJ	
Hammer Fall	24"	30"	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
4/22/08	7:00 am	19.5	35.0	115.1
4/24/08	7:00 am	19.0	35.0	166.1

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	FIELD CLASSIFICATION AND REMARKS
						0.0 - 6.0											Hand-augered from 0.0' to 6.0'. 0-0.5': Concrete 0.5-6.0': Brown, c-f SAND, little c-f Gravel, little Silt, occasional black pebble. (FILL)
5			S	1		6.0 - 8.0	3	3	4	4	3						Black brown, c-f SAND, little m-f Gravel, little (-) organic silt. (FILL)
			S	2		8.0 - 10.0	7	9	14	12	4						Black brown, c-f SAND, little m-f Gravel, little (-) organic silt, with brick fragments. (FILL)
10			S	3		10.0 - 12.0	9	13	16	17	4						Dark brown, c-f SAND, and c-f Gravel, little Silt, with brick fragments. (FILL)
15			S	4		15.0 - 17.0	3	3	3	3	6						Gray brown, c-f SAND, and Silt, trace (+) m-f Gravel, micaceous. (SM)

BORING LOG
(continued)

THE PARTNERSHIP

BORING NUMBER: **PE-274**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	FIELD CLASSIFICATION AND REMARKS
			S	5		20.0 - 22.0	4	29	16	22	6						Gray, c-f SAND, some (+) m-f Gravel, some Silt, micaceous. (SM)
25			S	6		25.0 - 27.0	14	10	6	8	6						Gray brown, c-f SAND, some (+) c-f Gravel, trace (+) Silt, wet. (SP)
30			S	7		30.0 - 32.0	5	4	6	8	22						Gray, SILT & CLAY, trace (+) f Sand. (ML)
35			S	8		35.0 - 35.3	100/4"				4						35.9' Gray, c-f SAND, trace Silt . (Decomposed Schist)
																	Note: Start rock coring at 35.9' depth.
40																	

Boring No. **PE-274** Sheet **2** of **2**

THE PARTNERSHIP CORING LOG

BORING NUMBER: **PE-274**
SHEET NUMBER: **1** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **New York, New York**
CLIENT: **NJ Transit**
CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**
DRILLING METHOD: **Rotary Wash; Diamond Coring**
RIG TYPE: **CME-75, Truck-mounted, Automatic Safety Hammer**

LOCATION: **11th Ave at 30th St, NE corner**
COORD.: **N: 699,717.1 E: 629,641.9**
SURFACE ELEV.:**318.6 feet**
DATUM: **Horizontal: NJ State Plane Vertical: NYCT datum-200 ft**
START DATE: **4/15/08** TIME: **10:00 am**
FINISH DATE: **4/24/08** TIME: **11:30 am**

CORE BARREL DATA:
TYPE: Double Barrel, solid inner barrel with wireline
CORE SIZE: NQ
O.D.: 3"
I.D.: 1.875"
CASING SIZE: 4" (4.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
4/22/08	7:00 am	19.5	35.0	115.1
4/24/08	7:00 am	19.0	35.0	166.1

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
40	4	C-1 35.9 - 43.4	90	100	59	C-1, 35.9-37.6' and 38.5-40.7': Light gray to medium gray PEGMATITE; medium to coarse grains of quartz, white feldspar, muscovite, and biotite; close to moderate fracture spacing; slightly weathered; medium strong; irregular seams of mica throughout; orange iron-staining above 37.6'; schist inclusion at 36.8-37.0'. 37.6-38.5' and 40.7-43.5': Dark gray to brown SCHIST; fine to medium grains of biotite, muscovite, quartz, feldspar, and scattered garnets, up to 1/8" across; very close to moderate fracture spacing, except extremely close at 43.1-43.5'; slightly weathered, except moderately weathered at 41.8-42.5'; medium strong, except weak at 41.8-42.5'; distinct wavy to laminated schistosity dips 50-75 degrees; orange iron staining at 41.8-43.0', with thin (<0.1") coatings of softened mica and gray clay on fracture surfaces.	II	R3	*45	2.0	2.0	36.1
									70	3.0	2.0	36.5
									*20	1.5	2.0	36.7
									*60	1.5	1.0	37
									20	3.0	2.0	37.2
									*40	2.0	2.0	37.5
									*70	2.0	4.0	37.8
									*50	1.5	2.0	38.4
									*5	2.0	1.0	38.7
									*40	1.5	1.0	39.5
									15	2.0	1.0	40
									*60	MB	MB	40.7
									15	1.5	1.0	41
							III	R2	*50	1.0	4.0	41.8
									*60	1.0	4.0	41.9
							II	R3	*60	1.5	4.0	42.2
									*70	2.0	2.0	42.5
									30	2.0	2.0	42.55
45	4	C-2 43.5 - 45.3	21	100	57	C-2: 43.5-44.4': Tan to light gray PEGMATITE; coarse grains of quartz, white feldspar, and muscovite, with gray schist inclusions; close fracture spacing; slightly weathered; medium strong; orange iron staining throughout, with healed hairline fractures. 44.4-45.2': Dark gray SCHIST; fine to coarse grains of biotite, muscovite, quartz, feldspar, scattered garnets, up to 1/8" across; close fracture spacing; slightly weathered; medium strong; distinct wavy to crenulated schistosity dips 60-75 degrees. C-3: Dark gray to medium gray SCHIST; fine to coarse grains of muscovite, biotite, quartz, feldspar, and scattered garnets, up to 1/8" across; close to moderate fracture spacing; slightly weathered; medium strong to strong; distinct crenulated schistosity dips 50-80 degrees; medium gray to tan PEGMATITE; with muscovite seams, at 47.5-48.8'; no rock wall contact, with increased weathering at fractures at 48.7' and 48.8'; clay and softened mica	II	R3	*75	1.5	4.0	42.6
									5	3.0	2.0	42.9
									*60	2.0	1.0	43.2
									*60	1.5	1.0	43.5
							II	R3/R4	*60	2.0	2.0	43.8
									80	1.5	2.0	43.9
									50	2.0	2.0	44
									85	3.0	1.0	44.3
									*60	1.5	1.0	44.7
									85	3.0	1.0	45
									30	3.0	1.0	45.1
									45	3.0	1.0	45.2
									50	3.0	1.0	45.8
									*60	1.5	1.0	45.9
									30	2.0	2.0	47.2
									30	3.0	2.0	47.9
50	5	C-3 45.2 - 55.1	118	99	91				*50	1.5	2.0	48.3
									10	1.0	6.0	48.4
									10	3.0	3.0	48.5
									40	2.0	2.0	48.6

THE PARTNERSHIP **CORING LOG** (continued)

BORING NUMBER: **PE-274**
SHEET NUMBER: **2** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						on 50 degree fractures at 51.3' and 51.8'; quartz vein along schistosity at 50.1-50.2'.			0	MB	MB	48.7
									30	1.0	6.0	48.8
									*60	1.5	4.0	49.3
									*60	1.5	2.0	49.7
									*50	1.0	3.0	50.1
									50	2.0	4.0	51.3
									*60	1.5	4.0	51.8
									*60	2.0	1.0	53.8
55									*60	1.5	2.0	54.6
						C-4: Dark gray SCHIST; fine to coarse grains of biotite, muscovite, quartz, feldspar, and many garnets, up to 1/4" across; close to moderate fracture spacing; unweathered to slightly weathered; strong; crenulated to wavy schistosity dips 40-80 degrees; no rock wall contact at near horizontal fracture at 55.5'; softened mica along foliation fractures at 62.6' and 64.7'; ptygmatically folded bands of quartz-feldspar ~1/2" thick, at 60.1-60.5'; slightly bulging core sides throughout; pure QUARTZ at 57.7-58.2' and 62.6-64.6'; lower quartz has 1/8" seams of black mafic minerals and adjacent yellow metallic mineral (gold?).	I/II	R4	60	2.0	1.0	55.1
									*70	2.0	1.0	55.4
									10	1.0	6.0	55.5
									30	3.0	1.0	56.6
									15	2.0	2.0	57.8
									*40	1.0	2.0	58.2
									*60	1.5	1.0	58.8
60									*60	2.0	1.0	59.7
	5	C-4 55.1 - 65.1	120	100	97				*60	1.5	1.0	60.2
									*50	1.5	2.0	61.3
									*55	1.0	2.0	62.2
									20	3.0	1.0	62.3
									*50	1.0	4.0	62.6
									0	2.0	1.0	63.1
65									*50	1.0	4.0	64.7
						C-5: Dark gray SCHIST; fine to coarse grains of muscovite, biotite, quartz, feldspar, and scattered garnets, up to 1/8" across; close to moderate fracture spacing, except very close at 69.7-69.8' and 71.6-71.7'; unweathered to slightly weathered; strong; distinct crenulated to wavy schistosity dips 50-80 degrees; softened mica on foliation fractures at 69.7' and 69.8'; thin (<0.1") calcite coatings on foliation fractures at 73.1', 73.6' and 75.1'.	I/II	R4	0	3.0	2.0	65.1
									20	2.0	1.0	65.5
									20	1.0	6.0	65.6
									*60	2.0	1.0	66
									15	3.0	1.0	67.3
									20	3.0	2.0	67.9
									30	3.0	1.0	68.4

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-274**
SHEET NUMBER: **3** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
70	4	C-5 65.1 - 75.5	120	96	90				*60	1.5	4.0	69.7
									*60	1.5	4.0	69.8
									*50	1.5	2.0	70.8
									40	3.0	1.0	71.6
									40	3.0	2.0	71.7
									*60	1.5	2.0	73.1
75									*60	1.0	2.0	74.6
									*60	1.0	2.0	75.1
						C-6: Dark gray to medium gray SCHIST; fine to coarse grains of biotite, muscovite, quartz, feldspar, and scattered garnets, up to 1/4" across; moderate to wide fracture spacing; unweathered, except slightly weathered at 81.0-81.2'; strong; foliation defined by distinct crenulated schistosity and few 1/2" thick contorted bands of quartz-feldspar; orange iron staining at 81.0'; calcite coatings on all foliation fractures; core sides slightly bulging at 77.0-80.5'.	I/II	R4				
									*60	1.5	1.0	78
									*60	1.5	1.0	79
80	4	C-6 75.5 - 85.5	120	100	100				50	2.0	1.0	79.7
									60	MB	MB	80.5
									50	MB	MB	80.7
									30	3.0	2.0	81
									*50	2.0	1.0	83.5
85												
						C-7: Dark gray SCHIST; fine to coarse grains of biotite, muscovite, quartz, feldspar and many garnets, up to 1/4" across; moderate to wide fracture spacing, except very close at 91.7-92.0', 94.0- 94.2' and 94.8-95.6'; unweathered, except slightly weathered at 94.8-95.5'; strong; wavy to crenulated schistosity and scattered contorted quartz bands dip 60-75 degrees; thin (<0.1") calcite coatings on	I	R4	*60	2.0	2.0	85.5
									40	2.0	1.0	85.9
									50	3.0	1.0	87

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-274**
SHEET NUMBER: **4** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						foliation fractures at 89.0', 90.5', and 91.8'; no rock wall contact at weathered low-angle fracture at 95.2'.			*50	1.0	1.0	89
90	4	C-7 85.5 - 95.5	120	100	93				*55 0 *60	1.0 3.0 1.0	1.0 1.0 1.0	89.9 90 90.5
									*60	1.5	1.0	91.8
									*60	2.0	1.0	93.8
95							II	R4	*60 *70	2.0 1.5	1.0 2.0	94.8 95.1
						C-8: 95.5-99.1': Dark gray SCHIST; fine to medium grains of biotite, muscovite, quartz, feldspar; moderate to wide fracture spacing; unweathered; strong; wavy to crenulated schistosity dips 60-80 degrees; calcite coating on foliation fracture at 96.1'; pure QUARTZ at 98.8-99.0'.	I	R4	*70 10 *60 *80	2.0 1.0 2.0 2.0	1.0 6.0 2.0 1.0	95.15 95.2 95.5 96.1
						99.1-104.7': Medium gray to light gray GRANITE; fine to medium grains of feldspar, quartz, and muscovite; wide fracture spacing; unweathered, except slightly weathered at horizontal fractures at 101.6' and 101.9'; very strong; faint near vertical banding; trace QUARTZ at 101.6-101.9', with no contact at horizontal fractures at upper and lower contacts.			*60	1.5	2.0	98.4
100	4	C-8 95.5 - 104.7	110	100	96		I/II	R5	*60	1.5	1.0	99.1
									0 0	1.0 1.0	6.0 6.0	101.6 101.9
									15	MB	MB	103.9
105						C-9: 104.7-111.5': Light gray GRANITE; medium grains of feldspar, quartz, and muscovite; moderate to wide fracture spacing; unweathered, except slightly weathered at 40 degree fracture at 107.0'; strong to very strong; faint banding and thin (<0.1") muscovite seams at 107.8-109.6' are near vertical;	I/II	R4/R5	40	2.0	1.0	104.7

THE PARTNERSHIP **CORING LOG** (continued)

BORING NUMBER: **PE-274**
SHEET NUMBER: **5** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						pure QUARTZ at 107.0-107.5', 108.1-108.4', and 110.9-111.5';			40	3.0	2.0	107
	4	C-9 104.7 - 111.5	81	100	100	dark gray SCHIST inclusion at 110.2-110.9', with medium grains of biotite, other mafic minerals, muscovite, quartz, and feldspar; iron staining at horizontal fracture at 110.3'.			0	MB	MB	108.3
									*80	1.0	4.0	108.9
									20	MB	MB	109
110												
									0	3.0	2.0	110.3
									20	3.0	1.0	110.9
	4	C-10 111.5 - 115.5	48	100	100	C-10: 111.5-112.9': Medium gray QUARTZ, with biotite schist and feldspar pegmatite inclusions; moderate fracture spacing; unweathered; strong. 112.9-115.5': Dark gray to black SCHIST; fine to medium grains of biotite, muscovite, quartz, and feldspar; moderate fracture spacing, unweathered; strong; planar schistosity dips 60 degrees; all fractures have thin (<0.1") calcite coatings.	I	R4	*50	1.5	1.0	111.5
									*50	3.0	1.0	112.9
									*60	1.0	1.0	114
115									*50	1.5	1.0	114.7
						C-11: Dark gray SCHIST; fine to medium grains of biotite, muscovite, quartz, and feldspar; wide fracture spacing; unweathered, except slightly weathered at near vertical fracture at 122.0'; strong; faint wavy schistosity dips 60-90 degrees; orange iron staining on rough, near vertical cross-foliation fracture at 122.0'; contorted intrusions of light gray GRANITE at 116.5-117.0', 119.3-120.7' and 123.1-124.2'; schistosity parallels contorted contacts.	I/II	R4	*60	1.5	1.0	115.5
									30	MB	MB	117
120												
	4	C-11 115.5 - 125.3	117	100	100				20	2.0	1.0	120.6
									85	2.0	2.0	122
125												
									*60	1.5	1.0	124.6
						C-12: Dark gay to black SCHIST; fine to medium	I	R4	20	3.0	1.0	125.3

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-274**
SHEET NUMBER: **6** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						grains of biotite, muscovite, quartz, feldspar, and sparse garnets, up to 1/8" across; wide fracture spacing; unweathered; strong; faint, wavy schistosity dips 60-90 degrees; pure QUARTZ, with vertical contacts at 125.3-126.0'; light gray GRANITE, with near-vertical muscovite seams, with vertical contacts along schistosity at 126.5-129.0'.			*60	1.5	1.0	126.5
130	5	C-12 125.3 - 135.3	120	100	100				45	3.0	1.0	130.2
135									*80	2.0	2.0	134.6
						C-13: Dark gray SCHIST; fine to medium grains of biotite, muscovite, quartz, feldspar, and sparse medium grained garnet; close to moderate fracture spacing; unweathered to slightly weathered; strong; indistinct schistosity dips 60-90 degrees; contorted 1/2" band of quartz-feldspar at 142.4-142.6', parallel to schistosity; no rock wall contact and orange iron staining at low-angle fracture at 136.6'; thin (<0.1") calcite coating on foliation fracture at 142.8'; softened mica on smooth foliation fracture at 143.9'.	I/II	R4	0	2.0	1.0	135.3
									30	3.0	1.0	135.6
									20	1.0	6.0	136.6
									10	1.0	6.0	137.5
									40	MB	MB	138.9
140	4	C-13 135.3 - 145.4	121	100	93				30	3.0	1.0	139.9
									*50	2.0	1.0	141
									*60	2.0	1.0	142.8
									40	3.0	1.0	143.1
									*50	1.5	2.0	143.7
									*70	1.0	4.0	143.9

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-274**
SHEET NUMBER: **7** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
145									*60	1.0	1.0	144.2
									60	1.0	2.0	144.7
	6	C-14 145.4 - 146.9	17	94	22	C-14: 145.4-146.0': Light gray GRANITE; medium grains of quartz, feldspar, and muscovite; closely fractured; slightly weathered; strong; healed hairline fractures dip 70 degrees.	II/III	R2/R3	*40	1.5	1.0	145.3
									40	2.0	1.0	145.4
									*70	2.0	1.0	145.8
									*60	1.0	4.0	146.1
	6	C-15 146.9 - 150.4	35	83	60	146.0-146.9': Dark gray SCHIST; fine to medium grains of biotite and other mafic minerals, quartz, muscovite and feldspar; very close to extremely close fracture spacing; slightly weathered at 146.0-146.9'; moderately weathered at 146.2-146.9'; weak to medium strong; softened mica on foliation fractures below 146.0'; irregular, broken pieces are pitted and weathered.	III	R2/R3	*60	1.0	4.0	146.2
									10	3.0	2.0	146.3
									80	1.5	2.0	146.4
							II	R4	0	1.5	3.0	146.5
									*50	1.0	2.0	146.55
									75	1.5	2.0	146.6
									15	2.0	2.0	146.65
									10	3.0	2.0	146.7
150									*60	1.0	2.0	146.8
									20	2.0	2.0	147.6
	4	C-16 150.4 - 156.1	68	100	100	C-15: 146.9-147.8': Dark gray SCHIST; as above, except extremely close fracture spacing throughout; moderately weathered; some overdrilled pieces; recovery loss likely at 146.9-147.6'; 147.8-150.4': Dark gray SCHIST; fine to coarse grains of biotite, muscovite, quartz, feldspar; many garnets, up to 1/2" across; close to moderate fracture spacing; slightly weathered; strong; crenulated schistosity dips 60-80 degrees. C-16: Dark gray to medium gray SCHIST; fine to coarse grains of biotite, muscovite, quartz, feldspar, sparse calcite, and many garnets, up to 3/8" across; moderate fracture spacing; slightly weathered; strong; distinct crenulated schistosity dips 60-70 degrees; calcite coating on foliation fracture at 153.0'.	II	R4	75	2.0	2.0	147.65
									15	2.0	2.0	147.68
									*60	1.5	1.0	147.7
									10	2.0	2.0	147.72
									*70	2.0	4.0	148.1
									15	2.0	2.0	148.15
									20	3.0	2.0	149.9
									*60	1.5	1.0	150.1
									*70	2.0	4.0	150.4
									*65	MB	MB	151.4
									*65	1.5	1.0	151.7
155									*60	1.5	2.0	153
						C-17: 156.1-158.6': Dark to medium gray SCHIST; as above, except close fracture spacing and extremely close foliation fractures at 157.6-157.8'.	II	R4	30	3.0	1.0	156.1
									*60	1.5	1.0	156.8
						158.6-164.2': Black to dark green AMPHIBOLITE; fine to medium grains of hornblende, quartz, biotite, and sparse calcite; close to wide fracture spacing; unweathered to slightly weathered; very strong; faint schistosity and quartz bands dip ~ 50 degrees; biotite-rich at 160.2-160.7', where core sides are slightly bulging; calcite on most fracture surfaces; extremely dense.			20	3.0	2.0	157.4
									45	2.0	2.0	157.6
									*50	1.5	4.0	157.65
							I/II	R5	*60	1.5	1.0	157.8
									*50	1.0	2.0	158.2
									*30	1.5	1.0	158.7
160									40	1.5	1.0	159
									30	2.0	1.0	160
									*50	1.5	1.0	160.3
	4	C-17 156.1 - 166.1	120	100	91	164.2-166.1': Dark to medium gray SCHIST; fine to medium grains of biotite, muscovite, quartz, and feldspar; moderate fracture spacing; unweathered; strong; distinct crenulated schistosity dips 60 degrees.			20	2.0	1.0	160.7

