- 1		È≡	Pars	ons				BORING	NUM	BER:	CD-1	2		
			<b>E</b> Brind	kerho	off	1	CORING LOG	SHEET N	NUME	ER:_	1	c	of	4
			Quad			,	CORING LOG							
L		10 YEA	Doug	glas, I	nc.			PROJEC	T NU	MBE	R: <b>265</b> :	53A		
			No 7 Sul		line l	Extens	sion	LOCATION						
			l: Manha	ttan				COORD.		13,87				0
	CLIEN					0 D	••••	STN. NO				DFFSI	ET:	
- ⊩			TOR: Jer		Boring	g & Di	rilling	SURFAC		EV.:1	.08.0 f	eet		
			M. Blejuy					DATUM:						
			R: A. Za					OT 4 DT 5		- 10-	10.2		0.00	
					mond	drilli	ng with double core barrel	START [						
ŀ	RIG I	YPE.	CME 75					FINISH [					4:00	pm
١	0005	<b>D</b> 4 7		<b>-</b> •		NOT			GR		WATEF Water			Hole
- 1-			RREL DA	IA:		NOT	ES:				Depth	Cas Dep	oth	Depth
⊢	TYPE:							Date	Tim		(ft)	(ft	:)	(ft)
- 1-	CORE		E: 2"					6/2/03	11:30	am	5.4	25	.0	120.0
L	O.D.:													
	I.D.: 2	"												
Ī	CASIN	IG S	IZE: 4" (4.	.5")										
Ī		in)								,	DIS	CONTI	NUITY	DATA
1	<del>(</del>	(ft/min)	CORE RUN NO. AND DEPTH (ft)	(in)	(%)		DESCRIPTION AND REMARK (Lithology, Structure, Weatherin		ā	т				
1	(fee	Ë	A T	₽	\	RQD (%)	Continuity, Strength, Color, Grain S	g, Size)	\ \frac{\frac{1}{2}}{2}	STRENGTH	eg)			et)
1	Ŧ	RATE	I.R.	)VE	) K	SD	* - Denotes discontinuity along foli	ation	岸	EN	(o	<b>-</b> 5	a	<u>#</u>
1	DEPTH (feet)	NG	S S S	RECOVERY (in)	RECOVERY (%)	Ĭ Ř	, ,		WEATHERING	STF	ANGLE (deg)	,	,	DEPTH (feet)
١	_	CORING	ŏ₹	≅	<u> </u>		MB - Denotes mechanical brea	k	>		₹			
ŀ		0					Gray Quartz, Feldspar, Biotite SCHIST, s	slightly	II	R4	30	1.5	2	25.2
ŀ	-						weathered, sound to slightly fractured, me fracture spacing, strong rock, coarse to fin	oderate		10.			_	
ŀ	_		C-1	54	100	87	- Garnets 1/8" up to 3/16" throughout run	ne grained.			20 0	1.5 1.5	1.0	26.2 26.25
ŀ	_		25.0 - 29.5		100		- Garnets 1/8" up to 3/16" throughout run -Yellow rusted joints at 26.5' and 27.9'				0 30	1.5	1.0	26.3
ŀ	_						-Decomposed rock at 27.9' -Faster drilling rate at 26' to 27'				$35_{MR}$	1.5	1.0	26.5 27.1
L	- 30						Gray Quartz, Feldspar, Biotite SCHIST,	 slightly	II	R4	*40 <sub>MB</sub> 35 <sub>MB</sub>	-	-	27.5 27.8
L	_						weathered, sound, wide fracture spacing, c-f grained.	strong rock,			*40	1.5	2	27.9
			C-2	61	100	100	-Garnets 1/8" up to 3/16" present through	out the run.			35 *40 <sub>MB</sub>	1.5	2 -	27.95 28.4
I	_		29.5 - 34.6	61	100	100	-Yellowish rusted joint @ 34.1' and 33.2'				$ *40_{MR} $	-	-	28.9
ľ	-										*45 <sub>MB</sub> 40 <sub>MB</sub>	-	-	29.1 29.5
ı	_										$40_{\rm MR}$		-	31.8
ŀ	- 35						Gray Quartz, Feldspar, Biotite SCHIST, sweathered, sound moderate to fine fracture	slightly re spacing	II	R4	$30_{\mathrm{MB}}$ $10$	1.5	1 1	33.2- 34.1
ŀ	_						strong rock, coarse to fine grained.	e spacing,			30 <sub>MB</sub>	-	-	34.6
╁	-						-Wavy foliation at high angles -Red-yellow stains at 37.6' and 38.3'				25 <sub>MB</sub> 35 <sub>MB</sub>	-	-	36.1 36.4
ŀ	-						-Garnets up to 1/4" size				10	1.5	1.0	37.6
90/	-		C-3		100	100	-High angle incipient hairline fracture, sli weathered, cutting across joint at 40.4'	ghtly			5	1.5	1	38.3
8/21/06	<del>-</del> 40		34.6 - 44.2	115	100	100	-Hornblende Biotite SCHIST from 44' to	44.2'			$15_{MB}$	-	-	39
~1.GLB	-										20	3	1	40.4
											$0_{ m MB}$	_	_	41.5
MAIN											МВ			
CORING LOG NO 7NE.GPJ MAINL	-													
) 민	-						44.2'-48.1 light gray-white GRANITE, ur	weathered	I	R5	60	1.5	2	43.8 44.2_
0	<del>-</del> 45						sound, wide fracture spacing, very strong	, medium to			$30_{\mathrm{MB}}$	-	-	44.4_
၌	-						fine grained -Some core lost near 44.2' (Hornblende B	iotite Schist			$20_{\mathrm{MB}}$	_	_	46
힣	-						and top of Granite)							
SE P	-						48.1'-54.2' - Gray Quartz, Feldspar, Bioti	ь ССПСТ	II	R4	35 <sub>MB</sub>	-	_	47.3 48.1
$\sim$	-		C-4	118	98	98	wavy foliation, slightly weathered, slightly	y to sound	11	11/4	$0_{MB}$	-	-	
ġ			44.2 - 54.2				fracture, moderate fracture spacing, stron	g rock,			10	1.5	1	49.4

Boring No.

**CD-12** 

Sheet

4

of

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	IT: M	ITA				INSPEC	INSPECTOR: A. Zabala							
et) (ft/min) NO. ((in) (%)						DECODIDEION AND DEMARKS			DISCONTINUITY DATA					
DEPTH (feet)	CORING RATE (#//	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	ANGLE (deg)	٦٢	Ja	DEPTH (feet)		
-						coarse to fine grained -At 54' light gray-white PEGMATITE -High angle incipient fracture, slightly weathered			30 <sub>MB</sub> 35 <sub>MB</sub>	- -	-	49.6 49.9 -		
- -						cuts across joint 53.9'			$\begin{array}{c} 30_{\mathrm{MB}} \\ 40_{\mathrm{MB}} \end{array}$	-	-	51.8 <sup>-</sup> 52.5 <sub>-</sub>		
- 55						54.2'-59.5' and 62.4'-63.2', light Gray-White GRANITE unweathered, sound, wide fracture	I	R5	50 <sub>MB</sub> 45 <sub>MB</sub>	3	1.0	53.9 <sup>-</sup> 54.2_		
- -						spacing, very strong, medium to fine grained.			$0_{ m MB}$	-	-	55.7 <b>-</b>		
-		C-5	116	100	100				0 <sub>MB</sub>	3	1	57.3 <sub>-</sub> 58.8 -		
<del></del> 60		54.2 - 63.9	110	100	100	59.5' to 62.4' - SCHIST intercalated with Granitic material 63.2' to 63.9' - Dark gray SCHISTOSE GNEISS	I	R4	$\begin{array}{c} 60_{\mathrm{MB}} \\ 30_{\mathrm{MB}} \\ 40_{\mathrm{MB}} \end{array}$	- -	- -	59.1 59.7		
- - -						63.9' to 63.9 - Dark gray Hornblende Biotite SCHIS' 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		R4	30 <sub>MB</sub> 30 <sub>MB</sub> 0 *50	- 3 1.5	- 1 2	61 62.1 62.6 - 63.4 -		
65 - -						\-\frace \(\frac{Garnet (1/16" to 1/8") at 61.6 to 62.1'}{63.9' to 68.3' - Dark gray Hornblende Biotite SCHIST, unweathered, sound, moderate to wide fracture, strong rock, coarse to fine grained	1	17.4	35 <sub>MB</sub> 20 <sub>MB</sub>	-	-	63.9 64 — -		
- - — 70		C-6 63.9 - 73.9	120	100	100	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	, II	R5	25 40 20 <sub>MB</sub> 20	1.5 3 - 1.5	2 2 - 1.0	67 - 68.3 - 69 - 69.8		
- -						70' to 71.2' - Gray Mica SCHIST -Rusted Joint @ 69.8' and 73.5' -Occasional high angle to vertical healed hairline fractures			$0_{\mathrm{MB}}$	- -	-	71.1 71.8 -		
- 75 -						73.8' to 78.0' - Light gray-white GRANITE, unweathered, sound, wide fracture spacing, very strong, medium to fine grained.	I	R5	$\begin{array}{c} 40_{\rm MB} \\ 10 \\ 0_{\rm MB} \\ 55_{\rm MB} \\ 35_{\rm MB} \end{array}$	1.5 - -	1	72.9 7 73.5 - 73.9 74.8 7 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	$30_{\mathrm{MB}} \\ 20_{\mathrm{MB}} \\ 25_{\mathrm{MB}} \\ *40_{\mathrm{MB}} \\ *45$	- - - 3	- - - 2	78.2 78.6 - 78.7 78.8 78.9 -		
-									$10_{\mathrm{MB}} \\ 25_{\mathrm{MB}} \\ *40 \\ *40_{\mathrm{MB}}$	1.5	2	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 <sub>MB</sub>	3.0	1.0	81.4 - 81.9		
						Boring No.	CD-	12	Shee	t 2	of	4		

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CL	LIEN	T: M	ITA				INSPEC	TOR:	A. Za	bala			
		(ft/min)					DESCRIPTION AND DEMARKS			DIS	CONTI	VUITY	DATA
; ; ; ;	DEPTH (feet)	CORING RATE (ft/r	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	ANGLE (deg)	٦٢	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 <sub>MB</sub> *40 <sub>MB</sub> *40 *35 <sub>MB</sub> *40 <sub>MB</sub> *40 <sub>MB</sub> *40 <sub>MB</sub>	1.5	- 1 - - -	82.2 82.5 - 83.1 83.6 - 83.8 - 85.5 85.9 - 86.2
-	95		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  Extremely fractured, extremely close to close fracture spacing along foliations planes from 97.4' to 97.9'		R4 R1 R3	$^{*40}_{\mathrm{MB}}$ $^{*40}$ $^{*40}$ $^{*40}$ $^{*40}$ $^{*40}$ $^{*40}$ $^{*40}$ $^{*50}$ $^{*50}$ $^{*50}$ $^{*50}$ $^{MB}$ $^{*40}$ $^{MB}$ $^{*25}$	1 1.5 - 1.5 - 1.5 1 - - - - - 1.5 1 - - - - - - - - - - - - - - - - - -	- 1 1 2 - 1 1 - - - - 1	86.9— 87.4 - 87.9 - 88.2 - 88.3 - 89 - 89.2 - 89.6 - 89.7 - 90.1 - 90.15 - 90.2 - 90.7
- 1 - 1	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	$egin{array}{c} 0 \\ *40_{ ext{MB}} \\ *40 \\ 20_{ ext{MB}} \\ *40 \\ *40 \\ \end{array}$	1.5 - 1.5 - 1.5 1.5	1 - 1 - 2 2	90.8 - 91 - 91.2 92.1 - 93.2 93.8 -
-	105		C-10 99.0 - 109.0	120	100	100	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  103.8' to 105' and 106.7' to 107.5' - Dark gray Hornblende Biotite GNEISS	II	R5	*40 *40 *40 10 50 10 <sub>MB</sub> 10 <sub>MB</sub> 0 <sub>MB</sub> 30 <sub>MB</sub> 60 <sub>MB</sub> 35 <sub>MB</sub>	1.5 0.5 3 3 - - - - 1.5	4 2 2 2 - - - - 2	93.9 94.1 94.4 94.9 95.5 95.6 95.7 96 96.1 96.2 96.6
NE.GPJ MAINLI~1.GLB	110		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 <sub>MB</sub> 50 75 <sub>MB</sub> *45 *45 *45 *45 *45 40 40 0 <sub>MB</sub> *45, o	1.5 - 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	2 - 2 - 4 4 4 4 4 4 4 4 4 4 - -	97.1 97.3— 97.4 97.5 - 97.6 - 97.7 97.8 - 97.9 98.1 - 98.3— 98.6 98.7 - 99
NO. 7 CORIN							Light gray-white GRANITE, slightly weathered, wide  Boring No.	II CD-	R5	*40 <sub>MB</sub> *40 *45 30	1.5 1.5 1.5 1.5	- 1 1 1	99.8 100.1 100.2 - 101.4

AN	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER: CD-12 SHEET NUMBER: \_

PROJECT NUMBER: 26553A

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

CLIEN	NT: M	ΙΤΑ					INSPECT	OR:	A. Za	bala			
	(nir					•				DIS	CONTI	VUITY	DATA
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 Si.  * - Denotes discontinuity along foliat  MB - Denotes mechanical break	, ze) ion	WEATHERING	STRENGTH	ANGLE (deg)	٦	Гр	DEPTH (feet)
- - - - - 125 -		C-12 119.0 - 123.9	59	100	100	fracture spacing, sound, very strong, mediugrained Except 120.5' to 121.3' - Gray Mica SCHIS-From 120.7' to 121' - possible micro-shear foliation, extremely thin, extremely close to close spacing  E.O.B. at 123.9'.	ST rs along			55 <sub>MB</sub> 30 <sub>MB</sub> 20 <sub>MB</sub> *35 <sub>MB</sub> 30 <sub>MB</sub> *35 <sub>MB</sub> 0 <sub>MB</sub> 0 <sub>MB</sub> 0 <sub>MB</sub> 35 <sub>MB</sub> 50 <sub>MB</sub> *40		- - - - - - - - - 1	102.1 102.8 - 102.9 103.1 - 103.4 - 103.9 105.2 - 106.5 108.1 108.3 - 108.9 109 - 109.1
- - 130 - -										$^{*40}_{15_{\mathrm{MB}}}_{45}_{45}_{10_{\mathrm{MB}}}_{0_{\mathrm{MB}}}_{0-30_{\mathrm{MB}}}_{25_{\mathrm{MB}}}_{*45_{\mathrm{MB}}}_{0_{\mathrm{MB}}}_{50}$	3 - 1.5 - - - - - 1.5	1 - 1 - - - - 1	109.3 - 109.8 - 110.5 110.9 - 111.2 111.3 - 112.9 113.3 - 114
- - 135 - - - -										$\begin{array}{c} 10_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ 0\text{-}30_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ 15_{\mathrm{MB}} \\ 0_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ 40_{\mathrm{MB}} \\ 35_{\mathrm{MB}} \\ 50_{\mathrm{MB}} \end{array}$		-	115.1 - 115.6 _ 115.9 _ 116.1 - 117.5 _ 118.1 - 118.9 _ 119 _ 119.5 -
- 140 - - -										0 <sub>MB</sub> *45 *45 *45 <sub>MB</sub> 35 <sub>MB</sub> 30 <sub>MB</sub> 20 <sub>MB</sub> 20 <sub>MB</sub>	1.5	- 4 - - - - -	120.4 120.9 121 121.3 123.6 123.6 123.8
NO. 7 CORING LOG NO_7NE.GPJ MAINLI-~1.GLB 8/21/06													-
NO. 7 CORING LOG NO						Rorin	ıg No.	<b>CD-</b> 1	12	Shee	t 4	of	4

		<b>₽</b> F	ar	sor	าร															
		_				off	R	<b>∩</b> R	INI	CI	$\mathbf{O}$	G	SHEET	NUMBER	R:1_	of _	2			
							ט	Olv	7114	G L		G								
	YEAR	s <sub>®</sub>	)οι	ıgla	as,	Inc.							PROJEC	T NUMB	ER: <b>265</b> 5	3A				
						line Ext	ension	1												
			nh	atta	an												5.0			
			_																	
	BORING LOG   BORING LOG   SHEET NUMBER: 1																			
													DATUM:							
																	•			
					Ko <sup>*</sup>	tary Was	h													
KIG I	IPE.				Sn.	lit Spaan Sh	olby Tr	ov Tube Pieton Grab Core Barr			oro Barrol	FINISH				y piii				
Typo/S	Symbo				Эр									GINOUI		1	Hole			
	уннос	<u>ا</u> ر						_			7		Data	Time	Depth	Depth	Depth			
													Date	Time	(11)	(11)	(11)			
			4.5							-		3"								
ı ~				_																
		-																		
Hamm	er Fa		24'	<u>'</u>		30"	1.0	). (O.D.	)	2.9	937" (2	.938")								
	(D				SAI	MPLE		SOIL	(Blows	/6 in.)										
eet)		s/ft)	一				0/6	6/12	12/10	19/24	REC.	1								
J. H	일	Slow:				et)	0/6	0/12	12/10	10/24	(in.)	FI	ELD CLAS	SSIFICAT	ION ANI	O REMAR	RKS			
EPT	\ \AP!	[ 일 일 의		ZER.	g	H (#		(	CORING	3										
	<u> </u>	ASIN	YPE	UME	YMB	EPT														
-	T. Sp. ∵ 4.	OO	Ĺ	z	S		(in.)	(in.)	%	(in.)	%		Hand Augar	ad Matarial	-					
-			┨										0' to 1' - Cor	ncrete						
-	* 1		┨										l' to 4' - L1g Gravel	ht brown, y	ellowish Sa	nd with litt	le .			
L			-			0.0 - 6.0		Hand		Auger			4' to 6' - Dar	k brown, co	parse to fine	grained Sa	ınd,			
-	* 5		-										some coarse	to medium	Gravel, tra	ce organics				
- 5	****		1														_			
_	1 D Z		1																	
	* 4		S	1		60-80	WOH	WOH	WOH	1	12				e m-f Grave	el, little Silt	, very			
L				1		0.0 0.0	,,,	" 011	" 011	1	12		10050, 1110150	•			_			
L	4 Ou 5																_			
10	₩.																			
	, L		]	,		100 120	١ ,	2	1	2	20		S-2A (10") s	same as abo	ve.	CCAND 1				
	1 A 4		18	2		10.0 - 12.0	2	3	1	2	20									
	*		1														•			
			1														•			
	<b>₩</b> Δ		1														•			
<u> </u>	. L		1														AND,			
5			S	3		15.0 - 17.0	4	3	3	6	20		trace c-f Gra	ivel, little S	ilty Clay, lo	oose.				
-	- ا		┨									<b> </b>	3-3D (6 ) L	igiii giay Si			)se. 			
<u>.</u>  -																				
-			┨														-			
_ 20		-	-										Doub harren	Ciles CL AX	i7 little on f	Cand high	DI -			
<u> </u>  -			S	4		20.0 - 22.0	2	2	2	3	19			Sifty CLA	Y, little m-i	Sand, nign	ΡΙ,			
<u></u>	s																			
2			1																	
}			1									L								
												Bori	na No	CD-15	Shee	t 1 c	of 2			

		<u></u> P	ars	son	S								BORING NUMBER: CD-15								
	Brinckerhoff Quade &								RIN	GI	0	G	SHEET NUMBER: 2 of 2								
<u> </u>	100 YEAR					Inc.			contir	nued)			PROJECT NUMBER: 26553A								
PROJ	ECT:	No 7	Su	ıbv	vay	line Exte	ension	ì					CONTRACTOR: Jersey Boring & Drilling								
LOCA	TION:	Maı	nha	atta	an								DRILLER: M. Blejuwas								
CLIEN	NT: M	TA											INSPECTOR: A. Zabala								
	(1)				SAI	MPLE		SOIL	(Blows	/6 in.)											
DEPTH (feet)	GRAPHIC LOG	ws/ft)						6/12	12/18	18/24	REC. (in.)	1									
PTH	√PHI(	G (Mir		监	占	l (feel		(	CORING	 Э	()	FIE	ELD CLASSIFICATION AND REMARKS								
	GR.	CASING (Blows/ft) CORING (Min./ft)	TYPE	NUMBER	SYMBOL	DEPTH (feet)	RUN REC. REC. L>4" RQD D														
	  • .•	00	S	5	တ	24.0 - 26.0	(in.)	(in.)	3	(in.)	% 24	Elev.	S-5B (6") Gray m-f SAND, some Silt, loose, dry.								
ţ			S	6		26.0 - 28.0	2	3	1	6	22		S-6A (11") Gray m-f SAND, some Silt, very loose, trace Grayel, very loose								
-	600	-				20.0 20.0	_					28.5	trace Gravel, very loose. S-6B (11") Reddish SILT, m-f Sand, very loose, dry								
- 30 -												,,	Roller bit refusal and begin coring at 28.5'.								
-																					
+																					
- 35													<u> </u>								
-																					
+																					
<del>-</del> 40													-								
<b>†</b>																					
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<del>-</del> 45													-								
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7.GLB																					
~ MAININI - 55																					
ਣੂ ਰੂ – 55													_								
HI N																					
ž v o																					
RING!																					
<u></u>			<u> </u>									l Bori	ing No. CD-15 Sheet 2 of 2								

		Pars	ons				BORING	NUM	BER	: CD-1	5		
	₹≣	\overline 🖺 Brind	kerho	off		CORING LOG	SHEET I	NUMB	ER:	1	0	of	4
		Quad				CORING LOG							
	10 YEA	Doug	glas, I	nc.			PROJEC	T NU	MBE	R: <b>265</b>	53A		
PROJ	ECT:	No 7 Sul	bway	line l	Extens	sion	LOCATION	ON: L	IRR	(West	Side '	Yard`	)
		l: Manha					COORD.	N: 2	13,87	74.0 I	E: 983	,206.	0
CLIEN							STN. NC				OFFSI	ET:	
CONT	RAC	TOR: Jer	sey B	Boring	g & D1	rilling	SURFAC	E ELI	EV.:	108.0 f	eet		
DRILL	ER:	M. Blejuv	was				DATUM:						
INSPE	ECTO	)R: <b>A. Z</b> a	bala										
DRILL	ING	METHOD	): Dia	mond	drilli	ng with double core barrel	START [	DATE:	6/2/	03	ΓIME:	8:00	am
RIG T	YPE:	CME 75					FINISH [	DATE:	6/6/	03	ΓIME:	4:00	pm
								GR	OUNI	DWATER	R DATA		
CORE	BAI	RREL DA	TA:		NOT	ES:				Water	Cas		Hole
TYPE	: NX						Date	Tim	e	Depth (ft)	Dep (ft		Depth (ft)
CORE	SIZ	E: 2"											
O.D.:	3"												
I.D.: 2	2"												
CASIN	NG S	IZE: 4" (4.	.5")										
	Jin)									DIS	CONTI	NUITY	DATA
et)	(ff/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	_	DESCRIPTION AND REMARK (Lithology, Structure, Weatherin		S S	王				
DEPTH (feet)	RATE	몽붑	ıR∀	l Y.	(%)	Continuity, Strength, Color, Grain	Size)	WEATHERING	STRENGTH	ANGLE (deg)			DEPTH (feet)
	¾	E R DE	OVE		RQD	* - Denotes discontinuity along foli	ation	I	R E	Щ	'n	a	<u>;</u>
吕		S O	SEC	O U	12	MB - Denotes mechanical brea		WE/	ST	19			
	CORING	04	L LE	12		MD - Denotes mechanical brea	ĸ			⋖			
						Dark gray SCHIST, slightly weathered, s fractured, strong rock, coarse to fine grain	lightly	II	R4	40	1.5	2	28.6
<del>-</del> 30		C-1	42	100	69	Intercalated with light gray fine-medium	grained			70 30	1.5 1.5	2 2	28.7 29.1
-		28.5 - 32.0		100		GRANOFELS, faintly foliated (about 80 Granofels)	% of rock is			35 *50	1.5 1.5	2	29.3 29.6
-						-Yellow rusted joints @ 28.7' (reddish), 2	27.3' and	l <sub>II</sub>	R4	$60_{MB}$	-	-	30 -
-						29.6'; 28.5' - 28.6'- quartz vein. No wall contact at 31.8'	1	111	1.4	30 <sub>MB</sub> 55	1.5	2	30.5
-						Intercalated dark gray SCHIST and light	gray fine			40	4	1	31.3
<del>-</del> 35						fine-medium grained, light gray GRANC slightly weathered, sound, wide fracture	spacing,			$0_{ m MB} \\ 90$	1.5	- 1	31.8 31.9-
						strong rock, coarse to fine grained -Rusty coated joint walls: 34.2' - reddish	-			$0_{MR}$	Roller		32
		C-2 32.0 - 41.3	112	100	96	joint, 36.5' - green with Pyrite joint, 37.9'				*40 <sub>MB</sub> *55 <sub>MB</sub>	-	-	32.8 33.5
		32.0 - 41.3				joint				25	3	1	34.2
										$^{*40}_{MB}$	3.0	- 1	35.1 - 36.2
-										*60	1.5	1	36.6
<del>-</del> 40										45 <sub>MB</sub> *60	1.5	2	36.9_ 37.3
-										60-10	1.5	2	37.9
<u>_</u>						Gray SCHIST, slightly weathered, sound to wide fracture spacing, strong rock, coa	, moderate arse to fine	II	R4	30 *60	1.5 1.5	1 1	39.9 40.5
- 1/21/0						grained				*60 <sub>MB</sub>	-	-	40.9
B B L						Except 43.8' to 45.4", light gray-white PI -Garnets 1/8" along the run	EGMATTE			35 <sub>MB</sub> *70	1.5	- 1	41.3
ণ - 45						- Reddish coated joint walls at 42.0', 43.7	", 47.2',			40	3	2	42 43.1
		C-3				48.3'				$40_{\mathrm{MB}} \\ 90_{\mathrm{MB}}$	-	_	43.3
Ž		41.3 - 51.2	119	100	97					$\begin{array}{c} 60_{\mathrm{MB}} \\ 0 \end{array}$	1.5	1.0	43.5
E.G.										$50_{\mathrm{MB}}$	-	-	43.8
06 NO 7NE.GPJ MAINL										$0_{\mathrm{MB}}$ $20$	1.5	2	44.5 45.4
N										20	1.5	2	45.5
<u>ූ</u> – 50										*50 <sub>MB</sub> *40 <sub>MB</sub>	-	- -	46 - 46.7
NING -						Gray SCHIST, slightly weathered, sound	wide to	II	R4	*40	1.5	1.0	47.2
202						very wide fracture spacing, strong rock, or				55 *70 <sub>MB</sub>	1.5	1.0	48.3 49.1
<b>ġ</b>  -						fine grained		I		*70 <sub>MB</sub>	-	-	49.5

Boring No.

**CD-15** 

Sheet 1

of **4** 

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

DESCRIPTION AND REMARKS (Lithbidgy, Structure, Weathering, Cooking (Lithbidgy, Structure, Weathering, Cooking, Cooki	CLIEN	NT: N	ITA				INSPEC	TOR:	A. Za	bala			
Bar		min)					DECODIDATION AND DEMARKS			DIS	CONTI	NUITY	DATA
C-4	DEPTH (feet)	RATE	CORE RUN NO AND DEPTH (ft	RECOVERY (in	RECOVERY (%	RQD (%)	(Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)  * - Denotes discontinuity along foliation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
Gray SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained.  C-5	- - -		C-4 51.2 - 61.2	120	100	100	-Garnets 1/8" along the run			$ \begin{array}{c} 40_{\mathrm{MB}} \\ 40 \\ 0 \\ *70_{\mathrm{MB}} \\ 0_{\mathrm{MB}} \\ *60_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ 40 \\ 20_{\mathrm{MB}} \\ 40_{\mathrm{MB}} \\ *60_{\mathrm{MB}} \end{array} $	1.5 1.0 - - - 1.5 -	2 2 2.0	50.6 51 - 51.2 52.2 53.8 - 54.8 55.2 - 55.4 55.8 56.4 - 57.2
To be a seried of the series of the series of the grained, and series of the series of the series of the grained, wavy foliation and fracture spacing, strong rock, coarse to fine grained, wavy foliation and fractures to series 1/8" along the run and 71.2" and 71.9" are green stains 71.7" and from 81' to 81.2" and from 81' to 81.2" are green stains 71.7" and 71.9" are green stains 71.0" are green stains 71.0" are green stains	- - - - 65 -		C-5 61.2 - 71.2	120	100	91	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'	3	R4	*65 <sub>MB</sub> *80 <sub>MB</sub> *70 <sub>MB</sub> *70 <sub>MB</sub> 65 <sub>MB</sub> 35 <sub>MB</sub> *70 <sub>MB</sub> 60-90 <sub>MB</sub> 40 <sub>MB</sub>	- - - - - - - - 1.5	3.0	58.6 59.9 60.6 61.2 61.4 62.2 62.6 64 65.5
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	- - 70 - - -						fracture spacing, strong rock, coarse to fine grained, wavy foliation -Garnets 1/8" along the run	II	R4	*65 0 <sub>MB</sub> 55 <sub>MB</sub> 35 *75 30 <sub>MB</sub> 65 <sub>MB</sub> 70	1.5 - 1.5 1.5 - - 1.5	3.0 - 2 1.0 - 1.0	67.4 68.5 - 69.7 - 69.9 70 - 70.1 - 70.3 71.2 -
			C-6 71.2 - 81.2	120	100	95	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'			*60 10 <sub>MB</sub> 0-50 <sub>MB</sub> *70 35 <sub>MB</sub> *55 <sub>MB</sub> 20 50 85 50	1.5 - 1.5 - 1.5 1.5 1.5	1.0 - 1.0 - 2 1.0 1.0	72.7 - 73.5 - 75.4 - 76.3 - 76.8 - 77.2 - 77.2 - 77.8 - 77.8
	- - -						fracture spacing, strong rock, coarse to fine grained,	II	R4	$40_{\rm MB} \\ *40_{\rm MB} \\ *60_{\rm MB} \\ 30-40$	1.5	1.0	78.4 – 79.9 81.2 – - 84
	85 - - -		C-7 81.2 - 90.5	112	100	98				$\begin{array}{c} 40_{\rm MB} \\ 20_{\rm MB} \\ *60_{\rm MB} \\ 0\text{-}30_{\rm MB} \end{array}$	1.5	- - -	84.6 84.9 - 85.3 _ 85.7 -

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	IT: M	<b>TA</b>				INSPEC	TOR:	A. Za	bala			
	(ft/min)					DESCRIPTION AND DEMARKS			DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#/r	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	ANGLE (deg)	٦٢	Ja	DEPTH (feet)
- 90 -						Gray SCHIST, unweathered, sound, very wide	I	R4	0 *65 45 30 <sub>MB</sub>	1.5 1.5 1.5	1.0 1.0 1.0	88.3 - 89.3 - 90 90.5 -
- - -						fracture spacing, strong rock, coarse to fine grained -PEGMATITE Material from 98.3' to 98.7' congruent to foliation -Possible micro-shears at 98.2' to 98.3'	İ		*65 <sub>MB</sub>	-	-	90.9 -
95 - - -		C-8 90.5 - 100.0	114	100	100				$^{*50_{\rm MB}}_{40_{\rm MB}}$ $^{70_{\rm MB}}_{40_{\rm MB}}$ $^{20_{\rm MB}}$			95.3 95.8 96.3 96.5 98.2
_ 100 -						Gray SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained	II	R4	60 <sub>MB</sub>	-	-	100
- - - 105 -		C-9 100.0 - 109.6	115	100	92	(100'-103.8'), except PEGMATITE material from 101.1' to 101.5' congruent with wavy foliation  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	0 <sub>MB</sub> *50 <sub>MB</sub> *40 *30 *30 *30 50 10 <sub>MB</sub> 30 <sub>MB</sub>	1.5 1.5 1.5 1.5 1.5 1.5	1.0 2.0 1.0 1.0 1.0	101.3 101.7 102.5 - 103.1 103.4 - 103.6 103.8 104.8 - 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				
- - - 115		C-10 109.6 - 118.8	110	100	100	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	$^{*65_{\rm MB}}_{0_{\rm MB}}$ $^{0_{\rm MB}}_{40_{\rm MB}}$ $^{60_{\rm MB}}$	-		112 - 113.3 113.8 114.3
-  -  -									50 <sub>MB</sub>	-	-	116.8 <sup>-</sup> 117.9 <sup>-</sup>
- - 115 - - - - - 120 -		C-11 118.8 - 125.0	74	100	100	Gray SCHIST, slightly weathered, sound, wide fracture spacing, strong rock, coarse to fine grained. Foliation is + or - 65 degrees along the run.	II	R4	$55_{\mathrm{MB}} \\ 30_{\mathrm{MB}} \\ *60_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ *70_{\mathrm{MB}}$			118.4 – 118.8 119.5 – 120.2 – 121.4 –
-		123.0				Boring No.	CD-	<u> </u> 15	Shee	t 3	of	4

DR	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

SHEET NUMBER:\_

4 of 4

PROJECT NUMBER: 26553A

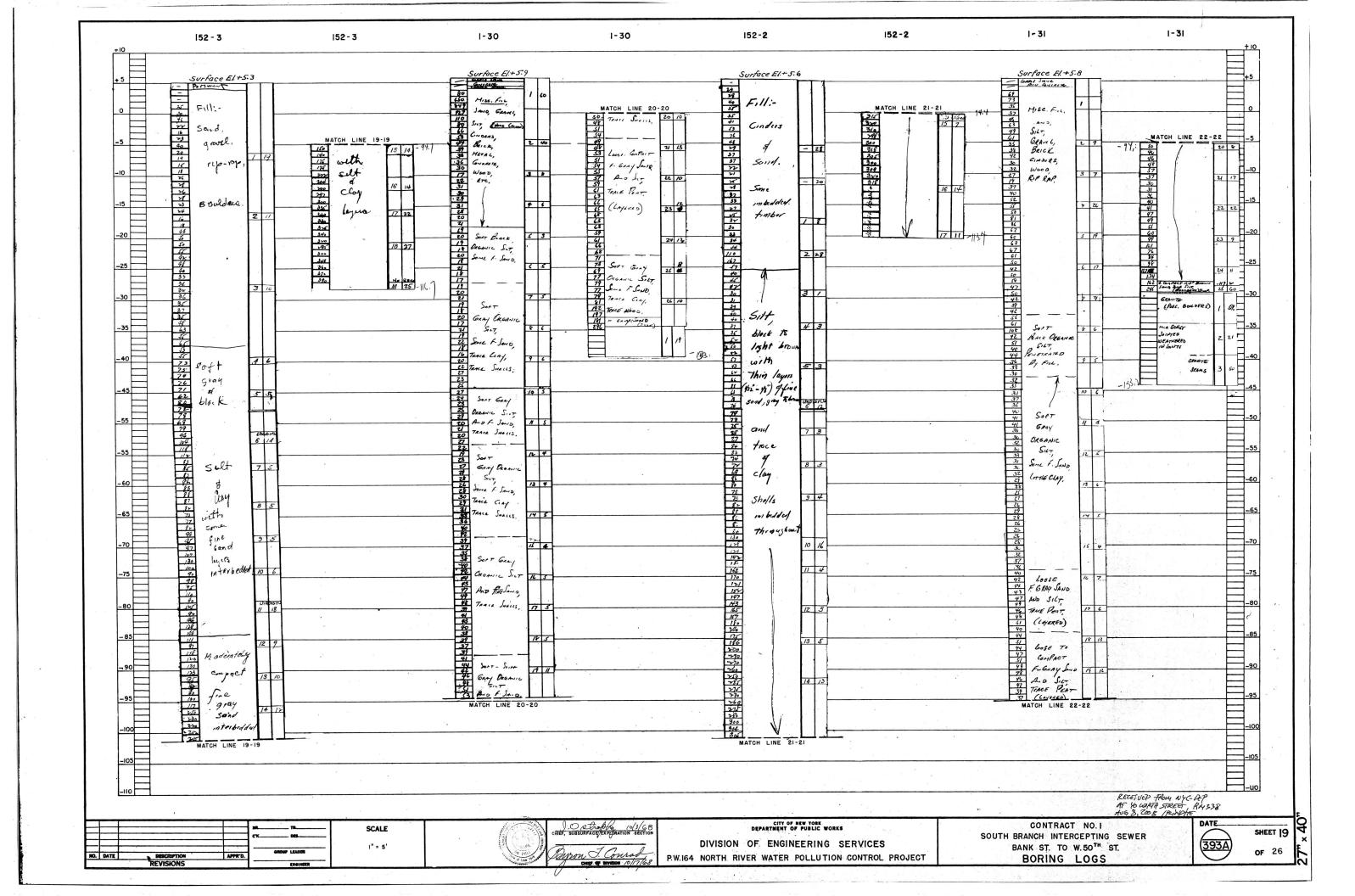
BORING NUMBER: CD-15

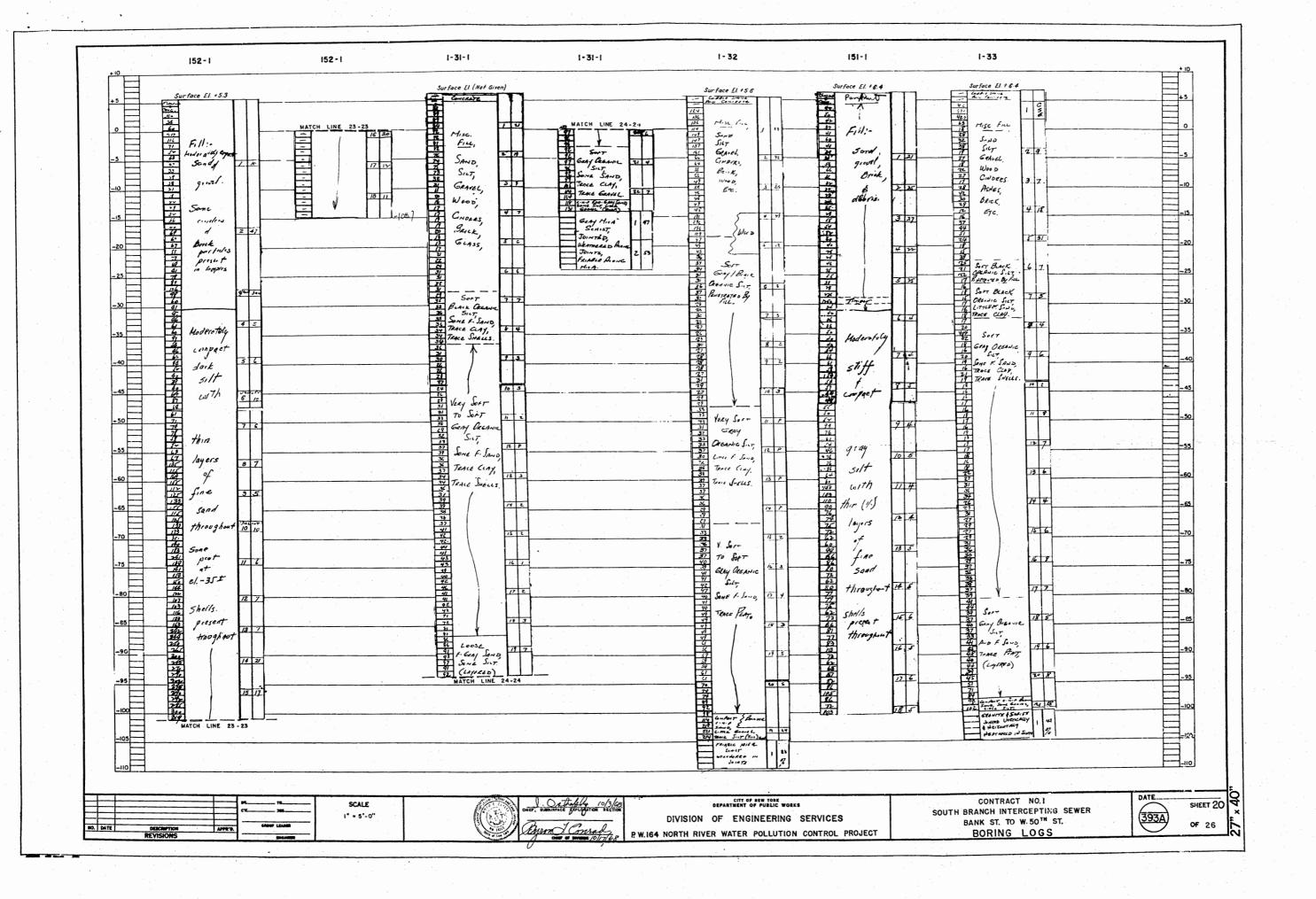
PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

CL	.IEN	T: <b>M</b>	TA					INSPEC <sup>-</sup>	ΓOR:	A. Za	bala			
		(uir									DIS	CONTI	NUITY	DATA
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	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 S  * - Denotes discontinuity along folia  MB - Denotes mechanical breal	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
- - 1	25						E.O.B. at 125'.				20 <sub>MB</sub> *65 <sub>MB</sub> 10 <sub>MB</sub>	- - -	- - -	123.7 - 124.4 125 -
- - - - 1 -	30													- - - - -
- - - 1 -	35													- - -
- - - 1 -	40													- - - -
Ł	45													- - - -
E.GPJ MAINL ~1.GLB 8/2	50													-
NO. 7 CORING LOG NO 7NE.GPJ MAINLI~1.GLB 8/21/06	55													-
<b>ــــ</b>					I	I	Bori	ng No.	CD-1	15	Shee	t 4	of	4





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Project   HUDSON YARDS - TOWER D   170019115   4918   4
Licration  Lirra west side yard, Terra Firma, Manhattan NY  Datiling Company  Warren George, Inc.  Drilling Equipment  Acker AD2 Truck-Mounted Drill Rig  Size and Type of Bir 2-7/8" Diameter Tricone Roller Bit  Casing Diameter (in)  3&4"-Inner-Diameter Flush Steel Casing Performent Safety  Weight (lbs)  2"-Outer-Diameter Split Spoon/ NX Core Barrel  Sampler Description  Sample Description  Elevation and Datum  Approx. 13.5 feet BPMD  Date Finished  6/19/13  6/20/13  Food Depth  Soft  Tompletion Depth  Soft  Soft  Tompletion Depth  Soft  Tompletion Depth  Tompletio
Date Started    Date Started   Date Finished   G/20/13
Completion Depth   Soft   So
Acker AD2 Truck-Mounted Drill Rig  Size and Type of Bit 2-7/8" Diameter Tricone Roller Bit Casing Dameter (in) 3&4"-Inner-Diameter Flush Steel Casing Casing Hammer Safety  Weight (lbs) 140  Drop (in) 30  Sampler Hammer Safety  Sampler Description  Sample Description  Sample Description  Acker AD2 Truck-Mounted Drill Rig Size and Type of Bit 2-7/8" Diameter Tricone Roller Bit  Number of Samples  This completion
2-7/8" Diameter Tricone Roller Bit  Casing Diameter (in)  3&4"-Inner-Diameter Flush Steel Casing  Weight (lbs)  140  Drop (in)  Sampler Hammer  Safety  Sampler Hammer  Safety  Sample Description  Sample Des
384"-Inner-Diameter Flush Steel Casing   24   Water Level (it.)   2   1
Casing Hammer Safety    Sampler   2"-Outer-Diameter Split Spoon/ NX Core Barrel
2"-Outer-Diameter Split Spoon/ NX Core Barrel Sampler Hammer Safety    Inspecting Engineer
Safety 140 30 Corrie Campbell  Sample Description  Sample Descript
+13.5
+13.5
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
6/19/13 8:49PM: Begin to drill through concrete slab using 5-7/8" diameter roller bit. Add drilling fluid to tub
8:49PM: Begin to drill through concrete slab using 5-7/8" diameter roller bit. Add drilling fluid to tub
5-7/8" diameter roller bit. Add drilling fluid to tub
Brown wash.
Brown, medium- to fine-grained, SAND,  Brown, medium- to fine-grained, SAND,  Take S-1(SS): 5' to 7'
Brown, medium- to fine-grained, SAND, some silt, trace gravel [FILL] [Class 7]  0.0  Take S-1(SS): 5' to 7'
9:30PM Install 9' of 4" diameter
casing: 0' to 9'
Drill to 10'. Smooth drilling.
Brown wash
Brown, medium- to fine-grained, silty  Take S-2(SS): 10' to 12'
SAND, trace gravei
Install 5' of casing: 9' to 14'
Drill to 15'. Smooth drilling.
Gray, medium- to fine-grained, SAND, some silt, some gravel 0.0 Take S-3(SS): 15' to 17'
Gray, medium- to fine-grained, SAND, some silt, some gravel [FILL] [Class 7]  Gray, medium- to fine-grained, SAND, some silt, some gravel [FILL] [Class 7]  Take S-3(SS): 15' to 17'
8 11   3.5   -
Brown wash, turned black at 17'. Smooth drilling
Class

Log of Boring D-01 Sheet of 2 3 Project Project No. East **HUDSON YARDS - TOWER D** 170019115 4918 Elevation and Datum Location North LIRR west side yard, Terra Firma, Manhattan NY Approx. 13.5 feet BPMD 4066 Sample Data Building Code Coring (min) PID Readin (ppm) Remarks Elev (ft) N-Value (Blows/ft) Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 20 WOR Gray, SILT, some sand, trace mica, Take S-4(SS): 20' to 22' organic odor WOR .Template TEMPLATE. SS S-4 24 [ML] [Class 6] 0.0 21 WOR Class WOR 22 23 -10.0 Report: Log - LANGAN 24 Drill to 25' Smooth drilling. Gray wash 25 Take S-5(SS): 25' to 27' Brown, medium- to fine-grained, SAND, some silt, some gravel, trace mica 12 SS [SM] [Class 3a] 0.0 9 21 Class 7/18/2013 10:53:00 AM 21 27 Take S-6(SS): 27' to 29' 4 Brown, medium- to fine-grained SAND. some decomposed mica schist, trace silt SS 28 [SP-SM] [Class 3b] 12 29 Drill to 30'. Smooth drilling. -16.0 Brown wash COMIDATAINY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ Attempt to take S-7(SS): 30' Gray, decomposed MICA SCHIST, with 50/2' S-7 SS 2 50/2" to 32' sand Refusal at 30'-2" [Class 1d] 31 Install casing: 14' to 24' 32 Class 11:30PM: Drillers stop 33 6/20/13 3:20PM: Drill to 35'. Brown wash. Slow drilling. Rig 34 chatter 30' to 35'. Very slow drilling at 35' -21.5 35 7:00 Gray, medium- to fine-grained, quartz-36 feldspar- muscovite- biotite- garnet MICA 3:52PM RQD=49"/60" =82% REC=56"/60" =93% SCHIST, close to moderate fracture Begin core C-1: 35' to 40' 4:00 NX CORE BARREI spacing, slightly weathered, with fractures 37 dipping approximately 0 degrees and 30 4:11PM: Complete C-1 7 3:00 degrees from horizontal [Class 1b] Good quality 38 5:00 39 4:00 Class 2:00 Gray, medium- to fine-grained, quartzfeldspar- muscovite- biotite- garnet MICA REC=60"/60" =100% SCHIST, close to moderate fracture 2:00 Begin core C-2: 40' to 45' spacing, moderately weathered, with fractures dipping approximately 45 RQD=31"/60" 4:40PM: Complete C-2 degrees and 0 degrees from horizontal 3:00 [Class 1b] Fair quality 43 3:00 3:00

D-01 Log of Boring Sheet of 3 3 Project Project No. East **HUDSON YARDS - TOWER D** 170019115 4918 Location Elevation and Datum North Approx. 13.5 feet BPMD 4066 LIRR west side yard, Terra Firma, Manhattan NY Sample Data Building Code PID Reading (ppm) Coring (min) Remarks Elev. (ft) Depth N-Value (Blows/ft) Recov. (in) Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 45 NLANGAN. COMIDATAINYIDATA1/170019115/ENGINEERING DATANGEOTECHNICAL/GINTLOGS\170019115 HUDSON YARDS. GPJ ... 7/18/2013 10:53:02 AM ... Report. Log - LANGAN ... Template TEMPLATE. GDT Gray, medium- to fine-grained, feldspar-schistic QUARTZITE, close to moderate fracture spacing, slightly weathered, with 46 4:53PM REC=60"/60" =100% RQD=58"/60" =97% Begin core C-3: 45' to 50' NX CORE BARREI fractures dipping approximately 0 degrees and 45 degrees from horizontal Class 5:08pm: Complete C-3 [Class 1a] Excellent quality 48 49 5:15PM to 5:44PM: Boring was backfilled. Drillers cleaned up around -36.5 50 End of Boring at 50' completed boring and moved to new location. 52 53 54 55 56 58 59 60 61 62 63 64 65 66 67 68 69

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4	L	4			1/V	Log	of E	Borin	g		D-0	)2			Sheet	1	of	3
	Project		HIID	SON YARDS - T	COWER D		Pr	oject N	lo.		1700	1911	5			East		4949
l	Location						Ele	evation	and Da		1700	1911	,			North		4949
	Drilling C	compa		west side yard,	Terra Firma, Manhatta	an NY	Da	ite Sta	rted		Appr	ox. 12	2.5 feet		MD Finished			4067
l			Warre	en George, Inc.							6/2	20/13		D	D II	6/	20/13	
	Drilling E	:quipm		r AD2 Truck-Mo	unted Drill Rig			mplet	on Dept	n		60 ft		Rock	Depth		44 ft	
25	Size and	Туре	of Bit	" Diameter Trico			Νι	ımber	of Samp	oles	Distu		8	Un	ndisturbed		Core	3
4	Casing D	Diamet	er (in)		ush Steel Casing	Casing Depth (ft)	W	ater Le	evel (ft.)		First			Co	ompletion		24 HR.	
	Casing F	łamme	er Safet	v	Weight (lbs) 140	Drop (in) 30	Dr	illing F	oreman		_ <del>_</del> _				<u>¥</u>		<u> </u>	
Diale	Sampler				olit Spoon/ NX Core Ba	arrel	Ins	spectir	g Engin		ddie (	Cardo	na					
υ ::	Sampler	Hamn	ner	Safety	Weight (lbs) 140	Drop (in) 30	$\perp$					Camp			-			
201	MATERIAL SYMBOL	Elev.	Building Code		Sample Description	_	Coring (min)	Dep	th bg	Φ		nple Da	N-Va	lue	-		narks	
		(ft) +12.5	Buil		Sample Description	ı	Coring	Sca	th le Number	Туре	Reco	resist BL/6in	(Blow	,	Fluid Lo	ss, Drillin	Depth of Cas g Resistance	sing, e, etc.)
7		+12.0.		6-inch-thick (	CONCRETE SLAB			E	=							of W P of S P.		
								_ 1	-							Split Sp		
N 2								_ 2	4						6/20/1			
0.53.0								Ē.	=								gin drilling crete slab	
2013								- 3							Duill As			
0 //								4	=						Drill to	) 5		
							SPIN	- - 5	1									
S C C C C C C C C C C C C C C C C C C C				trace gravel,	um- to fine-grained, sil trace brick, trace woo	ty SAND, d		ŧ ,	=			3 2			Take	S-1(SS	s): 5' to 7'	
				[FILL] [Class	7]			- 6	S-1	SS	9	3	1					
UDL.								7	1			2			6:28P	M: Inst	tall 9' of 4	."
8								Ė ,	=								sing: 0' to	
00/1/6								- 8 -	=						6·32P	M: Drill	I to 10'	
LOGS			Class					9	=						Rig ch		3' to 10'	
2 5 7			7					- - 10							DIOWI	ı wasıı		
				wood, some	um- to fine-grained, SA brick, some silt	AND, some		F				3 6			6:36P		S): 10' to	12'
				[FILL] [Class	7]		SPIN	- <b>1</b> 1	S-2	SS	80	7	13			(	.,	-
A IGE							OI IIV	12	<u> </u>			4			Install	5' of c	asing: 9'	to 14'
בערי								Ė ,,	. =								<b>J</b>	
								<u> </u>	· ]									
								- 14	, 글						Drill to			
0				0	and the first section of the	OAND to		- - 15	; 🟪						Smoo	th drilli	ng. Brow	n wash
2007				gravel	m- to fine-grained, silty	/ SAND, trace		Ē	=			WOR 3			Take	S-3(SS	s): 15' to	17'
4				[FILL] [Class	/]		SPIN	- 16	S-3	SS	13	3	<b>5</b> †					
N T C								17	· <del>]</del>	H		2			6:50P	M		
2								- - - 18							Install	5' of c	asing: 14	' to 19'
	7 7 17 1	-6.0.							' <u>-</u>									
GAIN.			Class 6					19	1							M: Drill		
3			J					E 20	, <u> </u>						Smoo	ın arılli	ng. Gray	wasn

1		4	\	V <b>G</b> AIV		f Boring		D-02		Sheet	2	of	3
Р	roject		HUD	SON YARDS - TOWER D		Project No.		17001911	5		East		4949
L	ocation					Elevation ar	d Datur		<u> </u>		North		7373
			LIRR	west side yard, Terra Firma, Manhattan NY					2.5 feet BPI	MD 			4067
	MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description		Depth Scale		Recov. (in) Penetr. resist BL/6in		(Drilli Fluid Lo	Remang Fluid, Doss, Drilling	arks epth of Cas Resistance	ing, e, etc.)
Ieiiipiate IEiwirchie.GDI		, -11.0 <sub>/</sub>	Class 6	Gray, sandy SILT [MH] [Class 6]		20 - 21 - 22 - 23 -	SS SS	3 2 4 3	6•	Drill to	o 25'	: 20' to 2 g. Gray	
S 10.33.09 AWI Repoil. Log - LAINGAIN				Brown, medium- to fine-grained, silty SAND, trace mica [SM] [Class 3b]		- 24 - - 25 - - 26 - - 27 -	C- 0	9 4 5 8 8	13•	Add	Irilling flu	g. Gray lid to tub	)
ווטלוסייי ווייייייייייייייייייייייייייייייי		-21.0	Class 3	Brown, medium- to fine-grained, silty SAND, trace mica [SM] [Class 3b]		- 30 - - 31 - - 32 - - 33 -	0-0 0-0	4 7 12	11	Take	oth drillin	g. Brown	
WGEOTECHINICAL/GINTLOGS				Brown, sandy decomposed MICA SCHIST, some silt [Class 1d]		34 - 35 - 36 - 37 -	S-7 SS	12 36 41 37	777	Rig c	PM: Drill hatter 33 S-7(SS)		37'
COMMUNITION INTO THE PROPERTY CONTRIBUTION OF			Class 1	Brown, decomposed MICA SCHIST with sand, trace silt [Class 1d]		- 38 - - 39 - - 40 - - 41 - - 42 -		ත් 49 50/2"	50/2"	Slow to 38' drillin  Take Refus	. Brown g at 40' S-8(SS) sal at 40	Resistar wash. S : 40' to 4	mooth 10.7'
M. Airight		-31.5	Class 1	γγγ	4	:00 44 -	5						

Log of Boring D-02 Sheet of 3 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 Sample Data Building Code Remarks Elev (ft) N-Value (Blows/ft) Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 45 Gray, medium- to fine-grained, quartz- feldspar-3:00 Begin core C-1: 44' to 49' muscovite- biotite- garnet MICA SCHIST, close REC=53"/60" =88% 46 to moderate fracture spacing, moderately to 9:17PM: Complete C-1 slightly weathered, with fractures dipping 5:00 RQD=41"/60" approximately 0 degrees and 50 degrees from horizontal 3:00 [Class 1b] Fair quality 48 3:00 49 3:00 50 REC=59"/60" =98% Gray, medium- to fine-grained, quartz- feldspar-3:00 Begin core C-2: 49' to 54' NX CORE BARRE muscovite- biotite- garnet MICA SCHIST, extremely close to moderate fracture spacing, RQD=32"/60" 9:53PM: Complete C-2 slightly to moderately weathered, with fractures 6.00 dipping approximately 50 degrees from 52 Class 5:00 [Class 1b] Fair quality 53 4:00 3:00 Gray, medium- to-fine grained, quartz- feldspar-//LANGAN.COM/DATA/NY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ muscovite- biotite- garnet MICA SCHIST, very 55 REC=60"/60" =100% 10:12PM RQD=51"/60" =85% close to moderate fracture spacing, moderately 4:00 Begin core C-3: 54' to 59' NX CORE BARRE weathered to unweathered, with fractures 56 dipping approximately 0 degrees from horizontal 10:32PM: Complete C-3 [Class 1a] Good quality 5:00 4:00 58 Some of core stuck in hole. 4:00 Retrieve until 11:15PM Core additional 1' in process 59 REC=12"/12" =100% 100% %19 CORE RQD=8"/12" =67% -47.5 60 11:15PM to 11:45PM End of boring at 60' Boring was backfilled Drillers cleaned up around 61 completed boring and moved to new location. 62 63 64 65 66 67 68 69

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	Project		HUDS	SON YARDS - TOW	/ER D			Pro	oject No.		1	7001911	5			East		4972
	Location					NIV		Ele	evation a	nd Dat	tum				`	North		
	Drilling C	ompai		west side yard, Ter	ra Firma, Manhatta	in NY		Da	te Starte	d	A	pprox. 6.	.5 feet		inished			4068
	Drilling E	auinm		en George, Inc.				Co	mpletion	Denth	<u> </u>	6/28/13		Rock D	Depth	7	7/1/13	
			Acke	r AD2 Truck-Mounte	ed Drill Rig				mpiotion	Бори		46.2 ft		T TOOK E	эори і		32 ft	
פֿבּוֹ	Size and	Type		" & 2-7/8" Diameter				Nu	mber of	Sampl	es D	isturbed	6	Unc	disturbed		Core	3
7	Casing D		3&4"-	Inner-Diameter Flus	sh Steel Casing	Casing Dept	h (ft) 32	W	ater Leve	el (ft.)		irst V		Cor	mpletion	2	4 HR.	
	Casing F	lamme	Safet	y	ight (lbs) 140	Drop (in	30	Dr	illing Fore	eman	0:1						_	
ambiai	Sampler		2"-Oı	ıter-Diameter Split S				Ins	pecting I	Engine		Burgess <i>i</i>	Saile	orenzo	0			
	Sampler	Hamm		Safety	ight (lbs) 140	Drop (in	30			1		rie Camp Sample D						
Y D N N	MATERIAL SYMBOL	Elev. (ft)	Building Code	Samp	le Description		Reading (ppm)	Casng blws/ ft. Coring (min)	Depth Scale	Number		(in) Penetr. resist			(Drillir		narks Depth of Cas	ing,
- 60-	MA.	+6.5	Bu	·			OH OH	Casn	— 0 -	Nun	Ty	Per	10 20	· '			Depth of Cas g Resistance	e, etc.)
eport:		+5.5		1-foot-thick GRA	VEL				Ē 						68' N	of WP.	L.	
ž ::		+5.5.							- 1 - -						55= 5	Split Sp	oon	
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0.0								PUSH	- - 3 -									
2/2015									-	-								
:									- 4									
0.673				Brown medium-	to fine-grained, SA	ND			5 -	_		5			10:32	PM		
I A R				some gravel, trac [FILL] [Class 7]	ce silt (moist)	ard,				<del> </del>		8					): 5' to 7'	
2005				[i icc] [Olass i]			0.0	SPIN	<del>-</del> 6 -	S-1	SS	13	21					
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18100			Class 7					28	- - 8 -	=							asing: 0' ill to 10'	to 9 <sup>-</sup>
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									<u> </u>							th drillir	ng	
AL/6				Brown, medium-	to fine-grained, SA	ND,			10 -	-		1			10:59	PM		
				with silt (wet) [FILL] [Class 7]	•	·	0.0		- - 11 -	S-2	SS	1 1			Take :	S-2(SS	): 10' to	12'
							0.0	PUSH		S		1 1						
5/4/1									<del>-</del> 12 -							PM: Dri th drillir	ill to 15'	
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2001				trace mica (mois [SM] [Class 6]	o fine-grained, silty t)	OAND,			- - 16 -	S-3	SS	4	6+		l ake s	S-3(SS	): 15' to 1	17
2 4			Class	[SIVI] [Class 6]				PUSH	E	5		2 3					ill to 20'	
AINT			6						- 17 - -	+					Smoo Gray v	th drillir vash	ng	
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20.2		-12.0.							- 19 -	<u>-</u>					7/1/13 4·02P		Irill to 20'	
ANGA			Class 3						19	-					Smoo	th drillir	ng. Brow	
اِ									<u>└</u> 20 -	1					vvasn	เนเบร	gray at 15	,

Log of Boring **D-03** Sheet of 2 3 Project Project No. East 170019115 **HUDSON YARDS - TOWER D** 4972 Location Elevation and Datum North LIRR west side yard, Terra Firma, Manhattan NY Approx. 6.5 feet BPMD 4068 Sample Data Building Code PID Readin (ppm) Remarks N-Value (Blows/ft) Elev Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) (ft) Scale 10 20 30 40 20 Brown, medium- to fine-grained, SAND 4·12PM with silt, trace mica (wet) .Template TEMPLATE. ss S-4 Take S-4(SS): 20' to 22' [SM] [Class 3b] 21 11 12 PUSH 22 4:20PM: Drill to 25' Brown wash Smooth drilling 23 Report: Log - LANGAN 24 25 4:27PM Brown, medium- to fine-grained, SAND, 15 Take S-5(SS): 25' to 27' some gravel, trace decomposed rock, SS 18 Class S-5 No recovery some silt (wet) 26 0 [SM] [Class 3a] 20 43 7/18/2013 10:53:17 AM 4:37PM 20 Install 5' of casing: 9' to 14' 27 Install 5' of casing: 14' to 19' 4:51PM: Redrill to 25' 28 5:03PM: Retake S-5(SS)-Try to get recovery 29 5:07PM: Drill to 30 COMIDATAINYIDATA11170019115/ENGINEERING DATAIGEOTECHNICAL\GINTLOGS\170019115 HUDSON YARDS.GPJ. Rig chatter. Slow drilling 82 30 SS 5:21PM Brown, coarse- to medium-grained, SAND 22 S-6 Take S-6(SS): 30' to 32' 9 with decomposed mica schist, trace silt Refusal at 32' [SP-SM] [Class 3a] 31 50/1" 50/1" Attempt to drill to 35' 32 Resistance at 32' 4:00 5:47PM: Install 32' of 3" **%68=** REC=48"/50" =95% diameter casing: 0' to 32' 33 Gray, medium- to fine-grained, feldspar-**NX CORE BARREI** 3:00 muscovite- biotite- garnet SCHIST, close Redrill to 32' RQD=45"/50" to moderate fracture spacing, slightly 5 6:28PM weathered to unweathered, with fractures 5:00 Begin core C-1: 32' to 37' dipping approximately 50 degrees from 35 horizontal 6:47PM [Class 1a] Excellent quality 3:00 Complete core at 36'-2" Clog in barrel 36 4:00 37 Gray, medium- to fine-grained, feldspar-RQD=60"/60" =100% REC=60"/60" =100% muscovite- biotite- garnet SCHIST, with 4:00 Begin core C-2: 36.2' to 41.2' **NX CORE BARREI** quartz intrusions, long fracture spacing, 38 7:25PM: Complete C-2 Class unweathered, with fractures dipping 3:00 approximately 20 degrees from horizontal 39 [Class 1a] Excellent quality 3:00 40 4:00 5:00 REC=60"/60" =100% RQD=60"/60" =100% 8:00PM Gray, medium- to fine-grained, feldspar-**NX CORE BARREL** 4:00 Begin C-3: 41.2' to 46.2' muscovite- biotite- garnet SCHIST, long fracture spacing, unweathered, with C-3 43 8:25PM: Complete C-3 fractures dipping approximately 20 4:00 degrees from horizontal [Class 1a] Excellent quality 7:00



Log of Boring D-03 Sheet 3 of 3 Project Project No. East **HUDSON YARDS - TOWER D** 170019115 4972 Location Elevation and Datum North Approx. 6.5 feet BPMD 4068 LIRR west side yard, Terra Firma, Manhattan NY PID Reading (ppm) Sample Data Building Code Remarks Elev. (ft) Depth Scale N-Value (Blows/ft) Number Recov. (in) Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) 10 20 30 40 45 NLANGAN. COMIDATAINYIDATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ... 7/18/2013 10:53:18 AM ... Report. Log - LANGAN ... Template TEMPLATE. GDT Class င္ပ 5:00 46 8:45PM to 9:40PM End of boring at 46.2' Boring was backfilled. Drillers cleaned up around completed boring and moved to new location. 48 49 50 52 53 54 55 56 58 59 60 61 62 63 64 65 66 67 68 69