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-274**
SHEET NUMBER: **8** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
							I	R4	0	2.0	1.0	164.2
165									*50	1.5	2.0	164.7
									*50	1.5	1.0	165.3
									*50	2.0	1.0	165.9
						C-18: 166.1-170.8': Dark gray SCHIST; as above; near vertical healed hairline fractures have orange, weathered calcite fillings.	I	R4	50	2.0	2.0	166.1
									*60	1.5	4.0	166.8
									*60	1.0	2.0	167.2
						170.8-172.0': Black and white pinstriped HORNBLENDE-BIOTITE-SCHIST; fine to medium grains of hornblende, biotite, quartz, and thin (<0.1" bands of calcite; moderate fracture spacing; unweathered; very strong; distinct planar schistosity and banding dip 60-70 degrees; very dense.			*70	1.5	2.0	168.2
170									20	MB	MB	169.8
	4	C-18 166.1 - 175.4	112	100	89	172.0 ft to 175.4 ft: Dark to medium gray SCHIST; fine to medium grains of biotite, muscovite, quartz, feldspar, and sparse garnets, up to 1/4" across; moderate fracture spacing; unweathered to slightly weathered; strong; wavy schistosity dips 70-80 degrees; calcite coatings on most fracture surfaces; pure, medium gray QUARTZ at 174.2-175.0', with yellow metallic flakes (pyrite ?) on fracture surface at 174.9'.	I	R5	*70	1.5	1.0	170.6
									*70	1.5	1.0	170.8
							I/II	R4				
									*70	2.0	2.0	172.7
									*50	2.0	1.0	174.1
									*40	1.5	1.0	174.3
175									5	3.0	1.0	174.9
									*70	2.0	1.0	175.2
						C-19, Dark gray SCHIST; fine to coarse grains of biotite, quartz, muscovite, feldspar, and medium grained garnet; close to moderate fracture spacing, except very close to extremely close at 175.7-179.1'; slightly weathered, except moderately weathered along fractures at 175.7-179.1'; strong, except weak to medium strong at 175.7-179.1'; foliation defined by distinct wavy schistosity and wavy bands and nodules of quartz; strike-slip slickensides on 80 degree foliation fracture at 177.1'; thick (>0.1") coatings of gray clay and calcite on all fractures at 177.1-179.1', most of which are along foliation. C-20: Dark to medium gray SCHIST; fine to medium grains of muscovite, biotite, quartz, feldspar, and calcite; close to moderate fracture spacing, except very close foliation fractures at 185.0-185.1'; slightly weathered; medium strong to strong; distinct planar schistosity dips 60-70 degrees; calcite coatings on	II	R4	*70	1.0	1.0	175.3
							III	R2/R3	20	4.0	1.0	175.4
									*50	4.0	4.0	176.3
	6	C-19 175.4 - 179.1	44	100	23				*70	1.0	2.0	176.8
									*80	0.5	4.0	177.1
									30	3.0	4.0	177.5
									*70	1.0	4.0	177.6
									*70	1.5	4.0	177.7
									*70	1.0	4.0	177.9
							II	R3/R4	*60	1.0	4.0	178
									*70	1.5	4.0	178.3
180									50	2.0	2.0	178.6
									*70	1.0	4.0	179
									*70	1.0	4.0	179.05
	5								30	2.0	3.0	179.1
									*70	1.0	4.0	179.9
									0	3.0	2.0	180.5

THE PARTNERSHIP CORING LOG (continued)

BORING NUMBER: **PE-274**
SHEET NUMBER: **9** of **9**
PROJECT NUMBER: **19499B**

PROJECT: **Trans-Hudson Express (THE) Project**
LOCATION: **11th Ave at 30th St, NE corner**
CLIENT: **NJ Transit**

CONTRACTOR: **Jersey Boring & Drilling**
DRILLER: **J. Kurzynowski**
INSPECTOR: **M. Tekin**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
	4	C-20 179.1 - 185.7	79	100	89	almost all fractures; silt coatings on horizontal fractures at 180.5' and 184.3'; pitted horizontal healed hairline fracture at 184.35'.			*70	1.0	2.0	180.7
									15	1.5	2.0	181
									20	MB	MB	182.8
									0	2.0	3.0	184.3
185									*70	1.0	4.0	185
									*70	2.0	4.0	185.1
						C-21: 185.7-186.4': Dark gray SCHIST, as above.	II	R3/R4	*60	1.0	2.0	185.5
									*60	1.0	1.0	185.7
						186.4-191.2': Light to medium gray GRANITE; fine to medium grains of quartz, feldspar, muscovite, and sparse medium grained garnet; moderate fracture spacing; unweathered; very strong; faint banding dips 50 degrees; quartz-feldspar PEGMATITE at 187.4 ft, 187.8 ft, 190.0-190.3', and 190.7-191.1';; dark gray schist at 188.1-188.6'.	I	R5	*60	1.0	1.0	185.8
									*60	1.0	4.0	185.9
									*50	1.0	1.0	186.4
									10	MB	MB	186.7
									*50	1.0	1.0	188.1
190						191.2-194.0': Dark to medium gray SCHIST; fine to medium grains of biotite, muscovite, quartz, and feldspar; wide fracture spacing; slightly weathered; strong; distinct planar schistosity dips 50 degrees.							
	5	C-21 185.7 - 195.8	121	100	94	194.1-195.8': Light gray GRANITE, as above except close to moderate fracture spacing; slightly weathered; strong; schist inclusion at 195.3-195.6'; very close horizontal fractures at 194.8-194.9' have orange iron staining and silt coatings.	II	R4	*50	1.0	1.0	191.4
									45	3.0	1.0	194.1
195									0	1.5	3.0	194.8
									5	1.5	3.0	194.9
									0	2.0	1.0	195.4
						End of Boring at 195.8'			10	2.0	1.0	195.5
									80	3.0	1.0	195.7
									15	2.0	1.0	195.8
200												

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG

BORING NUMBER: **SEG-3-1T**
SHEET NUMBER: **1** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION: **30th St., 11th Ave., New York, NY**
COORD. **N: 1,915,821.2 E: 14,802,907.7**
STN. NO.: OFFSET:
SURFACE ELEV.: **306.5 feet**
DATUM:
START DATE: **8/24/15** TIME: **1:00 pm**
FINISH DATE: **8/26/15** TIME: **2:30 pm**

	Casing	Split Spoon	Shelby Tube	Pitcher	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▯
I.D.	4"	1.375"	2.938"	"	"	2.155"
O.D.	4.5"	2"	3"	"	"	2.98"
Length	65	24"	30"	"	"	60"
Hammer Wt.	140 lb lbs	140 lbs	Drill Rod Size		NW	
Hammer Fall	30" in.	30 in.	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/26/2015	7:15:00 AM	10.9	65	70

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 6.0												Excavated top 6' soil to clear utilities. Mud at 3' to 4'.
5			S	1		6.0 - 8.0	2	1	1	1	8							S-1: Dark brown medium to fine SAND, trace medium to fine Gravel, very loose, moist-Fill.
			S	2		8.0 - 10.0	2	8	14	5	24							S-2: Brown coarse to fine SAND,some medium to fine Gravel, little Silt,medium dense, moist (SM)-Fill.
10			S	3		10.0 - 12.0	5	6	6	4	10							S-3: Brown medium to fine SAND, some medium to fine Gravel, trace Silt, medium dense, moist-Fill.
15			S	4		15.0 - 17.0	5	3	2	2	0							S-4: No Recovery.
20			S	5		20.0 - 22.0	6	3	5	8	9							S-5: Brown coarse to fine SAND, little medium to fine Gravel, little Silt, loose, wet (SM).

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG
(continued)

BORING NUMBER: **SEG-3-1T**
SHEET NUMBER: **2** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			S	6		25.0 - 27.0	5	11	10	7	0							S-6: No Recovery.
30			S	7		30.0 - 32.0	5	3	4	5	13							S-7: Brown coarse to fine SAND, little Silt, trace medium to fine Gravel, loose, wet (SM).
35			S	8		35.0 - 37.0	2	7	8	6	11							S-8A: 35' to 35.7': Same as above; S-8B: 35.7' to 37': Dark gray Clayey SILT, stiff, wet (ML).
40			S	9		40.0 - 42.0	8	4	3	4	0							S-9: No Recovery.
45			S	10		45.0 - 47.0	3	3	2	4	24							S-10: Gray Fat CLAY, trace fine Gravel, medium stiff, wet (CH).
50			S	11		50.0 - 52.0	3	2	2	2	11							S-11: Gray Fat CLAY, soft, wet (CH). Spoon is getting jammed and rods are getting jammed which hold back sampling efficiency.
55			S	12		55.0 - 57.0	2	2	3	2	2							S-12 Gray Fat CLAY and Organic CLAY, trace medium to fine Gravel, medium stiff, wet (CH-OH).

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

BORING LOG
(continued)

BORING NUMBER: **SEG-3-1T**
SHEET NUMBER: **3** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S	13		60.0 - 62.0	WOH	WOH	WOH	WOH	22	S-13: Gray Fat CLAY, frequent marine material, very soft, wet (CH).
65			S	14		65.0 - 67.0	WOR	WOR	WOR	WOR	18	S-14: Same as above.
70			S	15		70.0 - 72.0	WOR	WOH	WOH	2	0	S-15: No Recovery.
75			S	16		75.0 - 77.0	WOR	WOH	WOH	1	20	S-16: Gray Silty CLAY, frequent marine material, very soft, wet (CL).
80			S	17		80.0 - 81.3	40	35	50/4"	-	0	S-17: No Recovery.
												End of soil at 83' bgs. Start rock coring at 83' bgs.
85												
90												

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

CORING LOG

BORING NUMBER: **SEG-3-1T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30 St., 11 Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: MUD ROTARY
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION:
COORD.
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **8/24/15** TIME: **1:00 pm**
FINISH DATE: **8/26/15** TIME: **2:30 pm**

CORE BARREL DATA:
TYPE: Double Tube Swivel
CORE SIZE: NQ
O.D.: 2.98"
I.D.: 1.875"
CASING SIZE: 3" (3.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
85		C-1 83.0 - 88.0	53	88	68	C-1: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, medium strong, close to moderate fracture spacing, schistosity dips 55° to 65°, recovery loss assumed at 85.1'-85.7', granitic band at 84.1'-84.3'.	II	R3	0_{MB}	-	-	83
									$*60_{MB}$	1	1	83.4
									$*60_{MB}$	1	1	84.1
									$*60_{MB}$	1	3	84.3
									10_{MB}	1	6	85
									80_{MB}	1	6	85.05
									10_{MB}	1	6	85.1
									10_{MB}	1	6	85.7
90		C-2 88.0 - 93.0	60	100	87	C-2: Gray SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, medium strong, close to moderate fracture spacing, granitic bands at 88.7'-88.9', and 89.2' to 89.3', schistosity dips 60° to 65°.	II	R3	$*65_{MB}$	1.5	2	86.65
									15_{MB}	2	2	86.95
									$*55_{MB}$	1	1	87.7
									20_{MB}	3	2	88
									$*60_{MB}$	1.5	1	88.3
									$*60_{MB}$	1	1	89.5
									15_{MB}	1.5	1	90.4
									$*60_{MB}$	1.5	1	91.5
95		C-3 93.0 - 98.0	60	100	93	C-3: Gray gneissic SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet, slightly weathered, medium strong, moderate to wide fracture spacing except very close fracture spacing at 93.3' to 93.45' and 97.8' to 98', schistosity and gneissic bandings dip 70° to 80°, indistinct schistosity band at 95.7', granitic band at 95.7' to 96.3'.	II	R3	$*65_{MB}$	1	1	92.7
									10_{MB}	3	2	93
									60_{MB}	1.5	2	96.3
									10_{MB}	2	2	96.45
100		C-4 98.0 - 103.0	60	100	95	C-4: Gray SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet, slightly weathered, medium strong, close to moderate fracture spacing except extremely close to very close fracture spacing at 102.15' to 102.3', schistosity dips 65° to 70°.	II	R3	10_{MB}	2	2	97.8
									15_{MB}	1.5	2	98
									$*70_{MB}$	1	1	98.6
									10_{MB}	1.5	2	100.35
									$*70_{MB}$	1.5	2	101
									$*70_{MB}$	1	1	101.7
									$*65_{MB}$	1	1	102.15
105		C-5 103.0 - 108.0	58	97	85	C-5: Gray SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet, slightly weathered, medium strong to strong, close to moderate fracture spacing except extremely close to very close fracture spacing at 106.3' to 106.5', schistosity dips 60° to 65°, quartz band at 106' to 106.4', loss of recovery assumed at 106.4' to 106.6', multiple healed fractures.	II	R3/R4	$*70_{MB}$	1	1	102.2
									10_{MB}	2	1	102.3
									10_{MB}	3	2	103
									$*60_{MB}$	1	1	104.4
									30_{MB}	3	2	105.55
									10_{MB}	3	1	106.3
									80_{MB}	1	2	106.4

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

CORING LOG
(continued)

BORING NUMBER: **SEG-3-1T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-6 108.0 - 109.9	23	100	100	C-6: Gray gneissic SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet, slightly weathered, strong, moderate fracture spacing, schistosity dips 65° to 70°.	II	R4	$*60_{MB}$ 85_{MB} 65_{MB}	1 3 3	2 2 1	106.6 107 107.6
110									$*60_{MB}$ 40_{MB}	3 3	2 2	108 109.9
						End of boring at 109.9' bgs.						
115												
120												
125												
130												
135												
140												

PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG

BORING NUMBER: **SEG-3-2T**
SHEET NUMBER: **1** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION: **30th St., 11th Ave., New York, NY**
COORD. **N: 1,915,957.9 E: 14,802,845.3**
STN. NO.: OFFSET:
SURFACE ELEV.: **307.3 feet**
DATUM:
START DATE: **8/10/15** TIME: **11:00 am**
FINISH DATE: **8/15/15** TIME: **10:30 am**

	Casing	Split Spoon	Shelby Tube	Pitcher	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▯
I.D.	4"	1.375"	2.938"	"	"	2.155"
O.D.	4.5"	2"	3"	"	"	2.98"
Length	60	24"	30"	"	"	60"
Hammer Wt.	140 lb lbs	140 lbs	Drill Rod Size		NW	
Hammer Fall	30" in.	30 in.	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA				
Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 5.0												Excavated top 5' soil to clear utilities.
5			S	1		5.0 - 7.0	3	3	3	4	8							S-1: Brown and red brown coarse to fine SAND, some medium to fine Gravel, some Silt, loose, moist (SM)-Fill.
			S	2		7.0 - 9.0	7	7	4	4	3							S-2: Same as above.
10			S	3		9.0 - 11.0	2	11	3	4	0							S-3: No Recovery.
15			S	4		15.0 - 17.0	3	7	4	4	1							S-4: Dark brown coarse to fine SAND, little Silt, trace fine Gravel, medium dense, wet (SM).
20			S	5		20.0 - 22.0	5	8	10	6	0							S-5: No Recovery. Gravel jammed at spoon tip.

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG
(continued)

BORING NUMBER: **SEG-3-2T**
SHEET NUMBER: **2** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S	6		25.0 - 27.0	11	7	9	7	0	S-6: No Recovery.
			S	7		27.0 - 29.0	12	7	4	6	3	S-7: Brown coarse to fine SAND, trace medium to fine Gravel, little Silt, medium dense, wet (SM).
30			S	8		30.0 - 32.0	6	10	11	10	9	S-8: Brown coarse to fine SAND, little Silt, some medium to fine Gravel, medium dense, wet (SM).
35			S	9		35.0 - 37.0	21	8	9	18	3	S-9: Same as above.
40			S	10		40.0 - 42.0	6	7	8	8	21	S-10: Gray Fat CLAY, trace medium to fine Sand, frequent marine material, stiff, wet (CH).
45			S	11		45.0 - 47.0	WOH	WOH	WOH	2	23	S-11: Gray Fat CLAY, trace medium to fine Sand, frequent marine material, very soft, wet (CH).
50			S	12		50.0 - 52.0	WOR	WOH	WOH	WOH	23	S-12: Gray Silty CLAY, trace medium to fine Sand, frequent marine material, very soft, wet (CL).
55			S	13		55.0 - 57.0	WOR	WOH	WOH	3	24	S-13: Gray fine SAND, some Clayey Silt, frequent marine material, very soft, wet (SM).

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

BORING LOG
(continued)

BORING NUMBER: **SEG-3-2T**
SHEET NUMBER: **3** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	FIELD CLASSIFICATION AND REMARKS
			S	14		60.0 - 61.8	6	8	7	60/4"	8						S-14: Brown coarse to fine SAND, some coarse to fine Gravel, some Silt, medium dense, wet (SM) - Decomposed SCHIST.
																	End of soil at 63' bgs. Start rock coring at 63' bgs.
65																	
70																	
75																	
80																	
85																	
90																	

Depth Elev.

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

CORING LOG

BORING NUMBER: **SEG-3-2T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30 St., 11 Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: MUD ROTARY
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION:
COORD.
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **8/10/15** TIME: **11:00 am**
FINISH DATE: **8/15/15** TIME: **10:30 am**

CORE BARREL DATA:	NOTES:
TYPE: Double Tube Swivel	
CORE SIZE: NQ	
O.D.: 2.98"	
I.D.: 1.875"	
CASING SIZE: 3" (3.5")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
65		C-1 63.0 - 65.0	20	83	46	C-1: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite, garnet and chlorite, slightly to moderately weathered, medium strong, very close to close fracture spacing, schistosity dips 65° to 75°, recovery loss assumed at 64.7'-65.7'.	II/III	R3	0_{MB}	-	-	63
									55_{MB}	3	2	63.5
									0_{MB}	10	2	63.95
		C-2 65.0 - 70.0	56	93	52	C-2: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite, garnet and chlorite, slightly to moderately weathered from 65' to 66.9', slightly weathered from 66.9' to 70', medium strong, very close to moderate fracture spacing, schistosity dips 70° to 85°, recovery loss assumed at 65'-65.3'.	II/III	R3	$*80_{MB}$	1.5	4	64.3
									50_{MB}	3	2	64.6
									10_{MB}	1	6	64.7
									20_{MB}	1	6	65.3
									$*70_{MB}$	1	6	65.6
									30_{MB}	1	6	65.85
70		C-3 70.0 - 75.0	60	100	93	C-3: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite, garnet and chlorite, slightly weathered, medium strong, very close to moderate fracture spacing, schistosity dips 75°, quartz band at 73.8' to 74.6'.	II	R3	10_{MB}	1.5	3	66.9
									$*85_{MB}$	1.5	3	67.1
									50_{MB}	3	2	67.3
									30_{MB}	3	2	68.25
									30_{MB}	3	2	68.5
									$*80_{MB}$	1	2	68.55
									10_{MB}	3	2	68.75
									$*80_{MB}$	1	2	68.9
									50_{MB}	3	2	69.1
									10_{MB}	1	2	69.7
75		C-4 75.0 - 80.0	60	100	88	C-4: Gray SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, moderate to wide fracture spacing except close fracture spacing at 75' to 75.4', schistosity dips 75° to 85°.	II	R4	20_{MB}	3	1	69.8
									$*85_{MB}$	1	1	69.9
									45_{MB}	3	1	70
									$*75_{MB}$	1.5	2	70.1
									10_{MB}	3	2	70.6
									10_{MB}	1.5	2	71.25
									$*75_{MB}$	1	1	72
									10_{MB}	1.5	2	72.15
80		C-5 80.0 - 85.0	60	100	100	C-5: Gray SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered to fresh, strong, wide fracture spacing except close fracture spacing at 84.4' to 85', schistosity dips 70° to 85°.	II/I	R4	25_{MB}	3	2	73.15
									20_{MB}	3	1	73.5
									15_{MB}	1.5	1	74
									20_{MB}	1	1	74.1
									20_{MB}	3	1	75
									$*85_{MB}$	1	2	75.4
									30_{MB}	3	2	77.6
									15_{MB}	3	1	78.5
85		C-6 85.0 - 89.8	58	100	100	C-6: Gray SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered to fresh, strong, wide fracture spacing, schistosity dips 70° to 85°.	I	R4	25_{MB}	3	1	80
									15_{MB}	3	1	84.4
									10_{MB}	3	1	85

PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

CORING LOG
(continued)

BORING NUMBER: **SEG-3-2T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
90						End of boring at 89.8' bgs.			40_{MB}	3	2	89.8
95												
100												
105												
110												
115												
120												

PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG

BORING NUMBER: **SEG-3-3T**
SHEET NUMBER: **1** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION: **30th St., 11th Ave., New York, NY**
COORD. **N: 1,915,923.2 E: 14,802,927.9**
STN. NO.: OFFSET:
SURFACE ELEV.: **306.6 feet**
DATUM:
START DATE: **8/19/15** TIME: **2:00 pm**
FINISH DATE: **8/24/15** TIME: **12:00 pm**

	Casing	Split Spoon	Shelby Tube	Pitcher	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▯
I.D.	4"	1.375"	2.938"	"	"	2.155"
O.D.	4.5"	2"	3"	"	"	2.98"
Length	68	24"	30"	"	"	60"
Hammer Wt.	140 lb lbs	140 lbs	Drill Rod Size		NW	
Hammer Fall	30" in.	30 in.	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/24/2015	7:10:00 AM	8.5	68	93

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 6.0												Excavated top 6' soil to clear utilities. Mud from 0' to 6'.
5			S	1	■	6.0 - 8.0	5	3	3	3	10							S-1: Black coarse to fine SAND, some medium to fine Gravel, loose, moist (Fill).
			S	2	■	8.0 - 10.0	7	5	3	2	10							S-2: Black coarse to fine SAND, some medium to fine Gravel, loose, moist (Fill).
10			S	3	■	10.0 - 12.0	3	3	3	1	7							S-3: Black coarse to fine SAND, some medium to fine Gravel, loose, moist (Fill).
15			S	4	■	15.0 - 17.0	1	WOH	1	1	16							S-4: Black Clayey SILT, trace fine Sand, trace fine Gravel, very soft, wet (ML)-Fill.
20			S	5	■	20.0 - 22.0	4	4	4	4	0							S-5: No Recovery.

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG
(continued)

BORING NUMBER: **SEG-3-3T**
SHEET NUMBER: **2** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S	6		25.0 - 27.0	3	4	3	5	5	S-6: Brown coarse to fine SAND, some medium to fine Gravel, little Silt, loose, wet (SM).
30			S	7		30.0 - 32.0	2	3	2	3	0	S-7: No Recovery.
35			S	8		35.0 - 37.0	WOH	WOH	WOH	WOH	21	S-8: Gray Fat CLAY, occasional marine material, very soft, wet (CH).
40			S	9		40.0 - 42.0	WOR	WOH	WOH	WOH	18	S-9: Gray Fat CLAY, trace fine Sand, trace fine Gravel, very soft, wet (CH).
45			S	10		45.0 - 47.0	WOR	WOH	WOH	WOH	24	S-10: Gray Fat CLAY, occasional marine material, very soft, wet (CH).
50			S	11		50.0 - 52.0	1	1	WOH	WOH	24	S-11: Same as above.
55			S	12		55.0 - 57.0	2	1	WOH	WOH	24	S-12: Gray Fat CLAY, some medium to fine Sand, occasional marine material, very soft, wet (CH).