Log of Boring **D-05** Sheet of 1 3 Proiect East Project No. **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 **Drilling Company** Date Started Date Finished 6/27/13 Warren George, Inc. 6/21/13 Rock Depth Drilling Equipment Completion Depth Acker AD2 Truck-Mounted Drill Rig 66 ft 46 ft Size and Type of Bit Disturbed Undisturbed Core Number of Samples 2-7/8" Diameter Tricone Roller Bit 5 **FEMPLATE** 24 HR. Casing Diameter (in) Casing Depth (ft) First Completion Water Level (ft.) 4"-Inner-Diameter Flush Steel Casing 29 Casing HammerSafety Weight (lbs) Drop (in) Drilling Foreman 30 140 Eddie Cardona/ Gil Burgess Sampler 2"-Outer-Diameter Split Spoon/ NX Core Barrel Inspecting Engineer Sampler Hammer Weight (lbs) Drop (in) 30 Safety Corrie Campbell Report: Log - LANGAN Sample Data Building Code (ppm) (min) Remarks MATERIA Depth Number (in) Penetr. resist BL/6in Coring ( (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Sample Description (ft) Scale 믑 +9.5 10 20 30 40 0 4 9 0 14' E of W P.L. 6-inch-thick CONCRETE SLAB +9.0 90' N of S P.L. SS= Split Spoon /LANGAN.COM/DATA/NY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ ... 7/18/2013 10:53:33 AM .. 6/21/13 4:00PM: Drillers arrive 4:20PM: Drill through concrete slab using 5-7/8" 3 diameter drill bit 4:33PM: Drill to 5' Rig chatter 0.5' to 5' Slow drilling SPIN 5 5:00PM Brown, medium- to fine-grained, SAND Take S-1(SS): 5' to 7' SS 2 S-1 9 0.0 and WOOD, some silt [FILL] [Class 7] 3 5:05PM Install 9' of casing: 0' to 9' 8 5:27PM: Drill to 10' Brown wash 9 Class 10 2 Take S-2(SS): 10' to 12' SS Brown, medium- to fine-grained SAND 0 S-2 with gravel, trace silt 0.0 [FILL] [Class 7] SPIN 5 12 Install 5' of casing: 9' to 14' 13 Drill to 15' Smooth drilling Brown wash SS Take S-3(SS): 15' to 17' Gray, medium- to fine-grained, SAND, 2 Little recovery 0.0 16 trace silt, trace gravel 2 Push spoon again from 15' [FILL] [Class 7] SPIN to 17' to try to get enough for 1 17 environmental sample -8.5 18 Install 5' of casing: 14' to 19' Drill to 20' Class Smooth drilling 19 Brown to black wash at 18'

Log of Boring D-05 Sheet of 3 2 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 Sample Data Building Code Coring (min) PID Readin (ppm) Remarks Elev (ft) N-Value (Blows/ft) Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 20 Take S-4(SS): 20' to 22' .Template TEMPLATE.GD Black, organic SILT, trace gravel 2 S-4 SS [OH] [Class 6] 0.1 21 6 2 Class 3 22 Install 5' of casing: 19' to 24' 23 Drill to 25' Brown wash Report: Log - LANGAN Smooth drilling 24 25 3 Take S-5(SS): 25' to 27' Brown, medium- to fine-grained, silty SAND, trace gravel SS Class 16 0.0 26 [SM] [Class 6] SPIN 7/18/2013 10:53:34 AM 6 27 Install 5' of casing: 24' to 29' 6:20PM to 7:00PM 28 Drillers take lunch -19.0 Drill to 30' 29 Brown wash Smooth drilling COM/DATAINY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS,GPJ , 30 Take S-6(SS): 30' to 32' Brown, medium- to fine-grained, SAND SS Class 20 0.0 31 with silt, trace mica 12 [SM] [Class 3b] 22 32 33 -24 ( 34 Take S-7(SS): 35' to 37' Gray, decomposed MICA SCHIST, some S-7 SS 35 ω sand 50/3" Refusal at 35'-8" [Class 1d] 36 37 Drill to 40' Some rig chatter Brown wash 38 Resistance at 40' 39 Class 10:00 Gray, medium- to fine-grained, quartz-muscovite- biotite SCHIST, extremely Begin core C-1: 40' to 46' =11% REC=29"/72" =40% close to moderate fracture spacing, slightly 9:00 8:27PM: Stop drilling- clog to moderately weathered, with fractures dipping approximately 0 degrees to 45 RQD=8"/72" degrees from horizontal 7:00 Still in weathered rock Drill to 43' [Class 1d] Very poor quality 43 6:00 9:11PM: Complete C-1 12:00

Sheet Log of Boring **D-05** 3 of 3 Proiect Project No. East **HUDSON YARDS - TOWER D** 170019115 4914 Elevation and Datum Location North LIRR west side yard, Terra Firma, Manhattan NY Approx. 9.5 feet BPMD 4090 Sample Data Building Code PID Readin (ppm) Remarks N-Value (Blows/ft) Elev Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Coring ( (ft) Scale 10 20 30 40 45 Class ? 14:00 -36.5 46 Gray, medium- to fine-grained, quartz-4:00 feldspar- muscovite- biotite- garnet Class SCHIST, close to moderate fracture 9:27PM REC=60"/60" =100% =62% spacing, slightly weathered 3:00 Begin core C-2: 46' to 51' **NX CORE BARREI** -38.3 [Class 1b] Fair quality 48 RQD=37"/60" Light gray to pink, medium- to fine-grained, PEGMATITE, extremely close to close C-2 4:00 Report: Log - LANGAN 9:54PM: Complete C-2 49 fracture spacing, slightly weathered, with fractures dipping approximately 0 degrees 10:00 from horizontal 50 [Class 1b] Fair quality Class 11:00 Light gray to pink, PEGMATITE, close fracture spacing, slightly weathered, with 5.00 7/18/2013 10:53:35 AM fractures dipping approximately 0 degrees 52 from horizontal Begin core C-3: 51' to 56' 3EC=59"/60" =98% [Class 1b] Fair quality 7:00 53 RQD=31"/60" 10:36PM: Complete C-3 Gray, medium- to fine-grained, guartz-C-3 4:00 feldspar- muscovite- biotite- garnet 54 SCHİST, extremely close to moderate Class fracture spacing, moderately to slightly 5:00 /LANGAN.COM/DATA/NY/DATA/1/10019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS. GPJ weathered, with fractures dipping 55 approximately 0 degrees from horizontal 5:00 [Class 1b] Fair quality -46.5 56 10:00 11:00PM Gray, medium- to fine-grained, quartz-Begin core C-4: 56' to 61' feldspar- muscovite- biotite- garnet REC=60"/60" =100% RQD=8"/60" =13% SCHIST, extremely close to close fracture 4:00 **NX CORE BARREI** spacing, slightly to highly weathered, with fractures dipping approximately 0 degrees 11:26PM: Complete C-4 58 Class 11:45PM to 12:10AM 4:00 and 40 degrees from horizontal Drillers transfer rig to LIRR [Class 1d] Very poor quality 59 railyard side 4:00 12:15AM: End of 6/21 60 4:00 6/27/13 -51.5 3:30PM: Driller arrive on site 4:40PM to 5:15PM 4:00 Gray, medium- to fine-grained, quartz-Set up boring D-5 62 5:18PM: Redrill to 61' muscovite- biotite- garnet SCHIST, REC=56"/60" =93% **%06=** intrusions of quartz and granulite, close to 6:00 NX CORE BARREI moderate fracture spacing, slightly 63 RQD=54"/60" weathered to unweathered, with fractures Class 5:00 Begin core C-5: 61' to 66' dipping approximately 45 degrees from horizontal 64 6:45PM: Complete C-5 [Class 1a] Excellent quality 8:00 65 7:00 -56. 66 7:00PM to 8:15PM End of boring at 66' Boring was backfilled. Drillers cleaned up around 67 completed boring and moved to new location. 68 69

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Р	roject							F	roject No	).							East		
Lo	ocation		HUD	SON YARDS - 1	TOWER D			E	levation a	and Da		7001	9115				North		4930
				west side yard,	Terra Firma, Manl	hattan NY					A	Approx	x. 10						4095
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				r AD2 Truck-Mo	unted Drill Rig								.5 ft					38 ft	
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C	asing H	lamme	r None		Weight (lbs)	Dro	op (in)		rilling Fo	reman		<u></u>				<u>*-</u>		<del></del>	
	ampler				olit Spoon/ NX Cor	e Barrel		Ir	specting	Fngine		die C	ardor	na					
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GAN GAN	OL IIA	Elev.	ing e	·		·	ading	ws/ ft	Donth	Ĺ			ole Dat		h		Rer	narks	
LAI	MATERIAL SYMBOL	(ft)	Building Code	Sa	ample Descriptio	n	PID Reading	Casng blws/ ft.	Depth Scale		Type	(in) Penetr.	resist 3L/6in	N-Va (Blow	s/ft)	(Drilli Fluid Lo	ing Fluid, oss. Drillir	Depth of Ca	sing, e. etc.)
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7/18/2013 10:53:42 AM									3	4							ete sia eter dri	b using 5 Il bit	)-//8 <sup>**</sup>
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YAK				Brown, coars silt, trace gra	e- to fine-grained,	SAND with	h 0.0		6	S-1	SS	6	3 5	,		таке	5-1(53	S): 5' to 7	
				[FILL] [Class						300		` 2	2						
DH G									- 7	+	H							stall 9' of	
1.181.									- 8	]						diam	eter ca	sing: 0' to	9'
0/1/0										=									
NI LOGS/170019115 HUDSON YAKDS.GPJ			Class						9	=						11:13	BPM: D	rill to 10'	
			7						10	=									
S							62.	1	10	=		1						S): 10' to leum odd	
				Black, coarse silt, strong pe	e- to fine-grained, s etroleum odor	SAND with	02.	`	_ 11	S-2	SS	ص 1	5	15			3		
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A A A									_ 12	#						Drill t	o 15' :/brown	wach	
) (1)									13	4						Rig c	hatter 1	12' to 15'	
핅									Ē	=						1	drilling	rilling sto	ns
NG.									14	=						11.00	71 IVI. D	illing oto	ρū
115/4									15	1						6/18/ 3:35F			
00197				Prown modiu	um to fine grained	CAND with	h		13	=		2						S): 15' to	17'
COMIDALAINYIDA I A111/0019115/ENGINEEKING DALAKGEO I ECHNICALKG				silt, some gra	ım- to fine-grained avel, trace brick	SAIND WILL	1.0		16	S-3	SS	و 13	8	17		Instal	l 5' of c	asing: 9'	to 14'
E A				[FILL] [Class	[]			SPI	-	1	SS		4			Instal	1 5' of c	asing: 14	1' to 19'
AIN									17	1									
M D A									18	=									
5 -		-8.5.							Ė ,_	=									
NGAN.			Class 6						19	7							PM: Dri	I to 20' ing. Gray	wash
¥									<u> </u>	1						311100	our utill	iiig. Glay	wasii

*LANGAN* D-06 Log of Boring Sheet of 3 2 Project Project No. East 170019115 **HUDSON YARDS - TOWER D** 4930 Location Elevation and Datum North LIRR west side yard, Terra Firma, Manhattan NY Approx. 10 feet BPMD 4095 Sample Data Building Code PID Readin (ppm) Remarks Elev (ft) Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 20 Report: Log - LANGAN ... Template TEMPLATE.GD Take S-4(SS): 20' to 22' Gray, sandy SILT, trace gravel, trace mica SS S-4 4 [ML] [Class 6] 3.0 21 Class 3 22 -13.0 23 24 SPIN Drill to 25' Smooth drilling. Gray wash turns brown at 23' 25 Take S-5(SS): 25' to 27' SS S-5 26 0 No recovery 10 7/18/2013 10:53:43 AM . 8 27 28 Drill to 30' 29 Smooth drilling. Rig chatter 28' to 30'. Brown wash. COMIDATAINYDATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ . 30 Class Take S-6(SS): 30' to 32' Brown, silty SAND, some gravel SS 16 S-6 SPIN 31 1.0 [SM] [Class 3a] 26 8 32

33

34

35

36

37

38

39

42

43

129

12:00

4:00

6:00

5:00

4:00

0.7

SS

REC=60"/60" =100%

RQD=57"/60" =95%

47 2

50/5"

50/5"

Brown, medium- to fine-grained, silty

Gray, medium- to fine-grained, quartz-

spacing, slightly weathered, with fractures

dipping approximately 45 degrees from

feldspar- muscovite- biotite- garnet SCHIST, close to moderate fracture

[Class 1a] Excellent quality

SAND, some gravel

[SM] [Class 3a]

horizontal

-28.0

Class

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 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 Begin core C-1: 38.5' to 43.5' 4:54PM: Complete C-1

Log of Boring **D-06** Sheet of 3 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 Sample Data GCasng blws/ ft Coring (min) Building Code PID Readin (ppm) Remarks Elev (ft) N-Value (Blows/ft) Depth Number Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 45 Gray, medium- to fine-grained, quartz-REC=60"/60" =100% 5:14PM: Begin core C-2: feldspar- muscovite- biotite- garnet NX CORE BARRE 4:00 46 43.5' to 48.5' SCHIST, quartz intrusions, close to RQD=59"/60" moderate fracture spacing, slightly 5:36PM: Complete C-2 weathered, fractures dipping 4:00 approximately 50 degrees from horizontal [Class 1a] Excellent quality 5:00 48 49 4:00 6:01PM Gray, medium- to fine-grained, quartz-Begin core C-3: 48.5' to 53.5' Class feldspar- muscovite- biotite- garnet 3:00 50 SCHIST, quartz intrusions, close to REC=72"/72" =100% 8:18PM: Complete C-3 moderate fracture spacing, slightly NX CORE BARRE weathered, fractures dipping 3:00 51 RQD=58"/72" Started losing water at 51' approximately 45 degrees from horizontal [Class 1b] Good quality 6:37PM: Only 30" in core 4:00 52 barrel, attempt to retrieve remaining core 7:07PM: Unsuccessful at 5:00 53 retrieving rock 7:14PM: Drill additional 1' to 6:00 54 try to retrieve core VILANGAN COM/DATA/NY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS. GPJ End of Boring at 54.5' 55 8:10PM: Boring was backfilled. Drillers cleaned up around 56 completed boring and moved to new location. 57 58 59 60 61 62 63 64 65 66 67 68 69

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L	4	M		1/V		Lo	g of E	Bor	ing			D-(	07			Sheet	1	of	3
Project		HIID	SON YARDS - T	OWER D			Pr	rojed	ct No.		1	1700	)19115				East		4949
Location							Ele	leva	tion and	d Dat	um						North		
Drilling C	ompa		west side yard,	Terra Firma, Ma	nhattan	NY	Da	ate :	Started		P	∖ppr	ox. 12	feet l		D Finished			4092
Drilling E	auinm		en George, Inc.				- C	omn	letion E	)onth		7	7/5/13		Dook	Depth		7/5/13	
	quipiri		r AD2 Truck-Mo	unted Drill Rig				omp	netion L	Эерин			51 ft		ROCK	Берит		36 ft	
Size and	Type	of Bit	" Diameter Trico				Νι	umb	er of S	ample	es [	Distu	ırbed	7	Un	disturbed		Core	3
Casing D	iamet	er (in)		ush Steel Casing		asing Depth (ft)	w	/ate	r Level	(ft.)	F	First				mpletion		24 HR.	
Casing F	lamme	Safet	у	Weight (lbs)	140	Drop (in) 30	Dr	rillin	g Foren	man		_				<u>-</u>		<del>-<u>*</u>-</del>	
Sampler				olit Spoon/ NX Co	ore Barre		Ins	spe	cting Er	ngine		I Lo	renzo						
Sampler	Hamn		Safety	Weight (lbs)	140	Drop (in) 30	1	_			Jas		Hertz nple Da	ıto.		1			
G - LANGAI MATERIAL SYMBOL	Elev. (ft) +12.0	Building Code		Sample Descr	iption		Coring (min)		Depth Scale	Number	Type	$\overline{}$	Penetr. resist BL/6in	N-V: (Blow	vs/ft)	(Drilli Fluid Lo		marks , Depth of Ca ing Resistand	sing, e, etc.)
Report Lo									1 =								of W of S F Split S	P.L.	
7/18/2013 10:53:51 AM							SPIN	N	2 - 3 - 3 - 4 - 3							Add v		et up borir drilling flu g to 5'	
NILOGSNI70019115 HUDSON YAKUS.GFJ		Class 7		um- to fine-graine e-grained gravel, 7]			SPIN		5	S-1	SS		32 100/2",		100/2''	Refus	al at s	S): 5' to 7 5.67' ng to 4'	•
<u>-</u> 1			Danier week		- 4 0 0 0	D			8 - 9 - 10 - 10 - 10							Slight	n wasl chatt	h er 8' to 9' S): 10' to	12'
DATA(GEOTECHNICALICALICALICALICALICALICALICALICALICAL			silt, trace fine [FILL] [Class	um- to fine-graine e-grained gravel, 7]	ed, SAN trace bri	D, some ick			11 -	S-2	88	(')	27 50/4"		50/4"	Refus	al at	10.83'	12
G DATAIGE	-1.0								12									.g .U 3	
D'ENGINEEKIN	7.0.						SPIN		13 -							Slight	n wasl chatt	h er 11' to 1 lling at 13'	
11810001811		Class 6		c, medium- to fine race gravel, trace ss 6]		d, organic			15 -	S-3	SS	13	1 2 2			Take	S-3(S	S): 15' to	17'
IAMANDAI									17		-		5			Instal	l casir	ng to 19'	
SAN COMINDA	-6.5.	Class				. — — — —			18 -							Drill to Smoo		lling to 20	
LAN		3						-	20										

Log of Boring D-07 Sheet of 3 2 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 Sample Data Building Code Remarks Elev (ft) N-Value (Blows/ft) Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 20 Take S-4(SS): 20' to 22' Gray to black, medium- to fine-grained, organic ..Template TEMPLATE. SS S-4 7 silty SAND, trace shells 21 18 [SM] [Class 3b] 10 22 Drill to 20' Medium to hard drilling at 25' 23 Gray wash turns brown at 24' Report: Log - LANGAN .. 24 25 Take S-5(SS): 25' to 27' Red to brown, medium- to fine-grained, silty SAND, trace fine-grained gravel, trace mica SS [SM] [Class 3a] 4 34 7/18/2013 10:53:52 AM 17 27 Drill to 25' Class Brown wash 28 29 COMIDATAINYIDATA11170019115/ENGINEERING DATAIGEOTECHNICAL\GINTLOGS\170019115 HUDSON YARDS.GPJ. Take S-6(SS): 30' to 32' Red to brown, medium- to fine-grained, silty 13 SAND, trace fine-grained gravel, trace mica 16 SS [SM] [Class 3a] 3 31 18 17 32 Drill to 35' Brown wash 33 34 Take S-7(SS): 35' to 37' 100/2" S-7 SS Decomposed MICA SCHIST [Class 1d] 1 100/2' Class Refusal 36 3:00 37 12:25PM Gray, medium- to fine-grained, quartz- feldspar-REC=60"/60" =100% muscovite- biotite- garnet SCHIST, close to 4:00 Begin core C-1: 36' to 41' moderate fracture spacing, slightly weathered, 38 RQD=56"/60" with fractures dipping close to horizontal to 3:00 approximately 40 degrees from horizontal [Class 1a] Excellent quality 39 4:00 40 Class 5:00 3:00 REC=60"/60" =100% RQD=54"/60" =90% NX CORE BARREL 1:20PM Gray, medium- to fine-grained, quartz- feldspar-4:00 Begin C-2: 41' to 46' muscovite- biotite- garnet SCHIST, close to moderate fracture spacing, slightly weathered, 43 with fractures dipping close to horizontal to approximately 40 degrees from horizontal 4:00 [Class 1a] Excellent quality 4:00

	H	1//	<b>U</b> AN	Log o	f B	oring			D-	07		-	Sheet	3	of	3
Project		HIID	SON YARDS - TOWER D		Pro	ject No.			170	01911	5			East		4949
Location	1	пор	SON TARDS - TOWER D		Ele	vation ar	nd Da	atum	170	01911	5			North		4949
		LIRR	west side yard, Terra Firma, Manhattan NY								2 feet	ВРМС	)			4092
MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description		Coring (min)	Depth Scale	Number	Type		Penetr. resist aldm BL/6in Q	N-V (Blov	alue ws/ft)	(Dri Fluid L	Rem lling Fluid, D Loss, Drilling	narks Depth of Ca g Resistand	sing, e, etc.)
	-39.0	Class 1	Gray, medium- to fine-grained, quartz- feldspa 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	4 5 , 4	:00	49 -	C-3	NX CORE BARREL	REC=60"/60" =100%	RQD=50"/60" =83%				n core C		
			End of boring at 51'			52 - 53 - 54 - 55 - 56 - 57 - 58 - 60 - 61 - 62 - 63 - 64 - 65 - 66 - 67 - 68 - 69 - 70 - 70 - 70 - 70 - 70 - 70 - 70 - 7							Drille com	ng was bers clear	ed up ar oring and	ound

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1	L	4			<b>1/V</b>	Log	of E	Воі	ring			D-0	8			Sheet	1	of	2
ſ	Project		HIID	SON YARDS - T	OWER D		Pr	roje	ct No.		1	700	19115				East		4967
ŀ	Location		ПОВ	SON TANDS - I	OWERD		Ele	eva	tion an	d Dat		700	1911	,			North		
ŀ	Drilling C	ompar		west side yard,	Terra Firma, Manhatta	an NY	Da	ate	Started	I	P	Appro	ox. 6.	5 feet		inished			4092
l	Daillia a E			en George, Inc.					1-4:	D4b		7/	/3/13		Daal. [	D4b		7/3/13	
	Drilling E	quipm		r AD2 Truck-Mo	unted Drill Rig			omp	oletion	Depth		40	0.5 ft		Rock [	Jeptn		25.5 ft	
3	Size and	Туре	of Bit	" Diameter Trico			Νι	umb	per of S	Sample	es [	Distur	bed	6	Und	disturbed		Core	3
	Casing D	iamete	er (in)		ush Steel Casing	Casing Depth (ft) 20	w	/ate	r Level	(ft.)	F	First			Cor	mpletion		24 HR.	
	Casing H	amme	Donu	t	Weight (lbs) 300	Drop (in) 30	Dr	rillin	g Fore	man		<u>-¥</u>			<del>-</del>	<del>-</del>		<u> </u>	
	Sampler				olit Spoon/ NX Core Ba		Ins	spe	cting E	ngine		l Lore	enzo						
<u>e</u>	Sampler	Hamm	ner	Safety	Weight (lbs) 140	Drop (in) 30				1	Mic		l Zoni			1			
g - LANGAI	MATERIAL SYMBOL	Elev. (ft) +6.5	Building Code		Sample Description	1	Coring (min)		Depth Scale	Number	Type		resist ald	N-Va (Blow	s/ft)	(Drillir Fluid Lo		marks , Depth of Ca ing Resistand	sing, ce, etc.)
Report: Lo		+5.5.		1-foot-thick G	GRAVEL			E	0 -								of W F	L.	
3.39 AIVI									2 -							7/3/13		et up rig	
FJ // 18/2015 10:53							PUSH	1 - 1 - 1 - 1 - 1 - 1	3 -							3-7/8" Black	tricor wash rown/	rill to 5' us ne roller b : 1' to 3' 'tan wash er	it
DSON TARDS.G				SAND and m some brick, s	to black, coarse- to fir ledium- to fine-grained some asphalt, cobble a ed gravel in tip (wet) 7]	I GŘAVEL,			6	S-1	SS	e	3 3 5 3	8•			S-1(S	S): 5' to 7	•
NI LUGSVI / UU 191113 HUDSUN TAKDS. GFJ			Class 7				SPIN		7 — 8 — 9 —							Spin o 5:30P Stop o	4" cas casing M to 6 drilling	6:15PM because	of rain
5				Gray, mediur	m- to fine-grained, SAI	ND, some silt,			10 -			3	3			6:25P	M	ill to 10'	
ICHINI				trace gravel, [FILL] [Class	trace brick (wet) 7]			E	11 -	S-2	SS	16	5	8 •			•	S): 10' to oin 4" casi	
KING DALA/GEOTECHNICAL		-7.0.					PUSH		12 -				4			6:40P	M: Dr	ill to 15' lling. Brov	
DATATATOUTETTO ENGINEE			Class 6		gray, medium- to fine e silty clay, some shell				14 — 15 —	S-3	SS	9	2 2 5 7	7 •		6:55P Take		S): 15' to	17'
DAIAINY							300 lb Hamm	b_ ler	17 -				•			to adv	ance	se 300 lb casing to	20'
N.C.O.N.		-12.0						Ė										8:00PM: E	
MANGA			Class 3					-	19 -							8:15P Gray v		ean out c	asing

Log of Boring **D-08** Sheet of 2 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 Sample Data Building Code Remarks Elev (ft) N-Value (Blows/ft) Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 20 Red to brown, fine-grained, SAND, some silt 8:25PM 8 Template TEMPLATE. SS S-4 4 Take S-4(SS): 20' to 22' 21 [SM] [Class 3b] 10 10 22 8:35PM 12 Class Take S-5(SS): 22' to 24' Red to brown, fine-grained, SAND, some silt 14 S-5 SS 10 23 8:50PM: Drill to 25' 18 [SM] [Class 3a] Red/brown to gray wash 35 Light chatter 23' to 25' 24 9:00PM -18. 25 Take S-6(SS): 25' to 27' Class S-6 SS 2 Decomposed MICA SCHIST 50/5" Refusal at 25'5" -19.0 2:00 26 9:05PM: Drill to 25.5' Gray, medium- to fine-grained, feldsparmuscovite- biotite SCHIST, close to moderate 10:54:00 AM RQD=47"/60" =78% REC=47"/60" =78% 4:00 27 9:10PM NX CORE BARRE fracture spacing, moderately weathered, with Begin core C-1: 25.5' to 30.5' fractures dipping approximately 0 to 45 degrees 7 4:00 28 from horizontal 9:27PM: Complete C-1 [Class 1b] Good quality 29 3:00 /LANGAN.COM/DATA/NY/DATA/1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ 4:00 30 4:00 31 Gray, coarse- to fine-grained, feldspar-muscovite- biotite SCHIST, moderate fracture RQD=53"/60" =88% REC=57"/60" =95% 6:00 32 9:37PM NX CORE BARREI spacing, slightly weathered, with fractures Begin core C-2: 30.5' to 35.5' dipping approximately 0 to 70 degrees from Class 7:00 33 horizontal 9:50PM: Complete C-2 [Class 1a] Good quality 7:00 34 8:00 35 9:00 36 REC=60"/60" =100% Gray, coarse- to fine-grained, feldspar-RQD=53"/60" =88% 8:00 37 muscovite- biotite SCHIST, moderate fracture 10:05PM NX CORE BARREI spacing, slightly weathered, with fractures Begin core C-3: 35.5' to 40.5' dipping approximately 70 degrees from 7:00 38 horizontal 10:37PM: Complete C-3 [Class 1a] Good quality 39 9:00 40 -34.0 End of boring at 40.5' 42 43

1	L	4	$\Lambda$		A/V			Log	of E	Boring			<b>D-</b> 1	10		_	She	eet	1	of	3
	Project	HUDSON YARDS - TOWER D						Pro	Project No. 170019115								East		4914		
ŀ	Location	cation							Ele	Elevation and Datum									North		
	Drilling C	LIRR west side yard, Terra Firma, Manhattan NY lling Company							Da	Approx. 8 fee					feet E		D e Finish	ned			4113
	Drilling C	Warren George, Inc.								6/27/13 Completion Depth						Doc	ole Donath	<b>.</b>	6	/28/13	
ľ	Drilling Equipment  Acker AD2 Truck-Mounted Drill Rig									mpletion	55 ft			ck Depth 35 f			35 ft				
GDT	Size and	Туре	Type of Bit 2-7/8" Diameter Tricone Roller Bit						Nu	Number of Samples				Disturbed 6		ı	Undisturbed			Core	4
Template TEMPLATE.GDT	Casing D	ng Diameter (in)  4"-Inner-Diameter Flush Steel Casing  Casing Dept						1 (ft)	Wa	Water Level (ft.)			First		(	Completion			24 HR.		
TEMF	Weight (lbs)								Dri	Drilling Foreman							<u>+</u>				
nplate	Sampler 2"-Outer-Diameter Split Spoon/ NX Core Barrel							Ins	Gil Burgess Inspecting Engineer												
	Sampler Hammer Safety Weight (lbs) 140 Drop (in)						30		Corrie Campbell												
NGAN	MATERIAL SYMBOL	Elev.	Building Code	C	amala Dagawintia			PID Reading (ppm)	olws/ ft	Depth by g			Sample Data		/alue				marks		
g - LA	SYN	(ft) +8.0	Beij	Sample Description			PID R	Casng blws/ ft	Depth Scale		Туре	Recov. (in) Penetr. resist BL/6in		(Blo 10 20	ws/ft) 30 4		(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc				
ort: Lo		+7.3.		8-inch-thick CONCRETE SLAB						0								14' E of W P.L 113' N of S P.L			
Rep										1 -								SS= S			
2 AM									PUSH	2 -								6/27/1 8:33P	27/13 33PM to 8:49PM		
0:54:1																		Drill th	ill through concrete sl ing 5-7/8" roller bit		e slab
2013 1										- 3 -								8:55P	M: Dri		
7/18/										4 -						9:15		M: En	d of 6/27	/13	
3PJ	Elev (ft) +8.		Class 7							_ :										iani	
RDS.				mica (moist)				0.0		5 -				10				6/28/13 3:15PM			
V NC										6 -	S-1	SS	13	5 6	11					S): 5' to 7	,,
AUDS				[FILL] [Class	; 7]				63	7 -				5					9' of (	casing: 0	
9115																		casing		ınd on ca	р от
117001		-0.5.								8 -										II to 10'	
LOGS										9 -									natter i	7' to 8'	
GINT									PUSH	10										fluid to tu	ıb
NICAL				Black, organic SILT with sand, some wood (wet) [OL] [Class 6]			ood			- 10 -		SS		1				4:08PM Take S-2(\$		SS): 10' to 1:	12'
TECH										11 -	S-2	SS	20	1 2							
(GEO										12 -				2				4·16D	M: Dri	II to 15'	
DATA									38									4:16PM: D Smooth dr Gray wash			
RING										– 13 –								Glay	wasii		
GINE			Class							14 -											
15/EN			6							4.5											
00191					nic SILT with sand,	trace mic	ca			_ 15 - _				5				4:22P Take		S): 15' to	17'
A1/17				(wet) [OL] [Class 6	ô]					16 -	S-3	SS	6	6 2	8				•		
MDAT										17 -				2				4·26D	N/: 1~-	tall 5' of	nacina
ATA/N																		from 9		tall 5' of of	Lasing
OM/D										– 18 –										II to 20' ing. Gray	wash
3AN.C										19 -								5,1100	ar Will	ig. Oldy	wasii
FANC										20 –											

Log of Boring **D-10** Sheet of 3 2 Project Project No. East **HUDSON YARDS - TOWER D** 170019115 4914 Elevation and Datum Location North LIRR west side yard, Terra Firma, Manhattan NY Approx. 8 feet BPMD 4113 Sample Data Building Code PID Readin (ppm) Casng blws/ Remarks Elev. (ft) N-Value (Blows/ft) Depth Penetr. resist BL/6in Sample Description Recov. (in) (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 20 Black, organic SILT with sand, trace brick, .Template TEMPLATE.GD 4:46PM 2 trace gravel, trace shells (wet) SS Take S-4(SS): 20' to 22' S-4 15 21 [OL] [Class 6] 3 Class 14 22 4:52PM: Drill to 25' Smooth drilling Gray wash 23 -15.5 Report: Log - LANGAN 24 25 Brown, fine-grained, SAND with silt, trace Take S-5(SS): 25' to 27' mica (wet) SS 7 26 [SM] [Class 3b] 10 7/18/2013 10:54:13 AM 12 27 5:08PM: Drill to 30' Rig chatter Slow drilling at 29' 28 Brown wash 29 Class .COM/DATA/NY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ 30 5:14PM 13 Brown, medium- to fine-grained, SAND, Take S-6(SS): 30' to 32' some silt, trace mica (wet) SS 13 S-6 31 29 [SM] [Class 3b] 16 20 32 5:19PM: Drill to 35' Slow drilling 33' to 35' Brown wash 33 Encounter rock at 35' 34 -27.0 35 5:46PM Begin core C-1: 35' to 40' 36 Gray, medium- to fine-grained, quartz-feldspar- muscovite- biotite- garnet REC=48"/60" =80% RQD=47"/60" =78% 6:05PM: Complete core C-1 NX CORE BARREI SCHIST, intrusions of quartzite, very close 37 to moderate fracture spacing, unweathered to slightly weathered, with Class 38 fractures dipping approximately 45 degrees from horizontal [Class 1b] Good quality 39 32.0 Begin core C-2: 40' to 45' Gray, medium- to fine-grained, quartz-RQD=20"/60" =33% 6:41PM: Complete C-2 REC=48"/60" =80% feldspar- muscovite- biotite- garnet SCHIST, extremely close to close fracture spacing, moderately to slightly weathered, Class with fractures dipping approximately 45 6:50 to 7:10PM Change lift on rock core degrees from horizontal 43 [Class 1d] Poor quality 7:32PM to 7:47PM Collect remainder of C-2 stuck in hole

**D-10** Log of Boring Sheet of 3 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 Sample Data Building Code PID Readin (ppm) Remarks Elev (ft) N-Value (Blows/ft) Depth Recov. (in) Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Scale 10 20 30 40 45 46 Gray, medium- to fine-grained, quartz-RQD=46"/60" =77% REC=54"/60" =90% feldspar- muscovite- biotite- garnet NX CORE BARRE SCHIST, close to moderate fracture Begin core C-3: 45' to 50' spacing, slightly weathered to unweathered, with fractures dipping 8:20PM: Complete C-3 48 approximately 60 degrees from horizontal [Class 1b] Good quality 49 Class 50 Gray, medium- to fine-grained, quartz-REC=58"/60" =97% RQD=54"/60" =90% Begin core C-4: 50' to 55' feldspar- muscovite- biotite- garnet SCHIST, close to wide fracture spacing, 52 unweathered, with fractures dipping 9:06PM: Complete C-4 approximately 60 degrees from horizontal [Class 1a] Excellent quality 53 54 NLANGAN.COMIDATANNYDATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ -47.0 55 9:20PM to 10:25PM End of boring at 55' Boring was backfilled. Drillers cleaned up around 56 completed boring and moved to new location. 57 58 59 60 61 62 63 64 65 66 67 68 69

LANGAN Log of Boring D-11 Sheet of 2 1 Project East Project No. **HUDSON YARDS - TOWER D** 170019115 4932 Location Elevation and Datum North LIRR west side yard, Terra Firma, Manhattan NY Approx. 9 feet BPMD 4119 **Drilling Company** Date Started Date Finished 6/17/13 6/17/13 Warren George, Inc. Drilling Equipment Rock Depth Completion Depth Acker AD2 Truck-Mounted Drill Rig 38 ft 23 ft Size and Type of Bit Disturbed Undisturbed Core Number of Samples 2-7/8" Diameter Tricone Roller Bit 3 **FEMPLATE** 24 HR. Casing Diameter (in) Casing Depth (ft) First Completion Water Level (ft.) 4"-Inner-Diameter Flush Steel Casing 23 Casing Hammer None Weight (lbs) Drop (in) Drilling Foreman Eddie Cardona Sampler 2"-Outer-Diameter Split Spoon/ NX Core Barrel Inspecting Engineer Sampler Hammer Weight (lbs) Drop (in) 140 30 Safety Corrie Campbell Report: Log - LANGAN Sample Data Building Code PID Readin (ppm) Remarks MATERIA Depth Number (in) Penetr. resist BL/6in (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Sample Description Coring ( (ft) Scale +9.0 10 20 30 40 0 4 9 0 6-inch-thick CONCRETE SLAB 32' E of W P.L. +8.5 119' N of S P.L. SS= Split Spoon ILANGAN. COMIDATAINYDATA11170019115/ENGINEERING DATAIGEOTECHNICALIGINTLOGS/170019115 HUDSON YARDS. GPJ ... 7/18/2013 10:54:21 AM . 6/17/13 2 4:00PM to 4:17PM Drill through 6" thick concrete slab using 5-7/8" 3 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 5 3 4:26PM SPI Brown, medium- to fine-grained, SAND SS Take S-1(SS): 5' to 7' 5 S-1 7 6 with silt, some decomposed mica schist 0.1 3 4:30PM (moist) Replace casing drill bit [FILL] [Class 7] 3 Class 4:43PM Install 9' of 4" diameter casing: 0' to 9' 8 9 5:14PM: Drill to 10' 10 Brown wash Very slow drilling 9' to 10' SS Dark brown, medium- to fine-grained, silty S-2 12 SAND, trace shells, trace gravel (wet) 5:26PM SPIN 3 [FILL] [Class 7] Take S-2(SS): 10' to 12' 4 12 13 -4.5 Drill to 15' Dark brown wash Smooth drilling 15 SS 5 0.1 Black, sandy organic SILT, trace mica 2 Class 16 (wet) 2 [OL] [Class 6] Take S-3(SS): 15' to 17' 2 17 SPIN 18

19

Drill to 20' Brown/black wash

Smooth drilling

-9.