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

BORING LOG
(continued)

BORING NUMBER: **SEG-3-3T**
SHEET NUMBER: **3** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			S	13		60.0 - 62.0	2	2	2	3	10							S-13: Gray Fat CLAY, occasional marine material, soft, wet (CH).
65			S	14		65.0 - 66.1	WOR	5	50/1	-	13							S-14: Gray Clayey SILT, some medium to fine Sand, frequent decomposed SCHIST, hard, wet (ML).
																		End of soil at 68' bgs. Start rock coring at 68'.
70																		
75																		
80																		
85																		
90																		

TEST BOREING SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16

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AECOM PARSONS BRINCKERHOFF STV

CORING LOG

BORING NUMBER: **SEG-3-3T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30 St., 11 Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: MUD ROTARY
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION:
COORD.
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **8/19/15** TIME: **2:00 pm**
FINISH DATE: **8/24/15** TIME: **12:00 pm**

CORE BARREL DATA:	**NOTES:**
TYPE: Double Tube Swivel	
CORE SIZE: NQ	
O.D.: 2.98"	
I.D.: 1.875"	
CASING SIZE: 3" (3.5")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
70		C-1 68.0 - 73.0	58	97	72	C-1: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, medium strong, extremely close to moderate fracture spacing, schistosity dips 70° to 80°, pyrite on multiple fractures, recovery loss assumed at 72.8'-73'.	II	R3	10_{MB}	-	-	68
									$*80_{MB}$	1.5	3	68.7
									$*75_{MB}$	1.5	2	69.6
									$*80_{MB}$	1.5	2	70.3
									$*75_{MB}$	1.5	1	71.3
									$*80_{MB}$	1	1	72.2
75		C-2 73.0 - 78.0	57	95	92	C-2: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, medium strong, moderate fracture spacing except very close to close fracture spacing at 77.8' to 78', schistosity dips 70° to 80°.	II	R3	$*80_{MB}$	1	2	72.55
									10_{MB}	1	6	72.65
									85_{MB}	1	6	72.7
									10_{MB}	1	6	72.8
									15_{MB}	1	6	73.25
									30_{MB}	1.5	1	75.2
80		C-3 78.0 - 83.0	60	100	100	C-3: 78' to 81.35': Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, wide fracture spacing schistosity dips 70° to 80°; 81.35' to 83': Light gray-green Muscovite GRANITE, coarse to fine grains of quartz, feldspar, muscovite, epidote (?) and garnet, slightly weathered, strong, close to moderate fracture spacing, high-angle healed fractures.	II	R4	$*75_{MB}$	1	1	77.15
									40_{MB}	3	2	77.8
									20_{MB}	3	2	78
									60_{MB}	1.5	2	81.35
									75_{MB}	3	1	82.4
85		C-4 83.0 - 88.0	60	100	82	C-4: 83' to 85': Light gray-green Muscovite GRANITE, coarse to fine grains of quartz, feldspar, muscovite, epidote (?) and garnet, slightly weathered, strong, close to moderate fracture spacing; 85' to 88': Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, medium strong to strong, very close to moderate fracture spacing, schistosity dips 60° to 75°.	II	R3/R4	10_{MB}	3	2	83
									70_{MB}	1	2	84.6
									$*70_{MB}$	1	2	85
									10_{MB}	3	2	85.96
									45_{MB}	1.5	2	86.05
									50_{MB}	1.5	2	86.4
90		C-5 88.0 - 93.0	60	100	75	C-5: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, medium strong to strong, very close to moderate fracture spacing, schistosity dips 65° to 75°.	II	R3/R4	20_{MB}	3	1	88
									60_{MB}	1.5	1	89
									40_{MB}	3	1	89.45
									$*75_{MB}$	1	2	89.55
									$*70_{MB}$	1	1	90.1
									$*65_{MB}$	1	1	90.6
									$*65_{MB}$	1	1	91

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

CORING LOG
(continued)

BORING NUMBER: **SEG-3-3T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
						End of boring at 93' bgs.			*70$_{MB}$ 30$_{MB}$	1 3	1 1	91.6 93
95												
100												
105												
110												
115												
120												
125												

PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG

BORING NUMBER: **SEG-3-4T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION: **30th St., 11th Ave., New York, NY**
COORD. **N: 1,916,164.6 E: 14,802,800.5**
STN. NO.: OFFSET:
SURFACE ELEV.: **308.6 feet**
DATUM:
START DATE: **8/13/15** TIME: **11:00 am**
FINISH DATE: **8/19/15** TIME: **2:00 pm**

	Casing	Split Spoon	Shelby Tube	Pitcher	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▯
I.D.	4"	1.375"	2.938"	"		2.155"
O.D.	4.5"	3"	3"	"		2.98"
Length	35	24"	30"	"		60"
Hammer Wt.	140 lb	140 lbs	Drill Rod Size		NW	
Hammer Fall	30"	30 in.	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA				
Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/17/2015	9:00:00 AM	11.5	35	35
8/18/2015	10:00:00 AM	11	35	35
8/19/2015	7:00:00 AM	9.3	35	35

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 6.0												Excavated top 6' soil to clear utilities.
5			S	1		6.0 - 8.0	9	9	8	5	16							S-1: Brown, green and dark brown coarse to fine SAND, and Silt, little coarse to fine Gravel, medium dense, moist (SM)-Fill.
			S	2		8.0 - 10.0	5	8	11	8	10							S-2: Same as above.
10			S	3		10.0 - 12.0	3	2	1	3	1							S-3: Brown and green coarse to fine SAND, trace Silt, very loose, moist (SP)-Fill.
15			S	4		15.0 - 17.0	1	1	1	2	15							S-4: Brown medium to fine SAND, trace Silt, very loose, moist (SP)-Fill.
20			S	5		20.0 - 22.0	1	1	1	2	17							S-5: Gray Fat CLAY, some fine Sand, trace fine Gravel, very soft wet (CH)

PB BORINGS 2_SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/21/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG
(continued)

BORING NUMBER: **SEG-3-4T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			S	6		25.0 - 27.0	WOH	WOH	WOH	2	23							S-6: Dark green-gray Fat CLAY, some fine Sand, trace fine Gravel, very loose, wet (CH).
30			S	7		30.0 - 32.0	WOH	1	1	1	5							S-7: Dark gray Clayey SILT, trace fine Sand, occasional marine material, very soft, wet (ML).
																		End of soil at 35' bgs. Start rock coring at 35' bgs.
35																		
40																		
45																		
50																		
55																		

PB BORINGS 2_SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/21/16

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AECOM PARSONS BRINCKERHOFF STV

CORING LOG

BORING NUMBER: **SEG-3-4T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30 St., 11 Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: MUD ROTARY
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION:
COORD.
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **8/13/15** TIME: **11:00 am**
FINISH DATE: **8/19/15** TIME: **2:00 pm**

CORE BARREL DATA:	NOTES:
TYPE: Double Tube Swivel	
CORE SIZE: NQ	
O.D.: 2.98"	
I.D.: 1.875"	
CASING SIZE: 3" (3.5")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
40		C-1 35.3 - 40.0	57	100	91	C-1: Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet, slightly weathered, medium strong, very close to moderate fracture spacing, schistosity dips 60° to 65°, occasional banding parallel to schistosity.	II	R4	0_{MB}	-	-	35.25
									$*65_{MB}$	1	2	36.3
									$*65_{MB}$	1	2	36.7
									$*60_{MB}$	1	1	37.5
									$*65_{MB}$	1	2	38
									$*60_{MB}$	1	2	38.9
									$*60_{MB}$	1	2	39
45		C-2 40.0 - 45.0	58	97	83	C-2: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, close to moderate fracture spacing, schistosity dips 55° to 65°, occasional banding parallel to foliation.	II	R4	$*60_{MB}$	1	2	39.5
									$*60_{MB}$	1	2	39.9
									$*60_{MB}$	1	1	40
									$*60_{MB}$	1	1	40.7
									$*60_{MB}$	1	2	41.5
									$*60_{MB}$	1.5	2	41.85
									$*65_{MB}$	1	2	42.8
									$*55_{MB}$	1	2	43.5
50		C-3 45.0 - 50.0	59	98	58	C-3: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, very close to moderate fracture spacing.	II	R4	$*55_{MB}$	1	2	44
									$*55_{MB}$	1	2	44.2
									$*55_{MB}$	1.5	2	44.6
									$*60_{MB}$	1	4	45
									$*60_{MB}$	1.5	4	45.25
									$*60_{MB}$	1	2	45.5
									$*50_{MB}$	1	2	46.7
									$*55_{MB}$	1	1	47
55		C-4 50.0 - 54.9	59	100	92	C-4: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, close to moderate fracture spacing, schistosity dips 50° to 65°.	II	R4	$*60_{MB}$	1	1	47.35
									$*65_{MB}$	1	1	47.6
									$*65_{MB}$	1	1	47.8
									$*65_{MB}$	1	1	47.9
									$*65_{MB}$	1.5	2	47.95
									30_{MB}	1	6	48
									30_{MB}	1.5	2	48.9
									35_{MB}	3	1	49
60		C-5 54.9 - 59.9	59	98	68	C-5: 54.9' to 57.7': Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, close to moderate fracture spacing, schistosity dips 55° to 60°; 57.7' to 58.6': QUARTZ, fresh, strong, moderate fracture spacing; 58.6' to 59.9': Gray Garnet-Mica SCHIST, medium to fine grains of quartz, feldspar, biotite, muscovite and	I/II	R4	$*65_{MB}$	1	1	50.8
									20_{MB}	1.5	1	51.2
									$*50_{MB}$	1.5	2	52.9
									65_{MB}	3	2	53.2
									45_{MB}	-	-	54.3
									$*60_{MB}$	1	2	54.9
									20_{MB}	1.5	1	55.2
									$*55_{MB}$	1.5	2	55.5
									35_{MB}	1	1	56.5

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

CORING LOG
(continued)

BORING NUMBER: **SEG-3-4T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
65		C-6 59.9 - 64.9	60	100	93	garnet, slightly weathered, strong, very close to moderate fracture spacing, schistosity dips 55° to 60°. C-6: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, close to moderate fracture spacing, schistosity dips 55° to 60°, quartz band at 64.1' to 64.35'.	II	R4	40_{MB} $*55_{MB}$ 60_{MB} 10_{MB} 30_{MB} 15_{MB} 55_{MB} 50_{MB}	1 1 3 1.5 1 1.5 1.5 1.5	2 1 2 1 2 2 1 1	56.7 57 57.5 58.1 58.9 59.05 59.9 60.4
70		C-7 64.9 - 69.9	59	98	88	C-7: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, moderate to wide fracture spacing except close fracture spacing at 69.6' to 69.9', schistosity dips 60° to 70°.	II	R4	$*60_{MB}$ 10_{MB} $*55_{MB}$ 55_{MB} 30_{MB}	1 3 1 3 3	2 2 2 2 1	61.7 63.7 64.1 64.9 67.55
75		C-8 69.9 - 74.9	58	97	93	C-8: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, medium strong to strong, very close to moderate fracture spacing, schistosity dips 65°, muscovite granite bands at 70.9' to 71.8', and 73.55' to 73.75' with coarse to fine grains of quartz, feldspar, muscovite and garnet.	II	R3/R4	$*70_{MB}$ 10_{MB} 10_{MB} 25_{MB} $*65_{MB}$ 40_{MB} 40_{MB} 40_{MB} 40_{MB}	1.5 1 1 3 1 3 1.5 1.5 1.5	2 6 6 2 2 1 1 1 1	69.5 69.8 70.1 70.25 70.7 71.5 72.15 72.6 73.25
80		C-9 74.9 - 79.9	55	92	60	C-9: Gray Garnet-Mica SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, medium strong, very close to moderate fracture spacing, schistosity dips 65° to 70°, loss of recovery assumed at 74.9' to 75.35'.	II	R3	$*65_{MB}$ $*65_{MB}$ $*65_{MB}$ 35_{MB} $*65_{MB}$ $*65_{MB}$ 30_{MB} 30_{MB}	1 1 1 1 1 1 3 3	3 6 2 6 1 2 2 1	74.3 74.35 74.4 74.9 77 77.35 77.7 78.55
85						End of boring at 79.9' bgs.			35_{MB} 10_{MB} 30_{MB}	3 1.5 3	2 2 2	79.4 79.6 79.9
90												
95												

PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

BORING LOG

BORING NUMBER: **SEG-3-5T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION: **30th St., 11th Ave., New York, NY**
COORD. **N: 1,916,066.0 E: 14,802,889.8**
STN. NO.: OFFSET:
SURFACE ELEV.: **306.6 feet**
DATUM:
START DATE: **8/28/15** TIME: **2:00 pm**
FINISH DATE: **8/30/15** TIME: **2:00 pm**

	Casing	Split Spoon	Shelby Tube	Pitcher	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▯
I.D.	4"	1.375"	2.938"	"		2.155"
O.D.	4.5"	3"	3"	"		2.98"
Length	35	24"	30"	"		60"
Hammer Wt.	140 lb	140 lbs	Drill Rod Size		NW	
Hammer Fall	30"	30 in.	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 6.0												Excavated top 6' soil to clear utilities.
5			S	1		6.0 - 8.0	2	6	4	4	7							S-1: Gray medium to fine SAND, trace medium to fine Gravel, loose, moist-Fill.
			S	2		8.0 - 10.0	10	8	9	14	1							S-2: Gray coarse to fine GRAVEL, medium dense, moist-Fill.
10			S	3		10.0 - 12.0	15	10	8	9	9							S-3: Gray Coarse to fine SAND, and Silt, some coarse to fine Gravel, medium dense, moist (SM)-Fill.
15			S	4		15.0 - 17.0	1	2	5	2	6							S-4: Brown medium to fine SAND, loose, moist-Fill.
20			S	5		20.0 - 22.0	WOH	1	1	1	1							S-5: Brown medium to fine SAND, little coarse to fine Gravel, very loose, wet-Fill.

PB BORINGS 2_SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/21/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 years

BORING LOG
(continued)

BORING NUMBER: **SEG-3-5T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			S	6		25.0 - 27.0	WOH	1	1	3	24							S-6: Dark gray Fat CLAY and Organic CLAY, very soft, wet (CH-OH).
30			S	7		30.0 - 32.0	1	1	WOH	1	24							S-7: Dark gray Fat CLAY and Organic CLAY, occasional marine material, very soft, wet (CH-OH).
35			S	8		35.0 - 37.0	2	1	1	1	20							S-8: Dark gray Fat CLAY and Organic CLAY, occasional marine material, very soft, wet (CH-OH).
40			S	9		40.0 - 42.0	WOH	1	WOH	1	23							S-9: Brown medium to fine SAND, and Clayey Silt, occasional marine material, very loose, wet (SM).
45			S	10		45.0 - 47.0	WOH	1	1	6	20							S-10: Same as above.
50			S	11		50.0 - 52.0	15	9	19	17	4							S-11: Dark brown coarse to fine GRAVEL, and coarse to fine Sand, little Silt, medium dense, wet (GM).
55			S	12		55.0 - 57.0	24	24	21	13	4							S-12: Dark brown medium to fine SAND, some medium to fine Gravel, dense, wet (SP).
																		End of soil at 58' bgs. Start rock coring at 58' bgs.

PB BORINGS 2_SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/21/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

CORING LOG

BORING NUMBER: **SEG-3-5T**
SHEET NUMBER: **1** of **1**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30 St., 11 Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: MUD ROTARY
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION:
COORD.
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **8/28/15** TIME: **2:00 pm**
FINISH DATE: **8/30/15** TIME: **2:00 pm**

CORE BARREL DATA:
TYPE: Double Tube Swivel
CORE SIZE: NQ
O.D.: 2.98"
I.D.: 1.875"
CASING SIZE: 3" (3.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
60		C-1 58.0 - 63.0	53	88	55	C-1: Light gray to pink intermixed PEGMATITE and Muscovite GRANITE, coarse to fine grains of quartz, feldspar, muscovite and sparse biotite, slightly weathered, medium strong to strong, very close to moderate fracture spacing except wide fracture spacing at 61' to 63'.	II	R3/R4	0_{MB}	-	-	58
									10_{MB}	3	1	58.35
									10_{MB}	3	2	58.75
									85_{MB}	1	2	58.85
									10_{MB}	1.5	2	59
									10_{MB}	1.5	2	59.1
									85_{MB}	1.5	2	59.2
									60_{MB}	1	6	59.4
65		C-2 63.0 - 68.0	60	100	83	C-2: Light gray to pink intermixed PEGMATITE and Muscovite GRANITE, coarse to fine grains of quartz, feldspar, muscovite and sparse biotite, slightly weathered, strong, close to moderate fracture spacing.	II	R4	60_{MB}	3	3	60.1
									55_{MB}	1.5	2	60.5
									25_{MB}	3	2	61
									10_{MB}	1.5	1	63
									15_{MB}	1.5	1	64.3
									20_{MB}	1	1	64.5
									10_{MB}	1.5	2	65.6
									25_{MB}	1.5	2	65.8
70		C-3 68.0 - 72.7	56	100	88	C-3: Light gray Muscovite GRANITE, coarse to fine grains of quartz, feldspar, biotite, muscovite and sparse biotite, fresh to slightly weathered, strong, close to moderate fracture spacing.	I/II	R4	85_{MB}	1.5	2	66
									10_{MB}	1.5	1	66.9
									10_{MB}	1.5	1	68
									10_{MB}	1	1	69.6
									0_{MB}	1	1	70.2
									10_{MB}	1	1	70.7
									80_{MB}	1.5	2	71
									20_{MB}	1	1	71.6
75		C-4 72.7 - 77.8	61	100	74	C-4: Light gray Muscovite GRANITE with PEGMATITE lenses, coarse to fine grains of quartz, feldspar, biotite, muscovite and sparse biotite, fresh to slightly weathered, strong, very close to moderate fracture spacing.	I/II	R4	5_{MB}	1	1	72.1
									15_{MB}	1.5	1	72.6
									10_{MB}	1.5	2	73.2
									80_{MB}	1	2	73.4
									10_{MB}	1.5	2	73.45
									80_{MB}	1	2	73.55
									15_{MB}	1.5	1	73.7
									80_{MB}	1	2	73.8
80		C-5 77.8 - 82.4	55	100	100	C-5: Light gray Muscovite GRANITE with PEGMATITE lenses, coarse to fine grains of quartz, feldspar, biotite, muscovite and sparse biotite, fresh, strong, wide fracture spacing.	I	R4	10_{MB}	1.5	2	73.9
									45_{MB}	3	2	74.1
									80_{MB}	1.5	2	74.4
									10_{MB}	1	1	74.9
									10_{MB}	1	1	76.4
									30_{MB}	1.5	1	77.8
						End of boring at 82.4' bgs.			25_{MB}	1.5	1	82.4

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV 100 Years

BORING LOG

BORING NUMBER: **SEG-3-6T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION: **30th St., 11th Ave., New York, NY**
COORD. **N: 1,916,207.5 E: 14,802,887.9**
STN. NO.: OFFSET:
SURFACE ELEV.: **307.5 feet**
DATUM:
START DATE: **8/26/15** TIME: **4:00 pm**
FINISH DATE: **8/28/15** TIME: **12:00 pm**

	Casing	Split Spoon	Shelby Tube	Pitcher	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▤
I.D.	4"	1.375"	2.938"	"		2.155"
O.D.	4.5"	3"	3"	"		2.98"
Length	35	24"	30"	"		60"
Hammer Wt.	140 lb	140 lbs	Drill Rod Size		NW	
Hammer Fall	30"	30 in.	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
8/28/2015	7:10:00 AM	9.7	33	83

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 6.0												Excavated top 6' soil to clear utilities. Mud at around 2'.
5			S	1		6.0 - 8.0	4	5	2	2	13							S-1: Black coarse to fine SAND, loose, moist-Fill.
			S	2		8.0 - 10.0	4	10	9	10	13							S-2: Brown coarse to fine GRAVEL, some coarse to fine Sand, trace Silt, medium dense, moist (GW)-Fill.
10			S	3		10.0 - 12.0	6	6	10	9	22							S-3: Brown medium to fine SAND, trace fine Gravel, medium dense, moist-Fill.
15			S	4		15.0 - 17.0	WOH	WOH	1	1	22							S-4: Gray Fat CLAY, very soft, wet (CH).
			U	1		17.0 - 19.0					8							Shelby Tube.
20			S	5		19.0 - 21.0	WOR	WOH	WOH	WOH	17							S-5: Gray Clayey SILT, very soft, wet (ML).

PB BORINGS 2_SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/21/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

BORING LOG
(continued)

BORING NUMBER: **SEG-3-6T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			S	6		25.0 - 27.0	WOH	WOH	WOH	WOH	24							S-6: Gray Fat CLAY, occasional marine material, very soft, wet (CH).
30			S	7		30.0 - 31.0	WOH	WOH	60/0	-	4							S-7: Gray Clayey SILT, very soft, wet (ML).
																		End of soil at 33' bgs. Start rock coring from 33' bgs.
35																		
40																		
45																		
50																		
55																		

PB BORINGS 2_SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/21/16

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

CORING LOG

BORING NUMBER: **SEG-3-6T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30 St., 11 Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**
DRILLING METHOD: MUD ROTARY
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION:
COORD.
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **8/26/15** TIME: **4:00 pm**
FINISH DATE: **8/28/15** TIME: **12:00 pm**

CORE BARREL DATA:	NOTES:
TYPE: Double Tube Swivel	
CORE SIZE: NQ	
O.D.: 2.98"	
I.D.: 1.875"	
CASING SIZE: 3" (3.5")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
35		C-1 33.0 - 38.0	56	93	78	C-1: 33' to 33.5' and 35' to 38': Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet, slightly weathered, medium strong, very close to moderate fracture spacing, schistosity dips 50° to 65°, recovery loss assumed at 33' to 33.3'; 33.5' to 35': Light gray, white and pink Muscovite GRANITE; gneissic towards the bottom, coarse to fine grains of quartz, feldspar, biotite and muscovite, slightly weathered, strong, moderate fracture spacing.	II	R3/R4	0_{MB}	1	6	33.3
									$*55_{MB}$	1	1	33.4
									$*50_{MB}$	1.5	2	33.5
									40_{MB}	1.5	2	34.3
									$*60_{MB}$	1.5	2	35
									$*55_{MB}$	1.5	2	35.3
									$*60_{MB}$	1	3	35.9
									$*60_{MB}$	1	2	36
40		C-2 38.0 - 43.0	60	100	98	C-2: 38' to 42.05': Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite and muscovite, slightly weathered, medium strong, moderate fracture spacing except extremely close fracture spacing at 38.7' to 38.75'; 42.05' to 43': Gray QUARTZ, coarse to fine grains of quartz, fresh, very strong, close fracture spacing.	I/II	R3/R5	$*60_{MB}$	1	2	37.3
									$*60_{MB}$	1	1	38
									$*60_{MB}$	1	2	38.7
									$*60_{MB}$	1	2	38.75
									$*60_{MB}$	1	1	39.6
									20_{MB}	3	1	40.7
45		C-3 43.0 - 48.0	58	97	97	C-3: 43' to 43.95': Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite and muscovite, slightly weathered, medium strong, moderate fracture spacing except extremely close fracture spacing at 43' to 43.15', schistosity dips 60°; 43.95' to 48': Light gray-green to pink Muscovite GRANITE, medium to fine grains of quartz, feldspar, muscovite and sparse garnet, in some areas coarse grained, fresh, strong, moderate to wide fracture spacing, healed fractures dipping 55°.	II	R3	30_{MB}	1.5	1	42.05
									30_{MB}	1	1	42.5
									30_{MB}	1.5	1	43
									30_{MB}	1	6	43.1
									30	1.5	2	43.15
									40_{MB}	1	6	43.95
									30_{MB}	1	6	44
									25_{MB}	1.5	1	45.5
50		C-4 48.0 - 53.0	60	100	97	C-4: 48' to 50': Light gray-green to pink Muscovite GRANITE, medium to fine grains of quartz, feldspar, muscovite and sparse garnet, in some areas coarse grained, fresh, strong, wide fracture spacing; 50' to 53': Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite and muscovite, slightly weathered, strong, moderate fracture spacing except extremely close fracture spacing at 50' to 50.1', schistosity dips 55° to 65°.	I/II	R4	15_{MB}	1.5	1	48
									10_{MB}	1.5	2	50
									$*55_{MB}$	1	2	50.1
									$*65_{MB}$	1.5	1	51.4
									$*60_{MB}$	1	2	52.2
55		C-5 53.0 - 58.0	59	98	67	C-5: Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite and muscovite, slightly weathered, medium strong, very close to moderate fracture spacing, schistosity dips 55°, quartz-feldspar band at 56.8' to 57.3'.	II	R3	30_{MB}	1	6	53
									$*65_{MB}$	1	2	53.1
									"55_{MB}	1	1	53.9
									20_{MB}	2	2	54.45
									$*65_{MB}$	1	1	54.8
									85_{MB}	3	2	56.1
									$*65_{MB}$	1.5	4	57.2

The Gateway Trans-Hudson Partnership

AECOM PARSONS BRINCKERHOFF STV

CORING LOG
(continued)

BORING NUMBER: **SEG-3-6T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **AMTRAK Hudson Yards**
LOCATION: **30th St., 11th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe, George Raymond**
INSPECTOR: **Juan Zapata Jr.**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
60		C-6 58.0 - 63.0	58	97	92	C-6: Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet with quartz and feldspar lenses up to 1" thick, slightly weathered, medium strong, moderate fracture spacing except close fracture spacing at 58' to 58.5'.	II	R3	10_{MB} 10_{MB} $*65_{MB}$ 85_{MB} 30_{MB} 20_{MB} 75_{MB} $*60_{MB}$	1.5 1.5 1.5 3 1 1 2 1.5	2 2 4 2 6 6 2 2	57.35 57.5 57.6 57.8 58 58.2 58.5 59.6
65		C-7 63.0 - 68.0	60	100	77	C-7: Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet with quartz and feldspar lenses up to 1" thick, slightly weathered, medium strong except medium strong to weak at 65.4' to 65.8', very close to moderate fracture spacing except extremely close fracture spacing at 65.6' to 65.8', schistosity dips 65° to 70°.	II	R2/R3	65_{MB} 30_{MB} 55_{MB} 65_{MB} 10_{MB} 10_{MB} 30_{MB} 40_{MB}	1.5 1.5 1.5 3 1 1 1 1	2 2 2 2 6 6 6 6	61.2 63 63.3 64.9 65.4 65.6 65.65 65.7
70		C-8 68.0 - 73.0	59	98	90	C-8: 68' to 72.5': Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and sparse garnet with quartz and feldspar lenses up to 1" thick, slightly weathered, medium strong, moderate to wide fracture spacing except close fracture spacing at 68' to 68.4', schistosity dips 65° to 75°, quartz bands at 71.9' to 72.5'; 72.5' to 73': Light gray-Muscovite GRANITE, medium to fine grains of quartz, feldspar, muscovite and sparse garnet, slightly weathered, strong, close fracture spacing.	II	R3/R4	40_{MB} 25_{MB} 50_{MB} 20_{MB} 40_{MB} 0_{MB} 50_{MB}	1.5 1.5 3 2 1 15 1.5	2 2 2 1 6 2 1	65.75 66 67.8 68 68.1 68.4 70.8
75		C-9 73.0 - 78.0	59	98	93	C-9: 73' to 76.2': Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong. wide fracture spacing except very close fracture spacing at 76' to 76.2', schistosity dips 45° to 50°; granitic band at 73.2' to 73.5'.	I/II	R4	40_{MB} 50_{MB}	1.5 3	1 1	72.5 73
80		C-10 78.0 - 83.0	60	100	100	76.2' to 78': Light green-gray Muscovite GRANITE, coarse to fine grained quartz, feldspar, muscovite, epidote (?), chlorite and sparse garnet, slightly weathered to fresh, strong, close to moderate fracture spacing. C-10: 78' to 78.8': Light green-gray Muscovite GRANITE, coarse to fine grained quartz, feldspar, muscovite, epidote (?), chlorite and sparse garnet, slightly weathered to fresh, strong, moderate fracture spacing; 78.8' to 83': Gray SCHIST, coarse to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, close to wide fracture spacing, schistosity dips 70° to 75°. End of boring at 83' bgs.	I/II	R4				
85												
90												

PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15

PARSONS BRINCKERHOFF BORING LOG

BORING NUMBER: **SEG 4-4T**
SHEET NUMBER: **1** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **Hudson Yards Phase II**
LOCATION: **30th St., 12th Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe**
INSPECTOR: **Brian Connolly/Juan Zapata**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION: **30th St., 12th Ave., New York, NY**
COORD.
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **3/19/15** TIME: **9:00 am**
FINISH DATE: **3/24/15** TIME: **10:00 am**

	Casing	Split Spoon	Shelby Tube	Pitcher	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▯
I.D.	4"	1.375"	2.938	"		2.155"
O.D.	4.5"	2"	3	"		2.98"
Length	94	24"	30	"		60"
Hammer Wt.	140 lb	140 lbs	Drill Rod Size		NW	
Hammer Fall	30"	30 in.	I.D. (O.D.)		2.25" (2.625")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
3/23/2015	7:26:00 AM	11.1	35	93
4/7/2015	7:23:00 AM	8	94	133

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			G	1		0.0 - 6.0												Hand augered to 6'. 0-0.5': Asphalt. 0.5'-5.5': Brown SAND, some Silt, frequent brick fragments, occasional fabric, occasional wood fragments (Fill). 5.5'-6.0': Brick fragments (Fill).
5			S	1	■	6.0 - 8.0	76	3	3	3	12							S-1: Brown and gray SAND, some Silt, frequent brick fragments, occasional fabric, occasional wood fragments, loose, moist (Fill). Note: Brick layer at first 6".
			S	2	■	8.0 - 10.0	5	4	4	2	4							S-2: Brown and black SAND, some Silt, frequent brick fragments, occasional wood fragments, loose, moist (Fill).
10			S	3	■	10.0 - 12.0	5	2	5	6	4							S-3: Brown fine GRAVEL, and fine to coarse Sand, trace Silt, frequent brick fragments, occasional wood fragments, loose, moist (Fill).
15			S	4	■	15.0 - 17.0	WOH	WOH	WOH	WOH	14							S-4: Brown SILT, some Sand, very soft, moist (ML).
20			S	5	■	20.0 - 22.0	WOH	WOH	WOH	WOH	24							S-5: Gray and brown Silty CLAY, trace fine Sand, very soft, wet (CL).
			U	1		22.0 - 24.0												U-1: Shelby tube.
			S	6	■	24.0 - 26.0	WOH	WOH	WOH	WOH	20							

PB BORINGS 2_HUDSON YARD LOGS SOIL.GPJ CANARSIE-LIB.GLB.GLB 5/13/15

PARSONS BRINCKERHOFF

BORING LOG
(continued)

BORING NUMBER: **SEG 4-4T**
SHEET NUMBER: **2** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **Hudson Yards Phase II**
LOCATION: **30th St., 12th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe**
INSPECTOR: **Brian Connolly/Juan Zapata**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
																		S-6: Gray and brown Silty CLAY, trace fine Sand, very soft, wet (CL).
30			S	7		30.0 - 32.0	WOH	WOH	WOH	WOH	20							S-7: Dark gray Clayey SILT, trace fine Sand, very soft, wet (CL).
35			S	8		35.0 - 37.0	WOH	WOH	WOH	WOH	24							S-8: Dark gray Silty CLAY, trace fine Sand, frequent decomposed marine material, very soft, wet (CH/OH).
40			S	9		40.0 - 42.0	WOH	WOH	WOH	WOH	24							S-9: Dark gray Silty CLAY, trace fine Sand, occasional decomposed marine material, very soft, wet (CH/OH).
45			S	10		45.0 - 47.0	WOH	WOH	WOH	WOH	24							S-10: Dark gray Silty CLAY, little fine Sand, occasional decomposed marine material, very soft, wet (CH/OH).
50			S	11		50.0 - 52.0	WOH	WOH	WOH	2	22							S-11: Dark gray Silty CLAY, little fine Sand, occasional decomposed marine material, very soft, wet (CH/OH).
55			S	12		55.0 - 57.0	WOH	WOH	WOH	WOH	24							S-12: Dark gray Silty CLAY, trace fine Sand, occasional decomposed marine material, very soft, wet (CH/OH).

PB BORINGS 2_HUDSON YARD LOGS SOIL.GPJ CANARSIE-LIB.GLB.GLB 5/13/15

PARSONS BRINCKERHOFF

BORING LOG
(continued)

BORING NUMBER: **SEG 4-4T**
SHEET NUMBER: **3** of **3**
PROJECT NUMBER: **4016879**

PROJECT: **Hudson Yards Phase II**
LOCATION: **30th St., 12th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe**
INSPECTOR: **Brian Connolly/Juan Zapata**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
			S	13		60.0 - 62.0	WOH	WOH	WOH	WOH	24							S-13: Dark gray Silty CLAY, trace fine Sand, occasional decomposed marine material, very soft, wet (CH/OH).
65			S	14		65.0 - 67.0	WOH	WOH	WOH	WOH	24							S-14: Dark gray Silty CLAY, trace fine Sand, occasional decomposed marine material, very soft, wet (CH/OH).
70			S	15		70.0 - 72.0	WOH	WOH	WOH	WOH	24							S-15: Dark gray Silty CLAY, trace fine Sand, occasional decomposed marine material, very soft, wet (CL/OL).
75			S	16		75.0 - 77.0	WOH	WOH	WOH	WOH	21							S-16: Dark gray Silty CLAY, trace fine Sand, occasional decomposed marine material, very soft, wet (CL/OL).
80			S	17		80.0 - 82.0	1	2	2	7	24							S-17: Dark gray Silty CLAY, trace fine Sand, medium stiff, wet (CL-ML).
85			S	18		85.0 - 87.0	2	6	6	9	0							S-18: No recovery.
90			S	19		90.0 - 90.5	100/6"				3							S-19: Dark gray to black fine to coarse SAND, and fine to coarse Gravel, very dense, moist (Completely weathered bedrock).
																		End of boring at 93'.

PB BORINGS 2_HUDSON YARD LOGS SOIL.GPJ CANARSIE-LIB.GLB.GLB 5/13/15

PARSONS BRINCKERHOFF CORING LOG

BORING NUMBER: **SEG 4-4T**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **Hudson Yards Phase II**
LOCATION: **30th St., 12th Ave., New York, NY**
CLIENT: **AMTRAK**
CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe**
INSPECTOR: **Brian Connecy/Juan Zapata**
DRILLING METHOD: MUD ROTARY
RIG TYPE: **CME-75 (truck mounted), Automatic Hammer**

LOCATION:
COORD.
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **3/19/15** TIME: **9:00 am**
FINISH DATE: **3/24/15** TIME: **10:00 am**

CORE BARREL DATA:	NOTES:
TYPE: Double Tube Swivel	
CORE SIZE: NX	
O.D.: 2.98"	
I.D.: 2.16"	
CASING SIZE: 3" (3.5")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
95		C-1 93.0 - 98.0	56	93	80	C-1: Gray SCHIST, medium to coarse grained, fresh, medium strong to strong, very close to moderate fracture spacing, foliation dips 25°-70°, rock tends to break along foliation, quartz and feldspar band from 96.6'-96.9'.						
100		C-2 98.0 - 103.0	60	100	92	C-2: Gray SCHIST, medium to coarse grained, fresh, medium strong to strong, very close to wide fracture spacing, foliation dips generally 70°, rock tends to break along foliation, quartz and feldspar bands up to 2" thick.						
105		C-3 103.0 - 108.0	59	98	92	C-3: 103'-103.7' & 105.7'- 108.0': Light gray and gray garnet-biotite-muscovite SCHIST, medium grained, fresh, medium strong, close to moderate fracture spacing except extremely close fracture spacing at 106.1'-106.25'. 103.7'-105.7': Light brown granitic GNEISS, fresh, strong, moderate fracture spacing.						
110		C-4 108.0 - 113.0	60	100	97	C-4: Gray SCHIST, medium to coarse grained, fresh, medium strong to strong, close to wide fracture spacing, foliation dips 65°-75°, rock tends to break along foliation.						
115		C-5 113.0 - 118.0	60	99	90	C-5: Gray SCHIST, medium to coarse grained, fresh, medium strong to strong, close to moderate fracture spacing, foliation dips 60°-65°, rock tends to break along foliation.						

PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB.GLB 5/13/15

PARSONS BRINCKERHOFF

CORING LOG
(continued)

BORING NUMBER: **SEG 4-4T**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **4016879**

PROJECT: **Hudson Yards Phase II**
LOCATION: **30th St., 12th Ave., New York, NY**
CLIENT: **AMTRAK**

CONTRACTOR: **ADT**
DRILLER: **Dominick Pepe**
INSPECTOR: **Brian Connecy/Juan Zapata**

DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size) * - Denotes discontinuity along foliation MB - Denotes mechanical break	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
120		C-6 118.0 - 123.0	60	100	85	C-6: Gray SCHIST, medium to coarse grained, slightly weathered to fresh, medium strong, close to moderate fracture spacing except at 122.0'-122.35', foliation dips 60°-65°, rock tends to break along foliation planes.						
125		C-7 123.0 - 128.0	60	100	86	C-7: Gray and light gray garnet-biotite-muscovite SCHIST, medium to coarse grained, fresh, medium strong, very close to moderate fractrue spacing, foliation dips 50°-65°, rock tends to break along foliation planes, 1-1/4' thick quartz band at 124'.						
130		C-8 128.0 - 133.0	60	100	97	C-8: Gray SCHIST, medium to coarse grained, fresh, medium strong to strong, close to moderate fractrue spacing, foliation dips 45°-65°, rock tends to break along foliation planes.						
135		C-9 133.0 - 138.0	60	100	72	C-9: Gray SCHIST, medium to coarse grained, fresh, medium strong to strong, close to moderate fractrue spacing, foliation dips 45°-65°, rock tends to break along foliation planes, frequent quartz and feldspar bands and lenses up to 1" thick.						
140		C-10 138.0 - 141.0	35	97	75	C-10: Dark to light gray garnet-biotite-muscovite SCHIST, medium to coarse grained, fresh, medium strong, very close to moderate fractrue spacing, pegmatite band at 138.95'-139.75', foliation where observed, dips 45°-65°(centered in places). End of coring at 141'.						
145												
150												

PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB.GLB 5/13/15

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **NW-5B**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **187625A**

PROJECT: **Gateway, Phase II**
LOCATION: **Hudson Yards, New York, NY**
CLIENT: **TPC**
CONTRACTOR: **WGI**
DRILLER: **C. Moreira**
INSPECTOR: **Baris Imamoglu**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **DK 525 (diesel fueled track rig)**

LOCATION: **Under 11th Ave. overpass, betw. 30th and 33th St., NYC**
COORD. **not surveyed**
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **1/16/15** TIME: **10:30 am**
FINISH DATE: **1/16/15** TIME: **2:30 pm**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol		S ■	U ▯	P ▨	G ☒	C ▤
I.D.	3"	1.375"				2.16"
O.D.	3.5"	2"				2.98"
Length		24"				5'
Hammer Wt.	N/A	140 lbs	Drill Rod Size		N	
Hammer Fall	N/A	30 in.	I.D. (O.D.)		2" (2.375")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
1/9/15	6:20 pm	5.6	10.0	10.0
1/19/15	10:15 am	6.0	44.0	58.2

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
																		Cleared for utilities with by hand/vactron to 10' bgs.
5						0.0 - 10.0												
10			S	1	■	10.0 - 12.0	41	41	50	40	0							No Recovery.
			S	2	■	12.0 - 14.0	10	16	9	7	3							S-2A: Gray Silty CLAY at top 1", stiff, moist (CL). S-2B: Gray to grayish brown, fine to coarse SAND, some fine gravel, little silt, medium dense, moist (SM) at bottom 2" (at tip of split spoon).
15			S	3	■	15.0 - 17.0	2	3	5	7	24							S-3 Gray CLAY, soft, moist (CL). 19': possible boulder.
20			S	4	■	20.0 - 22.0	8	9	13	12	12							S-4 Brown to light grayish brown SILT, stiff, moist (ML).