Class

Log of Boring D-11 Sheet of 2 2 Project Project No. East **HUDSON YARDS - TOWER D** 170019115 4932 Elevation and Datum Location North LIRR west side yard, Terra Firma, Manhattan NY Approx. 9 feet BPMD 4119 Sample Data Building Code Coring (min) PID Readin (ppm) Remarks N-Value (Blows/ft) Elev Depth Penetr. resist BL/6in Number Sample Description Recov. (in) (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) (ft) Scale 10 20 30 40 20 SS 5:41PM Brown, medium- to fine-grained, silty Class S-4 SAND, some gravel, trace shells (wet) [SM] [Class 3a] 2 Take S-4(SS): 20' to 22' 18 Template TEMPLATE. Refusal at 21.2' 0.0 SPIN 21 50/2" 50/2" 5:48PM: Drill to 23' Decomposed rock Slow drilling 21.1' to 22' Class 22 [Class 1d] Very poor quality Brown/gray wash Rig chatter 23 6:14PM Install 5' of casing: 9' to 14' 10:00 Report: Log - LANGAN. 24 Gray, medium- to fine-grained, quartz-Install 5' of casing: 14' to 19' REC=58"/60" =97% feldspar GRANULITE, close to moderate 7:00 6:21PM fracture spacing, slightly weathered, with 25 Install 4' of casing: 19' to 23' RQD=57"/60" NX CORE fractures dipping approximately 5 degrees 6:46PM: Redrill to 23' 7 6:00 and 70 degrees from horizontal [Class 1a] Excellent quality 26 7/18/2013 10:54:22 AM ... 7:00 Begin core C-1: 23' to 28' 27 8:33PM: Complete C-1 5:00 28 6:00 Gray, medium- to fine-grained, quartz-29 feldspar GRANULITE, moderate fracture 8:43PM spacing, slightly weathered, with fractures dipping approximately 70 degrees from REC=58"/60" =97% RQD=58"/60" =97% 5:00 Being core C-2: 28' to 32' /LANGAN.COM/DATA/NY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ. 30 NX CORE horizontal 9:10PM: Complete C-2 Class [Class 1a] Excellent quality 4:00 31 6:00 32 6:00 33 6:00 Gray, medium- to fine-grained, quartz-REC=40"/60" =67% 6:00 Begin core C-3: 33' to 38' feldspar GRANULITE, quartz intrusions, wide fracture spacing, slightly weathered, 35 RQD=40"/60" NX CORE with fractures dipping approximately 50 9:48PM: Complete C-3 6-3 6:00 degrees from horizontal 36 [Class 1b] Fair quality Last 20" of core did not break off 5:00 Try to retrieve last 20" 37 Unable to break off 4:00 -29.0 38 10:10PM: Boring was End of Boring at 38' backfilled. Drillers cleaned up around 39 completed boring and moved to new location. 40 42 43

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	Project		ниг	SON YARDS - 1	TOWER D			Pr	oject No.		1	700191	15			East		4972
ŀ	Locatio	n						Ele	evation a	nd Da	tum					North		
ŀ	Drilling	Comp		R west side yard,	Terra Firma, Manhatt	an NY		Da	ite Starte	d	Α	pprox.	7.5 fe		MD te Finished			4111
1			War	ren George, Inc.						D	1-	7/8/1	3	-	- L D - III		7/8/13	
	Drilling	Equipi		er AD2 Truck-Mo	ounted Drill Ria			Co	mpletion	Depti	n	38.5	ft	Ro	ck Depth		23.5 ft	
	Size an	d Type	e of Bit	3" Diameter Trico	_			Νι	ımber of	Samp	les C	Disturbed		4	Undisturbed		Core	3
<u>i</u>	Casing	Diame	eter (in)			Casing Dept	` '	w	ater Leve	el (ft.)		First			Completion		24 HR.	
	Casing	Hamn	14 -II nerSafe	iner-Diameter Fit :tv	ush Steel Casing Weight (lbs) 140	Drop (in	9 30	Dr	illing Fore	eman		<u>¥</u>			<u> </u>		<u>Ā</u>	
Iblate	Sample	r			plit Spoon/ NX Core Ba	arrel		Ins	specting I	Engine		Lorenz	.0					
<u></u>	Sample	r Ham		Safety	Weight (lbs) 140	Drop (in	30				Cor	rie Car		I				
NGAIN	RIAL	Elev	Building Code	0.	l- December		Reading (ppm)	olws/ ft (min)	Depth	ē		Sample		N-Value	$\dashv$		marks	
۲- آ	MATERIAL SYMBOL	(ft) +7.	i∭ S 5	58	ample Description		PID Re	Casng blws/ ft. Coring (min)	Scale	Number	Type	(in) Penetr. resist	(E 10	Blows/ft)	) (Drill Fluid L	ling Fluid, oss, Drilli	Depth of Car ng Resistanc	sing, e, etc.)
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2								SPIN	- - 2 -	3					7/8/1 3:00F		illers arriv	e
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2013									- 3 -	=						PM: Dri n wash		
70 //									4 -	3						hatter		
  -  -									F _	=								
.602				Brown, medi	um- to fine-grained, SA e gravel, thin organic l	AND aver.			5 -	=		4			3:47F Take		S): 5' to 7	ı
					um odor (moist)				6 -	S-1-S	SS	6 2	9					
SOUT			Class 7	[]	.,		0.0	99	- - 7 -	1			3		3:53F Insta		casing: 0'	to 9'
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00/1									8 -	=							ill to 10' n. Smooth	drilling
2002									9 -	=					Biow	ii wasi	i. Oillootii	urming
2 0									10	=								
2				Brown, medi	um- to fine-grained, Sa ice gravel (wet)	AND,			<u> </u>			3			4:14F Take		S): 10' to	12'
				[FILL] [Class	7]				11 -	S-2	SS	4 2	4					
NGEO							0.0		- - 12 -	1			1		4:18F Smo	PM: Dri	ill to 15' ling. Brow	n wash
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		6.	0	L					<u> </u>	=								
פווא									14 -	=								
									- - 15 -	1								
8 00				[ML] [Class 6	<sup>,</sup> SILT, trace mica (wet 6]	:)			13	<u> </u>	SS	1 ,	2		4:21F Take		S):15' to 1	7'
			Class 6				0.0		16 -	S-3	SS		5					
4									17 -	1	丨丨	- 6	3 \		4:24	PM: Dri	ill to 20'	
2									10	-					Gray	wash.	Smooth obstruction	
		-11.	o <u> </u>	<u> </u>					<u> </u>							19.5'		-
CAIN.			Class						19 -	_								
ξ.									E 20 -	+								

Log of Boring **D-12** Sheet of 2 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 Sample Data Building Code PID Readin (ppm) Remarks N-Value (Blows/ft) Elev Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) (ft) Scale 10 20 30 40 20 4:34PM Brown, medium- to fine-grained, silty 6 Template TEMPLATE. S-4 SS 4 Take S-4(SS): 20' to 22' SAND, trace gravel, trace mica (wet) 0.0 21 20 14 [SM] [Class 3b] Class 15 22 4:37PM: Attept to drill to 25' Encounter resistance at 23.5' 23 -16.0 24 5:00 REC=54"/60" =90% RQD=53"/60" =88% 7:00 25 **NX CORE BARREI** Gray, medium- to fine-grained, quartz-Begin core C-1: 23.5' to 28.5' feldspar- muscovite- biotite- garnet SCHIST, close to long fracture spacing, 5 6:00 26 5:33PM: Complete C-1 slighty weathered, with fractures dipping close to horizontal [Class 1a] Good quality 4:00 27 3:00 28 29 5:00 5:47PM Begin core C-2: 28.5' to 33.5' REC=60"/60" =100% //LANGAN.COM/DATA/NY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS. GPJ Gray, medium- to fine-grained, quartz-RQD=58"/60" =97% 5.00 30 feldspar- muscovite- biotite- garnet-SCHIST, close to long fracture spacing, 6:01PM: Core barrel clog slightly weathered to unweathered, with Class 6:00 Have to remove from ground 31 fractures dipping close to horizontal and at 30.5' approximately 45 degrees from horizontal [Class 1a] Excellent quality 7:00 32 6:13PM: Resume drilling 7:00 33 6:38PM: Complete C-2 6:00 34 RQD=60"/60" =100% Gray, medium- to fine-grained, quartz-REC=60"/60" =100% feldspar- muscovite- biotite- garnet 5:00 35 **NX CORE BARREI** SCHIST, moderate to long fracture Begin core C-3: 33.5' to 38.5' spacing, slightly weathered to 6-5 36 4:00 unweathered, with fractures dipping 7:16PM: Complete C-3 approximately 45 degrees from horizontal [Class 1a] Excellent quality 4:00 37 5:00 38 7:30PM to 8:30PM -31.0 Boring was backfilled. End of boring at 38.5' Drillers cleaned up around 39 completed boring and moved to new location. 8:30PM: Drillers off site 42 43

Log of Boring **D-14** Sheet of 2 1 Project East Project No. **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 **Drilling Company** Date Started Date Finished 6/26/13 6/26/13 Warren George, Inc. Drilling Equipment Rock Depth Completion Depth Acker AD2 Truck-Mounted Drill Rig 41 ft 25.5 ft Size and Type of Bit Disturbed Undisturbed Core Number of Samples 3-7/8" & 2-7/8" Diameter Tricone Roller Bit 3 **FEMPLATE** Casing Diameter (in) Casing Depth (ft) 24 HR. First Completion Water Level (ft.) 3&4"-Inner-Diameter Flush Steel Casing 26 Casing Hammer Donut Drilling Foreman Weight (lbs) Drop (in) 30 Gil Burgess Sampler 2"-Outer-Diameter Split Spoon/ NX Core Barrel Inspecting Engineer Sampler Hammer Weight (lbs) Drop (in) 30 Safety 140 Corrie Campbell Sample Data Building Code Remarks MATERIA Depth Number Recov. (in)
Penetr. resist BL/6in (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) Sample Description (ft) Scale Ы +9.5 10 20 30 40 6-inch-thick GRAVEL 16' E of W P.L. +9.0 146' N of S P.L. 6-inch-thick CONCRETE SLAB SS= Split Spoon |LANGAN.COM/DATA\\Y\DATA\\170019115\ENGINEERING DATA\GEOTECHNICAL\GINTLOGS\\170019115 HUDSON YARDS.GPJ ... 7/18/2013 10:54:39 AM 6/26/13 SPIN 10:41AM: Drill to 5' Encounter concrete slab at 0.5'. Slow drilling 3 10:45AM: Drill through concrete slab 5 11:02AM Take S-1(SS): 5' to 7' Brown, medium- to fine-grained SAND SS S-1 9 6 0.0 with silt, some gravel (moist) 2 [FILL] [Class 7] 57 3 Class 11:06AM: Install 9' of 4" diameter casing: 0' to 9' 8 11:21AM: Drill to 10' Rig chatter 7' to 9' Brown wash 9 Turns gray from 8' to 10' 10 11:28AM Take S-2(SS): 10' to 12' Black, sandy SILT, trace gravel, trace SS 13 S-2 mica (moist) 0.0 PUSH 11 ω 17 [FILL] [Class 7] 11:32AM: Drill to 15' 7 Smooth drilling 12 No return 13 -4.0 11:38AM Take S-3(SS): 15' to 17' 2 Little recovery Class SS Push spoon in again at same 2 S-3 16 depth to collect sample 3 11:45AM: 7 Black, organic SILT, trace gravel (wet) 17 Take S-3A(SS): 17' to 19' WOR [MH] [Class 6] No recovery Attempt using 3" spoon, WOR -8.5 0.0 18 minimal recovery WOR 12:06PM: Drill to 20' WOR Class Smooth drilling 19 Black to brown wash at 18' Encounter obstruction 19.5'

 LANGAN
 Log of Boring
 D-14
 Sheet
 2 of

 Project
 Project No.
 East

 HUDSON YARDS - TOWER D
 170019115
 East

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Project					Dr	oject No.							Tract
Project		HUDS	SON YARDS - TOWER D		Pi	ojeci No.			170	01911	5		East 49
ocation					Ele	evation a	nd Da						North
		LIRR	west side yard, Terra Firma, Manhattan NY								5 feet BPMD		414
MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Casng blws/ ft. Coring (min)	Depth Scale	Number	Туре		Penetr. resist ald BL/6in Q	N-Value (Blows/ft) 10 20 30 40	(Dril Fluid L	Remarks ling Fluid, Depth of Casing, oss, Drilling Resistance, etc.)
		Class 3	Brown, medium- to fine-grained, silty SAND, trace gravel, trace mica (wet) [SM] [Class 3b]	0.0	SPIN	21 - - 21 - - 22 -	S-4-8	SS	13	13 10 12 21	22		S-4(SS): 20' to 22'
××	-14.0					- - 23 -						Smo	BPM: Drill to 25' oth drilling n wash
		Class 1	Gray, decomposed MICA SCHIST with sand [Class 1d] Very poor quality			- 24 - - - 25 -							4PM S-5(SS): 25' to 25.5 sal at 25'5"
	-16.0			_			S-5	SS	5	50/5"	50/5"		DPM: Drill 4" into rock
			' '		6:00	L	-					creat 1:35l	e seal for casing PM: Install 20' of 3" eter casing: 0' to 20'
			Gray, medium- to fine-grained, quartz- feldspar- muscovite- biotite- garnet SCHIST, quartz intrusions, close to		5:00	27 - - - 28 -		ARREL	%06= "C	%8/= ,,(		1:56l 2:05l	PM: Redrill to 25.5'
			moderate fracture spacing, slightly weathered, with fractures dipping approximately 50 degrees from horizontal [Class 1b] Good quality		5:00	29 -	2	NX CORE BARREL	REC=54"/60"	RQD=47"/60"		2:35l	PM n core C-1: 26' to 31'
			,		5:00	30 -		_	RE	RC		Lose	water at 27.5'  PM: Complete C-1
					3:00	31 -							
		Class	Gray, medium- to fine-grained, quartz- feldspar- muscovite- biotite- garnet SCHIST, close to moderate fracture		5:00	F	-	ARREL	%8/= ,.(	%8/=0		3:26	PM
		1	spacing, unweathered, with fractures dipping approximately 50 degrees from horizontal [Class 1b] Good quality		3:00	34 -	C-2	NX CORE BARRE	REC=47"/60"	RQD=47"/60"		Begii 4:02l	n core C-2: 31' to 36' PM: Complete C-2
			[Oldoo 15] Good quality		9:00	35 -		Z	RE	RQ		groui	ve part of core got nd up due to long cor at end
					2:00	_	-						
			Gray, medium- to fine-grained, quartz- feldspar- muscovite- biotite- garnet SCHIST, very close to moderate fracture		2:00	- 37 - - - - 38 -		ARREL	%59=(	)" =53%		Ū	n core C-3: 36' to 41'
			spacing, moderately weathered, with fractures dipping 40 degrees from horizontal [Class 1b] Fair quality		2:00	39 -	C.3	NX CORE BARRE	REC=39"/60"	RQD=32"/60"		4:331	PM: Complete C-3
			Column to the state of the stat		3:00 6:00	40 -	-	Z	RE	RQ			
	-31.5		End of boring at 41'			41 -	-					Drille comp	PM:  g was backfilled.  rs cleaned up around  bleted boring and mo  w location.
						43 - - 44 -							

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	Project		HUDS	SON YARDS - T	OWER D			Pr	oject No.		1	170019	9115				East		4930
	Location					NIV		El	evation a	nd Da	tum			-4 DE	NAD.		North		
	Drilling C	ompai		west side yard,	Terra Firma, Manhatt	an NY		Da	ite Starte	d	F	Approx	κ. 9 τε			Finished	<u> </u>		4142
	Drilling E	quipm		en George, Inc.				Co	mpletion	Depth	า	6/23	3/13		Rock	Depth	6	/23/13	
			Acke	r AD2 Truck-Mo	unted Drill Rig				· 				13 ft		l l la		1.	27 ft	
ا ا	Size and		2-7/8	" Diameter Trico	one Roller Bit	lo	I- (6)	Νι	imber of	Samp	les	Disturbe	ea	5		ndisturbed		Core	4
MFLA	Casing D		4"-Ínr	ner-Diameter Flu	ush Steel Casing	Casing Dept	27		ater Leve	` '		First <u></u>				mpletion		24 HR. 	
316	Casing F	lamme			Weight (lbs) 300		30	_ Dr	illing Fore	eman	Gil	l Burge	ess						
	Sampler	Hamm			olit Spoon/ NX Core B Weight (lbs)	Dron (in	) 00	In:	specting I	Engine	eer								
:	·			Safety	140	' '	30	i) #			Со	orrie Ca Samp							
- LAING	MATERIAL SYMBOL	Elev. (ft)	Building Code	Sa	ample Description		PID Reading (ppm)	Casng blws/ ft. Coring (min)	Depth Scale	Number	Туре	Recov. (in) Penetr.	resist 3L/6in	N-Va (Blow	s/ft)	(Drilli Fluid Lo		narks Depth of Cas ng Resistance	sing, e, etc.)
II. LOG	X.	+9.0		1-foot-thick G	GRAVEL		Δ.	80	0 -	Z				10 20 3	30 40	30' E	of W F	P.L.	
repo		+8.0		6-inch-thick (	CONCRETE SLAB				- 1 -								N of S I Split Sp		
, AIVI		+7.5.						PUSH	- - 2 -							6/22/	13		
10.54.4																	M: Dril	I to 5' slab: 1' to	1.5'
2013								9	3 -										
// 10									4 -	=									
. כדם.									- - 5 -	1						8:37 <i>A</i>			
אאר				Brown, mediu	um- to fine-grained, S	AND,						3	3					S): 5' to 7'	1
SON				some silt [FILL] [Class	7]		0.0	79	<u> </u>	S-1	SS	2	5						
3113 110									7 -				2			8:51A chatte	AM: Dril er 7' to	l to 10'. F 8'. Brown	Rig ı wash.
33/1/00			Class 7						8 -									tall 9' of 4 sing: 0' to	
								PUSH	_	-						9:16	AM: Re	drill to 9'	
CAL									10 -			3				9:23 <i>A</i>		S): 10' to	12'
				Brown, mediu SAND, trace [FILL] [Class	um- to fine-grained, si gravel	lty	0.0		11 -	S-2	SS	3 ω 5	4 9			Take	0 2(00	5). 10 10	
AIAIGEO				[FILL] [Class	<i>1</i> ]			36	12 -			+	4				AM: Ins 9' to 14	tall 5' of c	asing
בבתוואם ב									13 -							wash	- turns	l to 15'. E black at 1	
INGINE									14 -	=						Smoo	oth drilli	ing.	
101101		-6.0.					-		15 -	1		1	$\parallel$			9:56 <i>A</i>			
1,001				Black, organi gravel	c SILT, some sand, tr	ace	0.0		16 -	S-3	SS	13	0			Take	S-3(SS	S): 15' to	17'
7			Class	[OL] [Class 6	]		0.0	PUSH		S		1	1						
71111			6						17 -	-	H								
. באלווי									18 -	1									
20.5		-9.5							19 -							5	. 001 6	0 2	
LANG			Class 3						_					$\left  \cdot \right $		No re		mooth dr	ıııng.
ا -								1	<del></del> 20 −	1	$\perp$			$\perp \Lambda \downarrow$		i .			

Log of Boring **D-15** Sheet of 2 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 Sample Data Building Code PID Readin (ppm) Remarks N-Value (Blows/ft) Elev Depth Penetr. resist BL/6in Sample Description Recov. (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) (ft) Scale 10 20 30 40 20 10:11AM Take S-4(SS): 20' to 22' Brown, medium- to fine-grained, silty 10 .Template TEMPLATE. SS S-4 Little recovery- push spoon SAND, some gravel [SM] [Class 3b] 21  $^{\circ}$ 11 again to get more sample 10:30AM: Drill to 25'. Rig 12 22 0.0 chatter 23' to 25'. No return. 10:50AM 23 Take S-5(SS): 25' to 27' Class Refusal at 26.5' Report: Log - LANGAN 11:15PM: Drill to 27'. 24 Encounter bedrock at 27' 11:34AM: Install 27' of 3" 25 diameter casing: 0' to 27' 10 11:55AM: Redrill to 27 SPIN Brown, coarse- to fine-grained, SAND, S-5 13 9 some gravel, trace silt [SP] [Class 3a] 0.0 26 12:12AM 28 Begin core C-1: 27'-28' 7/18/2013 10:54:48 AM 50/4" -18.0 12:42AM: Core barrel 27 clogged- remove & unclog 7 75% 20% 4:00 REC=9"/12" =75% RQD=6"/12" =50% 28 13:00 Gray, medium-to fine-grained, quartz-29 feldspar- muscovite- biotite- garnet 1:24PM REC=59"/60" =98% RQD=53"/60" =88% SCHIST, close to wide fracture spacing, 7:00 Begin core C-2: 28' to 33' **NX CORE BARREI** /LANGAN.COM/DATA/NY/DATA/1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ slightly weathered, with foliations dipping 30 approximately 0 degrees and 30 degrees 1:50PM: Complete core C-2 from horizontal 8:00 [Class 1a] Good Quality 31 5:00 32 6:00 33 4:00 Grav. medium- to fine-grained, guartzfeldspar- muscovite- biotite- garnet 34 REC=56"/60" =93% RQD=53"/60" =88% SCHIST, quartz intrusions, close to 7:00 Begin core C-3: 33'-38' **NX CORE BARRE** moderate fracture spacing, slightly Class 35 weathered to unweathered, with fractures 2:34PM: Complete core C-3 dipping approximately 0 degrees and 40 4:00 degrees from horizontal 36 [Class 1a] Good quality 3:00 37 4:00 38 3:00 Gray, medium- to fine-grained, quartz-39 feldspar- muscovite- biotite- garnet 2:53PM REC=52"/60" =87% RQD=52"/60" =87% SCHIST, quartz intrusions, wide fracture Begin core C-4: 38' to 43' 4:00 **NX CORE BARRE** spacing, unweathered, with fractures dipping approximately 30 degrees from 40 3:16PM: Complete core C-4 3:00 [Class 1a] Good quality 4:00 42 3:45PM to 4:30PM 9:00 Boring was backfilled. Drillers cleaned up around -34.0 43 End of boring at 43 completed boring. 4:45PM: End of 6/23/13

L		4		<b>LAN</b>	Log	g of E	Boring			D-16	6		She	et	1	of	2
Pro	oject		חווס	SON YARDS - TOWER D		Pr	oject No.			17001	0115			E	ast		4956
Lo	cation		ПОВС	SON TANDS - TOWER D		Ele	evation ar	nd Da		17001	9113			N	orth		4930
Dri	llina C	ompa		west side yard, Terra Firma, Manhattan NY		Da	ate Starte	4		Appro	x. 9 feet		ID te Finishe	-d			4142
	ming c	отпра	-	en George, Inc.						7/10	0/13		to i miorio	, u	7/1	1/13	
Dri	lling E	quipm		ADO T . I M . I I D !!! D!		Co	mpletion	Depth	1	4.5	0	Ro	ck Depth		0.0		
Siz	e and	Туре	of Bit	AD2 Truck-Mounted Drill Rig		Nı	umber of S	Sampl	loc	45 Disturb			Undisturb	ped	Co	).5 ft ore	
lemplate TEMPLATE GDI	sing C	iamet		' & 2-7/8" Diameter Tricone Roller Bit Casing D	epth (ft)	-				First		7	Completio	on	24	HR.	4
	aina I	lamm	3&4"-	Inner-Diameter Flush Steel Casing	25		ater Leve	` '		$\bar{\Delta}$	-	-	<u>▼</u>		7	<u></u>	
e Sa	mpler	iamme	erSafety		30	-  "	ming rore	inan	Sa	al Lore	enzo						
Sa		Hamn		ter-Diameter Split Spoon/ NX Core Barrel Weight (lbs) Drop	(in) 00	Ins	specting E	ngine									
z $-$				Safety 140	30	Ē			Co		ampbell ble Data						
- LANGAN	MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Number	Type	Recov. (in) Penetr.	L/6in N	-Value lows/ft	)	(Drilling I	Rema	pth of Ca	sing,
- E	<b>≥</b> ω	+9.0	ω -		吕	S	├ o -	Ž	-	R . 8	10	20 30	40	Fluid Loss,			e, etc.)
ebort:	).	+8.0		1-foot-thick GRAVEL			٠ .	1					1	142' N c	fSP.	L.	
Ý.		0.0				PUSH	- 1 -							SS= Sp	п Эро	on	
54 AN							_ 2 -	1						7/10/13			
10:54:							3 -							6:15PM: Rig chat			
2013								-					E	Brown w	/ash		
7/18/							- 4 -	1									
 				Danier was divine to fine anning divine the			5 -							6:35PM			
3DS.C				Brown, medium- to fine-grained, gravelly SAND, trace silt (moist)			-	_		4	11			Take S-	1(SS):	5' to 7	•
X X				[FILL] [Class 7]	0.0	256	6 -	S-1	SS	ري ا	22	1					
OSCI			Class				- 7 -				14			6:38PM nstall 9	of ca	sing: 0'	to 9'
15 H.			7				ļ .	1								•	
00191							- 8 - -							3:52PM: Brown w		o 10'	
3S/17							<del> </del> 9 -	1					1 1	Rig chat		to 10'	
							10	1									
T/GIV				Brown, medium- to fine-grained, SAND with silt, trace gravel (wet)			- 10 -			1	0_			7:00PM Fake S-	2(SS):	10' to	12'
N CA				[FILL] [Class 7]	0.0		- 11 -	S-2	SS	ဖ 3	5 <b>8</b>				()		
ᆲ				12' to 13.5': Brown, medium- to fine-		PUSH	- 12 -				2						
QEO				grained, SAND, some silt, trace wood			12			3	1 11			7:04PM Fake S-	3(SS):	12' to	14'
DATA		-4.5		(wet) [FILL] [Class 7]	0.0		<del>-</del> 13 -	S-3	SS	6 3	3 6						
	ППТ	-4.5	Class	13.5 'to 14': Gray, sandy SILT (wet)	_		14 -				2			7:10PM: Smooth			wash
	ЦЦI	-5.5	5	[ML] [Class 6]			'-	-						2.1100011	ar mini	y. Oray	114011
ENG.				Gray, fine-grained, SAND with silt, trace			<del>-</del> 15 -			1				7:17PM	4/00	4511	471
19115				shells (wet) [SM] [Class 3b]	0.0		- 16 -	S-4	SS	6	6 14			Γake S-	4(55)	15' t0	17
1700						129	-	0,		8	6						
ATA1			Class	Gray, fine-grained, SAND with silt, trace			- 17 -			1	0			7:20PM Γake S-	5/99\	17' +0	10'
.: N			Class 3	shells (wet) [SM] [Class 3b]	0.0		<b>–</b> 18 –	S-5	SS	15	9 2	1	'	ane 3-	υ( <b>υ</b> Ο).	17 10	10
DATA											4 17			7:23PM			-
NOON.							19 -						5	smooth	drillin	g. Brow	n wash
NILANGAN COMIDA ANYIDA IA1170019115ENGINEERING DA IAGEO I ECHNICALGINI LOGSUT70019115 HUDSON YARDS.GPJ 7/18/2013 10:54:54 AM				Brown, medium- to fine-grained, SAND with gravel, some silt (wet)			_ 20 -	<u></u>		5			7	7:32PM			
LAN				[SM] [Class 3b]			21 -	S-6	SS	4	10		T	Γake S-	6(SS):	20' to	22'