PB BORING W/O GRAPHIC SCALE NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG
(continued)

BORING NUMBER: **NW-5B**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **187625A**

PROJECT: **Gateway, Phase II**
LOCATION: **Hudson Yards, New York, NY**
CLIENT: **TPC**

CONTRACTOR: **WGI**
DRILLER: **C. Moreira**
INSPECTOR: **Baris Imamoglu**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S	5	■	25.0 - 27.0	24	30	27	29	16	S-5 Reddish brown fine to coarse SAND, and silt, trace fine gravel; medium dense, moist (SM).
30			S	6	■	30.0 - 31.3	43	78	100/3"	-	14	S-6 Brown to reddish brown, fine to coarse SAND, some(+) fine to coarse gravel, trace silt, some rock fragments; very dense, moist (SP).
												End of Boring at 32.0'
35												
40												
45												
50												
55												

PB BORING W/O GRAPHIC SCALE NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **NW-5B**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **187625A**

PROJECT: **Gateway, Phase II**
LOCATION: **Hudson Yards, New York, NY**
CLIENT: **TPC**
CONTRACTOR: **WGI**
DRILLER: **C. Moreira**
INSPECTOR: **Baris Imamoglu**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **DK 525 (diesel fueled track rig)**

LOCATION: **Under 11th Ave. overpass, betw. 30th and 33th St., NYC**
COORD. **not surveyed**
STN. NO.: OFFSET:
SURFACE ELEV.:
DATUM:
START DATE: **1/16/15** TIME: **7:00 am**
FINISH DATE: **1/19/15** TIME: **11:10 am**

CORE BARREL DATA:
TYPE: Double Tube Swivel
CORE SIZE: NX
O.D.: 2.98"
I.D.: 2.16"
CASING SIZE: 3" (3.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
1/9/15	6:20 pm	5.6	10.0	10.0
1/19/15	10:15 am	6.0	44.0	58.2

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)	WEATHERING	STRENGTH	DISCONTINUITY DATA ANGLE (deg)	Jr	Ja	DEPTH (feet)
35		C-1 34.0 - 38.2	9	18	11	C-1 Light brown and light gray, fine to medium grained gneissic GRANITE; fresh to highly weathered, extremely weak to strong, very close to close fracture spacing. 41" recovery loss assumed at top of run between 34' and 37.5', top of rock assumed at 37.5' bgs.	IV/I	R0/R4				
40		C-2 38.2 - 43.2	60	100	100	C-2 Light brown and light gray, fine to medium grained gneissic GRANITE; fresh to slightly weathered, strong to very strong, close to moderate fracture spacing, except at 39.55' to 39.8': extremely close fracture spacing. Numerous 0°-30° joints, slightly rough and planar to irregular with fresh to slightly weathered surfaces, slight FeOx coating; one 90° joint at 39.2' to 39.55', slightly rough and planar with slight FeOx coating; one 80° joint at 42.85' to 43.2', rough and undulating, heavy FeOx and silty fine to medium sand infill.	I/II	R4/R5				
45		C-3 43.2 - 48.2	56	94	90	C-3 Light gray, fine to coarse grained gneissic GRANITE with Quartz and Feldspar PEGMATITE bands and lenses; fresh , very strong to strong, moderate to very close fracture spacing. Five 0°-50° joints, slightly rough and wavy to planar with fresh surfaces, one with silt coating.	I	R5/R4				
50		C-4 48.2 - 53.2	60	100	60	C-4 Light gray, fine to coarse grained gneissic GRANITE with Quartz and Feldspar PEGMATITE bands and lenses, interlayered with SCHIST; fresh , very strong to strong, moderate to very close fracture spacing. SCHIST is slightly to moderately weathered, medium strong to weak. Prominent 70°-90° joint between 48.7' and 49.95', smooth and undulating with moderately weathered surfaces. Extremely close fracture spacing between 48.6' and 48.7'. Four 0°-70° joints, smooth to slightly rough, planar to wavy with slightly to moderately weathered surfaces, few with clayey sand infill and FeOx coating.	I/III	R5/R2				
55		C-5 53.2 - 58.2	48	79	64	C-5 53.2'-56': Dark gray to gray, fine to coarse grained schistose GNEISS; fresh, strong, moderate to close fracture spacing except at 53.2' to 53.35': slightly weathered, medium strong, very close fracture spacing. One 60° foliation joint, smooth and	I/II	R3/R5				

55TH STREET CORING LOG (PB) NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **NW-5B**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **187625A**

PROJECT: **Gateway, Phase II**
LOCATION: **Hudson Yards, New York, NY**
CLIENT: **TPC**

CONTRACTOR: **WGI**
DRILLER: **C. Moreira**
INSPECTOR: **Baris Imamoglu**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)	WEATHERING	STRENGTH	DISCONTINUITY DATA: ANGLE (deg)	Jr	Ja	DEPTH (feet)
60						slightly undulating. Four 0°-30° cross joints, smooth to slightly rough, planar to wavy with fresh surfaces. 56'-58.16': Light gray to light brown, Quartz and Feldspar PEGMATITE; fresh, very strong, moderate fracture spacing. No joints. End of coring at 58.2' bgs.						
65												
70												
75												
80												
85												
90												

55TH STREET CORING LOG (PB) NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG

BORING NUMBER: **WW-2**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **187625A**

PROJECT: **Gateway, Phase II**
LOCATION: **Hudson Yards, New York, NY**
CLIENT: **TPC**
CONTRACTOR: **WGI**
DRILLER: **C. Moreira**
INSPECTOR: **L. Sepulveda**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **DK 525 (diesel fueled track rig)**

LOCATION: **Under 11th Ave. overpass, betw. 30th and 33th St., NYC**
COORD. **not surveyed**
STN. NO.: OFFSET:
SURFACE ELEV.: **306.3 feet**
DATUM:
START DATE: **12/23/14** TIME: **7:30 pm**
FINISH DATE: **12/26/14** TIME: **10:30 am**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol		S ■	U ▯	P ▨	G ☒	C ▤
I.D.	3"	1.375"				2.16"
O.D.	3.5"	2"				2.98"
Length		24"				5'
Hammer Wt.	N/A	140 lbs	Drill Rod Size		N	
Hammer Fall	N/A	30 in.	I.D. (O.D.)		2" (2.375")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
12/22/14	7:55 am	6.7	9.0	9.0
12/22/14	7:00 pm	6.6	9.0	9.0

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	CORING RUN (in.)	CORING REC. (in.)	CORING REC. %	CORING L>4" (in.)	CORING RQD %	Depth Elev.	FIELD CLASSIFICATION AND REMARKS
5																		
10			S	1	■	9.0 - 11.0	16	3	4	4	13							S-1 Top 5": Gray fine to medium SAND, some silt, trace fine gravel, wet (SM). Bottom 8": Red brown SILT, little(+) fine sand, interlayered with gray fine sand, some(+) silt, trace(-) fine to medium gravel (ML). Note: Drove casing to 14'.
15			S	2	■	14.0 - 16.0	18	12	15	17	0							S-2 No recovery due to coarse GRAVEL lodged in tip.
			S	3	■	16.0 - 18.0	2	6	8	9	6							S-3 Dark gray SILT, little clay, trace(+) fine sand, trace shell fragments (ML). PP up to 0.25 tsf.
			S	4	■	19.0 - 19.4	100/5"	-	-	-	2							S-4 Dark gray CLAY, little silt, some fine sand, trace shell fragments, wet (CL). Note: Rolled on it without advancement, telescoped 3-inch casing and set at depth 19.5' 19.4-20.5' Boulder (2.75 mins/ft).
20			S	5	■	21.5 - 23.5	12	14	19	20	10							S-5 Brown fine SAND, some silt, dense, wet, micaceous (SM).

PB BORING W/O GRAPHIC SCALE NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15

Parsons Brinckerhoff Quade & Douglas, Inc.

BORING LOG
(continued)

BORING NUMBER: **WW-2**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **187625A**

PROJECT: **Gateway, Phase II**
LOCATION: **Hudson Yards, New York, NY**
CLIENT: **TPC**

CONTRACTOR: **WGI**
DRILLER: **C. Moreira**
INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE DEPTH (feet)	SOIL (Blows/6 in.) 0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
			S	6	■	25.0 - 26.0	12	50/6"	-	-	12	S-6 Brown SILT, little fine to coarse sand, very dense, moist, slightly micaceous (ML).
												Start coring at 30' bgs.
30												End of Boring at 30.0'
35												
40												
45												
50												
55												

PB BORING W/O GRAPHIC SCALE NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG

BORING NUMBER: **WW-2**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **187625A**

PROJECT: **Gateway, Phase II**
LOCATION: **Hudson Yards, New York, NY**
CLIENT: **TPC**
CONTRACTOR: **WGI**
DRILLER: **C. Moreira**
INSPECTOR: **L. Sepulveda**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **DK 525 (diesel fueled track rig)**

LOCATION: **Under 11th Ave. overpass, betw. 30th and 33th St., NYC**
COORD. **not surveyed**
STN. NO.: OFFSET:
SURFACE ELEV.: **306.3 feet**
DATUM:
START DATE: **12/23/14** TIME: **7:30 pm**
FINISH DATE: **12/26/14** TIME: **10:30 am**

CORE BARREL DATA:
TYPE: Double Tube Swivel
CORE SIZE: NX
O.D.: 2.98"
I.D.: 2.16"
CASING SIZE: 3" (3.5")

NOTES:

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
12/22/14	7:55 am	6.7	9.0	9.0
12/22/14	7:00 pm	6.6	9.0	9.0

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)	WEATHERING	STRENGTH	DISCONTINUITY DATA: ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-1 30.0 - 34.2	39	78	46	C-1 Gray and white, fine to coarse grained SCHIST; moderately weathered, medium strong to strong, close to moderate fracture spacing. 30'-30.2': coarse gravel sized rock fragments.	III	R4				
35		C-2 34.2 - 39.2	59	98	80	C-2 Gray and white, fine to coarse grained SCHIST; slightly weathered, strong, very close to moderate fracture spacing.	II	R4				
40		C-3 39.2 - 44.2	57	95	95	C-3 Gray and white, fine to coarse grained SCHIST; fresh, strong, close to moderate fracture spacing.	I	R4				
45		C-4 44.2 - 49.2	51	85	85	C-4 Dark gray, medium to coarse grained SCHIST; fresh, strong, moderate to wide fracture spacing.	I	R4				
50		C-5 49.2 - 54.2	56	93	93	C-5 Dark gray, medium to coarse grained SCHIST; fresh, strong, moderate fracture spacing.	I	R4				
						C-6 Dark gray, medium to coarse grained SCHIST;	I/II	R4				

Parsons Brinckerhoff Quade & Douglas, Inc.

CORING LOG
(continued)

BORING NUMBER: **WW-2**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **187625A**

PROJECT: **Gateway, Phase II**
LOCATION: **Hudson Yards, New York, NY**
CLIENT: **TPC**

CONTRACTOR: **WGI**
DRILLER: **C. Moreira**
INSPECTOR: **L. Sepulveda**

DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)	WEATHERING	STRENGTH	DISCONTINUITY DATA: ANGLE (deg)	Jr	Ja	DEPTH (feet)
		C-6 54.2 - 59.2	56	93	80	fresh to slightly weathered, strong, close to moderate fracture spacing.						
60						End of coring at 59.2'.						
65												
70												
75												
80												
85												

55TH STREET CORING LOG (PB) NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.
BORING LOG

SHEET 1 of 4
BORING NO. WT-501
FILE NO. 4840

PROJECT	WEST SIDE HIGHWAY	DOT CONTR NO	D 96416
COORDINATE N	192 777.0	E	1,997,988.5
LOCATION	West Street at 30th Street	ELEVATION	+ 5.2
INSPECTOR	G. Cardinez (WCC)	DATUM	Manhattan
CONTRACTOR	Warren George, Inc.	DATE STARTED	11/05/80
DRILLER	S. Muh	DATE COMP.	11/10/80
HELPER	F. Gaughan, M. Smith		

TYPE OF RIG: TRUCK ☐ SKID ☐ BARGE MOUNTED ☐ TRIPOD ☐ OTHER ☐

CASING DIA. 5 IN. FROM 0.0 TO 15.0 FT. DIA. 3 IN. FROM 0.0 TO 154.0 FT.

DRILLING MUD UTILIZED MUD TYPE Quick Gel — ROTARY BIT DIA 3-3/4;4-3/4 IN.

SAMPLING EQUIPMENT (TYPE & SIZE): D-SAMPLER: Split Spoon, 2" O.D. — DRILL ROD N; U-SAMPLER DIA - IN. TYPE -; CORE BIT Diamond, NX — CORE BARREL Double Tube

FEED DURING CORING: MECHANICAL ☐ HYDRAULIC ☒ OTHER ☐

SAMPLER HAMMER WEIGHT (LBS) 140 AVG FALL 30 IN

CASING HAMMER WEIGHT (LBS) 300 AVG FALL 18 IN

NO OF U-TUBES 0 NO OF VANE TESTS 0 DEPTH TO ROCK 154.0 FT DEPTH TO COMP 170.5 FT

WATER LEVEL OBSERVATIONS

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
11/10/80	1120	170.5	153	13.2	-0.1	30 minutes after coring
11/10/80	1130	170.5	-	6.11	-0.1	After casing was pulled out

DAILY PROGRESS	CASING BLOWS	SAMPLE NO	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
1000	O					*		W = Water content in %
	N				Concrete	**		qu = pocket penetrometer strength in tsf
	*	NR		50/0"		1.8		
	**				Boulder			
	*					4.5	5	
	O	1D	5.0	45 - 24	Coal, some gravel, bricks, black			
	*		7.0	14 - 21	silt, mica			* Asphalt
	17							** Belgium block
	38							
	198						10	
	23	2D	10.0	12 - 7	Medium, gray clayey silt, trace			W = 22
	37		12.0	9 - 11	medium sand, veg lenses, organics (ML)			
	34							
	25							
11/05/80 Partly sunny, cool	26						15	
		3D	15.0	8 - 3	Soft, gray silty clay, trace gvl			W = 24
			17.0	3 - 3	fine sand, mica, organics (CL)			Use of drilling mud at 15'
		4D	20.0	12 - 8	Gray silty fine to medium sand,		20	Use of drilling mud at 15'
			22.0	5 - 2	trace gvl, coal, wd, brick (SM)			Attempted spoon at 2' - refusal
		NR	25.0	5 - 4			25	
			27.0	4 - 9				
		5D	27.0	5 - 6	Soft, gray silt, some fine sand,			W = 20
			29.0	4 - 9	trace gravel, organic (ML)	Soft, gray organic silty clay and medium to fine sand, trace gravel, coal, brick (Fill)	30	
		6D	30.0	27 - 12	Coal, trace glass, medium to			
			32.0	9 - 5	fine sand, shells	Same as above		
		7D	35.5	4 - 3	Soft, black organic silty clay,		35	W = 52
			37.5	3 - 5	some wood layers, shells, fine sand (OH)	37.0		
		8D	40.0	WR/24"	Soft, black organic silty clay,		40	W = 54
			42.0		trace shells, fine sand (OH)			* Driller over-drove spoon 6"
		9D*	45.0	4 - 1	Top: DO 8D (OH)	Soft, black org silty clay, tr shells, f sand	45	W = 65 Top
1530 0700			47.0	3 - 4	Bot: Medium, gray organic silty clay, sm f sand partings, seams, trace shells (OH)	46.0		W = 50 Bot
		10D	50.0	4 - 4	Medium, gray organic silty clay,		50	W = 47
			52.0	4 - 5	trace f sand pockets, partings, shells (OH)			qu = 0.5
		11D	55.0	3 - 2	Medium, gray organic silty clay		55	W = 48
			57.0	3 - 3	trace fine sand, shells (OH)			
		12D	60.0	3 - 3	DO 11D, stiff (OH)		60	W = 50
			62.0	3 - 7				qu = 1.0
11/06/80 Sunny, cool		13D	65.0	WR/24"	Stiff, dark gray organic silty		65	W = 43
			67.0		clay, trace f sand, shells (OH)			qu = 1.0
		14D	70.0	3 - 3	DO 13D, trace fine sand partings (OH)		70	W = 51
			72.0	4 - 5				qu = 0.5
		15D	75.0	1 - 1	DO 13D (OH)		75	W = 55
			77.0	3 - 3				qu = 1.0
		16D	80.0	3 - 2	DO 13D, dark grey (OH)	Medium to stiff, gray organic silty clay, some fine sand layers, seams, lenses, trace shells, vegetation	80	W = 46
			82.0	3 - 4				qu = 1.0
							85	

MUESER, RUTLEDGE, JOHNSTON & DESIMONE
WOODWARD–CLYDE CONSULTANTS, INC.
BORING LOG

SHEET 3 of 4
BORING NO. WT-501
FILE NO. 4840

DAILY PROGRESS	CASING BLOWS	SAMPLE NO	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
		17D	85.0	WR/12"	Medium, dark gray organic silty		85	W = 33
			87.0	1 - 1	clay, tr f sand, shells (OH)			qu = 0.75
		18D	90.0	4 - 2	Medium, dark gray organic silty		90	W = 40
			92.0	2 - 4	clay, sm f sand, f sand seams, lenses, tr shells, mica (OH)			qu =0.75
		19D	95.0	7 - 4	DO 18D (OH)		95	W = 39
			97.0	9 - 11				qu = 0.75
		20D	100.0	3 - 6	DO 18D (OH)	Same as above	100	W = 34
			102.0	10 - 20				qu = 0.75
		21D	105.0	4 - 4	Medium, dark gray organic silty		105	W = 33
			107.0	5 - 6	clay, some f sand, tr shells (OH)			qu = 0.5
		22D	110.0	21 - 16	Gray silty fine sand, trace	110.0	110	
			112.0	23 - 24	clay, mica (SM)			
11/06/80		23D	115.0	8 - 8	Gray silty fine sand, some clay		115	
			117.0	10 - 12	layers, trace vegetation, mica (SM)	Med cpt DO cpt, gray silty f sa, tr cl, veg, mica		
		24D	120.0	10 - 12	Stiff, grey silty clay, trace	120.0	120	W = 33
			122.0	15 - 17	fine sand seams, f sand pkts, vegetation, mica (CL)			
		25D	125.0	3 - 2	DO 24D (CL)		125	W = 37
			127.0	10 - 8				
		26D	130.0	WR/6"-9	Stiff, gray silty clay, some f		130	W = 39
1530 0700			132.0	13-17	sand seams, lenses (CL)			qu = 0.5
11/07/80 Sunny, cool		27D	135.0	5 - 7	Medium, gray clayey silt, trace	Medium to stiff, gray silty clay, trace fine sand seams, pockets & partings	135	W = 38
			137.0	9 - 10	fine sand pockets, veg (ML)			qu = 0.75
		28D	140.0	5 - 5	Stiff, gray clay, trace mica (CL)	Same as above	140	W = 36
			142.0	5 - 8		145.0		qu = 1.0
		29D	145.0	25 -	Red-brown silty fine to coarse		145	Hard drilling @ 145.8 to 146.8 possible cobbles or boulders
11/07/80			145.8	100/4"	sa, sm gravel, mica (SM)			
		30D	150.0	19 - 23	Red-brn silty fine to coarse		150	
			151.8	50-50/1"	sand, sm gvl, trace clay (SM)	V cpt, red-brown silty f-c sand, sm gvl, tr mica		
		1C	155.5	Rec=81%	Gray slw mica schist, broken	154.0	155	
			160.5	RQD=20%				
1530 0700		2C	160.5	Rec=60%	Gray slw mica schist, broken		160	
			165.5	RQD=12%				
11/10/80 Partly sunny, cool		3C	165.5	Rec=96%	Light gray Unw mica schist,	Light gray slw to Unw mica schist, broken to cljtd	165	
1100			170.5	RQD=58%	cljtd	170.5	170	
							175	
							180	
							185	
							190	
							195	

APPENDIX E
Site-Specific Seismic Study

RELATED OXFORD
HUDSON YARDS

SITE-SPECIFIC SEISMIC STUDY

HUDSON YARDS - WRY
PLATFORM & ASSOCIATED PROJECTS

Document No.:
HYW-PL-KPF-RPT-A-20170501 Seismic Report

Prepared by:

LANGAN

Langan Engineering, Environmental, Surveying, & Landscape Architecture, DPC
21 Penn Plaza, 360 West 36th Street, 8th Floor
New York, NY 10001
212-479-5400

Issue Date:
May 1, 2017

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 Executive Summary

Langan Engineering, Environmental, Surveying and Landscape Architecture D.P.C. performed site-specific seismic studies for the proposed platform area of the West Rail Yard of Hudson Yards. Six platform zones, corresponding to the locations of expansion joints proposed by the project structural engineer, were independently evaluated in this study.

The entire platform site was preliminarily classified as Site Class F because of potential liquefaction susceptibility using the 2014 New York City Building Code (NYCBC) and 2015 New York State Building Code (NYSBC) general code procedures. Site Class F requires site-specific seismic analyses to assess the seismic response of the ground and to determine seismic parameters for use in design of the proposed structures.

This study is specific to the referenced site and reflects the state-of-practice in the fields of seismology and geotechnical earthquake engineering. This study was performed in accordance with the provisions of 2014 NYCBC, 2015 NYSBC and ASCE 7-10. The following summarizes the approach and key conclusions from the study:

1. Seismic hazard analysis and selection of bedrock acceleration time series:

    a. We performed a probabilistic seismic hazard analysis to develop the target bedrock acceleration response spectrum.

    b. We selected 11 representative “seed” ground motion acceleration time series and modified them by matching their acceleration spectra to the target spectrum to develop eleven input bedrock motions for the site-specific ground response analyses.

2. Site-specific ground-response analyses:

    a. The site was divided into six different zones (Zone1 to Zone 6) defined by the proposed expansion joints. For each zone, we performed individual site-specific total-stress and effective-stress ground response analyses (soil amplification analysis) using the developed input bedrock motions (acceleration time series). We applied the motions at the base of one dimensional soil columns and estimated ground response spectra.

    b. We developed a site-specific design response spectrum for each zone using the respective estimated ground response spectra.

3. Liquefaction analyses:

    a. For each zone, we evaluated the potential for liquefaction of the granular soils located below the groundwater table for the risk-targeted maximum considered earthquake (MCE_R) level event.

    b. We estimated the potential free-field ground surface seismic settlements during the MCE_R event.

    c. We estimated excess pore water pressure ratios in the soils during the MCE_R level event.

4. Conclusions and recommendations:

    a. The recommended short- and long-period design spectral accelerations and Seismic Design Categories are provided in Appendices A to F for zones 1 to 6, respectively.

b. We estimated excess pore water pressure ratios as high as 50 percent during the MCE_R-level event, corresponding to partial liquefaction (partial soil strength loss). Partial liquefaction should be considered in the analysis of lateral pile capacity, using the estimated excess pore water pressure ratios to reduce the soil strength.

c. We estimated about 0.1 to 0.5 inches of seismic-event-induced settlement for free-field conditions after the MCE_R-level event. Utilities under the sidewalks and site connections should be designed to account for differential settlements up to 0.5 inches between sidewalk and pile-supported structures.

2 Introduction

This report presents the results of our site-specific seismic study for the proposed development within the platform area of the West Rail Yard of Hudson Yards. Our study was performed to assess the seismic response of the ground at the project site, as required by the 2014 NYCBC and 2015 NYSBC for sites susceptible to liquefaction (i.e. Site Class F), and to determine appropriate seismic parameters for use in design of the proposed structures.

The analyses and recommendations presented herein are in accordance with the NYCBC, NYSBC and ASCE 7-10. All elevations contained herein reference the North American Vertical Datum of 1988 (NAVD88) and should be considered approximate.

3 Project Overview

3.1 Site Description

The project is on the Far West Side of Manhattan within the western half of the Metropolitan Transportation Authority (MTA) – Long Island Rail Road (LIRR) West Side Yards. The West Rail Yard (WRY) site is divided into “platform” (Block 676, Lot 5) and “terra firma” (Block 676, Lot 1) parcels. This report focuses solely on the platform site. The platform site measures about 423,000 square feet and is bound by West 33rd Street on the north, the terra firma parcel on the south, the Eleventh Avenue viaduct on the east, and Twelfth Avenue (New York State Rout 9A/Westside Highway) on the west. The site location is shown in Figure 1.

The majority of the platform site is occupied by 30 east-west oriented railroad tracks that are separated by concrete walkways of varying width. An access road runs along the west and south site perimeters. Numerous structures are located within and adjacent to the site.

Additional details pertaining to the site are included in our Geotechnical Report, dated 1 May 2017.

3.2 Proposed Development

The planned development includes construction of a structural platform over the existing rail yards along with five high-rise towers on the platform. Three existing LIRR buildings will also be reconstructed below the platform. The platform will be divided into six distinct zones by expansions joints. Each zone was evaluated separately for this study.

3.3 Local Faults and Seismicity

New York City is on the Manhattan Prong, in the passive continental margin of the stable central and eastern United States, far from tectonic plate boundaries (approximately 1,400 miles from the nearest tectonic plate boundary). Seismicity in this region is overall low, with the exception of a few zones such as the New Madrid (Missouri) and Charleston, South Carolina seismic zones. The Manhattan Prong is relatively active compared to most of this region; the largest earthquake in the area was a magnitude mbLg 5.25 event offshore of New York City in 1884.

Many faults have been identified in the Manhattan Prong and the surrounding regions, but the locations of active faults is not clear (Sykes et al. 2008). There are difficulties in characterizing the activity of faults in the region because of the small sizes of ruptures, the absence of surface rupture, and the distribution of seismicity on many smaller faults, each with very low displacement rates.

A fault known as Cameron's Line is about 2.5 miles east of the site. Cameron's Line is described as an Ordovician (Taconic) suture zone. Geologists postulate that the fault was healed by Paleozoic metamorphism and is no longer a zone of brittle faulting or a source of earthquakes. Assumed brittle faults of the Manhattan Prong include the 125th Street fault, which extends across Manhattan to Queens; the Dyckman Street fault; and the Dobbs Ferry fault. It is recognized that research is needed to improve the mapping and dating of these various faults to improve seismic-hazard studies.

3.4 Subsurface Data

Subsurface data was derived from numerous investigations undertaken within and adjacent to the WRY. This information includes borings and cone penetration testing (CPT) data, as well as laboratory testing of soil and rock. The data includes studies performed by Langan and several other entities. The approximate locations of the borings and CPTs are shown in Figure 2.

The geotechnical parameters used in this study were primarily derived from 29 geotechnical borings, eight standard CPTs, 16 seismic CPTs (SCPT), and laboratory testing performed as part of a study for the design of the proposed New York Sports and Convention Center (NYSCC) in 2004. This data was supplemented with historical data within and adjacent to the site prepared by others.

3.5 Generalized Subsurface Conditions

The general subsurface conditions consist of uncontrolled granular fill, underlain by consecutive layers of slightly organic silty clay, sand/glacial till, and finally bedrock. The depth to bedrock varies across the site from about 25 feet to about 140 feet, with the depth to rock increasing from east to west.

Groundwater monitoring wells installed in the vicinity of the site indicate that the groundwater level typically varies from about el -1.5 ft to el 2 ft. Groundwater levels are tidally influenced along the west side of the site given the relatively close proximity to the present Hudson River shoreline. In addition, groundwater levels are likely to fluctuate with seasonal changes and precipitation events. Zones of perched water may be present at some locations due to the inconsistent nature of the fill and native soils.

The shear wave velocity of the bedrock was estimated to be around 9,000 feet per second based on the cross-hole seismic tests and borehole suspension logging performed at nearby sites within the same rock formation.

The soil layers and the range of corresponding shear wave velocities used in the site specific seismic analyses are summarized for each zone in Appendices A through F.

Additional details are presented in our Geotechnical Report, dated 1 May 2017.

4 Seismic Evaluation

4.1 Introduction

The site was divided into six distinct zones (Zone 1 to Zone 6) defined by the locations of expansion joints selected by the project structural engineer. For each zone, we performed a site-specific seismic study to develop a design acceleration response spectrum, as required by the NYCBC and NYSBC for sites susceptible to liquefaction. Site specific analyses are more rigorous than the general procedures outlined in the NYCBC and NYSBC. The general procedures typically do not accurately represent the amplitude and frequency content specific to an individual site. As such, design acceleration response spectrum

values derived using the general procedures may be either overly conservative or, in some cases, unconservative.

Our evaluation included:

1. Performing a probabilistic seismic-hazard analysis;
2. Selecting and modifying appropriate bedrock acceleration time series;
3. Estimating dynamic soil and bedrock properties for each zone;
4. Determining the Site Class per the Building Code for each zone;
5. Performing total-stress and effective-stress ground response analyses for each zone;
6. Performing analyses to evaluate the liquefaction potential and estimate excess pore water pressures in the granular soils situated below the groundwater table for each zone;
7. Recommending an appropriate design acceleration response spectrum for each zone; and,
8. Determining the Seismic Design Category (SDC) for each zone.

We developed a design acceleration-response spectrum specific to each zone using state of practice methods and reflecting in situ soil and bedrock conditions. Our evaluation was performed in accordance with provisions of 2014 NYCBC, 2015 NYSBC and ASCE 7-10. The study included one-dimensional wave-propagation analyses to estimate the response at the site ground surface during a design seismic event.

The total-stress one-dimensional analyses were performed using the commercial computer program Shake2000 (Geomotions, 2015). The effective-stress one-dimensional analyses were performed using the commercial computer program D-MOD2000 (Geomotions, 2015).

4.2 Probabilistic Seismic Hazard Analysis

We performed a probabilistic seismic-hazard analysis (PSHA) to systematically account for uncertainties in the location, recurrence interval, and magnitude of future earthquakes. The results of a PSHA define a uniform hazard for a site in terms of a probability that a particular level of shaking will be exceeded during the given life of the structure.

As part of the development of the risk-targeted maximum considered earthquake (MCE_R) spectrum at bedrock level, we performed a PSHA to develop a site-specific response spectrum for a 2 percent probability of exceedance in 50 years (i.e. a return period of 2,475-year earthquake). The bedrock spectrum was developed using the computer code EZ-FRISK 8.00 (Fugro Consultants Inc. 2016). The approach used in EZ-FRISK is based on the probabilistic seismic-hazard model developed by Cornell (1968) and McGuire (1976).

4.3 Source Modeling and Characterization

We used the Petersen et al. (2014) seismic source model with the same logic tree used for the production of the USGS 2014 maps. We understand that Fugro Consultants Inc. obtained this database directly from the USGS.

4.4 Empirical Ground Motion Prediction Equations (GMPEs)

The estimate of uniform hazard spectral accelerations at bedrock level is based on empirical GMPEs, which use the bedrock shear-wave velocity in the upper 30 meters (Vs_{30}) as input. We assigned average bedrock Vs_{30} of 9,000 feet per second. We used the same weighting and the same empirical GMPEs that were used in Petersen et al. (2014).

4.5 Epistemic Uncertainty and Aleatory Variability

The term "epistemic uncertainty" is used to describe the uncertainty because of incomplete knowledge and data about the physics of the earthquake process. For example, there is uncertainty as to which attenuation relationship is more applicable for the site at hand. Similarly, the term "aleatory variability" is used to describe the randomness in the ground motion predicted by each attenuation equation. The epistemic uncertainty is taken into account by using a suite of attenuation relations with different weights. All the different weight combinations are incorporated in the final hazard estimations by using a logic-tree approach (McGuire 2004). The aleatory variability is taken into account by explicitly considering the randomness (standard deviation) in the predicted ground motions.

4.6 Probabilistic Seismic Hazard Analysis Results

The computed uniform hazard spectrum for 2 percent probability of exceedance in 50 years was based on the geometric mean component of the attenuation equations, and was then adjusted for the maximum direction component by multiplying with period-dependent amplification factors according to Sahi and Baker (2013), and was further adjusted by using the ASCE 7-10 risk coefficients for the site to determine the risk-targeted maximum considered earthquake (MCE_R) ground motion response accelerations. At each spectral response period, the uniform hazard bedrock response spectrum was multiplied by the risk coefficient C_R in accordance with Section 21.2.1 of ASCE 7-10. We used the USGS risk-targeted ground motion calculator, along with the site-specific hazard curves for periods of 0.2 and 1 second to estimate the C_{RS} and C_{R1} respectively. For periods less than or equal to 0.2 second, $C_R=C_{Rs}=0.93$; for periods greater than or equal to 1 second, $C_R=C_{R1}=0.94$; and for periods between 0.2 seconds and 1 second, C_R was linearly interpolated between C_{Rs} and C_{R1}. The bedrock MCE_R spectrum is shown in Figure 3. Digitized MCE_R values are listed in Table 1.

Table 1 – Bedrock Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectrum SA(g) for 5 Percent Damping

Structural Period T (sec)	Site-Specific SA(g) P.E. 2% in 50 years
0.01	0.146
0.10	0.255
0.20	0.192
0.30	0.136
0.40	0.103
0.50	0.081
0.75	0.052
1.0	0.039
2.0	0.020

4.7 Seismic Hazard Deaggregation Results

Seismic hazard deaggregation was performed to estimate the contribution of the various magnitudes events at various distances to the total seismic hazard. The results are useful in identifying pairs of earthquake magnitude and source-to-site distances that contribute the most to the estimated seismic

hazard, performing deterministic analyses, and developing different scenarios to be used in selecting acceleration time series.

For the peak ground acceleration, which is of interest for the soil liquefaction-potential analyses, the majority of the hazard for the maximum considered earthquake comes from small to moderate magnitude earthquakes from the CEUS Gridded seismic zone. The corresponding modal (most likely) moment magnitude and distance were estimated to be magnitude of 5.05 and a distance of 11 kilometers. The mean moment magnitude and distance were estimated to be 5.45 and 22 kilometers respectively.

4.8 Bedrock Acceleration Time Series

We selected 11 bedrock acceleration time series for use in our analyses following the guidelines of ASCE 7-10. All time series were recorded during earthquakes with magnitudes between 5.3 and 6.2, consistent with typical NYC design magnitudes. All time series were modified to match the target bedrock MCE_R spectrum presented in Figure 3 using a time-domain spectral-matching routine. The seed time series we used are listed in Table 2.

Table 2 – Acceleration Time Series Used for Matching to the Target MCE_R Rock Spectrum

No.	Earthquake & Year	NGA Sequence No.	Magnitude	Station Name	Closest Distance to Rupture (km)	Component
1, 2	Morgan Hill, 1984	455	6.19	Gilroy Array No.1	15	1230, 1320
3, 4	Whittier Narrows, 1987	624	5.99	Huntington Beach	45	270, 360
5	CA/Baja Border Area, 2002	2003	5.31	Calexico Fire Station	40	90
6, 7	Chi-Chi, Taiwan, 1999	2949	6.20	CHY033	13	E, N
8, 9	Chi-Chi, Taiwan, 1999	2985	6.20	CHY094	91	N, W
10, 11	Mineral, Virginia, 2011	8529	5.74	NP2555	124	N, E

Information obtained from the NGA-West and the NGA-East Flatfile (http://ngawest2.berkeley.edu/)

4.9 Dynamic Soil and Bedrock Parameters

Dynamic soil and bedrock parameters are required for use in ground-response analyses. These parameters are:

- Small-strain shear modulus (G_{max});
- Shear modulus degradation curve with increased shear strains (i.e., G-γ curve); and
- Soil damping curve with increased shear strains (i.e., β-γ curve).

The small-strain shear modulus was estimated from in situ measurements of shear-wave velocity. The modulus degradation and damping curves were selected from published data for specific representative soil types; the following curves were used in our analyses:

- Fill – Seed and Idriss “sand average” curve (1970)
- Organic Clay– Vucetic and Dobry (1991), PI = 40

- Silt and Clay– Vucetic and Dobry (1991), PI = 30
- Sand/Glacial Till – EPRI Sand(1993)
- Bedrock – EPRI Rock (1993)

4.10 Minimum Permissible Level of Design Response Spectrum

The site class and associated code-specified acceleration-response spectrum are required to determine the minimum permissible levels of the design response spectrum derived from a site-specific study.

The minimum permissible level of the design spectrum is based on the Site Class without considering soil liquefaction. Site Class E was used for the WRY.

4.11 Ground Response Analyses Results

Total-Stress ground-response analyses were performed using the selected bedrock acceleration time series and dynamic soil and bedrock properties described above. All bedrock acceleration time series were applied as rock-outcrop motions in accordance with ASCE 7-10.

For each zone, one-dimensional analyses were performed to assess the sensitivity of the ground surface acceleration-response spectra to variable depth to rock and stiffness of the soil column. The sensitivity of the depth to rock was assessed by varying the soil column thickness; we selected two soil columns for each zone, corresponding to the highest (C1) and lowest (C2) depth to rock for each zone. The sensitivity of the soil stiffness was assessed by varying the best-estimate shear-wave velocities for all layers by 20 percent above and below the estimated average, yielding six different soil columns in total.

The 11 modified bedrock acceleration time series were assigned at the base of each of soil column, resulting in a suite of 66 acceleration-response spectra. This relatively high number of spectra allows the mean response spectrum to provide a reasonable estimate of the average ground response during the design earthquake event, capturing the variable earthquake motions and variable soil conditions for each zone.

Per section 1613.5.4 of the 2014 NYCBC, section 1613.3.4 of the 2015 NYSBC and section 21.3 of ASCE 7-10, these 66 calculated MCE_R spectra were multiplied by a factor of two-thirds to model the "Design Earthquake (DE)."

The mean total-stress spectrum for each soil column is presented in Appendices A to F for Zones 1 to 6, respectively.

4.12 Soil Liquefaction Potential Analyses

The NYCBC requires an evaluation of the liquefaction potential of noncohesive soils below the groundwater table and to a depth of 50 feet below the ground surface. The potential for soil liquefaction was evaluated using the procedure outlined by Youd et al (2001). The Youd et al. evaluation is considered to be among the state of practice procedures. This evaluation uses an empirical relationship between the earthquake demand, represented by the Cyclic Stress Ratio (CSR), and the soil's resistance to dynamic loading, represented by Cyclic Resistance Ratio (CRR). The CSR is correlated to the Peak Ground Acceleration (PGA) of the design earthquake event and the in situ soil stresses. The CRR is correlated to SPT N-values, or cone penetration resistance obtained from field tests at the site. The field N-values are converted to $(N_1)_{60CS}$ by applying correction factors for soil overburden pressure, hammer energy efficiency, and percent fines. Field CPT tip resistances are converted to $(q_{c1N})_{cs}$ by applying correction factors for soil overburden pressure and percent fines.

Liquefaction analyses results are also presented in Appendices A to F. All six zones have points with factors of safety of 1.0 or below, indicating susceptibility to liquefaction.

To further assess the effect of liquefaction, we performed effective-stress non-linear soil amplification analyses with D-MOD2000 for each zone. This approach models the generation of excess pore water pressure (EPWP) and allows a more accurate evaluation of the liquefaction potential during the MCE_R event, and of the ground surface acceleration response spectrum. The EPWP ratio is defined as the ratio of pore water pressures developed in the soil at a certain depth, to the soil's effective stress at that depth. A ratio of 1.0 (or 100 percent) implies that the pore water pressure is equal to the effective stress at a specific depth; when this occurs, the soil has reached complete liquefaction. EPWP ratios less than 1.0 (less than 100 percent) correspond to partial liquefaction. For each zone:

- We modeled two soil columns (C1 and C2) to consider the influence of different depth to rock.
- We used time series CHY033N and/or CHY094N for each soil column as the bedrock input motion, to obtain the most conservative estimates of excess pore water pressures. CHY033N and CHY094N are the time series that give the highest acceleration response spectra and EPWP.
- We performed total-stress analyses with SHAKE2000 and D-MOD2000 and calibrated the D-MOD2000 damping parameters so that the ground surface acceleration spectra estimated by the two computer codes reasonably match. Then we performed effective stress analyses with D-MOD2000 using the previously estimated damping parameters.
- We used published relationships that are available in the D-MOD2000 library to model the pore water generation, the soil degradation, the redistribution of the pore water pressures, and the pore water pressure dissipation during the MCER-level event.

The D-MOD2000 analyses results and recommended EPWP ratios to be considered for foundation design at each zone are presented in Appendices A through F. Note that the D-MOD2000 analyses yielded maximum EPWP ratios up to about 50 percent for the upper fill layer. The associated ground-surface seismic volumetric settlements varied from 0.1 to 0.5 inches.

5 Results

The results of our analyses for Zones 1 through 6 are summarized in Appendices A through F.

6 Limitations

The conclusions and recommendations provided in this report are based on current state of practice. Research is ongoing to develop empirical ground-motion attenuation relations, as well as reviewing information related to the seismicity in the project region. Future research may prove counter to the assumed conditions. In addition, the subsurface conditions were inferred from a limited number of historic borings. The recommendations provided are dependent upon one another and no recommendation should be followed independent of the others.

Any proposed changes in structures or their locations should be brought to Langan's attention as soon as possible so that we can determine whether such changes affect our recommendations. The information is assumed to represent conditions reported only at the locations indicated and at the time of investigation. If different conditions are encountered during construction, they should immediately be brought to Langan's attention for evaluation, as they may affect our recommendations.

This report has been prepared to assist the Owner, architect and structural engineer in the design process and is only applicable to the design of the specific project identified. The information in this report cannot be utilized or depended on by engineers or contractors who are involved in evaluations or designs of facilities (including underpinning, grouting, stabilization, etc.) on adjacent properties which are beyond the limits of that which is the specific subject of this report.

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End of Report

FIGURES

NOTES:
BASEMAP PROVIDED BY UNITED STATES GEOLOGICAL SURVEY, 2016

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Project	WEST RAIL YARD PLATFORM HUDSON YARDS MANHATTAN NEW YORK
Drawing Title	SITE LOCATION MAP
Project No.	170444101
Date	04/29/2017
Scale	1"=2000'
Drawn By	MG
Submission Date	04/29/2017
Drawing	1
Sheet	1 of 3

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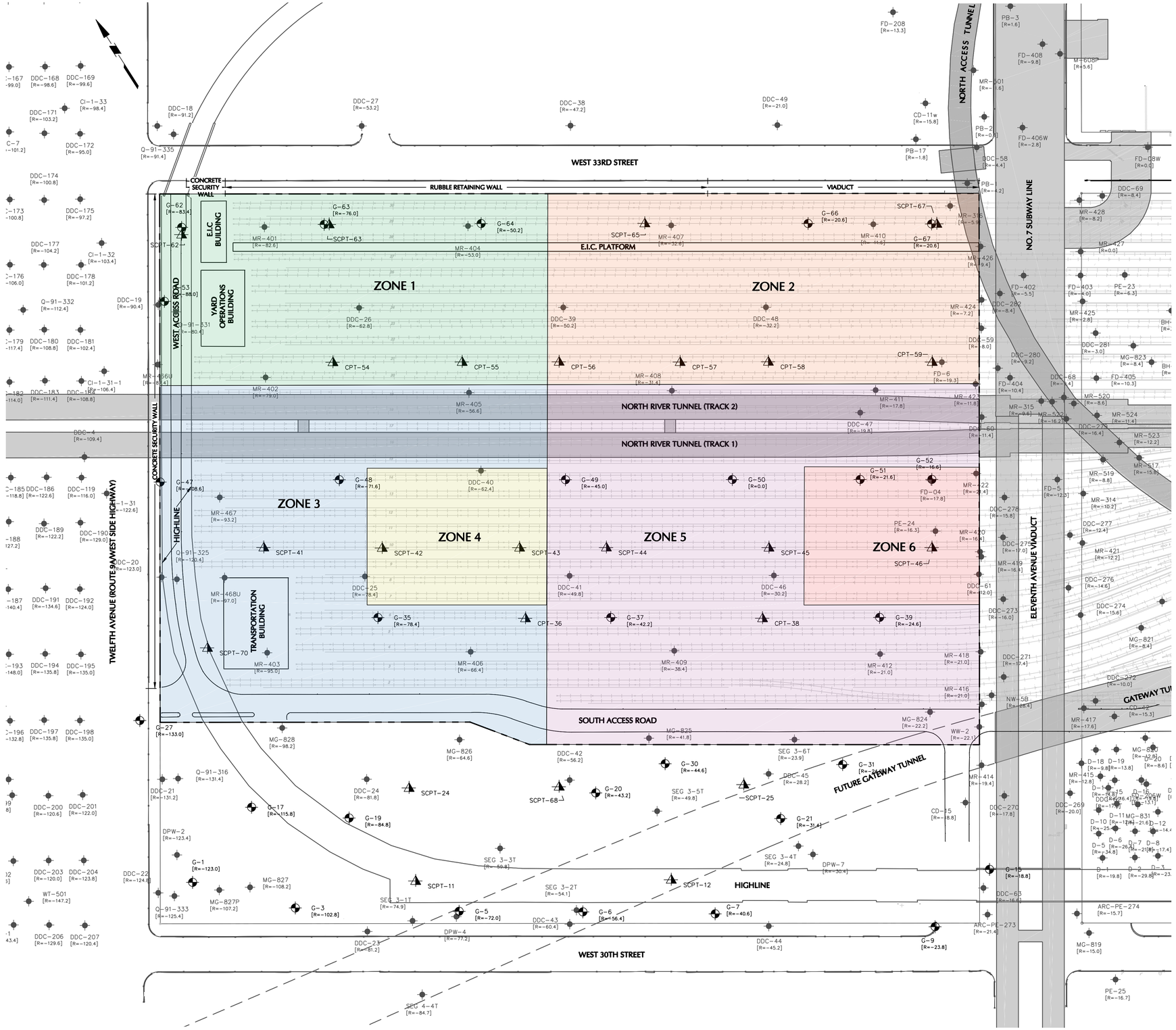

NOTES

1. EXISTING INFORMATION TAKEN FROM TOPOGRAPHIC AND BOUNDARY SURVEY PREPARED BY LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING AND LANDSCAPED ARCHITECTURE, D.P.C., DATED 4 APRIL 2004, AND LAST REVISED 13 MARCH 2017.
2. PROPOSED GATEWAY TUNNEL EXTENTS TAKEN FROM AMTRAK HUDSON YARDS PHASE II – WEST RAIL YARDS PROJECT LOCATION PLAN, X-011, DATED 30 DECEMBER 2016.
3. ELEVATIONS SHOWN HEREIN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) WHICH IS 1.681 FEET BELOW THE BOROUGH OF MANHATTAN DATUM (BPMD).