Project					Pr	oject No.								East		
ocation	1	HUDS	SON YARDS - TOWER D		Ele	evation ar	nd Da	tum		01911	5			North		4956
		LIRR	west side yard, Terra Firma, Manhattan NY						Арр	rox. 9	feet BPI	MD				4142
MATERIAL SYMBOL	Elev. (ft)	Building Code	Sample Description	PID Reading (ppm)	Coring (min)	Depth Scale	Number	Type		Penetr. resist aldw BL/6in gg	N-Valu (Blows/	ft)		Remang Fluid, Do	epth of Ca	
	-14.5	Class 3		0.0	233	- 21 - - 22 - - 23 -	9-8	SS	4	10 12	20	10	Resist	M: Drill tance 23 drilling.	3' to 23.	
	>		Gray, decomposed MICA SCHIST with sand, trace shells [Class 1d]	0.0		- 24 - - 25 -	S-7	SS	3	50/3"		0/3"	7:46P Take	S-7(SS)	: 25' to	27'
	>				6:00	26 -						0,0		al at 25' M: Insta	-	3"
		Class 1	Gray, decomposed MICA SCHIST		4:00	- - 27 -		REL	-10%	%0=				ter casi M: Redi	Ū	
$\bigotimes$			[Class 1d] Very poor quality		4:00	- 28 -	2	NX CORE BARREL	REC=6"/60" =10%	3∆D=0"/60"			8:47P			
					3:00	- 29 -		NXCC	REC=	RQD=			ŭ	core C- M: Com		
$\bigotimes$	-21.5				7:00	30 -										
	-22.5	Class 1	30.5' to 31.5': Gray, medium- to fine-grained, quartz- feldspar- muscovite-		7:00	31 -			%	. 0						
/。\	_		biotite-garnet SCHIST, slightly weathered		4:00	32 -		ARREL	REC=60"/60" =100%	%28=			9:28P Begin	M core C-	2· 30 5'	to 35
- /			31.5' to 35.5': Gray, medium- to fine-grained, quartz- feldspar- muscovite-biotite GRANULITE, close to moderate		3:00	- 33 -	C-2	NX CORE BARREL	.09/09	RQD=52"/60"			9:35P	M: Core M: Resi	barrel	clogg
			fracture spacing, slightly weathered to unweathered, with fractures dipping close to horizontal and approximately 80		4:00	- 34 -		XX	REC=	RQD				PM: Cor		•
`\ `			degrees from horizontal [Class 1a] Good quality		3:00											
/ °-		Class	Gray, medium- to fine-grained, quartz-		4:00	-			%C	%0			10:20 Begin	PM core C-	3: 35.5'	to 40
\ ./		1	feldspar- muscovite- biotite- garnet GRANULITE, close to long fracture spacing, unweathered, with fractures		3:00	ļ ·	8	NX CORE BARREL	REC=60"/60" =100%	.0" =100%			10:38	PM: Cor	mplete (	C-3
			dipping close to horizontal and approximately 45 degrees from horizontal,		4:00	ļ ·	င်း	X CORE	9/09=:	RQD=60"/60"						
			pegmatite intrusions from 39' to 40' [Class 1a] Excellent quality		3:00			2	REC	RQE				PM: Ligi PM: End		
	-		40.5' to 42': Gray, medium- to fine-grained,			- 40 - - - 41 -										
	-33.0		quartz- feldspar- muscovite- biotite GRANULITE, with pegmatite intrusions		8:00	-		닖	%0 <b>ℓ</b>	%22=				M: Drille	ers on-s	ite
			42' to 45.5': Gray, medium- to fine-grained,			- 42 - - 43 -	0.4 4	E BARRE	6= ,,09/	/90" =7			_	core C-		
		Class 1	quartz- feldspar- muscovite- biotite- garnet SCHIST, moderate to long fracture spacing, umweathered, with fractures		6:00	-	0	NX CORE BARREL	REC=54"/60" =90%	RQD=46"/60"			3:52P 4:10P	M: Core M: Resu M: Core	ıme dril barrel	ling clogg
			dipping close to horizontal [Class 1b] Good quality		6:00	-		_	R	RG			4:20P 4:32P	M: Resı M:	ıme dril	ling
<u> </u>	-36.5		End of boring at 45.5'	-		46 -							Driller	y was ba s cleane eted bo	ed up ar	ound
							1							v locatio		

LANGAN Sheet Log of Boring **D-18** 2 1 of 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 Drilling Company Date Started Date Finished 6/13/13 6/14/13 Warren George, Inc. Rock Depth **Drilling Equipment** Completion Depth Acker AD2 Truck-Mounted Drill Rig 34 ft 19 ft Size and Type of Bit Disturbed Undisturbed Core Number of Samples 3-7/8" Diameter Tricone Roller Bit 4 **FEMPLATE** 24 HR. Casing Diameter (in) Casing Depth (ft) Completion First Water Level (ft.) 3&4"-Inner-Diameter Flush Steel Casing 19 Casing Hammer Donut Weight (lbs) Drop (in) Drilling Foreman 30 Eddie Cardona Sampler 2"-Outer-Diameter Split Spoon/ NX Core Barrel Inspecting Engineer Sampler Hammer Weight (lbs) Drop (in) 30 Safety 140 Corrie Campbell Report: Log - LANGAN Sample Data Remarks MATERIA Elev Depth Number Recov. (in) Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, (ft) Scale Ы Fluid Loss, Drilling Resistance, etc.) +7. 10 20 30 40 6-inch-thick GRAVEL 11' E of W P.L. +7.0 172' N of S P.L. SS= Split Spoon ANGAN.COM/DATANY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/1/70019115 HUDSON YARDS.GPJ ... 7/18/2013 10:55:07 AM 6/13/13 2 4:30PM: Drill to 5' Rig chatter. Brown wash. At 3 1' add drilling fluid. SPIN 4:43PM: Take S-1(SS): 5' to 7' 5 Brown, coarse- to fine-grained, SAND, 22 some gravel, some silt, trace mica [FILL] [Class 7] 4:46PM: Install 9' of 4" SS 8 S-1 3 6 17 diameter casing: 0' to 9' 9 5:00PM: Rig making unusual 0.0 6 noises, very slow drilling 5:21PM to 7:15PM: Swivel fell off. Return to shop 8 7:20PM: Drill to 9.5'. Obstruction at 9.5' 9 7:30PM 50/0" Class S-2 SS 0 50/0' Take S-2(SS): 9.5' to 9.6' No recovery Gray, schist- pegmatite- granulite-6:00 BOULDERS, with trace shells 8:30PM: Drillers leave site [FILL] [Class 7] because of rain 5:00 6/14/13 12 RQD=24"/60" 2:43PM: Drillers arrive 5 3:00 3:55PM 13 Begin core C-1: 10' to 15' 3:00 4:12PM: Complete C-1 No water return 5:22PM Begin core C-2A at 15' 2-inch thick WOOD %0 % 5:31PM Barrel pulled. 2" thick wood 16 chunk in tip of core. SPIN REC=0"/6" =0% RQD=0"/6" =0% 17 4:50PM: Install 15' of 3" 18 diameter casing: 0' to 14'. Obstruction at 6 5:15PM: Redrill to 19' using

9:00

6

Class

2-7/8" diamter tricone roller

bit. Boulders from 0' to 19'

Log of Boring **D-18** Sheet of 2 2 Project Project No. East 170019115 **HUDSON YARDS - TOWER D** 4911 Location Elevation and Datum North LIRR west side yard, Terra Firma, Manhattan NY Approx. 7.5 feet BPMD 4172 Sample Data Coring (min) PID Readin (ppm) Remarks Elev N-Value (Blows/ft) Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) (ft) Scale 10 20 30 40 20 Gray, medium- to fine-grained, quartz-Install 5' of casing: 14' to 19'. 8:00 feldspar- muscovite- biotite- garnet Slow installation. Boulders REC=56"/60" =93% 21 encountered. Gray wash SCHIST, moderate fracture spacing, unweathered to slightly weathered, with 4:00 RQD=56"/60" 5:45PM: Redrill to 19 ft. Gray NX COR fractures dipping approximately 30 C-2 wash. Multiple obstructions degrees from horizontal 5:00 [Class 1a] Excellent quality Begin core C-2: 19' to 24' 23 6:31PM: Complete C-2 7:00 24 7:00 25 Gray, medium- to fine-grained, quartz-REC=55"/60" =92% 3:00 Begin core C-3: 24' to 29' feldspar- muscovite- biotite- garnet SCHIST, quartz intrusions, close to 26 RQD=49"/60" NX CORE moderate fracture spacing, slightly to 7:01PM: Complete C-3 C-3 4.00 moderately weathered, with fractures 10:55:08 AM Class dipping approximately 35 degrees from horizontal 3:00 [Class 1b] Good quality 28 4:00 29 3:00 //LANGAN.COM/DATA/NY/DATA1/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ 30 7:13PM Gray, medium- to fine-grained, guartz-REC=55"/60" =92% feldspar- muscovite- biotite SCHIST, 2:00 Begin core C-4: 29' to 34' quartz intrusions, close to moderate 31 RQD=55"/60" NX CORE 7:31PM: Complete C-4 fracture spacing, slightly weathered, with 5:00 fractures dipping approximately 30 degrees from horizontal 32 [Class 1a] Excellent quality 5:00 33 4:00 -26.5 34 End of Boring at 34' 7:45PM to 8:30PM Boring was backfilled. Drillers cleaned up around 35 completed boring and moved to new location. 36 9:15PM: End of 6/14/13 37 38 39 42 43

L	A	$\Lambda$	<b>VGAN</b>	Log	of E	Boring			D-19		_	Sheet	1	of	2
Project					Pr	oject No.							East		
Location	1	HUD	SON YARDS - TOWER D		Ele	evation a	nd Da		700191	15			North		4931
		LIRR	west side yard, Terra Firma, Manhattan NY					P	Approx.	8.5 fee					4172
Drilling (	Compa	-			Da	ite Starte	d			_	Date F	Finished			
Drilling I	Eauipm		en George, Inc.		Co	mpletion	Depth	1	6/25/1	3	Rock	Depth	6/2	25/13	
			r AD2 Truck-Mounted Drill Rig						45	ft				25 ft	
Size and	d Type		" Diameter Tricone Roller Bit		Nu	mber of	Sampl	es [	Disturbed	4	Un	disturbed		ore	4
Casing	Diamet	er (in)		Depth (ft)	W	ater Leve	l (ft.)	F	First		Co	mpletion	2	4 HR.	
Casing		Pr Donu	t Weight (lbs) 300 Dr	op (in) 30	Dr	illing Fore	eman	0-	_			<del>-</del>	I	<u></u>	
Sample	•	2"-Oı	uter-Diameter Split Spoon/ NX Core Barrel		Ins	specting E	Engine		l Lorenz	0					
Sample	Hamn	ner	Safety Weight (lbs) 140 Dr	op (in) 30				Со	rrie Car						
S S S	Elev.	ing Te		) Reading (ppm)	Casng blws/ ft. Coring (min)	Depth	-		Sample		/alue	-	Rem	arks	
MATERIAL SYMBOL	(ft)	Building Code	Sample Description	PID Reg	sng bl	Scale	Number	Type	(in) Penetr. resist	(Blo	ws/ft)	(Drill Fluid Le	ing Fluid, D	epth of Ca	sing, e. etc.)
	+8.5	ш	10 inch think ODAVE	₫	Š	<u> </u>	Ž	.	2 2	10 20	30 40		of W P.		0, 010.)
			12-inch-thick GRAVEL									172'	N of S P	.L.	
	+7.5.					- 1 -							Split Sp	oon	
2						2 -						6/25/	13 BAM: Dri	II to 5'	
3					SPIN							Rig c	hatter 0	to 5'. B	rown
2						_ 3 -						wash			
070						-									
						- 4 -									
						F _						10:35		): 5' to 7	1
			Brown, coarse- to fine-grained, gravelly SAND, trace silt (moist)	0.0		5 -	S-1	SS	3 50/3	_	50/3"	Refus	sal 5'-3"	). 5 10 7	
2			[FILL] [Class 7]			6 -						10:40	AM: Dri	II to 10'	
													hatter		
					60	7 -								tall 9' of	4"
<u></u>						8 -						diam	eter cas	ing	
													2AM: Re	drill to 1	0'
Ź						9 -					$\parallel$		n wash	ig	
5		Class 7				-					/				
Į.		,	Gray, coarse- to fine-grained, SAND with			10 -		SS	2	7   /	/	11:10 Take		): 10' to	12'
			gravel, trace silt (wet) [FILL] [Class 7]			11 -	S-2	g g	9 !	5 8 /					-
5						<u> </u>	0		3				BAM: Dri hatter 1		
S S S S S S S S S S S S S S S S S S S					PUSH	12 -		弔	2	<u>-</u>		No re		11' to 1:	2' and
5														Slow drill	
						13 -									
						14 -									
						- '									
2			Gray, medium to fine grained, silty SAND	,		15 -		$\exists$	6	-		12:00			
8			trace brick, trace mica (wet)			-	<u></u>	SS	0	5		Take	S-3(SS	): 15' to	17'
5			[FILL] [Class 7]	0.0		<u> </u>	S-3	SS ∏	6	11			AM: Dri		مادااا:م
5					SPIN	17 -			,			Brow	ıı wasıl.	Smooth	uriiing
<u> </u>						į .,									
2						18 -									
3	-10.0.					- 10	1								
2		Class 3				19 -	1								
<u> </u>						E 20 -									

Sheet Log of Boring **D-19** of 2 2 Proiect Project No. East 170019115 HUDSON YARDS - TOWER D 4931 Elevation and Datum Location North LIRR west side yard, Terra Firma, Manhattan NY Approx. 8.5 feet BPMD 4172 Sample Data Building Code PID Readin (ppm) Remarks N-Value (Blows/ft) Elev Depth Penetr. resist BL/6in Number Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) (ft) Scale 10 20 30 40 20 12:13PM Brown, medium- to fine-grained, silty SAND, trace mica (wet) Take S-4(SS): 20' to 21.9' 9 Template TEMPLATE. S-4 SS Refusal at 21'-11" 2 0.0 21 12 [SM] [Class 3b] SPI 50/5" 12:20PM: Drill to 25' Class 22 12:30PM: Drill bit gets clogged at 20.5' 12:40PM: Continue to drill to 23 24'. Rig chatter 20' to 24'. Slow drilling -15.5 1:05PM: Resistance at 24'. 24 Drill 4" into rock to be able to seat casing 25 1:33PM: Install 24' of 3" 4:00 diameter casing: 0' to 24' 1:53PM: Drill to 25' 26 Gray, medium- to fine-grained, quartz--93% REC=56"/60" =93% 3.00 feldspar- muscovite- biotite- garnet NX CORE BARRE Class SCHIST, moderate to wide fracture 27 RQD=56"/60" 2:05PM spacing, unweathered, with fractures 7 4:00 Begin core C-1: 25' to 30' dipping approximately 45 degrees from 28 2:23PM: Complete C-1 [Class 1a] Excellent quality 3:00 29 4:00 COM/DATA/NY/DATA/1/10019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ 30 4:00 31 2:45PM Gray, medium- to fine-grained, quartz-REC=24"/60" =40% feldspar- muscovite- biotite- garnet-Begin core C-2: 30' to 35' 15:00 NX CORE BARREI SCHIST, close to moderate fracture 32 RQD=18"/60" 3:43PM: Complete C-2 spacing, slightly weathered to C-2 4:03PM: Bad recovery 16:00 unweathered, with fractures dipping approximately 30 degrees from horizontal 33 Attempt to spin in casing more to create a better seal [Class 1d] Poor quality 11:00 in rock 34 4:07PM: Redrill to 35' 12:00 Remove wash accumulated -26.5 35 at bottom of hole 6:00 36 4:40PM Gray, medium- to fine-grained, quartz-RQD=56"/60" =93% REC=56"/60" =93% Begin core C-3: 35' to 40' feldspar- muscovite- biotite- garnet 5:00 NX CORE BARREL SCHIST, long fracture spacing, slightly 37 weathered, with fractures dipping 5:06PM: Complete C-3 6-5 5:00 approximately 30 degrees from horizontal 38 [Class 1a] Excellent quality 4:00 39 4:00 Class 4:00 Begin core C-4: 40' to 45' REC=60"/60" =100% Gray, medium- to fine-grained, quartz-=83% 4:00 feldspar- muscovite- biotite- garnet NX CORE BARREI 5:47PM: Complete C-4 SCHIST, close to moderate fracture 6:04PM: Part of core stuck in RQD=50"/60" spacing, unweathered to slightly 5:00 hole. Lower rods back down weathered, with fractures dipping to retrieve approximately 40 degrees from horizontal 43 6:30PM: Able to remove [Class 1b] Good quality 4:00 remainder of core 6:45PM: Boring was 6:00 backfilled. End of boring at 45'

LANGAN Log of Boring **D-20** Sheet of 2 1 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 Drilling Company Date Started Date Finished Warren George, Inc. 7/11/13 7/11/13 Drilling Equipment Rock Depth Completion Depth Acker AD2 Truck-Mounted Drill Rig 33.5 ft 18.5 ft Size and Type of Bit Disturbed Undisturbed Core Number of Samples 3-7/8" & 2-7/8" Diameter Tricone Roller Bit 4 **FEMPLATE** 24 HR. Casing Diameter (in) Casing Depth (ft) First Completion Water Level (ft.) 3&4"-Inner-Diameter Flush Steel Casing 18 Casing HammerSafety Weight (lbs) Drop (in) Drilling Foreman 30 Sal Lorenzo Sampler 2"-Outer-Diameter Split Spoon/ NX Core Barrel Inspecting Engineer Sampler Hammer Weight (lbs) Drop (in) 30 Safety 140 Corrie Campbell Sample Data Building Code Remarks MATERIA Depth Number (in) Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, (ft) Scale Ы Fluid Loss, Drilling Resistance, etc.) +8. 10 20 30 40 67' E of W P.L. 1-foot-thick GRAVEL 175' N of S P.L. SS= Split Spoon IGAN.COM/DATA/NY/DATA/170019115/ENGINEERING DATA/GEOTECHNICAL/GINTLOGS/170019115 HUDSON YARDS.GPJ ... 7/18/2013 10:55:19 AM 7/11/13 36 5:52PM: Drill to 5' Smooth drilling Gravel pad in first 1' 3 Rig chatter. Brown wash Class 5 Brown, medium- to fine-grained, gravelly 5:58PM 3 SAND, trace silt (moist) Take S-1(SS): 5' to 7' SS 3 S-1 [FILL] [Class 7] 6 က 0.0 6 186 9 Install 9' of casing: 0' to 9' Have to take out once to straighten 8 6:30PM: Drill to 10' -0.5 Brown wash. Rig chatter 10 Class 6:39PM Black, sandy SILT, trace gravel, trace shell 2 Take S-2(SS): 10' to 12' SS 3 S-2 [ML] [Class 6] 13 0.0 45 6:41PM: Drill to 15' 1 Encounter resistance at 13' 12 Black to brown wash at 12' 13 6:55PM: Install 13' of 3" 4:00 diameter casing: 0' to 13' 7:05PM: Redrill to 13' using Decomposed MICA SCHIST and REC=6"/60" =10% 2-7/8" diameter drill bit GRANULITE 1:00 **NX CORE BARRE** [Class 1d] Very poor quality Class 15 RQD=0"/60" 4:00 16 1:00 Begin core C-1: 13' to 18' 3:00

18

19

C-2

1 50/3"

0.0

5:00

Decomposed MICA SCHIST, trace shells

[Class 1d]

Class

7:40PM

50/3"

Take S-3(SS): 18' to 20'

diameter casing to 18' with

Refusal at 18'-3" 7:42PM: Install 4.5' of 3"

300 lb hammer

Log of Boring **D-20** Sheet of 2 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 Sample Data Building Code PID Readin (ppm) Remarks N-Value (Blows/ft) Elev Depth Penetr. resist BL/6in Sample Description (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.) (ft) Scale 10 20 30 40 ن 4:00 20 REC=47"/60" =78% 7:53PM: Drill to 18.5' Gray, medium- to fine-grained, quartz-NX CORE BARRE feldspar- muscovite- biotite- garnet SCHIST, moderate fracture spacing, 3:00 21 Resistance at 18.5' RQD=47"/60" unweathered, with fractures dipping 8:04PM 22 5:00 approximately 45 degrees from horizontal Begin core C-2: 18.5' to 23.5' [Class 1b] Good quality 4:00 23 8:25PM: Complete C-2 24 5:00 REC=60"/60" =100% RQD=60"/60" =100% 4:00 25 NX CORE BARREL Gray, medium- to fine-grained, quartz-Begin core C-3: 23.5' to 28.5' feldspar- muscovite- biotite- garnet 6-3 SCHIST, moderate to long fracture 4:00 26 9:04PM: Complete C-3 spacing, unweathered, with fractures Class dipping close to horizontal and 10:55:20 AM approximately 40 degrees from horizontal 3:00 27 [Class 1a] Excellent quality 4:00 28 29 4:00 NLANGAN COMIDATAINYIDATA11170019115\ENGINEERING DATA\GEOTECHNICAL\GINTLOGS\170019115 HUDSON YARDS.GPJ REC=58"/60" =97% 4.00 30 9:17PM Gray, medium- to fine-grained, guartzfeldspar- muscovite- biotite- garnet SCHIST, moderate to long fracture Begin core C-4: 28.5' to 33.5' RQD=56"/60" 9 4:00 31 9:36PM: Complete C-4 spacing, unweathered, with fractures dipping approximately 40 degrees from 32 4:00 horizontal [Class 1a] Excellent quality 10:15PM to 11:15PM 3:00 33 Boring was backfilled. Drillers cleaned up around -25.5 End of boring at 33.5' completed boring and moved 34 to new location. 11:30PM: End of 7/11/13 35 36 37 38 39 42 43

El.+6.0	# <b>5</b>	# <i>6</i>
0t02	oto of Filled	EI. +4.0'
of Filled Ground	Cindere class	Sand and
	5and 8	Of Boulders Of Boulders Of Boulders Of Boulders
El-24,0 (2)	Sand 8 Boulders	The William III
5/1/	El-39.0	Soft Mud
El-54.0. Silt. Pebbles	El-62.0 yes	יינה ליונו <sup>ן וו</sup> ווי
El-950 Shells		EI94.0
5and 5 Shells	Silt Sand	Mud and fine Sand
El-108.00 5070 8 El-111.0 00 Pebbles	All traines	EI1080
	El-116.0	Red Sand  EL -114.2 & & Boulders
Gneiss	Mica Schist	Rock
S. C.		N.Y.C. E-9-627 #332
P[-14].D	El-135.0   P.R.R P.R.R N.Y.CW.S. Imp. #21	8
P.R.R. N.Y.CW.S.Imp. #20		
ROCK DATA	V	OL.2 SHEET 10

2

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EL. +6.8 E GYOL +3.9 Cinders. Cinders, Cobbles, & Cobbles, Sand Sand Fill & Wood -29.2 29.7 Mud & Boulders Wood wood -Boulders EL. EL. -28.1 13:0' Pile Mud 15:0= 7 -45:0= -91.5 Mud Med. fine Sand & Mud Med. fine Sand & Mud EL. -101.1 1.0,01 Rock Red Clay, Clay N.Y.C.- E-9 - 627 #334 & Cobbles EL. EL. -125.1 Rock NY.C. E-9-627 #341

4.5	(A) b' (B) 2	
El.+5.8 # 15	El.+ 5.9 #16	#17 17
oto7 or Cinders	0107: A Brick Cinders Sand (50ft)	0t0.7
El16.2 A.	Dork River	El5.5  Cinders  Sond & Boulders
8. KIVEY Mud	El-34.1 Grey	El-22.5
El-71.0 Se Sand Grovel El-18.7 Se & Cobbles Rock	Rock	El-90.5 5 Coarse Red
El-88.7 Shelkandoned  NY.F. Imp. #347	El-81.6 #347	7 31 7
#10	#10	El105.5 N.Y. C. W.S. Imp. #361
	El.+4.7 #19	#20
©±070 & Cinders sand Small Boulders 8 El-12.8  Little Wood	Oto7 Cinders & Smoll Boulders	0±02, 4 Coarse
El-12.8 A Little Wood  El-21.1 A Wood  El-14.8 ERIVET MUD	El-23.3 Cinders & Small Boulders  El-123.4 Cork River  Mud  El-23.3 (very soft)	El. + 3 3 #20
Cinders sand  Small  Small  Small  Boulders 8  El-12.8  Med. Coarse  Sand  El-19.6  River Mud  El-14.8  El-90.5  Little fine Sond  Boulders  Rock	El-123  El-123  El-123  Dark River  Mud  (very soft)  Grey River  (soft)  Fine Sand  Rock	D±02; 420  O±02; 45 Coarse Sand  Cinders & Cobbles  Fine & Medium
Cinders sand Vi small Small Small Small Suboulders 8 El-12.8  El-19.6  El-1	Dark River  El-12.3  El-12.3  Dark River  Mud  (very soft)  Grey River  (soft)  Fine Sand  Rock	El. 13.3 #20  Otor Coarse Sond  El. 8.2 De Cobbles  Fine & Medium  Sond  Grey River  Mud
Cinders sand Small Small Small Small Small Small Boulders 8 Little Wood  El-12.8  A Little Wood  El-21.1  A River Mud  El-90.5  Cinders sand  Boulders 8  Little Wood  El-19.6  El-19.6  A Little Fine Sond  El-92.8  Rock  El-190.8	El-12.3  El-12.3  Dork River  El-89.3  El-105.3  Fine Sand  Rock  El-105.3  Rock	El. 13.3 #20  Otor Sond  El. 8.2 Solders & Cobbles  Fine & Medium  Sond  El. 13.2 Solder  Mud  El. 13.2 Solder  Cobbles  El. 13.5 Solder  Cobbles  El. 13.5 Solder  Cobbles  El. 13.5 Solder  Cobbles  El. 13.5 Solder  Cobbles  El. 13.5 Solder  Cobbles  El. 13.5 Solder  Cobbles  El. 13.5 Solder  Cobbles  El. 13.5 Solder  Cobbles  El. 13.5 Solder  Cobbles  Cobb
Cinders sand Small Small Small Small Small Small Boulders 8 Little Wood  El-12.8  A Little Wood  El-21.1  A River Mud  El-90.5  Cinders sand  Boulders 8  Little Wood  El-19.6  El-19.6  A Little Fine Sond  El-92.8  Rock  El-190.8	El-12.3  El-12.3  Dork River  El-89.3  El-105.3  Fine Sand  Rock  El-105.3  Rock	El. 13.3 #20  Otor   Coarse   Sand   Cinders & Cobbles   Fine & Medium   Sand   Cinders & Medium   Sand   El. 12.3   Grey   River   Mud  El. 13.2   El. 14.3   Boylder   Cobbles   Red Sand   El. 12.2
	4	
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Guell	*21	#22
El. +5.1	Sand R	El.+ 4.5
Et2.1 00	Sangra/	120
QtQ2	Cinders 4	
El-4.9	Bricks	Cobbles &
	Sand,	100 /111/F
22	Cinders,	El-13.5 A Wood
El-269 A	Wood 8 Cobbles	El-zio
	1	El-35.53 Mud (Soft)
	50ff Grey	Grey River.
78	Mud	El-77-5 TEMUS (Soft)
5/-/24.4	7700	EL-121.2 8 Fine Sano
3	Barrelatara	Med. Coorse,
F-1279" C	Boulders	EL-126.54 Sond & Cobble
000	Coorse	
£-132.9	Sand & Gravel	Rock
,		1 ~
4	Syenite	E/-140.5 . #233
E1-146.9		W.S.Imp. #333
W.S. Imp.	#316	
	24	***
	2 K K	
El.+6.8	638W 0	El.16.5 25
El. 16.8	Sand 8 Gravel	El. 16.5 25
El. +3.8 0	Sand 8 Gravel Cinders	Cinders
6.13.8 0 0 to 7 0 RP	Sand 8 Graref Cinders Wood 8	Oroz Sp Small Boulders
6.76.6 6.73.8 0 0 to 7 0 0 El-S.2	Sand & Gravel Cinders Wood & Cobbles	otos Spanoll
6.13.8 0 0 to 7 0 RP	Sand 8 Graref Cinders Wood 8	Otos Sinders Small Boulders El-145 (Hard)
6.76.6 6.73.8 0 0 to 7 0 0 El-S.2	Sand & Gravel Cinders Wood & Cobbles	Cinders Small Boulders EI-145 (F. Chard) EI-175 (F. Cinders EI-175 (F.
6.76.6 6.73.8 0 0 to 7 0 0 El-S.2	Sand & Gravel Cinders Wood & Cobbles	Cinders  Small  Boulders  El-14.5 (F. Chard)  El-27.5 (F. Chard)  El-30.0 (Charge Boulders
6.76.6 6.73.8 0 0 to 7 0 0 El-S.2	Sond & Gravel Cinders Wood & Cobbles Boulders Fill	Cinders Small Boulders (Hard)  EI-14.5 (D)  EI-17.5 (D)  EI-30.0 (D)
El. 17.2 D	Sond & Gravel Cinders Wood & Cobbles Boulders Fill	Cinders Small Boulders EI-14.5 (Hard) EI-27.5 (Grey EI-30.0 (Figure Boulders EI-30.0 (Figure Boulders EI-30.0 (Figure Boulders EI-30.0 (Figure Boulders EI-30.0 (Figure Boulders EI-30.0 (Figure Boulders EI-30.0 (Figure Boulders
El-3.8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Sond & Gravel Cinders Wood & Cobbles Boulders Fill Soft	Cinders Small Boulders (Hard)  El-14.5 (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)  El-17.5 (Cinders (Hard)
El. 17.2 D	Sond & Gravel Cinders Wood & Cobbles Boulders Fill	Cinders Small Boulders (Hard)  El-14.5 (D) Small Small Small Singles Compact Mud El-23.5 (D) El-30.6 (
0.107 60. 47 60.	Sond & Gravel Cinders Wood & Cobbles Boulders Fill Soft Grey Mud	Cinders Small Boulders El-145 Cinders Chard Boulders Chard C
El-9/2:	Sond & Gravel Cinders Wood & Cobbles Boulders Fill Soft Grey Mud	Cinders Small Boulders El-145 Cinders Chard Boulders Chard C
El-9/2:	Sond & Gravel Cinders Wood & Cobbles Boulders Fill Soft Grey Mud	Cinders Small Boulders (Hard)  El-145 Cinders (Hard)  El-145 Cinders (Hard)  El-175 Cinders Compact Mud El-74.1 Coarse Red Sand Mica Schist Talc Schist
El-83.4	Sand & Gravel Cinders Wood & Cobbles Boulders Fill Grey Mud	Cinders Small Boulders (Hard)  El-145 Cinders (Hard)  El-145 Cinders (Hard)  El-145 Cinders (Hard)  El-145 Complete Boulders El-141 Complete Mud El-141 Coarse Red Sand Mica Schist  Talc Schist
El-83.43	Sand & Gravel Cinders Wood & Cobbles Boulders Fill Grey Mud	Cinders Small Boulders (Hard)  El-145 Cinders (Hard)  El-175 Cinders (Hard)  Small El-175 Cinders Chara Sond El-174 Conse Red Sond El-174 Conse Red Sond El-174 Conse Red Sond El-174 Conse Red Sond El-175 Conse Red Sond El-176 Conse Red Conse
El-97.4	Sand & Gravel Cinders Wood & Cobbles Boulders Fill Soft Grey Mud  Fine Sand Horne blend Schist	Cinders Small Boulders (Hard)  El-14.5 (D)  El-27.5 (D)  El-30.0 (D)
El-83.4	Sand & Gravel Cinders Wood & Cobbles Boulders Fill Soft Grey Mud  Fine Sand Horne blend Schist	Cinders Small Boulders (Hard)  El-145 Cinders (Hard)  El-175 Cinders (Hard)  Small El-175 Cinders Chara Sond El-174 Conse Red Sond El-174 Conse Red Sond El-174 Conse Red Sond El-174 Conse Red Sond El-175 Conse Red Sond El-176 Conse Red Conse

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#07		
121	El+8.9 # 28	El.+9.2 # 29
E/.+5*4	14	Cinders,
otol Sand,	otol . Coorse	Ex Little Sond
1 8 Small	4 Cindere	0t07: V4 8
El-8.6 A Boulders	8	N (066/c
Vi Small	Cobbles	El-14.8
が 5moll * 祖 Boulders で (FIII)	El:-17.1	
	B B B B B B B B B B B B B B B B B B B	Grey
El-25.0 V	Mud Mud	River Min Mud
25.6	No Mud	F. C.
Grey Grey	Elstoj. Eine 8	E/-44.8
River Mud	Fine 8	Med Coalse
El-54.8	El-50.6 Fine 8 Coorse Sand	El-50.0 Red Sand
		to Port
Rock	S Rock	No.
7	El-656	E 618 #343
El-67.6 N.Y.C; #22C	El-65.6 N.Y.C. W.S.Imp. #362	W.5.1mp. #343
W.5./Mp. 1306		<b>-</b> 4. ∞
El.+8.6 #30	E/+9.1 #31	El.+9.4 #32
Cinders	. (0)	o Sand
oto 70 0. 5mall	otoz 5and 8 Cobbles	SETCIONETE 8
NE 8 LIHIC	El2.9 0°	27.03. Cobbles
El-15.9 Wood	5and.	Cinders
S Grey	Cinders 8 & Cobbles	El:-18.1
El-34.4 Mud	E/-22.4 60 4 CODDIES	Mud 4
Compact	Grey	El-26.6: Wood
	1.37.9. F. Mud 1.39.7 6 5868685	El-28.4 6 SCOBLES
	139.7 0 5808618s	
E-49.4 6 Cobbles		Rock
El-49.4 6 4 Cobbles	Rock	
	7.001	E/-4/.6
Rock		El-41.6 N.Y. G. W.S. Imp. #358
	7.54.9 V	3
El-61.9 \\ N.Y.C. #210	v.s. Imp. #353	
W.5./mp. "348	14C	5 X
ROCK DATA		VOL.2 SH. 10