   DATUM CONVERSIONS

BPMD	= NAVD88 – 1.676'
NGVD29	= NAVD88 + 1.076'
NYCT	= NAVD88 + 98.423'
PENN	= NAVD88 + 298.351'

4. BORING, CPT AND TEST PIT LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
5. BORINGS DENOTED AS G-# WERE DRILLED BY WARREN GEORGE, INC BETWEEN 11 OCTOBER AND 17 DECEMBER 2004 UNDER THE FULL-TIME INSPECTION OF A LANGAN ENGINEER.
6. CONE PENETRATION TESTS DENOTED AS (S)CPT-# WERE PREFORMED BY CONETEC, INC. BETWEEN 11 OCTOBER AND 19 NOVEMBER 2004 UNDER THE FULL-TIME INSPECTION OF A LANGAN ENGINEER.
7. THIS PLAN WAS PRODUCED USING DATA FROM MULTIPLE SOURCES. LANGAN MAKES NO WARRANTEE AS TO THE ACCURACY OF DATA NOT SPECIFICALLY WITNESSED BY LANGAN PERSONNEL.

BORING AND TEST PIT SERIES INFORMATION

G	WRY PLATFORM, LANGAN 2004
HRP	HUDSON RIVER PARK, LANGAN 2001
D	HUDSON YARDS TOWER D, LANGAN 2013
BH	HUDSON YARDS ERY PLATFORM, LANGAN 2013
CD	NO. 7 SUBWAY EXTENSION, PB TEAM 2003
PE	NO. 7 SUBWAY EXTENSION, PB TEAM 2003
FD	NO. 7 SUBWAY EXTENSION, PB TEAM 2004
DDC	VARIOUS PROJECTS COMPILED BY NYCDDC
MR	MTA WEST SIDE YARDS, MRCE 1980-81
WT/TT	WESTWAY PROJECT, MRCE 1980-86
MG	MABSTOA GARAGE, MRCE 1986
Q	AS REPORTED FOR MTA WEST SIDE YARDS, MRCE 1980-81
M	AS REPORTED FOR MTA WEST SIDE YARDS, MRCE 1980-81
ARC	ARC TUNNEL, PB/STV 2008
PB	NORTH ACCESS TUNNEL (EMPIRE LINE), 1987
CI	NORTH RIVER POLLUTION CONTROL, 1968
SEG3	GATEWAY TUNNEL, PB/STV 2015
SEG4	GATEWAY TUNNEL, PB/STV 2015
NW/WW	GATEWAY TUNNEL, PB/STV 2015
DPW	PIER 36, NYC DEPT. OF GENERAL SERVICES, 1994

LEGEND

- G-# / ELEV (NAVD88) — LANGAN BORINGS 2004 APPROXIMATE ELEVATION (TOP OF ROCK)
- (S)CPT-# — LANGAN CONE PENETRATION TESTING 2004
- ##-# / ELEV (NAVD88) — APPROXIMATE ELEVATION (TOP OF ROCK) BORINGS BY OTHERS SEE LIST ABOVE
- APPROXIMATE LIMITS OF PROPOSED WEST RAIL YARD DEVELOPMENT

50 0 25 50
SCALE IN FEET

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Project

WEST RAIL YARD PLATFORM

HUDSON YARDS

MANHATTAN NEW YORK

Drawing Title

BORING AND CPT LOCATION PLAN

Project No. 170444101	Drawing No. 2
Date 3/24/2017	
Scale 1" = 50'	
Drawn By KM / Checked By MP	
Submission Date -	Sheet 2 of 3

PROJECT NO. 170444101 SUBMISSION DATE: ### LANGAN

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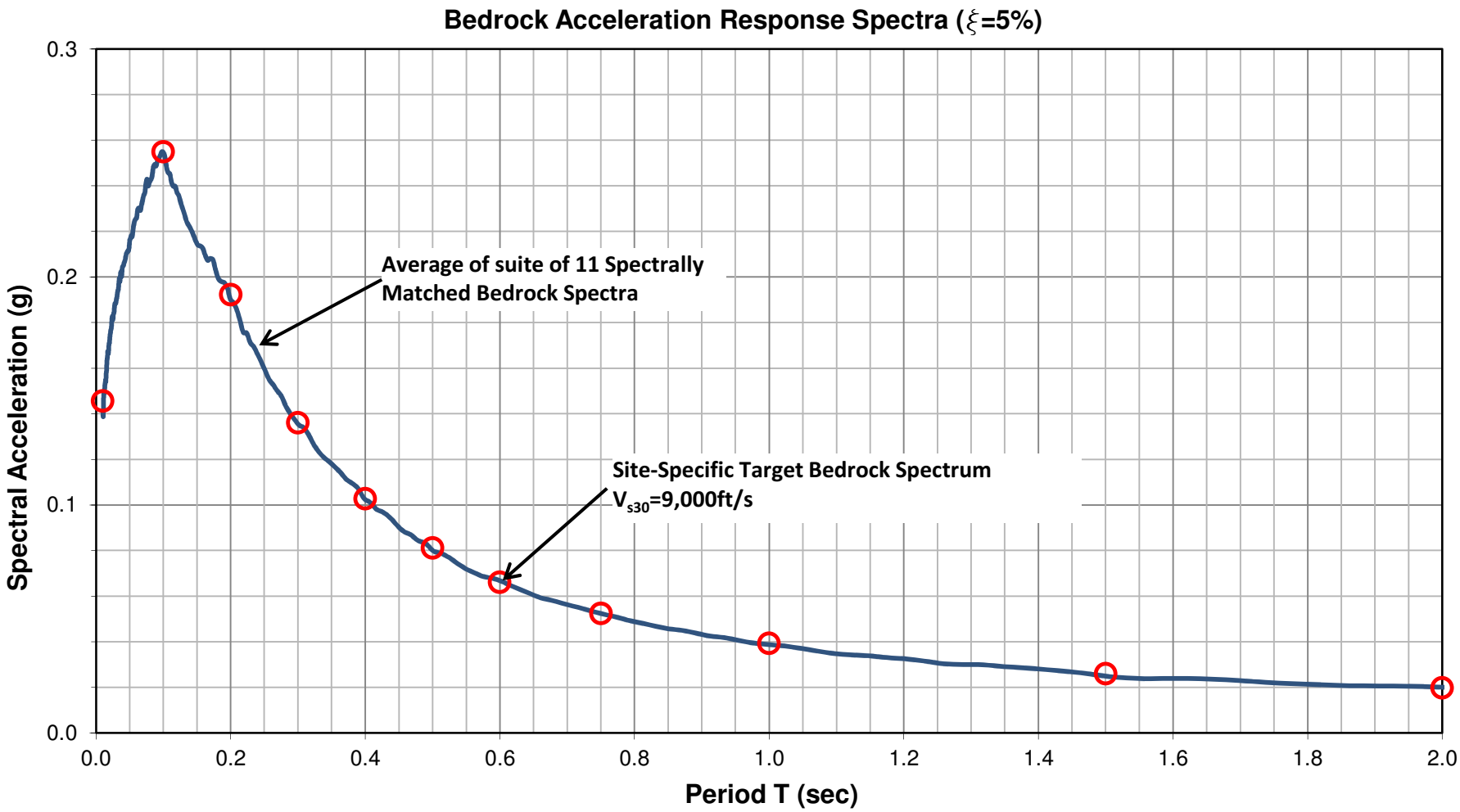

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Project No.	170444101
Date	4/29/2017
Scale	NTS
Drawn By	LY
Submission Date	4/29/2017
Drawing No.	3
	Sheet 3 of 3

APPENDIX A
ZONE 1 SITE-SPECIFIC SEISMIC STUDY

We performed a site-specific seismic analysis for Zone 1 of the platform. The key assumptions and results are summarized below.

1 Subsurface Conditions

The subsurface conditions at Zone 1 consist of fill, underlain by consecutive layers of organic clay, silty clay/clayey silt, glacial till and finally bedrock. The depth to bedrock varies from 59 to 95 feet, increasing east to west. We selected two soil columns (C1 and C2) to represent differing soil conditions and the variation in depth to bedrock of the zone. The soil layer thicknesses and shear wave velocities used for each column are listed in Table A-1.

The shear wave velocity of the rock is estimated to be about 9,000 feet per second (fps), based on cross-hole seismic testing and borehole suspension logging from nearby sites in the same rock formation.

Table A-1 – Summary of Assumed Soil Layer Thickness and Shear Wave Velocities

Column 1(C1) - Representative of west side of the zone Based on G-53, G-62, G-63, SCPT-62, SCPT-63			
Layer	**Average layer thickness (feet)**	**Range of measured/assumed shear wave velocities (fps)**	**Shear wave velocity used in model (fps)**
Fill	23	460 to 800	590
Organic Silty Clay	29	200 to 590	450
Silty Clay/Clayey Silt	38	250 to 900	650
Bedrock	N/A	9,000	9,000

Column 2(C2) - Representative of the east side of the zone Based on G-64, SCPT-62 , SCPT-63			
Layer	**Average layer thickness (feet)**	**Range of measured/assumed shear wave velocities (fps)**	**Shear wave velocity used in model (fps)**
Fill	23	460 to 800	590
Organic Silty Clay	22	200 to 590	470
Glacial Till	14	460 to 1,500	1,300
Bedrock	N/A	9,000	9,000

2 Site Class

We calculated weighted-average shear-wave velocities ($\overline{V}_s$) between about 500 and 530 fps. The site was preliminarily classified as Site Class E, as per 1613.5.2 of 2014 NYCBC, without consideration of soil liquefaction. The site was re-classified as Site Class F because of its potential for liquefaction using simplified methods, as described below.

3 Soil Liquefaction

Figure A-1 shows a plot of the factor of safety with depth using standard penetration test (SPT) and cone penetration test (CPT) results according to the Youd et al. (2001) procedures with the following parameters:

- An earthquake magnitude of 5.75 earthquake event, which is more conservative than the estimated mean deaggregation magnitude, but consistent with older studies (2008 USGS Seismic Hazard Maps and the 2016 NYCDOT Report);
- A PGA of 0.264 g. (In accordance with ASCE 7-10 section 21.5.3, the PGA was taken as the higher value determined from: 1) 80 percent of PGA for Site Class E (i.e. 0.8 * 0.33g); and 2) the site-specific PGA (0.12 g) determined from total-stress analyses.);
- A magnitude scaling factor (MSF) of 2.2, as per the Youd et al. 2001 recommendations.

The Youd et al. (2001) liquefaction analysis indicated potential liquefaction at depths between about 9 and 22 feet. We then performed DMOD2000 effective-stress nonlinear analyses and estimated maximum excess pore water pressure ratios as high as 50 percent at depths around 20 feet, corresponding to partial liquefaction (partial soil strength loss). Partial liquefaction should be considered in the analysis of lateral pile capacity, using the estimated excess pore water pressure ratios to reduce the soil strength. The excess pore water pressure ratios estimated from DMOD2000 analyses are presented in Figure A-2 and listed in Table A-2.

Table A-2 – Summary of Estimated Excess Pore Water Pressure Ratios

Depth (ft)	EPWP ratios	Recommended Design EPWPR
6 to 15	0% to 10%	10%
15 to 23	10% to 50%	50%
Below 23	0%	0%

We estimated about 0.1 to 0.5 inches of seismic-induced settlement for free-field conditions after the MCE_R-level event.

4 Design Acceleration Response Spectrum

The design spectrum recommendations based on the SHAKE2000 total-stress analyses are listed in Table A-3. The plot of the SHAKE2000 design spectra, and 80 percent of the Site Class E design spectrum (minimum allowed per ASCE 7-10) are presented in Figure A-3. The red triangles show our recommended design acceleration-response spectrum, which follows the 80% Site Class E line.

Table A-3 – Recommended Design Smooth Site-Specific spectrum, SA(g) for 5 percent damping

Period T (seconds)	Recommended Design Acceleration (g)
0.00	0.136
0.075	0.359
0.384	0.359
0.500	0.273
T>0.5	0.136/T

The recommended design spectrum satisfies the 2014 NYCBC, 2015 NYSBC and ASCE 7-10 requirements. A plot of the recommended design response spectrum containing a table with the spectral ordinates is presented on Figure A-4. The short-period and 1-second-period design accelerations obtained from the recommended design spectrum are as follows:

- SDS = 0.359 g at a period of 0.2 seconds
- SD1 = 0.136 g at a period of 1.0 second

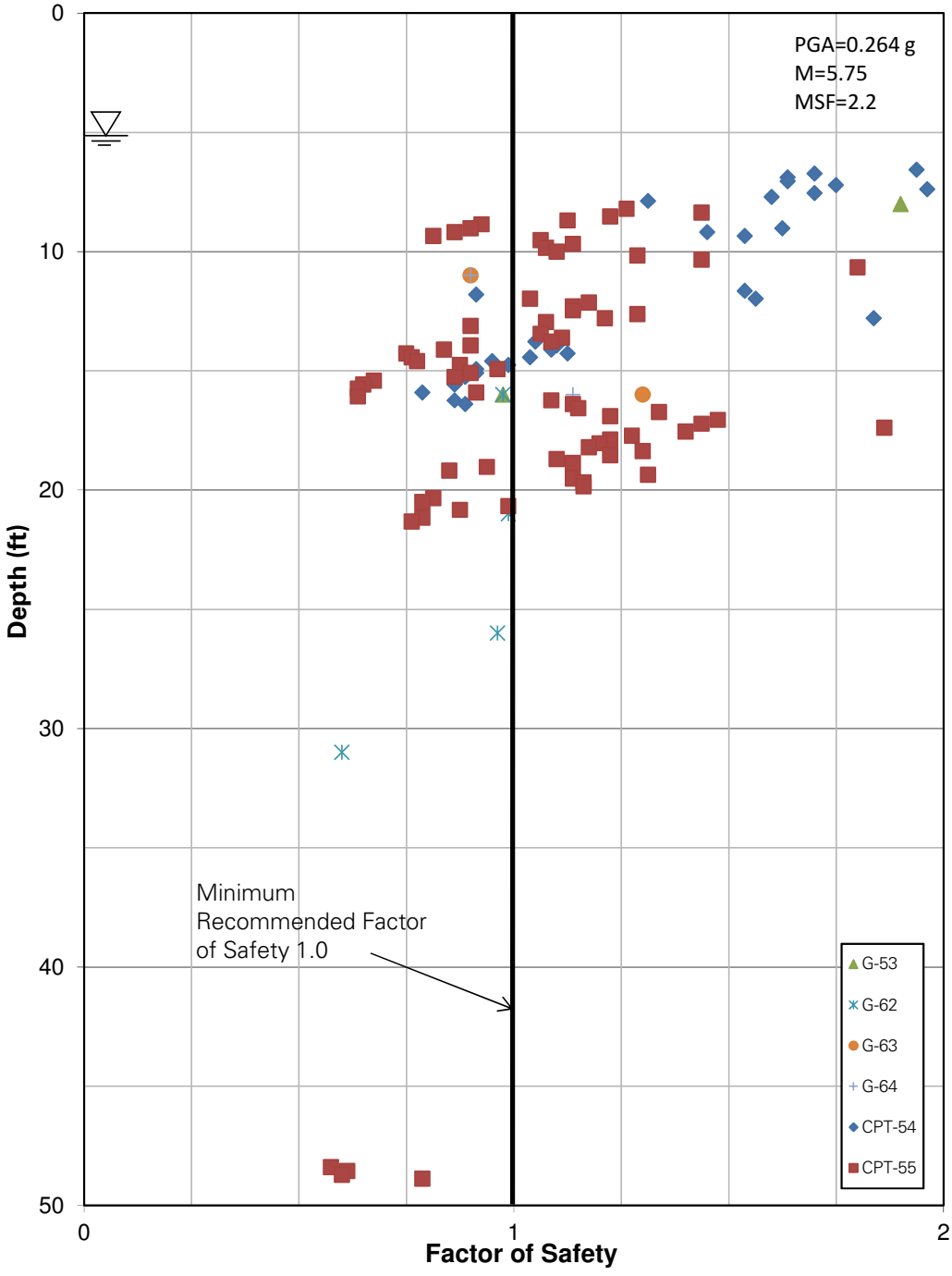
5 Seismic Design Category

For Risk Category I, II and III, the recommended design spectral accelerations obtained from our site-specific analysis result in a Seismic Design Category C, regardless of the structure's fundamental period of vibration. The results of the site-specific seismic study are listed in Table A-4.

Table A-4 – Recommended Seismic Design Parameters – Site-Specific Seismic Study

Design Parameter	Design Value
Site Class	E
Spectral Acceleration at short periods, S_{DS}	0.359 g
Spectral Acceleration at 1-sec period, S_{D1}	0.136 g
Site-Specific MCE_R-level PGA	0.12 g
Risk Category	I, II and III
Seismic Design Category, *SDC*	C

Zone 1 - Factor of Safety against Liquefaction
Simplified Procedure - Youd et al 2001



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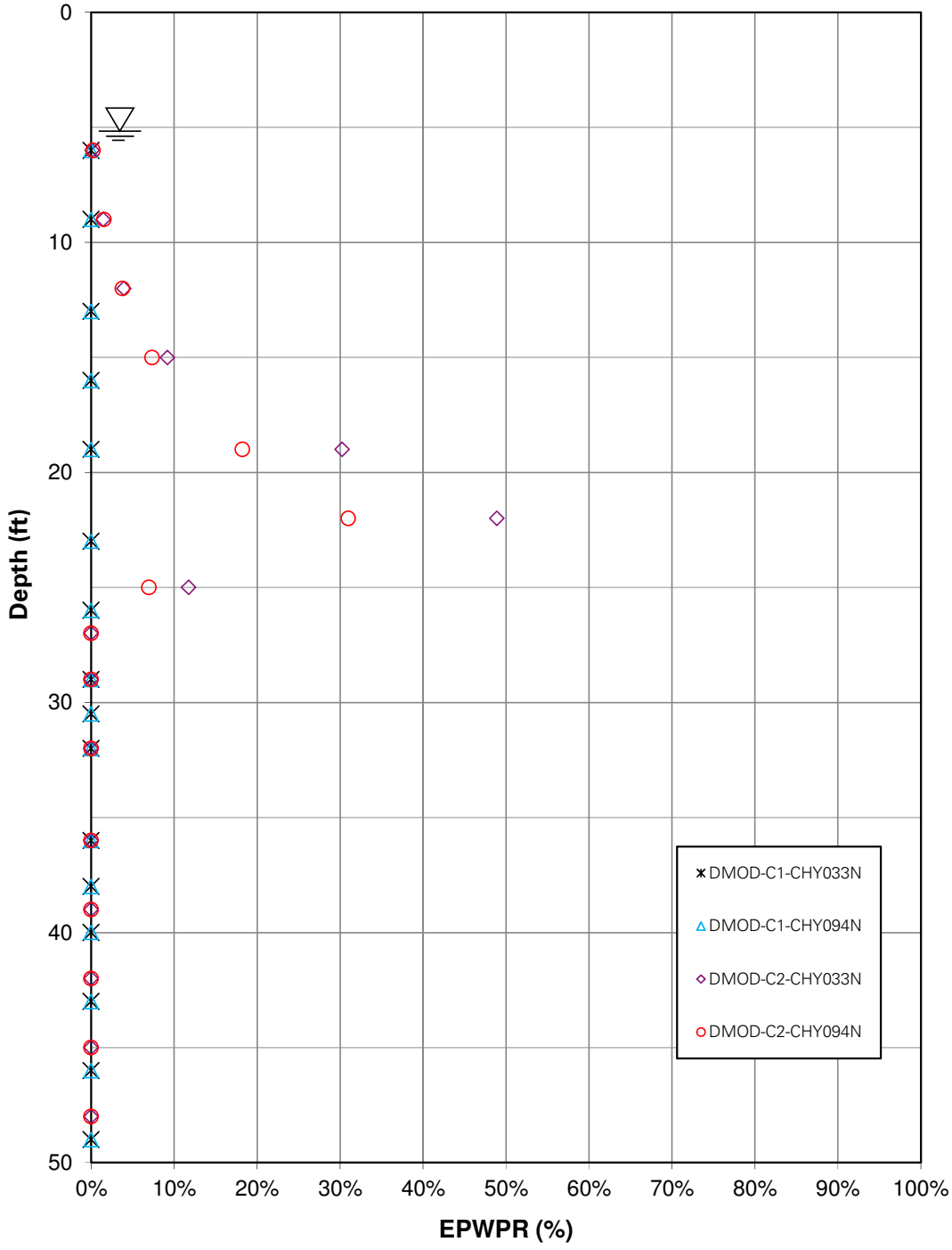
Project	WEST RAIL YARD PLATFORM HUDSON YARDS MANHATTAN NEW YORK
Drawing Title	ZONE 1 LIQUEFACTION ASSESSMENT (YOUD ET AL)
Project No.	170444101
Date	4/29/2017
Scale	NTS
Drawn By	LY
Submission Date	4/29/2017
Drawing No.	A-1
	Sheet 1 of 4

Zone 1 - Estimated Excess Pore Water Pressure Ratio



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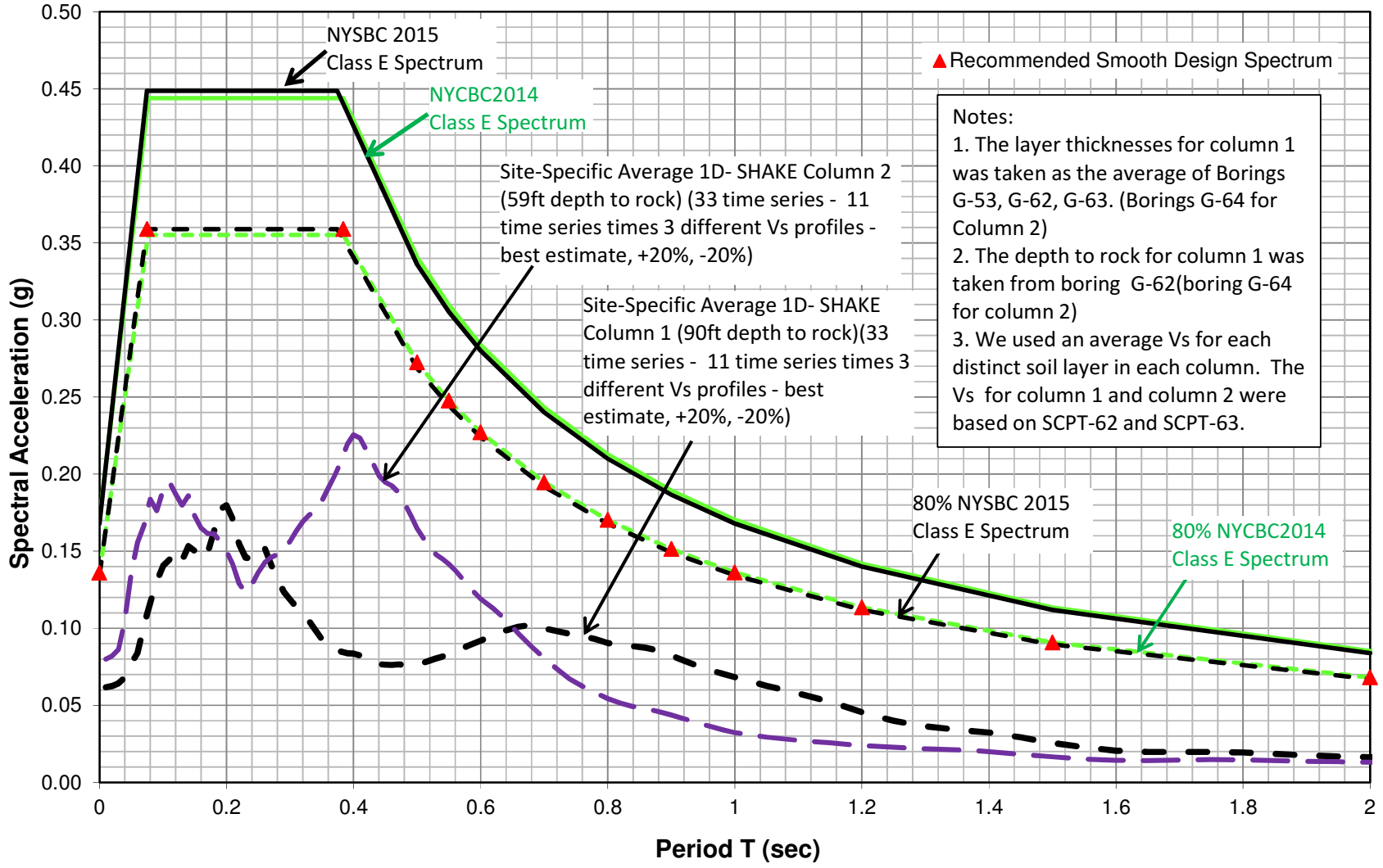
Project	WEST RAIL YARD PLATFORM HUDSON YARDS MANHATTAN NEW YORK
Drawing Title	ZONE 1 DMOD2000 EPWPR
Project No.	170444101
Date	4/29/2017
Scale	NTS
Drawn By	LY
Submission Date	4/29/2017
Drawing No.	A-2
	Sheet 2 of 4

Zone 1 - Ground Surface Design Acceleration Response Spectra (ξ=5%)



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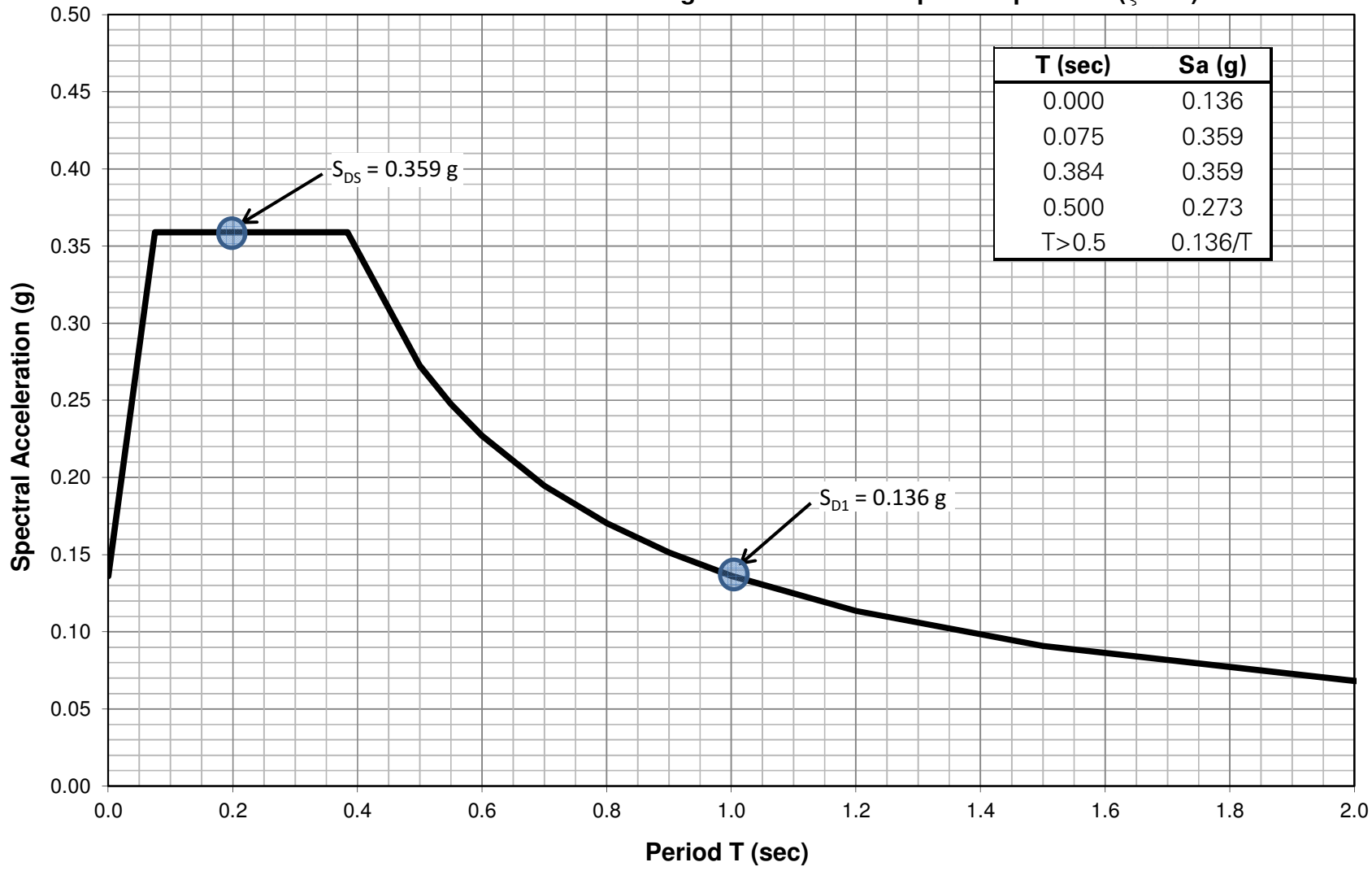
Drawing Title	ZONE 1 SITE-SPECIFIC DESIGN RESPONSE SPECTRA
Project No.	170444101
Date	4/29/2017
Scale	NTS
Drawn By	LY
Submission Date	4/29/2017
Drawing No.	A-3
	Sheet 3 of 4

Zone 1 - Recommended Surface Design Acceleration Response Spectrum (ξ=5%)



T (sec)	Sa (g)
0.000	0.136
0.075	0.359
0.384	0.359
0.500	0.273
T>0.5	0.136/T

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Project
WEST RAIL YARD PLATFORM
HUDSON YARDS
MANHATTAN NEW YORK

Drawing Title
ZONE 1 RECOMMENDED SITE-SPECIFIC DESIGN RESPONSE SPECTRUM

Project No. 170444101
Date 4/29/2017
Scale NTS
Drawn By LY
Submission Date 4/29/2017

Drawing No. A-4

APPENDIX B
ZONE 2 SITE-SPECIFIC SEISMIC STUDY

We performed a site-specific seismic analysis for Zone 2 of the platform. The key assumptions and results are summarized below.

1 Subsurface Conditions

The subsurface conditions at Zone 2 consist of fill, underlain by clay, glacial till, decomposed rock and finally bedrock. The depth to bedrock varies from 30 to 41 feet, increasing east to west. We selected two soil columns (C1 and C2) to represent differing soil conditions and the variation in depth to bedrock of the zone. The soil layer thicknesses and shear wave velocities used for each column are listed in Table B-1.

The shear wave velocity of the rock is estimated to be about 9,000 feet per second (fps), based on cross-hole seismic testing and borehole suspension logging from nearby sites in the same rock formation.

Table B-1 – Summary of Assumed Soil Layer Thickness and Shear Wave Velocities

Column 1(C1) - Representative of west side of the zone Based on G-66, SCPT-65 and SCPT-67			
Layer	**Average layer thickness (feet)**	**Range of measured/assumed shear wave velocities (fps)**	**Shear wave velocity used in model (fps)**
Fill	16	330 to 460	400
Clay	8	320 to 400	350
Sand/Glacial Till	17	450 to 1,660	950
Bedrock	N/A	9,000	9,000

Column 2(C2) - Representative of the east side of the zone Based on G-66, G-67, SCPT-65 and SCPT-67			
Layer	**Average layer thickness (feet)**	**Range of measured/assumed shear wave velocities (fps)**	**Shear wave velocity used in model (fps)**
Fill	16	330 to 460	400
Silt	8	320 to 400	520
Glacial Till/ Decomposed Rock	6	1,660	1,600
Bedrock	N/A	9,000	9,000

2 Site Class

We calculated weighted-average shear-wave velocities ($\overline{V}_s$) of about 450 fps. The site was preliminarily classified as Site Class E, as per 1613.5.2 of 2014 NYCBC, without consideration of soil liquefaction. The site was re-classified as Site Class F because of its potential for liquefaction using simplified methods, as described below.

3 Soil Liquefaction

Figure B-1 shows a plot of the factor of safety with depth using standard penetration test (SPT) and cone penetration test (CPT) results according to the Youd et al. (2001) procedure with the following parameters:

- An earthquake magnitude of 5.75 earthquake event, which is more conservative than the estimated mean deaggregation magnitude, but consistent with older studies (2008 USGS Seismic Hazard Maps and the 2016 NYCDOT Report);
- A PGA of 0.264 g. (In accordance with ASCE 7-10 section 21.5.3, the PGA was taken as the higher value determined from: 1) 80 percent of PGA for Site Class E (i.e. 0.8 * 0.33g); and 2) the site-specific PGA (0.15 g) determined from total-stress analyses.);
- A magnitude scaling factor (MSF) of 2.2, as per the Youd et al. 2001 recommendations.

The Youd et al. (2001) liquefaction analysis indicated potential liquefaction at depths between 10 and 45 feet. We then performed DMOD2000 effective-stress nonlinear analyses and estimated maximum excess pore water pressure ratios as high as 30 percent at depths around 12 feet, corresponding to partial liquefaction (partial soil strength loss). Partial liquefaction should be considered in the analysis of lateral pile capacity, using the estimated excess pore water pressure ratios to reduce the soil strength. The excess pore water pressure ratios estimated from DMOD2000 analyses are presented in Figure B-2 and listed in Table B-2.

Table B-2 – Summary of Estimated Excess Pore Water Pressure Ratios

Depth (ft)	EPWP ratios	Recommended Design EPWPR
6 to 16	0% to 30%	30%
below 16	0%	0%

We estimated about 0.1 to 0.3 inches of seismic-induced settlement for free-field conditions after the MCE_R-level event.

4 Design Acceleration Response Spectrum

The design spectrum recommendations based on the SHAKE2000 total-stress analyses are listed in Table B-3. The plot of the SHAKE2000 design spectra, and 80 percent of the Site Class E design spectrum (minimum allowed per the ASCE 7-10) are presented in Figure B-3. The red triangles show our recommended design acceleration-response spectrum, which follows the 80% Site Class E line.

Table A-3 – Recommended Design Smooth Site-Specific spectrum, SA(g) for 5 percent damping

Period T (seconds)	Recommended Design Acceleration (g)
0.00	0.136
0.075	0.359
0.384	0.359
0.500	0.273
T>0.5	0.136/T

The recommended design spectrum satisfies the 2014 NYCBC, 2015 NYSBC and ASCE 7-10 requirements. A plot of the recommended design response spectrum containing a table with the spectral ordinates is presented on Figure B-4. The short-period and 1 second period design accelerations obtained from the recommended design spectrum are as follows:

- SDS = 0.359 g at a period of 0.2 seconds
- SD1 = 0.136 g at a period of 1.0 second

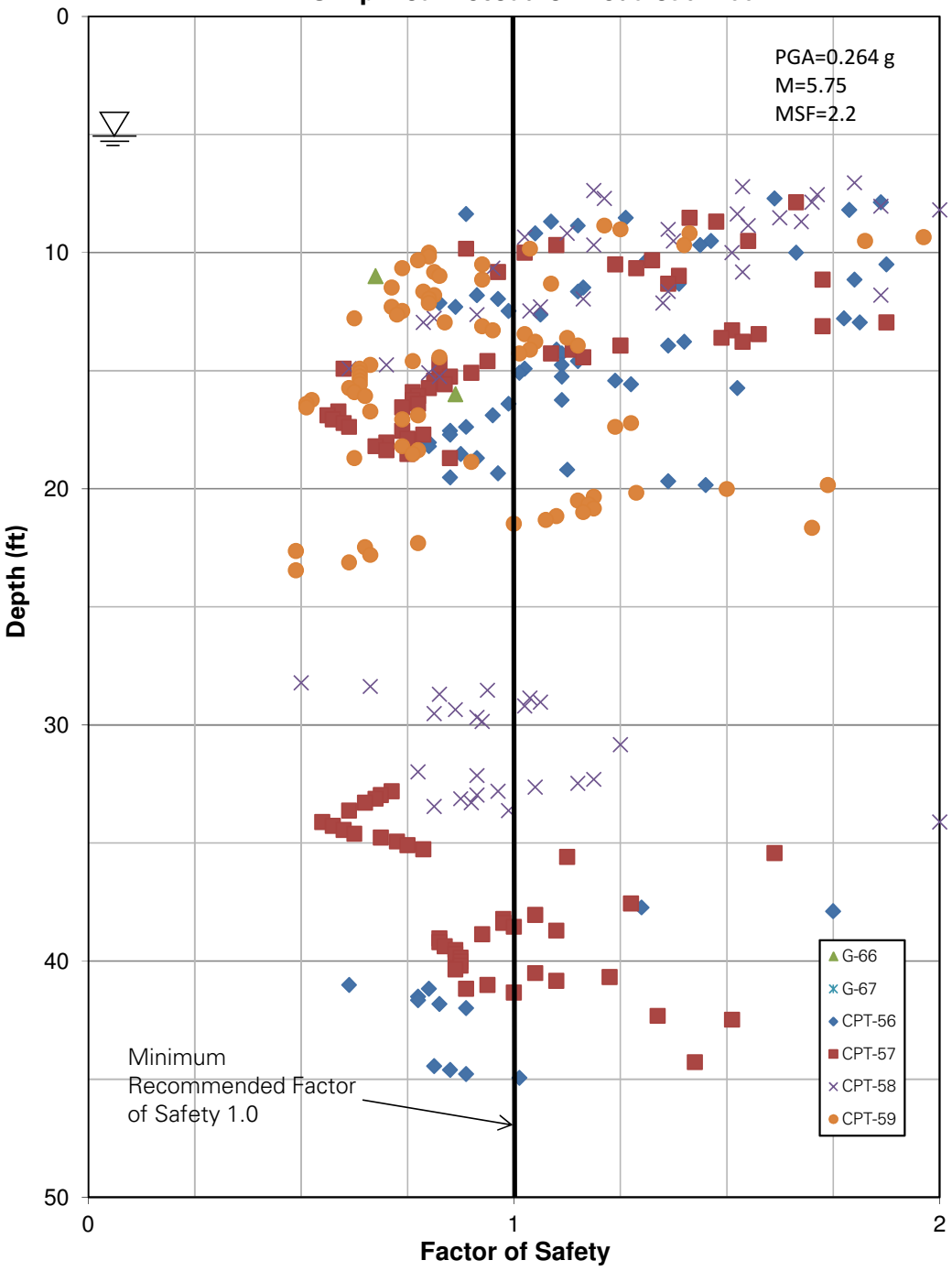
5 Seismic Design Category

For Risk Category I, II and III, the recommended design spectral accelerations obtained from our site-specific analysis result in a Seismic Design Category, regardless of the structure's fundamental period of vibration. The results of the site-specific seismic study are listed in Table B-4 below.

Table B-4 – Recommended Seismic Design Parameters – Site-Specific Seismic Study

Design Parameter	Design Value
Site Class	E
Spectral Acceleration at short periods, S_{DS}	0.359 g
Spectral Acceleration at 1-sec period, S_{D1}	0.136 g
Site-Specific MCE_R-level PGA	0.153 g
Risk Category	I, II and III
Seismic Design Category, *SDC*	C

Zone 2 - Factor of Safety against Liquefaction
Simplified Procedure - Youd et al 2001



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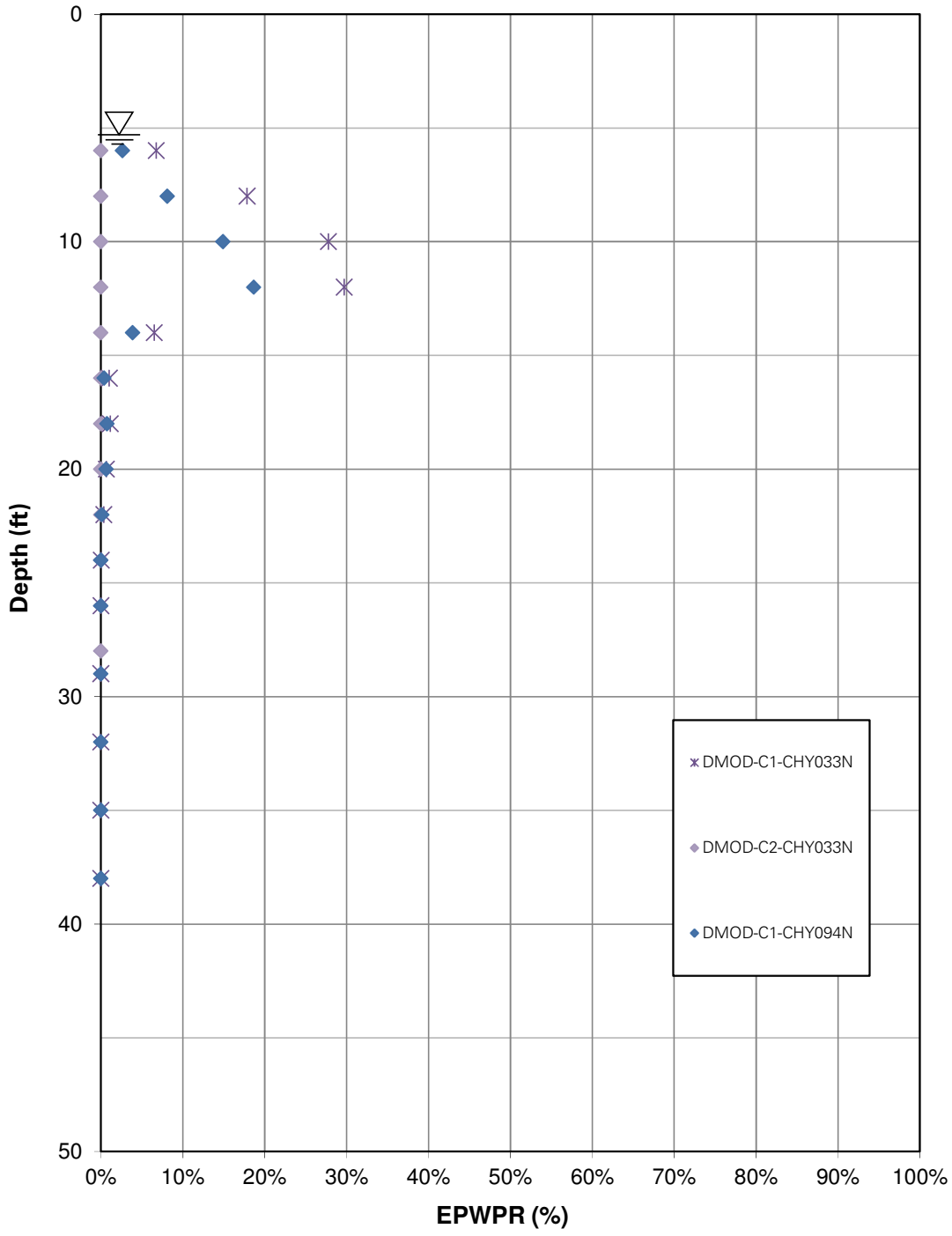
Drawing No.	B-1
	Sheet 1 of 4

Zone 2 - Estimated Excess Pore Water Pressure Ratio



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	Sheet 2 of 4