		2. 3
El.+11.8 *33	El.+11.5 #34	EI.+11.4 #35
El. 13.8 Cinders	A L	<b>(2)</b>
0+07	0402:	oto?
	Seria	1 11/2/10/07/23
Fine Son	Cobbles	Cabbles &
cobbles		(50H)
200	WE DON'T MAN	
	El-11.5 Course Sond	
El-16.5 1.0	The state of the s	PET RIVER
New Mud, Bould	Tels .	El-18.1 Sand & Cobbles
El-20.29 9 4 Wood	/ Rock	EL-19.6 Sand & Cobbles
E1-25.5 4 Wood		ò
C1,-23,3 Prof	F/-72 F	Rock
N P -4	El-27.5 N.Y.C. W.5./mp. #35	<u> </u>
Rock	W.5./mp. #33	- S. 37.6
		W.5.Imp. #349
El-40.2 #25		×, å
W.5. Imp. #35	2	8
El.+12.4 *36	#37	#38
S EALTH &	El.+11.3	_
El. 16.4 GOVC)	MI. I	
: 18:	Fly 3 Fine &	El.+8.1
oto ? d Cinders	El.H.3 Coarse Sone	
	El.H.3 Coarse Sone	Qto 2 VV Cinders
Oto 7 4 Cinders  El-8.1 Dark	El.41.3 Coorse Sone  Q+07 Coorse  Sond &  El.9.7 Cinders  Mud	
Oto 7 14 Cinders  El-8.1 Dark  El-23.8 Mud	El.41.3 Coarse Sond Qto7. Coarse Sond & El9.7 Cinders  El17.4 Market Mud	Oto 7 Cinders Sand 8  No Boulder
Oto 7 4 4 Cinders  El-8.1 The River  El-23.8 Footse Sand	El.+1.3 Coorse Sone  Q+07 Coarse  Sond &  El9.7 A Cinders  El17.4 M Wood  El17.7 M Wood  El24.18 M	Oto 7 To Cinders Sand 8 Divider Fill Mud
Oto 7 4 Cinders  El-8.1 Dark  El-23.8 Mud	El. 4.3 Coarse Sono Qto7 Coarse Sand & Sand & Cinders  H-17.4 West  El-17.7 West  El-17.7 West  El-17.7 Mood  El-24.1 Boulder  El-14.7 Boulder	Oto 7  Oto 7  Cinders  Sand 8  Boulder  Fill  El-18.9  Mud
Oto 7 4 4 Cinders  El-8.1 The River  El-23.8 Footse Sand	El.41.3 Coorse Sone  Qto7 . Coorse Sond & El.9.7 A Cinders  Mud  El.17.1 W Wood  Rel-24.18 Boulder  Fine Sond &	Cinders Sand 8 Soulder Fill  El-17.9  Med, Fine Sond 8
Oto ? 4 Cinders  El-8.1 To River  El-23.8 E Mud  El-23.6 To Borse Sand  El-30.1 To Gravel, Boulde	El.+1.3 Coorse Sone  Qto7 . Coarse  Sond &  El9.7 A Cinders  Mud  El17.4 W Wood  El14.7 Boulder  Fine  Sond &  Clay  El34.7 Clay	Cinders Sand 8 Soulder Fill  El-18.9  Med, Fine Sond 8  El-33.9  Little Mud
Oto 7 4 4 Cinders  El-8.1 The River  El-23.8 Footse Sand	El.41.3 Coorse Sono Qto7 Coarse Sond & El.9.7 A Cinders  El.41.7 W Wood  El.24.13 A Boulder  Fine Sond & Clau	El-17.9 Fill  El-33.9 Fine 8
Oto ? 4 Cinders  El-8.1  Dark  River  Mud  El-23.8  El-23.6  Rock  Rock	El.+1.3 Coorse Sond  Q+0.7 Coorse  Sond &  El9.7 Mud  El17.4 Mud  El17.7 Mud  El14.7 Sond &  Clay  El34.7 Coorse Sond	Cinders Sand 8 Soulder Fill  El-17.99  Med, Fine Sond 8 Little Mud  Fine Coarse Sand Red Clay
Oto ? 4 Cinders  El-8.1 To River  El-23.8 E Mud  El-23.6 To Borse Sand  El-30.1 To Gravel, Boulde	El.+1.3 Coorse Sone  Qto7 . Coarse  Sond &  El9.7 A Cinders  Mud  El17.4 W Wood  El14.7 Boulder  Fine  Sond &  Clay  El34.7 Clay	Cinders Sand 8 Soulder Fill  El-18.9  Med, Fine Sond 8  El-33.9  Little Mud
Cinders  El-8.1  El-23.8  El-23.8  El-23.8  El-23.8  El-23.8  El-23.12  Coorse Sand B Gravel  Coorse Sand B Gravel  Coorse Sand B Gravel  Rock  Rock	El. 17.4 Se Coorse Sond  El. 17.4 Se Mud  El. 17.4 Se Mood  El. 24.13 Se Mood  El. 24.13 Se Mood  El. 34.7 Se Sond &  El. 34.7 Se Coorse Sond  Rock	Cinders Sand 8 Soulder Fill  El-18.9  Med, Fine Sond 8 Little Mud  Fine 8 Coarse Sand Red Clay 8 Cobbles
Cinders  El-8.1  El-23.8  El-23.8  El-23.8  El-23.8  El-23.8  El-23.12  Coorse Sand B Gravel  Coorse Sand B Gravel  Coorse Sand B Gravel  Rock  Rock	El. 17.4 Mud  El. 17.4 Mud  El. 17.4 Mud  El. 17.7 Mud  El	Cinders Sand 8 Boulder Fill  El-18.9  Med, Fine Sond 8  El-33.9  Fine 8 Coarse Sand Red Clay Red Clay 8 Cobbles
Cinders  El-8.1  El-23.8  El-23.8  El-23.8  El-23.8  El-23.8  El-23.12  Coorse Sand B Gravel  Coorse Sand B Gravel  Coorse Sand B Gravel  Rock  Rock	El. 17.4 Se Coorse Sond  El. 17.4 Se Mud  El. 17.4 Se Mood  El. 24.13 Se Mood  El. 24.13 Se Mood  El. 34.7 Se Sond &  El. 34.7 Se Coorse Sond  Rock	Cinders Sand 8 Boulder Fill  El-18.9  Med, Fine Sand 8 Little Mud  Fine Sond 8 Little Mud  Fine Sond 8 Coarse Sand Red Clay 8 Cobbles  Rock
Cinders  El-8.1  El-23.8  El-23.8  El-23.8  El-23.8  El-23.8  El-23.6  Rock  Rock  Rock  Rock  Rock	El. 17.4 Mud  El. 17.4 Mud  El. 17.4 Mud  El. 17.7 Mud  El	Cinders Sand 8 Boulder Fill  El-18.9  Med, Fine Sond 8 Little Mud  Fine 8 Coarse Sand Red Clay 8 Cobbles  Rock
Cinders  El-8.1  El-23.8  El-23.8  El-23.8  El-23.8  El-23.8  El-23.12  Coorse Sand B Gravel  Coorse Sand B Gravel  Coorse Sand B Gravel  Rock  Rock	El. 17.4 Mud  El. 17.4 Mud  El. 17.4 Mud  El. 17.7 Mud  El	Cinders Sand 8 Boulder Fill  El-18.9  Med, Fine Sand 8 Little Mud  Fine Sond 8 Little Mud  Fine Sond 8 Coarse Sand Red Clay 8 Cobbles  Rock

El+7.7 #39	El. +8.0 #40	TE1.+7.8
oto? Cinders, Sand, Cobbles	oto 2 Star Filled Ground	Oto? Coorse
El-14:6 Wood	El-13.0	5ond  Ginders & Cobbles  El-144 Cobbles
El-223 GreyRiver	Sond	50 fd Grey Mud
El:37-3 Mud(Soff)	El-48.0 6 5/1e//s	El-189 Cobbles
5 Doulders (very Hard)	5and	El-51.5 Red Spnd
El-65.8 Rock  N.Y. Cimp. #329	El-64.0 Quartzite	El-(4.9 Kock)  N.Y.C. W.S.Imp. #323
	El-80.0 #15 P.R.R. W.S. Imp. #15	30 (A) (A) (A) (A) (A) (A) (A) (A) (A) (A)
EL+8.1 +42	#43 LEI.+7.6	El.+8.2 #44
etor Cinders,	Sand	Placers Cinders
El-9.9 Cobbles	0+01 4 Cinders El-2-4 Gravel	Coorse Sand  Cl-2.8 Domalf Boulders  Fine Sond  Gravel 8
Soft Grey Mud	El-17.4. Cobbles El-27.4 To & Cobbles	TE1:36.2 ES MUd
El-499 Fine Sond  El-52.3 Fine Sond  El-57.9 Quorizite Fetay  El-57.9 Mico Schist	El-434 Grey Mud	El-40.5 FO STOLES TOLC
El-65.9 Mica Schist	El-584 FF Fine sand  Sond Gravel  El-62.19 G & Cobbles  Mica	El-55.8 5chist N.Y. Elmp. #311
W.S.Imp. #314	El:79.1 Schist	
	W.S.Imp. # 301	

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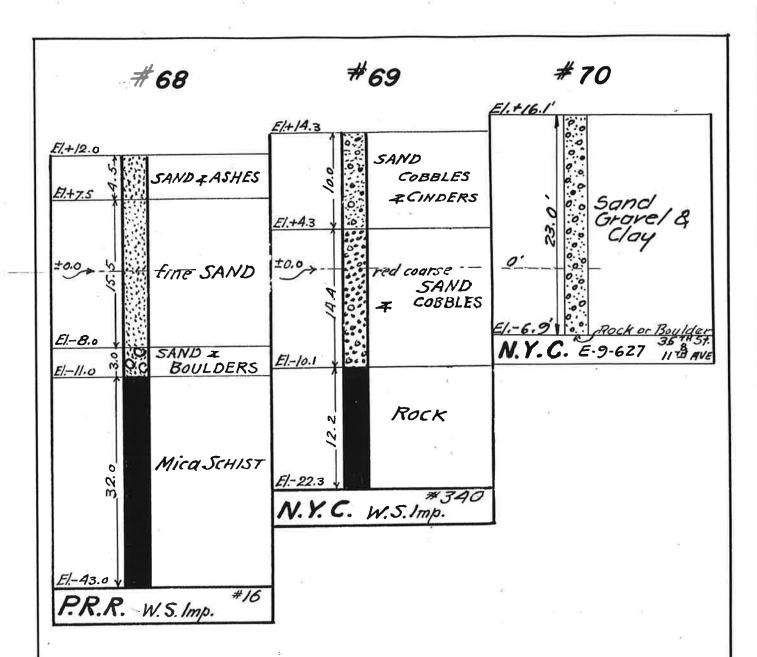
·	
£149.3 #46	El+10.0 # 47
EOFTH &	32
EL.+4.3 Gravel	
P. Sand	102
of a Cinders	0to7. Cinders
8 Small	Cinders, Ashes
E/-2.7. 1197	
6 5 11/16 20110	
NOTE I PALL IVILLA	El-215 Sand
14:42.2.113	
1 IF KEN CIOU	Feldenar
8-31.9 Cobbles	Feldspor Quorta
Mica	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Schist	
	E/-41.5
El-44.7	R.R.E. W.S.Imp. # 18
N.Y.c W.S. Imp. #322	2
11.0.111p.	*50
#49 EL+11.2	#50.
#49	EL+13.0 *50.
#49 E .+  .2 Cinders	EL+13.0 \$50.  EL+3.0 \$ Coorse Sond  EL+3.0 \$ & Cobbles
#49 E/.+11.2 CINDERS 0+07 (50ft) El-1.8 4	EL+13.0 \$50.  EL+3.0 \$ Consessono  EL+3.0 \$ A Cobbles  Oto1 Fine &  Coarse
#49 E +  .Z  O+0 7   (Soft) E -1.8   A Med. (oorse	El+13.0 \$50.  El+3.0 \$ & Conders sono  El+3.0 \$ & Cobbles  Oto1 Fine &  Coarse  Signal &  Signal &  Coarse
#49  E +  .Z  CINDERS  O+01 (Soft)  E -1.8 A Med (ogrso  Sono	El+13.0 \$50.  El+3.0 \$ Consession of the second sec
#49 E +  .Z  O+01 (Soft) E -1.8  Med (ogrso Sond	El+13.0 \$50.  El+3.0 \$ Conders Sono  El+3.0 \$ Fine &  Coarse  Fl-8.0 \$ Sond &  Boylder  Fl-8.0 \$ River Mud
#49  E +  .Z  O+01   (Soft)  E -1.8   (Soft)  E -7.8   (Med. Cogrecome Sono)  E -12.3   (Harof Harof)	El+13.0 \$50.  El+3.0 \$ Conders Sono  El+3.0 \$ Fine &  Coarse  Fl-8.0 \$ Sond &  Boylder  Fl-8.0 \$ River Mud
#49  El.+11.2  CINDERS  Oto 1 (Soft)  El1.8  Med. (ogrso  Sono  El12.3  El13.8  Red Clay  Grovel 8	El+3.0 \$ Conders Sono El+3.0 \$ Fine & Coarse  Fl-8.0 \$ Sond & El-8.0 \$ Fine Mud  Fine Sond
#49  El.+11.2  Oto 1	El+13.0 \$50.  El+3.0 \$ Conders Sono  El+3.0 \$ Fine &  Coorse  Sond &  El-8.0 \$ Boylder  El-12.0 \$ Fine Sond  El-14.6 \$ Fine Sond  Red Cloy
#49  El.+11.2  CINDERS  Oto 1 (Soft)  El1.8  Med. (ogrso  Sono  El12.3  El13.8  Red Clay  Grovel 8	El+3.0 \$ Conders Sono El+3.0 \$ Fine & Coarse  Fl-8.0 \$ Sond & El-8.0 \$ Fine Mud  Fine Sond
#49  El.+11.2  CINDERS  Oto 1 (Soft)  El1.8  Med. (ogrso Sono  Fl12.3  El13.8  El13.8  El13.8  El13.8  Cobbles	El+13.0 \$50.  El+3.0 \$ Conders Sono  El+3.0 \$ Fine &  Coorse  Sond &  El-8.0 \$ Boylder  El-12.0 \$ Fine Sond  El-14.6 \$ Fine Sond  Red Cloy
#49  E +  .Z  CINDERS  O+01 (Soft)  E -1.8 (Med. (ogrson Sono  E -7.8 (Med. (ogrson Sono  E -12.3 (Med. (ogrson Sono  E -12.3 (Med. (ogrson Sono  E -12.3 (Med. (ogrson Sono  F -12.3 (Med. (ogrson Sono  F -12.3 (Med. (ogrson Sono  F -12.3 (Med. (ogrson Sono  F -12.3 (Med. (ogrson Sono  F -12.3 (Med. (ogrson Sono  F -12.3 (Med. (ogrson Sono  F -12.3 (Med. (ogrson  F -	El+3.0 \$ Conders Sono El+3.0 \$ Coorse  Oto 1
#49  El.+11.2  CINDERS  Oto 1 (Soft)  El1.8  Med. (ogrsc  Sono  El12.3  El13.8  El13.8  El13.8  El22.6  Red Cloy  Grove/ 8  Cobbles  Rock	El+3.0 \$ Conders Sono El+3.0 \$ Coorse Sono Oto1
#49  E +  .Z  CINDERS  (Soft)  E -1.8  Med. (ogrsc  Sono  E -7.8  Dork River  Nud  E -12.3  E -13.8  E -22.6  Rock  Rock	El+3.0 \$ Conders Sono El+3.0 \$ Coorse Sono Oto1
#49  El.+11.2  CINDERS  Oto 1 (Soft)  El1.8  Med. (ogrsc  Sono  El12.3  El13.8  El13.8  El13.8  El22.6  Red Cloy  Grove/ 8  Cobbles  Rock	El+3.0 \$ Conders Sono El+3.0 \$ Coorse Sono Oto1
	EL. 4.3   Earth & Grave!  Oto 2: Sold Cinders & Small Cobbles  El. 13.2   Sold Fine Sono El. 13.2   Sold Fine Sono El. 23.9   Sold Fine Sono El. 24.

			78
(1)	#57 El. +15.1	<sup>#</sup> 58	# <b>59</b>
	Coarse Sand Cobbles & Cinders  El. +3.1' October Sand Cobbles & Cinders  El5.1' October Sand Cobbles & Cinders	Sand, Grave	EI. +12.4
//a	El2.9' 20 Rock	Medium Coarse San	
	N.Y.C. E-9 627 #365	Rock	
	#60 _EI.+II.0	#6I	N.Y.C. E-9 - 627#327
	Sand and Ashes  FL o' Coarse Sand	El. +11.0'  Sand, Cinders & Clay  Coarse  Sand & Cobbles	Fil + 6.1 Cinders and Gravel  Fine Sand,  Gravel & Cobbles
9 *** **	Gray Sand	EI10.0' Soft Mud  Red Clay & Gravel	Fine Sand. Cobbles & Mud  E110.9' Soft dark Mud
	Granite & Greiss	Mica Schist  Et24.2	Med. coarse Sand & Small Cobbles  Mica Schist
	N.Y.C. E-9-627-P.R.R. #17	· h	V.Y.C. E-9 - 627 #312
L	ROCK DATA		OL.2 SHEET IO

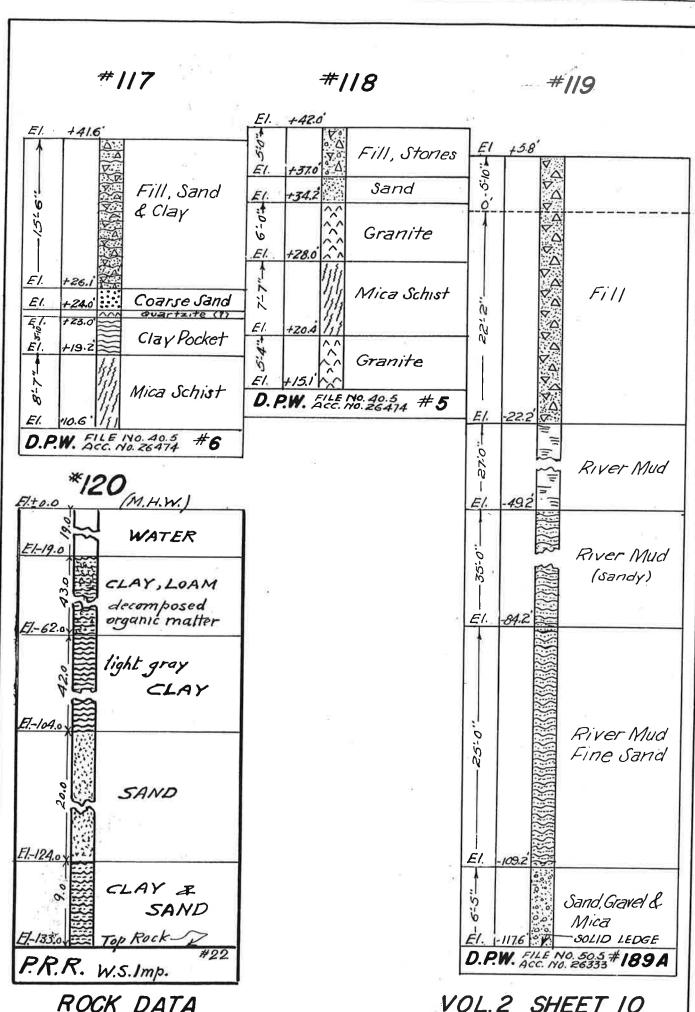
\*65 \*63 El.+9.5 Cinders, anthracite \*64 med, coarse fragments, coarse Gravel & Cobbles E1.+5.9 SAND & Small Surf El.+4.5 COBBLES fine 4 med, fine med. coarse SAND +0.0 SAND SAND & GRAYEL 45mall COBBLES +0.0 x El.+0.6 El.-3,3 coarse FILL fine SAND & Small CobblES fine SAND El-6.1 El.-5.6 cobbles & Wood El-9.3 Feldspar x coarse FILL El-11.1 GRANITE SILL med. Soft dark El-12.4 Boulders , Clay MUD. El-16.1 EZ-18.0 Mica Schist Sand & Cobbles El-18.3 Mica M.C.B.R. JENI N.Y.C. #309 Mica W.S. Imp. Schist Schist 7-36,1 F1-37.3 N.Y.C. M W.S.Imp. #302 MCBR 8N9 N.Y.C. E9-627 #310

ROCK DATA

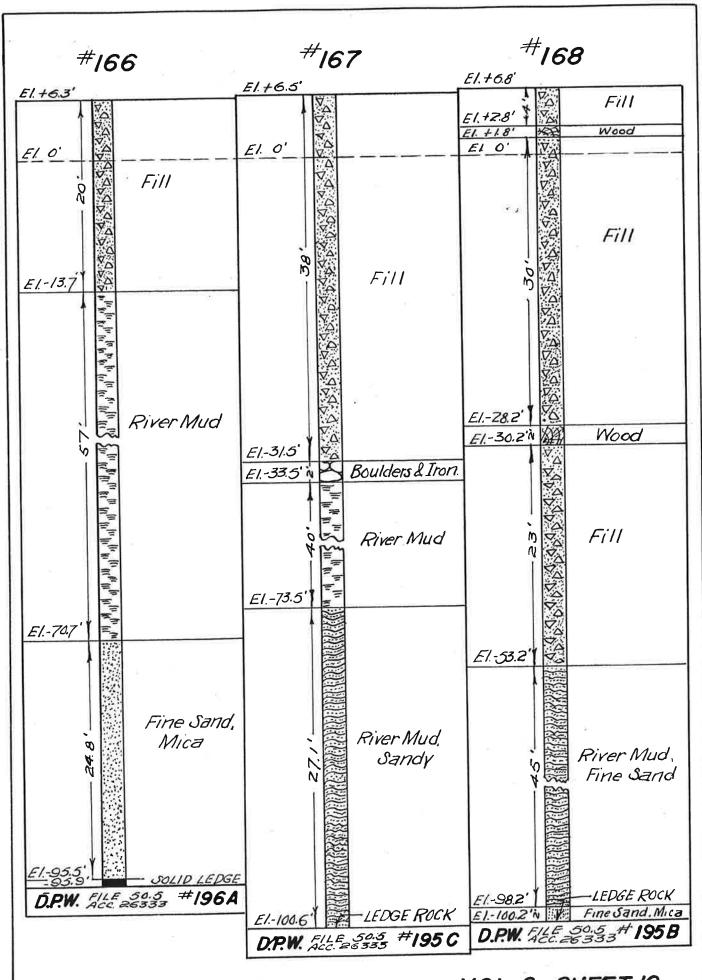
VOL. 2, SHEET 10



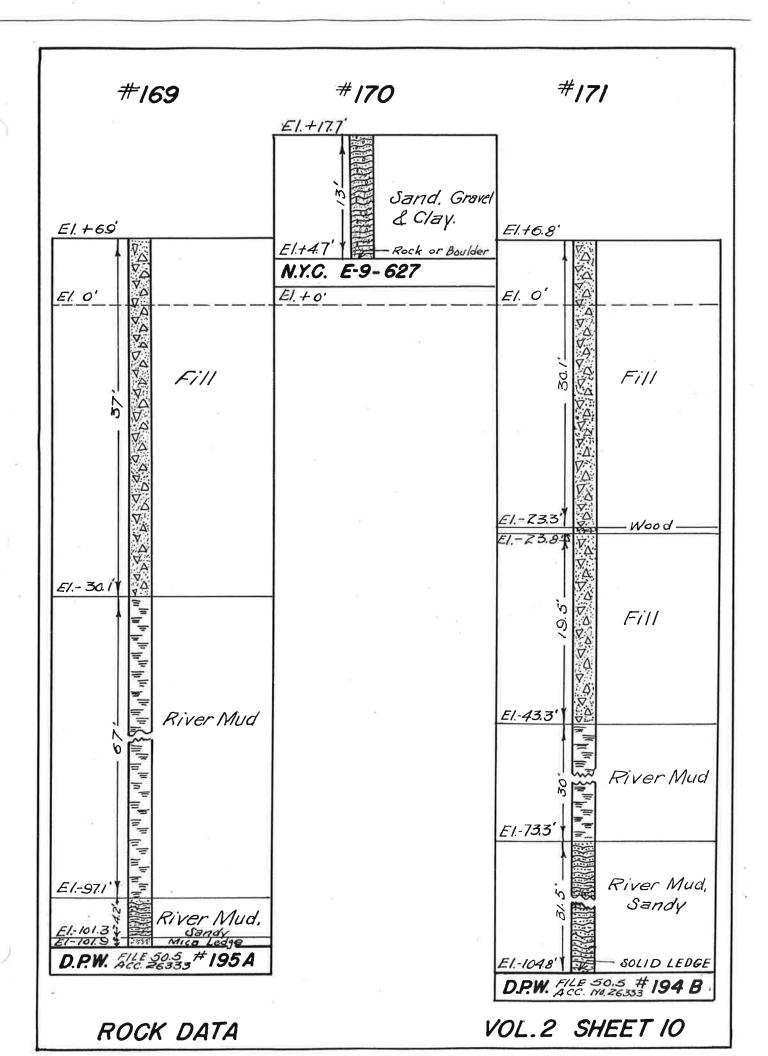
VOL. 2 SH. 10



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VOL. 2 SHEET 10

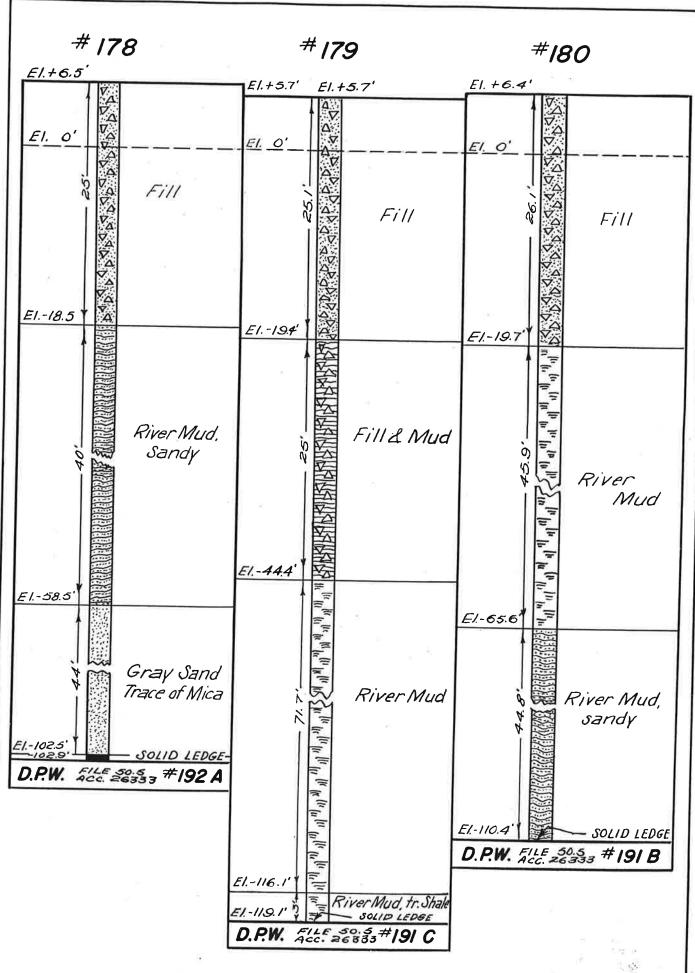


#172	**1 <b>73</b>	<sup>#</sup> 174
El. +6.3'	E/.+6.2'	El.+6.7'
EI. O'. VA.	E1. + 0'   V	A VA
1.52 Fill	Fill	, s Fill
E1-18.7'	E13381	
fc    1  n  n  n  to  to	River Muo	E122.9' \ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\
River Mud	E163.8' \ E1.	
16 16 16 16 16 16 16 16 16 16 16 16 16 1	River Mud. Sandy	Lu lu lu lu lu
EI78.7 River Mud.	El84.8'	E/:-83.5'
Sandy	River Mud, Very Sandy	River Mud, Sand
D.P.W. FILE SOS #194 A	E1-988'	
	Sand, Tr. of Mica EI102.5 F SOLID LEDGE D.P.W. ALE 2633 #193 C	EI1024 LEDGE ROCK
	U.F.W. ACC 26333" 1300	D.P.W. FILE NO. 503 #1938
ROCK DATA	L	IN 2 SHEET IN

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# <b>175</b> E1.+64	#176	#177 El.+6.6'
E1. 0' \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	EI, 6.9'  EI, 0' FIII  EI, -01: Wood	E1.+0.7; \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
FIII	Fill	100 Pill
26	E118.1' A Wood	El13.4' River Mud,
E1316 1	EI24.1' \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	trace of small gravel.
River Mud	E132.6' M Wood	It lie ti to the he fit
El68.6'V	River Muo	River Mud
River Mud, Sandy	E1-85.1'	El83.4'
El-86.6'		
Fine Sand  El-97.61  El-98.8' Fine Sand, Mica  D.P.W. Acc. 26333 # 193.A	Sand & Mica	Fine Sand, trace of Mica.
D.I.W. ALC. 26333	E1107.7' SOLID LEDGE D.P.W. FILE 30.3 26333#192C	EI-105.9' SOLID LEDGE  D.P.W. FILE 606 # 192 B
5004 5474		IOI O OUEETIO

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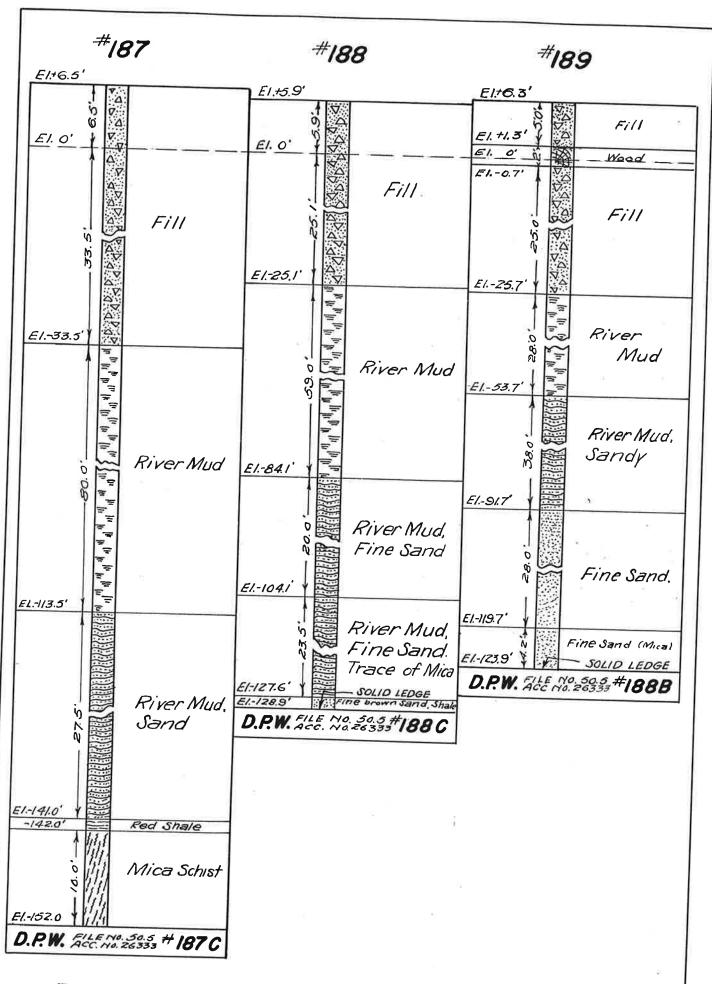


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#181	<sup>#</sup> 182	<sup>#</sup> /83
El. + 6.2' El. + 6.2' XII Pavement Blo	El.+58'	_El.+6.1'
EI. + 2.2 FIII  EI. + 1.2 FAREMENT BIO		EI. 0'
E113.8'   \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	75.58 Fill	E115.9' Wood
In lip like like like like like like like like	El29.7' 1 2	FIII
E173.8'	EI33.2 FILL	Fl30.9' Wood  Fl30.9' Wood  River
River Mud  River Mud  Trace of Schis	River Mud	Mud
El:103.8' Solid Ledge  D.P.W. FILE NO. 50.5 # 191 A	, ε γι   1   1   1   1   1   1   1   1   1	River Mud, Sand, trace of Shell
	El114.2' Solid Ledge El115.7 River Mud, Sandy	E11/3.1' Solid Ledge  D.P.W. FILE NO. 50.5 #190 B
ROCK DATA	D.P.W. FILE NO. 50.5 #190C	OL.2 SHEET IO

# <b>184</b> _E1.+5.8'	# <b>185</b> E1.+5.8	# <b>186</b>
EI. O' DAYADA FIII	EI. o'	EI. O' YA FIII
E114.2'Y	), SE   Fill	E16.9'
River Me Small Grave		River Mud
River Mu Shells.		ար արարարարարարարարարարարարարարարարարար
River Mud, Trace of Mic	River Mud	El68.9'
Fine Sand, Trace of Mica Solid LEDGE  P.RW. File 2033 #190	E1-104.2'   =	E178.9'  River Mud,  Trace of Schist
,	D.P.W. FILE 50.5 #1890	EI1/3.9' River Mud  EI1/8.9' Red Sand
		D.P.W. ACC. 26333#189B

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VOL. 2 SHEET 10

# 190	<sup>#</sup> 191	<sup>#</sup> 192
E1.+6.2	E1.+6.8	E1.+6.5
	FI.+1.3 Granite  Concrete	
E1/3.8 ↓ Fill	23./ Fill	32. Fill
River Mud	F/-23./	EI-28.6 River Mud
E174.8   11/11	River Mud	E158.5
Fine Gray River Mud	River Mud	River Mud
F1,-93.8	E1/o3.1	Sandy
Fine Gray Sand Trace of Mica	River Mud	
36.8	Sandy	EI118,5 River Mud  Mica  Fine Sand
	E1136.2 5"Solid Ledge	ا ا
D.P.W. File 505 #188A		D.P.W. File 505 D.P.W. Acc. 26333 #187A
ROCK DATA	101	O.P.W. Acc. 26333 #187

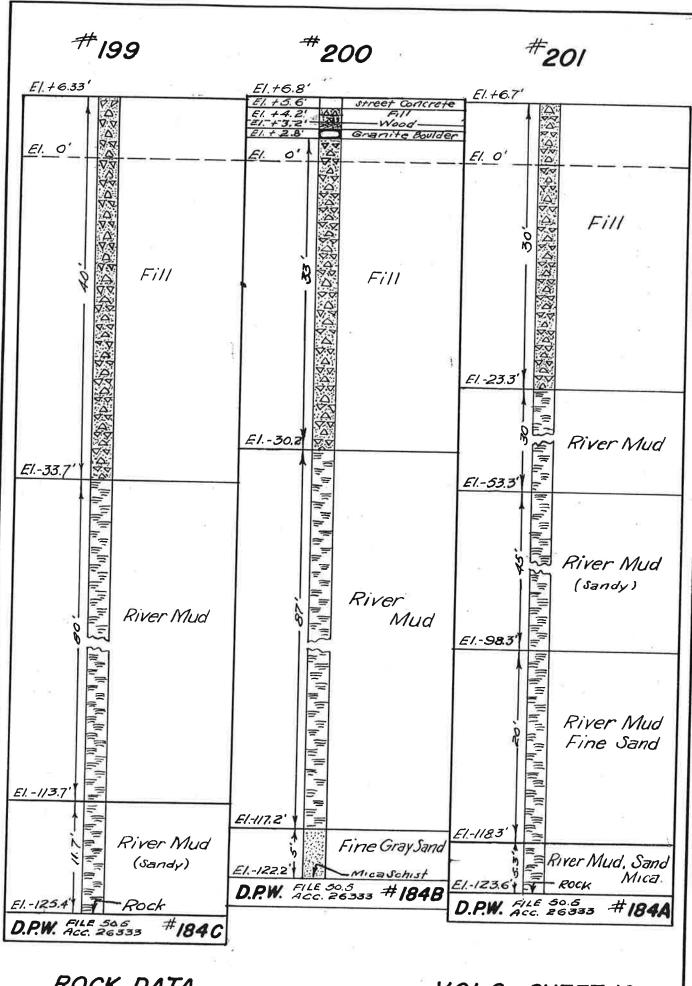
VOL. 2 SHEET 10.

*19 <b>3</b>	*194	*195
El. 0 Fill.	E1.6.46  Fill.  E1.0 1 Wood.	El. 0
E1. 0	E11.54 v	20' \$ Fi//.
40' Fill	32' A Fill	El-13.65
40 40 40 40 40 40	10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Is' A Fill, Sand, Mud.
₹ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	E1-33.54	E1-28.65 - N
WE WE WE WE WE WE WE WE WE WE WE WE WE W	40' River Mud.	17 19 19 19 19 19 19 19 19 19 19 19 19 19
80' F		65' River Mud.
River Mud.	E1,-73.64\ _ ==	E/-93.63 =
River Mud	River Mud  54  Sand	Fine Gray Sand, Trace of
146.6 y Sand	Solid Ledge	Trace of Mica
A 444 FILE 50 5	61137.64	D. P.W. File 50.5 186 A

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# 196	<sup>#</sup> 197	<del>#</del>
E1.+5.98	E1.+6.43	<sup>#</sup> 198
E1.+3.48 % A Fill.	EI.+5.23 Street Concrete	E1.+6.37
E1.+2.98 A A.		
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	72	\$4 \$4
5;4/ \$\frac{\fir}{\fint}}}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\fin}}}}}}{\firac{\frac{\fir}{\fired{\frac{\fir}{\fired{\frac{\fir}{\fir}}}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\fir}}}}{\firac{\fir}{\firint}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\f{\frac{\fin}}}}}}}{\firac{\frac{\frac{\fir}{\fir}}}}}}{\frac{\frac{\		EI33'.6 Properties and the state of the st
Fill.		
	\$25° Fill.	
E114.02	β Δ♥ <i>Fill</i> .	E133,6 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
		1 = =
- T	Δ <sub>Q</sub>	
보고 티를	Δ.Υ.	토 프
11 11 11 11 11 11 11 11 11 11 11 11 11	E130.57	==
		등 등
0 = -	구 구 금	= = = =
River Mud.		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	F	
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	River Mud.
= = ==		
River Mud.	E130.57	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1-10-10-10-10-10-10-10-10-10-10-10-10-10
E174.02	15 15 15 15 15 15 15 15 15 15 15 15 15 1	
	River Mud.	- E
Fine Sand, River Mud.	\ \ \==	1925 F
	11.	E193.6 √
E/94.02		
Fine Sand,		
River Mud,	1 11 11 11 11 11 11 11 11 11 11 11 11 1	
River Mud, Trace of Mica.	11/16 11	River Mud,
	11. 11. 11. 11. 11. 11. 11. 11. 11. 11.	Sandy.
Fine Sand, River Mud,	Mines California	
River Mud, Trace of Wood.	FI132.5 Mica Schist  Mud,	61-154 / S
1-1344 Fine Gray Sand,		El134.6 Red Shale.
	D. P. W. File Nº505 #1858	D.P.W. File Nº 505 #/85A
_		200. PV. Mac. 26333 100

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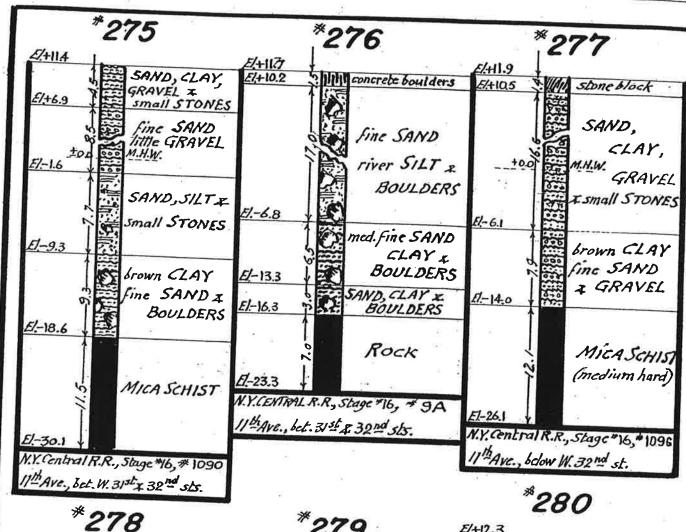
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#202	#203	#204
El+6.0'    V	El. + 2.4' Pavement  El. + 2.4' Fill  El. + 1.4' Doulders & Iron  El. 0' V	
	A FIII	Fill PARA FILL
	E///.6' \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	E114.0'y
	River Mud	River Mud
か	E182.6   F   River Mud & Shells	fr Br fig. Br for far far far far far far far far far fa
El51.5'   \(\frac{1}{2}\)	Piver Mud	E174.0'Y
River Mud	6190.6° TO 57/1+	River Mud, sandy
E1126.0	Clay & Sand	
Fine Sand (Trace of Mice) EI131.3 F ROCK  D.P.W. FILE NO. 50.5 # 183C	D.P.W. ACC. NO. 26333# 1838	EI125.5 Rock  D.P.W. FILE NO. 50.5 # 183 A

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# 205	# 206	#207
E1.+17.5	E1. +6.8	El. +5.8'    O
D.P.W. File 103.23 11TH AVE. Acc. 26390 236THst.		EI -14.3' \( \alpha\)
	River Mud	In In In In In In In In In In In In In I
	E1/00.2	E1943
74	River Mud  (Trace of Mua)	River Mud. Sand
	In the the the the the the the the the the	Fine Gray  Fine Gray  Sand (Trace of)  EI. 122.1  D.P.W. FILE NO. 50.5 # 182 A
ROCK DATA	D.P.W. ACC. NO. 26333 #182 B	VOL.2 SHEET IO

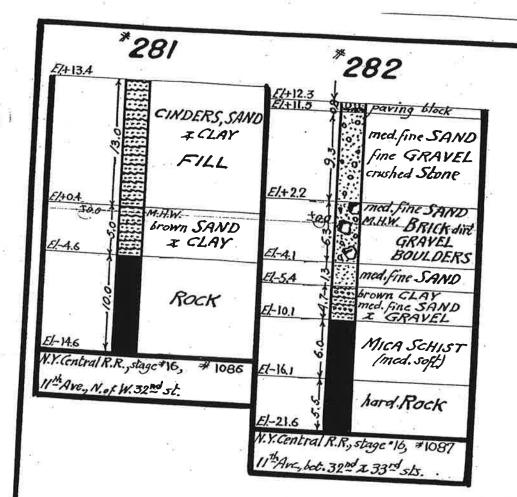
*269	*270	*271
E/.+10.8		
5498 Concrete	E/+10.3	E/+10.6
	3.5	SAND, CINDER
1 Sam	977	BRICK dirt x
SAND		E.45.3 \ WOOD
river	SILTA GRAVEL,	SAND, BRICK d
L'4-3.2 1 == 1	AND " CTONE	17 ( )
O'LY SAND, BY	RICKE Small STONES	El-3.8
BOOLD	ERS IN THE	EL-5.7 SKY BRICK
El-8.2 RY TIMB		SILT
	SILT 4	Ni o-
Fine SA	WD STONE	
157	E/-142 D	brown CLAY
CLA	Y Z Srown CLAY	William SAMA
BOL	IJ DEPS Fine SAND	OKE GRAVEI
166	EN-19.5 Small BOULDERS	Flato Small BOULDERS
E 2012	E. D. Small BOULDERS	El-19.0
El-21.7		f l
	Mina Suvin	MICA SCHIST
100	NICA SCHIST	
ROCK	(hard)	Z QUARTZ
El30,5		(hard)
N.Y. Central R.R., Stage 16, 4	C 705	
		<i>El,</i> −31.0 ∤
11 Ave., below 31st st.,	N.Y.Central R.R., Stugelb, #1095	
	11th Ave., below 31st st.	11th Arc. 4 W. 31st st.
*272		
E.+11.0	*273	*274
1604		214
SAND	El.+10.7	F/+11.4
11953	El+7.7 S CINDERS	SAND
GRAVEL		
1 10		
BRICKa		SE CLAY &
BRICK	lirt SAND,	
X STONE	SAND,  GRAVEL	CLAY & Small STONES
Z STONE F	SAND,  GRAVEL,  MHWBRICK dirt	CLAY & Small STONES
Z STONE F	SAND,  GRAVEL,  SMIN STONE	CLAY & Small STONES  JOO MHW. SILT, SAND.
El-5.5 SAND, GRAI	SAND,  GRAVEL,  MHWBRICK dirt  Small STONE	CLAY & Small STONES  JOO SAND, BRICK dirt
El-25 SAND, GRAVE El-5.5 SAND, GRAVE El-5.5 SILT X	SAND,  GRAVEL,  SMITH BRICK dirt  SMALL STONE  LL EL-66	CLAY & Small STONES  JOO MHW. SILT, SAND, BRICK dirt
El-25 SAND, GRAD El-5.5 SAND, GRAD STONE FIL EL-8.5 SILT X SMAIL STON	SAND,  GRAVEL,  MHWBRICK dirt  Small STONE  LL  EL-6.6	CLAY & Small STONES  JOO SAND, BRICK dirt
El-25 SAND, GRAVE STONE FILE STON	SAND,  GRAVEL,  MINISTRICK dirt  Small STONE  El-9.8 Small STONES	CLAY & Small STONES  JOO MHW. SILT, SAND, BRICK dirt
El-25 SAND, GRAD El-5.5 SAND, GRAD STONE FIL SILT X SMAIL STON	SAND,  GRAVEL,  MHWBRICK dirt  Small STONE  SILT Z  Small STONES  El-98  SILT Z  Small STONES  SILT  Small STONES  SILT  Small STONES  SILT  Small STONES	CLAY & Small STONES  Small STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY
El-25 SAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAVEL	SAND, GRAVEL, WEL LL EL-6.6  STONE  STONE  STAT Z  SMALL STONES  STAT Z  SMALL STONES  STAT Z  SMALL STONES  STAT Z  SMALL STONES  GRAVEL	CLAY & Small STONES  JOO MANN. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY fine SAND
El-25 SAND, GRAVEL El-85 SAND, GRAVEL El-85 GRAVEL  QUART.	SAND,  GRAVEL,  MINISTRICK dirt  Small STONE  SILT A  SMALL STONES  El-98  El-11.8  GRAVEL  Z.  El-14.9  GRAVEL	CLAY & Small STONES  Small STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY
El-25 SAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAVEL	SAND,  GRAVEL,  MINUS STONE  SILT Z  SILT Z  SILT Z  SILT  GRAVEL  GRAVEL  A SILT  GRAVEL  A SILT  GRAVEL  MICA SCHIST	CLAY & Small STONES  JOO MANN. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY fine SAND
El-25  SAND, GRAVEL  El-5.5  SAND, GRAVEL  SILT X  SMALL STON  GRAVEL  QUART.	SAND,  GRAVEL,  MHWBRICK dirt  Small STONE  SILT &  Small STONES  El-98 STATE  AMICA SCHIST  MICA SCHIST	CLAY & Small STONES  JOB MHW. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY fine SAND & GRAVEL
El-25  SAND, GRAN  El-5.5  SULT X  SMAIL STONE  FILE  FILE  SILT X  SMAIL STON  GRAVEL  QUART  (hard	SAND,  GRAVEL,  MHWBRICK dirt  Small STONE  SILT &  Small STONES  El-98 STATE  AMICA SCHIST  MICA SCHIST	CLAY & Small STONES  JOB MHW. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY fine SAND & GRAVEL
El-25  SAND, GRAN  El-5.5  SONE FIN	SAND,  GRAVEL,  MHWBRICK dirt  Small STONE  SILT Z  Small STONES  El-98  El-11.8  SILT  GRAVEL  MICA SCHIST  QUARTZ  CHARD  CONTROL  CONTR	CLAY & Small STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY Fine SAND & GRAVEL
El-25  SAND, GRAVEL  El-5.5  SAND, GRAVEL  SILT X  SMAIL STON  El-11.7  GRAVEL  PUARTA  (hard)	SAND,  GRAVEL,  MHYBRICK dirt  Small STONE  EL-98  EL-11.8  STLT  GRAVEL  GRAVEL  MICA SCHIST  OUARTIZ  N.Y. CENTRAL R.R., Stage 16, 1092	STONES  STONES  AND BRICK dirt E-76  Brown CLAY Fine SAND A GRAVEL  E-17.3  MICA SCHIST
El-2.5  SAND, GRAVEL  El-5.5  SAND, GRAVEL  SILT X  SMAIL STON  El-11.7  GRAVEL  QUARTA  (hard)	SAND,  GRAVEL,  MHWBRICK dirt  Small STONE  SILT Z  Small STONES  El-98  El-11.8  SILT  GRAVEL  MICA SCHIST  QUARTZ  CHARD  CONTROL  CONTR	CLAY & Small STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY Fine SAND & GRAVEL
El-2.5  SAND, GRAVEL  El-5.5  SAND, GRAVEL  SILT X  SMAIL STON  El-11.7  GRAVEL  QUARTA  (hard)	SAND,  GRAVEL,  MHYBRICK dirt  Small STONE  EL-98  EL-11.8  STLT  GRAVEL  GRAVEL  MICA SCHIST  OUARTIZ  N.Y. CENTRAL R.R., Stage 16, 1092	STONES  STONES  AND BRICK dirt E-76  Brown CLAY Fine SAND A GRAVEL  E-17.3  MICA SCHIST
El-25  SAND, GRAN  El-5.5  SAND, GRAN  El-5.5  SILT X  Small STON  El-11.7  GRAVEL  PUART  (hard)  V.Y. Gentral R.R., Stage 16., * 10	SAND,  GRAVEL,  MINUS RICK dirt  Small STONE  SILT  GRAVEL  EL-9.8  El-9.8  FI-11.8  SILT  GRAVEL  AMICA SCHIST  OUARTZ  (Nard)  N.Y. CENTRAL R.R., Stage 16, 1092  11 SAVE., N. of W. 31 st. st.	CLAY & Small STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  brown CLAY Fine SAND & GRAVEL  El-17.3  MICA SCHIST (hard)
El-2.5  SAND, GRAVEL  El-5.5  SAND, GRAVEL  SILT X  SMAIL STON  El-11.7  GRAVEL  QUARTA  (hard)	SAND,  GRAVEL,  MHWBRICK dirt  Small STONE  SILT Z  Small STONES  El-98 STATE  AND  SMALL  SM	CLAY & SMAIL STONES  SMAIL STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  Brown CLAY Fine SAND & GRAVEL  EI-17.3  MICA SCHIST (hard)
El-25  SAND, GRAVEL  El-5.5  SAND, GRAVEL  SILT X  SMAIL STON  El-11.7  GRAVEL  PUARTA  (hard)	SAND, GRAVEL, WEL  VEL  LL  El-6.6  SILT A  SMAIL STONES  FI-11.8  SILT  GRAVEL  El-14.9  MICA SCHIST SOFT  OUARTZ (Mard)  N.Y. CENTRAL R.R., Stage 16, 1092  11 BAVE., N. of W. 31 St. st.	CLAY & SMAIL STONES  SMAIL STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  Brown CLAY Fine SAND & GRAVEL  El-17.3  MICA SCHIST (hard)  T-30.3  W.CENTRAL R.R., Stage 16, # 1091
El-2.5  SAND, GRAN  El-5.5  SAND, GRAN  El-5.5  SILT x  SMAIL STON  El-11.7  GRAVEL  QUARTA  (hard)  El-23.7  (NY. Gentral R.R., Stage16, * 10	SAND, GRAVEL, WEL  VEL  LL  El-6.6  SILT A  SMAIL STONES  FI-11.8  SILT  GRAVEL  El-14.9  MICA SCHIST SOFT  OUARTZ (Mard)  N.Y. CENTRAL R.R., Stage 16, 1092  11 BAVE., N. of W. 31 St. st.	CLAY & SMAIL STONES  SMAIL STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  Brown CLAY Fine SAND & GRAVEL  El-17.3  MICA SCHIST (hard)  A. Stage 16, # 1091
El-25  El-25  SAND, GRAVE  El-55  SILT X  Small STON  El-11.7  CRAVEL  PUART  (hard)  V.Y. Gentral R.R., Stage 16., * 10	SAND,  GRAVEL,  MHMBRICK dirt  Small STONE  SILT Z  Small STONES  El-98 SILT  GRAVEL  El-11.8 GRAVEL  AND  MICA SCHIST  OUARTZ  OUARTZ  OUARTZ  N.Y. CENTRAL R.R., Stage 16, 1092  11 BAVE., N. of W. 315t st.	CLAY & SMAIL STONES  SMAIL STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  Brown CLAY  Fine SAND
El-2.5 SAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRAND, GRANEL  El-8.5 SAND, GRAND, GRA	SAND,  GRAVEL,  MHMBRICK dirt  Small STONE  SILT Z  Small STONES  El-98 SILT  GRAVEL  El-11.8 GRAVEL  AND  MICA SCHIST  OUARTZ  OUARTZ  OUARTZ  N.Y. CENTRAL R.R., Stage 16, 1092  11 BAVE., N. of W. 315t st.	CLAY & SMAIL STONES  SMAIL STONES  MHW. SILT, SAND, BRICK dirt & STONE FILL  Brown CLAY Fine SAND & GRAVEL  El-17.3  MICA SCHIST (hard)  A. Stage 16, # 1091



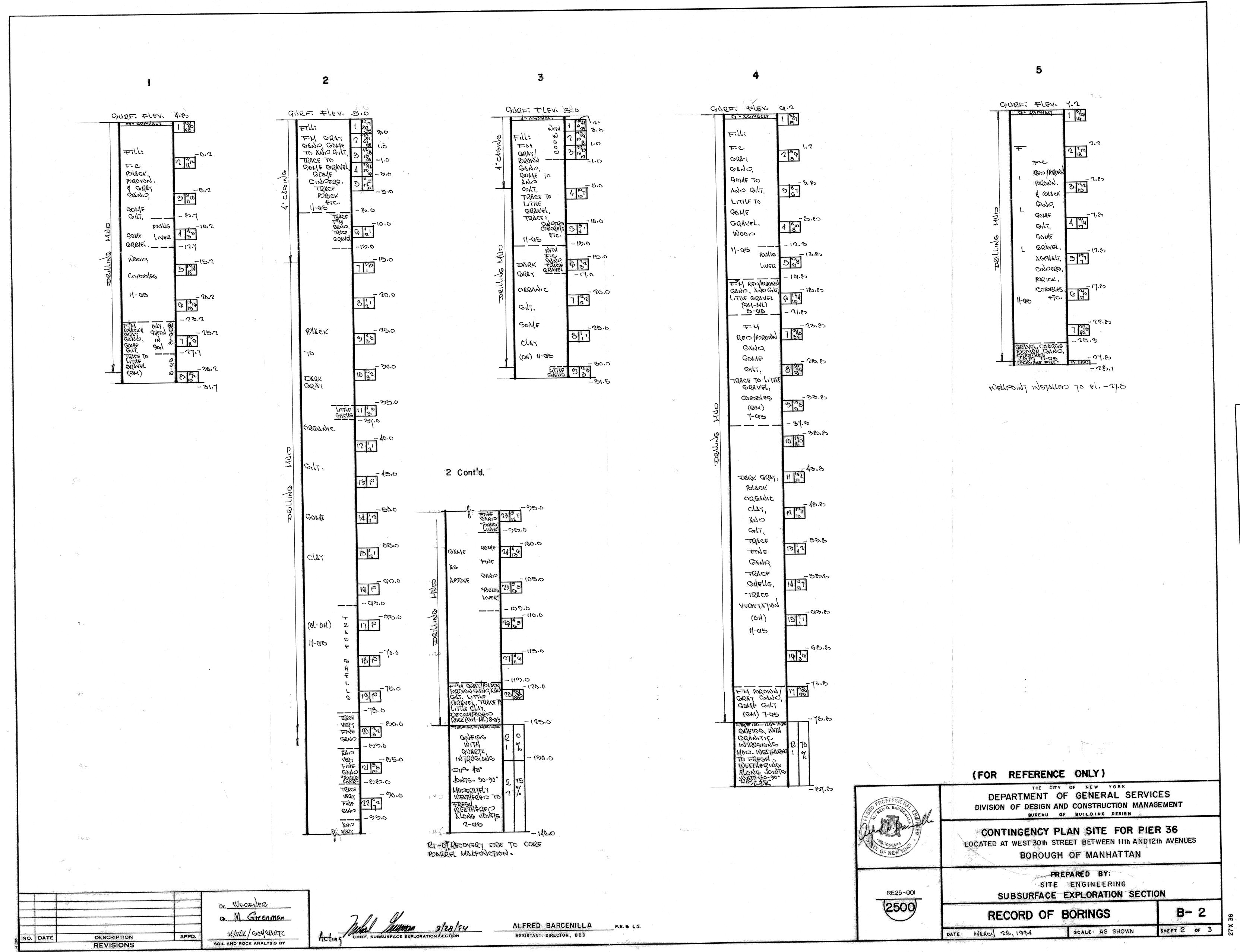
\*278 \*279 E/+12.3 SAND, CLAY, 5/+11.9 E.+10.3 tobbles BRICK X FILL, SAND, small STONES CINDERS SAND ASHES, BOULDERS El.+5.8 B+6.7 SAND brick Dirtz Z CLAY FILL El.+0.8 FILL SAND GRAVEL M.H.W. 20,00 M.H.W. MHW. ASHES El-2.5 ROCK FILL BRICKS river MUD x SILTE BOULDERS WOOD SAND. El-9.7 EL-9.5 F-9.8 SM Small BOULDERS brown SANDZCLAY Small BOULDERS E/-14.1 fine SAND hard Rock 事が後 E/-15.7 X CLAY Soft Rock E1-17.4 El-18.1 MICA SCHIST **QUARTZ** ROCK hard Rock N.Y. Central R.R., Stage 16, \$1089 N.Y. Central R.R., Stage 16, \*IIA 11th Ave., above W. 32nd st. El-29.1 11 Ave., below. S.W. corner W. 32ndst. N.Y. Central R.R., Stage \*16, + 1088 11th Ave., N.E. corner W. 32nd st.

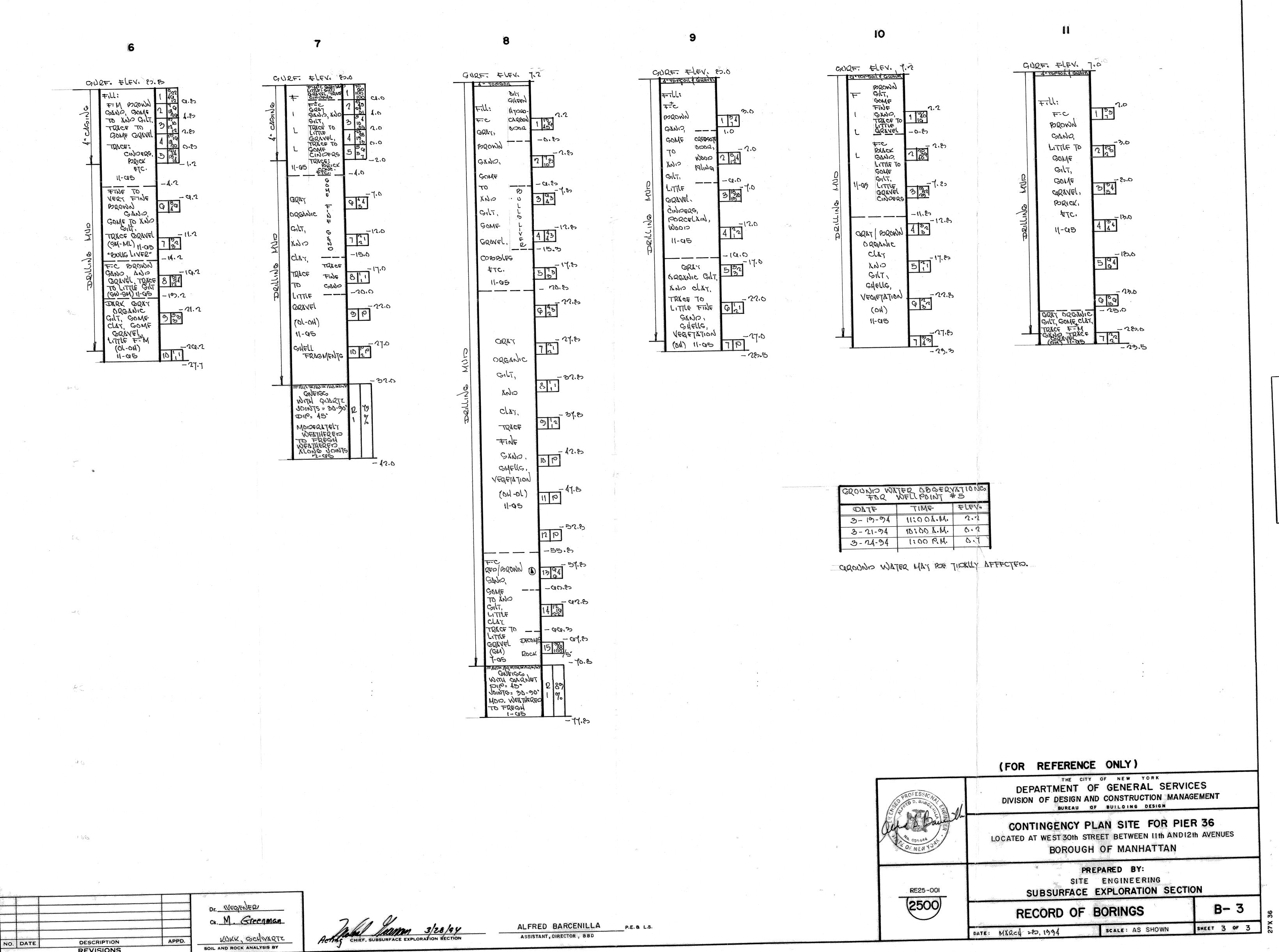
ROCK DATA

VOI 9 CHEET IN



VOL. 2, SHEET 10





APPD.

DESCRIPTION

REVISIONS

NO. DATE

		<u></u> ■	⊃ar	sor	IS								BORING	NUMBE	R: FD-20	6W	
		<b></b>	3rir	ncke	erh	off	D	$\cap$ D	INI	G L	$\mathbf{\cap}$	C	SHEET N	NUMBER	: <u>1</u>	of	1
<u> </u>				ade			D	Un	7114	GL	_0	G					
	100 YEAR		Ͻοι	ugla	ıs,	Inc.							PROJEC	T NUMB	ER:		
PROJE	ECT:	No '	7 S	ubv	vay	line Exte	ension	1					LOCATION	ON: DEP	Tunnel-	30th & 1	1th Ave
LOCA					•									N: 213,8			
CLIEN	IT: M	ГΑ											STN. NO			FFSÉT:	
CONT	RACT	OR	: <b>J</b>	erse	y l	Boring &	Drilli	ng					SURFAC	E ELEV.	: 110.0 fe	eet	
DRILL	ER: C	C. De	eig	har	t								DATUM:				
INSPE	CTO	R: <b>C</b>	. <b>B</b>	urz	yn	ski											
DRILL	ING N	ΙΕΤ	HC	D:]	Ro	tary Wasl	h						START [	DATE: 6/2	20/05 T	IME: <b>6:0</b>	0 am
RIG T	YPE: (	CM	E-5	55		-							FINISH [	DATE: 6/2	29/05 T	IME: 3:0	0 pm
			Casi	ng	Sp	lit Spoon Sh	elby Tu	ıbe F	Piston	Gra	b C	ore Barrel		GROU	NDWATER	DATA	
Type/S	Symbo	ol	HV	V		s 🛮	υΠ		PN	G	7	С			Water	Casing	Hole
I.D.	,		4"			1.375"	2.938"	_	.938"			2"	Date	Time	Depth (ft)	Depth (ft)	Depth (ft)
O.D.			4.5			2"	3"	+-	3"			3"	6/27/05	6:00 am	12.0	24.5	113.9
	_		4.5			_	24"					<u> </u>	0/2//03	0.00 am	12.0	24.3	113.9
Length						24"			24"								
Hamm		-	800			140 lbs	Drill	Rod Si	ze		NW.						
Hamm	er Fa	II	24	"		30"	I.D	). (O.D.	)		(2.938	3")					
					SAI	MPLE		SOIL	(Blows	/6 in.)							
<del></del>	90	E,	$ar{}$	_			_		`	,	DEO	4					
DEPTH (feet)	GRAPHIC LOG	(Blows/ft) (Min./ft)				t)	0/6	6/12	12/18	18/24	REC. (in.)						
Ī	훈	<u>8</u>		\ \ \	١.	jeej.					()	FII	ELD CLAS	SSIFICAT	ION ANI	O REMA	RKS
	₩	92	<u> </u>	開	B01	H		(	CORING	<i>3</i>							
-	9	CASING (	TYPE	NUMBER	SYMBOL	DEPTH (feet)	RUN	REC.	REC.	L>4"	RQD	Depth					
-	1 A 1	00	+	<u>Z</u>	S		(in.)	(in.)	%	(in.)	%	Elev.	Hand Auger	ad 01 to 61			
L	***		4		$\mathbb{N}$								Brown c-f S	AND, some	Clayey Sil	lt, some c-f	Gravel, -
	*		_		$\mathbb{N}$								( stone and b NOTE:	orick), trace	of debris(p	lastic)(FIL	L), dry.
L			-G	1	IV	0.0 - 6.0		Hand		Auger			Installed a 4	" diameter o	casing 0' to	4'.	_
	***************************************	}	1	1	$ \Lambda $	0.0 - 0.0		Tranu		Augei							
Γ_	<del>                                    </del>																-
<del>-</del> 5	<del>*</del> &				$   \rangle$												_
F	***		1										Gray c-f GR	AVEL ( sto	ne and bric	k), some c-	f Sand,
F		-	-S	1		6.0 - 8.0	10	21	76	53	14		little Clayey	Silt, (FILL	), moist.		-
-	1 × 1		-										Same as abo	we moist			-
-			-s	2		8.0 - 10.0	15	7	6	9	6		NOTE:	ŕ			
<del>-</del> 10	<b>梨</b> Δ [		4										Installed 4"	_		· · · · · · · · · · · · · · · · · · ·	_
	"		-s	3		10.0 - 12.0	4	6	16	9	9		Gray and bro Gravel (ston	own c-1 SA e and brick	ND, some S fragments)	silt, little m (FILL). mo	-t oist
L	40					10.0 12.0			10				NOTE:		,	(),	
	* >												Installed 4"	casing 9' to	14'.		
	***************************************																-
<b>-</b>	<del>       </del>		1														-
<u> </u>	* -		1										S-4A 15.0 to	17.0':			_
Ý –	(A)	-	-s	4		15.0 - 17.0	18	11	WOH	WOH	20		(Top 8") (FI	LL), wet.	1 1 0.	1. CLAN	1101
-	* "C	_	-										S-4B- Bottom-f Sand, lit				
<u>-</u>			4										(MH)		,	.,	-
	**************************************											L	Notes: 1) Black was	sh 16' to 19'			<i>,</i> –-
2 20												_ `_	2) Installed	4"casing 14	to 19'		
20			_ [	_		20.0.22.2			1.0	,	10		S-5A :( top 6	6") Dark Gr	ay c-f Grav	el, little m-	f Sand,
; <b> </b> -			S	5		20.0 - 22.0	20	23	16	14	12		little Clay & S-5B:( botto	: Silt. m 6") Red l	orown f SA	ND. little S	ilt &
<u>-</u>			1										Clay	. , =		,	-
<u></u>			+										NOTE: Installed 4"	casing 19' to	o 24'.		-
-		-	S	6		24.0 - 24.0	100-0					L	No Recover				
<u> </u>			_										•				
												Ror	ing No. I	FD_206xv	Shee	t 1 (	of 1

		Parso	ons				BORING	NUM	IBER	: FD-20	6w		
		Quad				CORING LOG	SHEET	NUME	BER:	1_	0	f	4
	10 YEA	Doug	glas, I	nc.			PROJEC	T NU	MBE	R:			
PROJI	ECT:	No 7 Sul	bway	line I	Extens	sion	LOCATION	ON: D	EP T	unnel-	30th	& 11	th Ave
		l: Manha	ttan				COORD	N: 2	<b>13,8</b> 0			-	3
CLIEN							STN. NC				FFSE	ET:	
CONT	RAC	TOR: Jer	sey E	Boring	8 D1	rilling	SURFAC	E EL	<b>EV</b> .:1	110.0 fe	eet		
		C. Deigha					DATUM:						
		OR: <b>C. Bu</b>											
		METHOD CME-55		mond	drilli	ng with double core barrel	START I						
								GF	OUNE	WATER	DATA		
CORE	BAI	RREL DA	TA:		NOT	ES:				Water	Cas		Hole
TYPE:	· NX						Date	Tim	e	Depth (ft)	Dep (ft		Depth (ft)
CORE		F: 2"					6/27/05	6:00		12.0	24.		113.9
O.D.:		L. 2					0/2//03	0.00	am	12.0	27.	.5	113.7
I.D.: 2		175. 411.74	<b>511</b> )										
CASIN		IZE: 4" (4.	.5")							DISC	CONTU	NUITY	DATA
	'/mir	0.€	(u	(%)		DESCRIPTION AND REMARK	S	(D		טוטנ	ONTH	10111	אייי
DEPTH (feet)	— Е П	Į ŽĮ	RECOVERY (in)	RECOVERY (%)	(9,	(Lithology, Structure, Weatherin	ıg, Sizo\	WEATHERING	STRENGTH	g)			¥
Į Ę	∖AT	RU EPJ	Æ	/ER	RQD (%)	Continuity, Strength, Color, Grain	Size)	里		ANGLE (deg)		_	(fee
I III	<u>6</u> 8	RE O D	00	000	A Q	* - Denotes discontinuity along foli	ation	Α	H	岸	٦	Ja	正
□	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RE	RE		MB - Denotes mechanical brea	ık	×	S	ANO			DEPTH (feet)
-	8					Dark gray to black SCHIST; c-f grains of	f biotite,	II	R3/R4	4			_
_						quartz, feldspar, muscovite; close to mod fracture spacing; medium strong to strong	lerate g; slightly			30 <sub>MB</sub>	-	-	25.9
		C-1 24.8 - 30.0	62	100	97	weathered; foliation defined by distinct, schistosity and contorted hands of quartz	wavy · foliation						-
-		24.8 - 30.0				schistosity and contorted bands of quartz dips 40° to 70°; granite/pegmatite with irr contacts with biotite concentrations from	egular			*80	1.5	2.0	27.7
-						contacts with biotite concentrations from 28.7', near vertical; wavy core sides in sc	27.7' to			*70 *45	2.0 1.5	2.0 1.0	28.2 28.7
<del>-</del> 30						C-2: 30.0' to 31.4' Dark gray to black SC		II	R3/R4	. 15	1.5	1.0	28.8_
_						above.	ŕ		K3/K	$\begin{bmatrix} 5 \\ 20 \end{bmatrix}$	1.5 1.5	1.0 1.0	28.9 29.4
_						7 31.4 to 35.4': Light to medium gray GRA to medium grains of feldspar, quartz, mu	ANITE; fine	I/II	R4/R	$10_{MB}$	-	-	30
		C-2 30.0 - 35.4	65	100	100	sparse black mafic minerals; wide fractur	re spacing;			10 20	1.5 2.0	1.0 1.0	30.8
		30.0 - 33.4				slightly weathered to unweathered; strong				30	3.0	1.0	32.1
25						strong; contacts with overlying schist is i dipping 80 with concentrations of quartz							-
<del>-</del> 35						C-3: 35.4' to 40.5' Medium gray GRANI'	ΓE: m-f	II/I	R4	40	2.0	1.0	35.3
Γ						grains of feldspar, quartz, muscovite, spa	rse black	11/1	11.7	$0_{MB}$	-	-	35.4
						mafic minerals; becoming coarse grained to 40.5'; wide fracture spacing; slightly w							-
<u>.</u>  -						strong; faint banding dipping ~80;							-
-						40.5' to 45.5: Dark gray to black SCHIST medium grains of biotite, quartz, feldsparents				5	3.0	1.0	39
<del>-</del> 40		C-3	121	100	0.7	black mafic minerals; close to very close	fracture			25	2.0	1.0	39.9
L		35.4 - 45.5	121	100	87	n spacing, with gravel size pieces at 41.7; weathered; medium strong to strong; con	slightly f	II	R3	$25_{MB}$	-	-	40.3
L						loverlying granite is intact but weathered,	dips 50			*40 *45	1.5 1.0	2.0 2.0	40.6 40.8
L						parallel to foliation; foliation defined by schistosity dipping 20 to 50°; core side w	distinct			*40	1.5	1.0	41.1
						somston, dipping 20 to 30, core side w.	<u>~</u>			*30 20	1.5 1.5	1.0 1.0	41.4
ſ										20	1.5	2.0	41.7
<b>⊢</b> 45						a. B			D 2 =	0/20	1.5 1.5	1.0 1.0	42.4- 43.4
ŀ						C-4: Dark gray to black SCHIST; c-f gra biotite, quartz, feldspar, other mafic mine	ins of erals sparse	II	R3/R	$30_{\mathrm{MB}}$	1.J -	1.0	43.8
-						garnet up to 0.1" across; close to moderate	te fracture			10 <sub>MB</sub> *40	- 1.5	1.0	44.3 45.15
F						spacing; slightly weathered; medium stro foliation defined by wavy schistosity dip	ong to strong;	1		*30	1.5	1.0	45.4
-						50°; pegmatite breccia in black, fine grain	ned matrix			20 5	1.5 1.5	1.0 1.0	45.5 47.3
						at 54.2-54.6'; wavy core sides throughou				,			
						Ror	ing No. 🔝	FD-20	16w	Shee	t 1	of	4

DR	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Deighart

CLIEN	IT: M	ГА				INSPEC	TOR:	C. Bu	rzyns	ki		
	(ft/min)		$\widehat{}$			DESCRIPTION AND DEMARKS			DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#/	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	ANGLE (deg)	Jr	Ja	DEPTH (feet)
-		C-4 45.5 - 55.2	115	99	97	noticeable 48.0' to 49.0'.			$5_{\mathrm{MB}}$ $20_{\mathrm{MB}}$ $0_{\mathrm{MB}}$ $0_{\mathrm{MB}}$ $5$ *50 *50	2.0 1.5 2.0	- - - 1.0 1.0 1.0	47.5 <sup>-</sup> 48.8 49.2 50 51 51.6 51.7 52.8
- 55						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 guartz gerret dipping 60 at 64.8'.	II	R4	20 <sub>MB</sub> *45/5 40 *60 0/30 30 <sub>MB</sub>	1.5 1.5 1.5 3.0 -	1.0 4.0 4.0 1.0	53.8- 54.3 54.8 55.2 55.9 57.5
- 60		C-5 55.2 - 65.2	120	100	98	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.			20 <sub>MB</sub> 40 10 <sub>MB</sub> 5 *60	1.5 - 2.0 1.0	2.0 - 1.0 1.0	60.2 61.1 61.3 62.4 63
- 65 - 70		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	П	R4	$\begin{array}{c} 30_{\rm MB} \\ 20 \\ *40 \\ 0_{\rm MB} \\ 0 \\ 35 \\ 10 \\ 10 \\ *40 \\ 30 \\ *50 \\ 10 \\ 0_{\rm MB} \\ 50 \\ \end{array}$	1.5 1.0 3.0 3.0 2.0 2.0 2.0 2.0 2.0 2.0 1.5 3.0	1.0 2.0 - 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	64.5 65.2 65.8 66.1 66.3 66.4 66.5 67.5 68.2 68.6 69.5
- 75		C-7 75.3 - 79.3	48	100	100	GRANITE, fine to medium grains of quartz, muscovite, feldspar; moderate fracture spacing; slightly weathered; very strong; coarse grained pegmatite, same composition below 75.0'; 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'.	II I/II	R5 R3	30 40 *40 *50 *60 *40 *50 40 <sub>MB</sub>	1.5 1.5 1.5 2.0 1.5 1.5 2.0 1.5	1.0 1.0 1.0 1.0 2.0 1.0 2.0 1.0	70.2 70.4 71.2 72.2 73.3 73.7 74 74.1 74.2
- 80		C-8 79.3 - 83.6	51	100	53	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 and extince at some fractures.		R3	$\begin{array}{c} 40_{\mathrm{MB}}^{\mathrm{MB}} \\ 40/0_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ 30 \\ 30 \\ 0 \\ 10 \\ 10 \\ 40_{\mathrm{MB}} \end{array}$	1.5 2.0 1.5 3.0 3.0	1.0 1.0 1.0 2.0 1.0	74.8 76.3 76.9 77 77.4 78.3 78.4 79 79.3
						weathered, with sand coatings at some fractures; mica phenocrystals in fine grained black matrix from	II FD-20	R4	0	3.0 t 2	1.0	79.6 <b>4</b>

AA	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER:	FD-200	<b>bW</b>		
SHEET NUMBER:	3	of _	4	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Deighart

CLIEN	IT: M	ITA				INSP	ECTOR	: <b>C.</b> Bu	rzyns	ki		
	(ft/min)					DESCRIPTION AND DEMARKS			DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#//	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	ANGLE (deg)	٦٢	Ja	DEPTH (feet)
- - 90		C-9 83.6 - 91.6	96	100	91	81.3' to 82.0'; no contact, poor rock fit at 80.5' an 83.0'; C-9: Medium gray to tan GRANITE; fine to med grains of white feldspar, quartz, muscovite, with black mafic minerals below 87.0'; moderate fract spacing, except very close spacing at 87.4' to 87.5 slightly weathered; strong; parallel alignment of conspicuous muscovite produces foliation from 8 to 87.0'; dipping 50' to 60°; red and orange iron staining on fractures from 87.2' to 89.2'; 1" quartz band dipping 60' across foliation at 84.1'; no	ium ure ''; 3.6'		20 20 20/0 40 20 30 <sub>MB</sub> 85 <sub>MB</sub> 20 <sub>MB</sub> 20	3.0 3.0 3.0 2.0 2.0 2.0 2.0 2.0 2.0	3.0 1.0 3.0 6.0 3.0 3.0 - - 2.0 1.0	79.7 79.9 80.1 80.5 80.7 81.1 81.5 81.6 81.7 83
- 95		C-10 91.6 - 95.9	51	100	94	contact, poor crack fit at 25 fracture at 84.4' (in product gray quartz).  C-10: Medium gray GRANITE; fine to medium grains of white and pink feldspar, quartz, muscov biotite, and other mafic minerals; close to modera fracture spacing; slightly weathered; strong; faint fabric defined by parallel alignment of platy minerals, dipping 50 to 60°; healed hairline	ite, ite	R5	20 25 20 *60 40 40 20 40	1.5 3.0 2.0 2.0 2.0 2.0 1.5 1.5	1.0 6.0 1.0 1.0 1.0 1.0 3.0	84.3 84.4 86 87.1 87.4 87.6 87.7 88.5
- 100 - 105		C-11 95.9 - 105.9	119	99	97	fractures parallel to fabric, dipping 50 to 60°, red staining on fracture surfaces at 93.6'.  Core bit NQ-6 Series in satisfactory condition. Loosing water throughout run.  C-11: Medium to tan GRANITE; fine to coarse grains of feldspar, quartz, muscovite, biotite, other mafic minerals; moderate to wide fracture spacin except two extremely close low angle fractures at 103.0' to 103.1'; slightly weathered, except moderately weathered at 103.0 to 103.1'; strong to very strong, except very weak at 103.0' to 103.1'; color change from gray to tan at 102.7' to 103.7'; grained from 101.5' to 102.5'; 1-inch wide pegma dipping 50° at 103.6'; iron staining on fracture surfaces from 100.6' to 103.6'; thin (<0.1") bands mica dipping 60° to 70°	of III	R4/R5	$ \begin{array}{c} *50 \\ 40 \\ *60 \\ 35 \\ 30_{\mathrm{MB}} \\ 30_{\mathrm{MB}} \\ 40 \\ 30_{\mathrm{MB}} \\ 40 \\ 40 \\ *40 \\ *40 \\ *40_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \end{array} $	1.5 1.5 1.5 1.5 2.0 - 1.5 1.5 1.5 1.5 2.0 2.0	1.0 1.0 1.0 1.0 1.0 - - 1.0 - 2.0 2.0 1.0 1.0	89 89.2 90.6 91.3 91.4 91.5 91.6 93.1 93.2 93.3 93.6 95.3 95.5
- 110 - 115		C-12 105.9 - 115.7	118	100	97	from 98.6' to 99.5'; no contact, poor crack fit at lot angle fracture at 103.0'. Loosing water throughout run. Rimmed borehole from 95.9' changed bit fro #6 Series to to #8 series.  C-12: Medium gray to tan GRANITE; fine to medium grains of feldspar, quartz, muscovite, blamafic minerals; moderate fracture spacing; slight weathered, with tan discoloration from 112.0' to 113.5'; strong to very strong; faint foliation from parallel alignment micas dip 30 to 50°; red stainin on 40° fractures at 106.4' and 112.8'; coarse grain gray pegmatite 111.7' to 112.2'; core sides are markedly non-parallel, wavy; 1-inch thick gray quartz band dipping 70° at 106.6'.	at m ack ly	R4/R5	$\begin{array}{c} 5_{\text{MB}} \\ 10_{\text{MB}} \\ 10_{\text{MB}} \\ 10 \\ 40 \\ 20 \\ 60_{\text{MB}} \\ 30 \\ 30 \\ 30 \\ 20 \\ 20 \\ 50 \\ 40 \\ 40 \\ \end{array}$	2.0 1.5 1.5 2.0 2.0 1.0 2.0 1.5 2.0 2.0	1.0 1.0 1.0 2.0 1.0 2.0 2.0 2.0 1.0 1.0	95.9 96.5 96.8 99.3 100.5 101.8 101.9 102 103 103.1 103.6 105.4
- 115						C-13: 115.7' to 116.5' Medium gray GRANITE; a above, except fine grained.  116.5' to 125.7': Dark gray to black SCHIST; fine medium grains of biotite, quartz, feldspar, mafic minerals; a few sparse garnets up to 0.1" across; close to moderate fracture spacing, except very compared to the space of the sp	e to II	R4/R5 R3/R4	40 45 40	1.5 1.5 1.5 1.5 1.5 2.0	1.0 1.0 1.0 1.0 1.0 -	106.4 106.6 108.5 108.8 109.6 110.75 111.5 111.7

DD	Parsons Brinckerhoff
TIJ	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER:	FD-206	W	
SHEET NUMBER:	4	of	4

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Deighart

C-14   125.7   120   100   99   135.7   135.7   120   100   99   135.7   135	INSPEC	TOR:	R: C. Burzynski						
Continuity, Strength, Color, Grains  * - Denotes discontinuity along foliation; some fractures along foliation; planar schistosity, dipping 40 to fractures along foliation; some fractures al				DIS	SCONT	INUITY	DATA		
trong; slightly weathered; foliation defindistinct, planar schistosity, dipping 40to of fractures along foliation; some fractures I softened mica and clay on surfaces. A few quartz-feldspar bands parallel to foliation wavy core sides.  C-14: Dark gray to black SCHIST; fine to grains of biotite and muscovite, quartz, feblack mafic minerals (amphibole?), numeral surfaces, and clay on surfaces.  C-14: Dark gray to black SCHIST; fine to grains of biotite and muscovite, quartz, feblack mafic minerals (amphibole?), numeral surfaces, softened by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fractures is softened mica coatings; slightly wavy core 127.5° to 129.0°.  C-15: 135.7' to 138.7°: Dark gray SCHIS′ 138.7° to 141.0°: Medium gray GRANITE interlayered SCHIST; alternating layers I each; granite is fine to medium grained, refeldspar, quartz, medium grained, refeldspar, quartz, medium grained garnet; above; becoming more granitic with dept    E.O.B at 141.0'.	ng, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦Ĺ	ьl	DEPTH (feet)		
grains of biotite and muscovite, quartz, feblack mafic minerals (amphibole?); nume garnets up to 0.4" across; moderate fractures slightly weathered to unweathered; strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined mice coatings; slightly wavy conductive softened mica coatings; slightly wavy conductive strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips 40 to 60°; a fractures along foliation; some fracture strong defined by distinct schistosity, undulating around garnets; foliation dips	ned by 60°, most have w 1/4" to 1"			10 40 *85 30 15 *10 *50 50	1.5 2.0 3.0 2.0 2.0 2.0 1.5 2.0 1.0	1.0 3.0 1.0 2.0 2.0 2.0 4.0 2.0 2.0	112.4 112.8 114.6 114.7 - 115.7 117.8 118.2 119.2-		
C-15 135.7 - 141.0  63 100 95  C-15: 135.7' to 138.7': Dark gray SCHIS' 138.7' to 141.0': Medium gray GRANITE interlayered SCHIST; alternating layers 1 each; granite is fine to medium grained; r feldspar, quartz, medium grained garnet; above; becoming more granitic with dept  E.O.B at 141.0'.	eldspar, erous ure spacing; g; foliation g only .ll urfaces have	I/II	R4	*55 *40 40 <sub>MB</sub> 65 *45 *55 *40 *40 *44 *45 *50 *50 *50 *50	1.5 1.5 2.0 1.0 1.5 1.0 1.5 1.0 1.5 1.0 1.5 1.0 2.0	2.0 1.0 1.0 4.0 2.0 4.0 4.0 1.0 2.0 1.0 1.0	119.8 120.4 - 120.55 120.65 121.5 - 122 122.4 - 122.8 122.9 123 - 124.5 125 - 125.1 125.2 125.4 - 125.6 125.6		
- 145 - 150 - 150	E, with 1" to 6" thick muscovite, schist is as		R4	*50 *45 *45 *45 *50 *50 *60 <sub>MB</sub> *5 *45 *45	1.5 1.0 1.5 1.5 1.0 1.5	1.0 1.0 1.0 2.0 1.0 1.0 2.0 4.0 2.0 4.0 4.0	125.7 126.6 127.5 - 128.2 129 - 130.8 131.8- 132.2 133.3 - 133.6		
				*45 *45 10 *50 <sub>MB</sub> *50 *45 *45 *45 *45 *40 20 <sub>MB</sub>	1.5 1.5 2.0 1.5 1.5 1.5 1.0 1.5 1.5	4.0 4.0 2.0 4.0 1.0 4.0 4.0 4.0 4.0	133.0 – 134.7 – 135.6 – 135.6 – 136.9 – 138.3 – 139.2 – 139.5 – 139.65 – 141		
				20 <sub>MB</sub>		-	-		

Sheet 4

		₽	ar	son	S						BORING NUMBER: FD-208												
		_		cke		off	R	<b>∩</b> P	INI	G L	$\mathbf{O}$	G	SHEET	NUMBER	R:1_	of	1						
		_	•	de	-		D	UN	7114	GL		G											
	10C YEAR		)ou	ıgla	s,	Inc.							PROJEC	T NUMB	ER:								
PROJE	ECT: ]	No 7	Sı	ıbv	vay	line Ext	ension	1					LOCATION	ON: <b>W</b> 34	th StV	iaduct							
LOCAT	ΓΙΟΝ:	Mai	nh	atta	ın								COORD. N: 214,583.1 E: 983,518.6										
CLIEN.													STN. NO.: OFFSET:										
CONT	RACT	OR:	Je	rse	y l	Boring &	Drilli	ng					SURFAC	E ELEV.	: 109.4 fe	eet							
DRILLI													DATUM:										
INSPE																							
						tary Was	h						START [			IME: 8:00							
RIG TY	/PE: ]			_		nd A 300							FINISH [			IME: 3:00	) pm						
	Casing Split Spoon Shelby Tube Piston Grab Core Barrel  Type/Symbol HW S■ II□ P□ G⊠ C□														NDWATER		T						
Type/Symbol HW S U □ P □ G □ C □															Water Depth	Casing Depth	Hole Depth						
I.D.	I.D. 4" 1.375" 2.938" 2.938" 2"													Time	(ft)	(ft)	(ft)						
O.D. 4.5" 2" 3" 3" 3"																							
Length 24" 24" 24"																							
Hammer Wt. 300 lbs 140 lbs Drill Rod Size NWJ																							
Hamm	Hammer Fall 24" 30" I.D. (O.D.) (2.938")																						
<u> </u>	SAMPLE SOIL (Blows/6 in.)																						
feet	CORING  William Coring  CORING  William Coring  CORING  William Coring  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING  CORING																						
l E	(15) H (1														RKS								
Ē.	CORING  WWW BEX  RUN REC. REC. L>4" RQD Depth Elev.  RUN Rec. (in.) % Elev.																						
	9	CORING  BUN REC. REC. L>4" RQD Depth (in.) (in.) % (in.) % Elev.																					
	· 🕰 · 4.	ΟŌ	Ĺ	z	Ś	٥	(in.)	(in.)	%	(in.)	%	Elev.	Gray asphalt (advanced to 3 feet via Jack Hammer)										
L	*A '	-											Gray asphalt (advanced to 3 feet via Jack Hammer)										
_	***												0.111										
L						0.0 - 6.0		Hand		Auger			Grayish-brown c-f SAND, some c-f Gravel (concrete and brick fragments), trace Silt, moist, occasional										
	***												wood fragm	ents (FILL)	,	,							
<b>-</b> 5	*4												Note: Large concre	ete fragmen	it encounter	red at 4.0 fe	et _						
L	100												-	_									
	* 4		S	1		6.0 - 8.0	29	57	22	10	12		Dark brown Gravel,trace										
	□Δ´		18	1		6.0 - 8.0	29	57	2.2	18	12		Graver, trace	Siit, wet, t	delise. (Sivi	) (FILL)							
	**************************************		1										No recovery	,									
<b>-</b>	<b>*</b> ∆ :		S	2		8.0 - 10.0	13	5	6	17	0		Coarse Grav	el (rock fra	gment) at t	he tip of spo	oon.						
<del>-</del> 10	□ □		S	3		10.0 - 10.6	8	100/1	-	-	0		No recovery				_						
-	**************************************		1										Second atter	npt									
-	ا <b>ن</b> ا		1										Dark Brown	c-f SAND.	some m-f	Gravel (roc	k						
-	** · · · · · · · · · · · · · · · · · ·		S	4		12.0 - 14.0	9	7	11	12	14		fragment), tr	race Silt, me	edium dens	e (SM) (FIL							
-	****		ł										4" casing dri	iven to a de	pui oi io d	epui							
<del>-</del> 15			ł										Dark brown	to black of	FSAND an	nd of Grave							
-	* -4		S	5		15.0 - 17.0	11	7	33	26	14		(rock fragme	ent, brick fr	agment), tr	ace Silt, me	dium						
L	* 5		-										(rock fragment, brick fragment), trace Silt, medium dense, occasional Shells (SP-SM) (FILL)										
	[ ⟨	1											_										
L	**											L											
<u> </u>	1								100/0														
			S	6		20.0 - 20.5	50	100/0	-	-	4		Brown m-f S	SAND, little	e Silt, trace	c Gravel.	_						
			1																				
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			1									<b> </b>											
	<u> </u>		1				<u> </u>					24.4	Roller bit re	fusal and be	egi <u>n</u> coring	at 24.4'.							
	1		-			1	•					Por	ing No.	FD-208	Shee	t 1 (	of 1						

	È <b>≣</b>	Parso	ons				BORING	NUM	IBER:	FD-2	08				
	<b>7</b>	Brind	kerho	off		CORING LOG	SHEET I	NUME	BER:_	1	c	of	4		
<u> </u>		Quad				COKING LOG									
	10 YEA	<b>P</b> Doug	glas, I	nc.			PROJEC	TNU	MBEI	R:					
PROJ	ECT:	No 7 Sul	bway	line I	Extens	sion	LOCATION	ON: <b>V</b>	V 34tł	ı StV	<sup>7</sup> iadu	ct			
		l: Manha	ttan				COORD. N: 214,583.1 E: 983,518.6								
CLIEN							STN. NO.: OFFSET: SURFACE ELEV.: 109.4 feet								
		TOR: Jer	sey B	Boring	3 & D	rilling			EV.: 1	.09.4 f	eet				
		D. Keith	_				DATUM:								
		R: N. Sha				<b></b>	(10.10	\ <i>r</i> =		0.00					
						ng with double core barrel	START [					8:00			
RIG I	YPE.	Ingersol	ı Kan	u A 3			FINISH [					3:00	pm		
					NOT			GF		WATEF Water			Hole		
		RREL DA	TA:		NOT	ES:				Depth	Cas De		Depth		
TYPE:							Date	Tim	е	(ft)	(f	t)	(ft)		
CORE		E: 2"													
O.D.:															
I.D.: 2	2"														
CASIN	NG S	IZE: 4" (4.	.5")												
	(ft/min)									DIS	CONTI	INUITY	DATA		
et)	(ft/r	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)		DESCRIPTION AND REMARK (Lithology, Structure, Weatherin		Ŋ	   <u>+</u>						
DEPTH (feet)	RATE	SE	ïR∀	Y	(%)	Continuity, Strength, Color, Grain	Size)	WEATHERING	STRENGTH	ANGLE (deg)			DEPTH (feet)		
	X	E R DE	OVE		Rab	* - Denotes discontinuity along foli	ation	Ŧ	R	Щ	느	l a	)   ``_		
DE	N N	SON	ŒC	EC	"	MB - Denotes mechanical brea	k	WE/	ST	υ					
	CORING		L LL	"		MD - Denotes mechanical prea	N.			⋖					
- 25						C-1 - 24.4'-27.8': Light gray GRANITE,	m-f grains	II	R4/R5	0	1.5	1.0	24.8		
						of white feldspar, quartz, muscovite, spar minerals, sparse medium grained garnet;	rse matic moderate			0	1.5	1.0	24.9		
L		C-1	58	97	88	fracture spacing, except very close fractu	re spacing at			5-10 0	1.5 1.5	1.0	25 25.9		
L		24.4 - 29.4				24.8'-25.0'; slightly weathered; strong to very faint near vertical banding; 27.8'-29	very strong; .4':			0	1.5	2.0	27		
						Dark-pink to medium gray GRANITE, m coarse grains of quartz, feldspar, biotite a	edium to			15	2.0 2.0	1.0	27.8 · 28.5 ·		
- 30						nafic minerals, muscovite and medium g	rained	II	R4	15	2.0	1.0	28.6		
_ 30						garnet; hard pink mineral resembling rose very close to close fracture spacing with	e quartz(?);  sharn			5 25	1.5 2.0	1.0	28.65 28.7		
		C-2	(0	100	0.5	angular fragments below 29.3', mechanic	cal breaks;			5 10	1.5 1.5	1.0 1.0	29.3 29.6		
		29.4 - 34.4	60	100	85	slightly weathered; strong to very strong; yellow staining on some low angle fractu				10 <sub>MB</sub>	-	-	29.7		
						stuck in core rock catcher, couldn't retrie	ve all rock.			$10_{\mathrm{MB}}^{\mathrm{MB}}$ $10_{\mathrm{MB}}$	_	-	30 30.2		
<b> </b>						Hammered hard to take it out. Core Barr alat 26' and at 29.3'. Changed Diamond bit	(coring bit),	III	R4	$10_{\rm MR}$	-	-	30.6		
<del>-</del> 35						Borehole depth measured using measurin	ig tape at	II	R4/R5	15 <sub>MB</sub>	1.5	1.0	31.2_ 31.6		
-						C-2- Dark pink to medium gray GRANIT				10	1.5	1.0	31.8		
<b>-</b>						grains quartz, feldspar, muscovite, garnet mafic minerals; enriched in garnet(?) from	t, sparse			10 20	1.5	2.0	31.95		
9						29.8'-32.0'; close to moderate fracture spa	acing;			20 30	2.0	1.0	33.6 34.4		
- 8/23/		C-3	120	100	82	slightly weathered, with brown staining of surfaces at 34.4'; yellow staining at 33.3'-				30	1.5	1.0	34.7		
# - 40		34.4 - 44.4	120	100	82	strong to very strong, becoming more coa	arse grained			20 20	2.0	2.0 2.0	34.85_ 34.9		
<u>-</u> -						with depth. Core is overdrilled from 31.6 C-3- Light gray to dark pink GRANITE;	c-f grains of			20	2.0	2.0	34.95		
MA A						white and pink feldspar, quartz, muscovit biotite, other sparse mafic minerals; dark	te, garnet,	II	R4	60 35	2.0	1.0	35 35.1		
∑						(?) enriched from 36.6' to 37.2'; moderate	to wide			10	2.0	2.0	37.6		
n D						fracture spacing except very close fracture from 34.7' to 35.1', with core surface pitto				35 50	2.0	2.0	37.8 37.9		
0 _ 1E						□ 20° fractures;		I	R4/R5	$40_{\mathrm{MB}}$	-	-	38.3		
⊋ <b> </b> — 45						strong except very weak from 34.7' to 35 core can be broken with hands, and medi				15 <sub>MB</sub> 5	2.0	1.0	38.4- 38.8		
0 0 0						from 40.7' to 41.2'; very coarse grained	,			0	2.0	1.0	39 39.4		
<b>E -</b>						PEGMATITE, with quartz pink and whit biotite, and garnet at 37.2' to 38.2'; 40.2'-	42.2',			$0_{\mathrm{MB}}$ $20_{\mathrm{MB}}$	-	-	40.4		
ĭ <b>-</b> `.						43.0'-44.4', in vertical contact with granit	e; slight			10 35	3.0	1.0 1.0	40.7 40.8		
<b>∮</b>  -	1	C-4				yellow staining throughout. No rock wal	i contact at	I		) )	3.0	1.0	40.0		

Boring No.

Sheet 1 FD-208

of

nn	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

DESCRIPTION AND REMARKS (Lithbodgy, Shructure, Weathering, Continuity, Strength, Color, Grains Size)   Page 2   Page 3   Page 4   Page 3   Page 4	CLIEN	ENT: MTA INSPECTOR: N. Shah												
Section   Part		nin)									DIS	CONTI	NUITY	DATA
C-4   44   44   47   67   Light gray to salmon pink   Till   R5   25   10   10   411   412   415   4	DEPTH (feet)	RATE	CORE RUN NO AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	(Lithology, Structure, Weathering Continuity, Strength, Color, Grain S * - Denotes discontinuity along folia	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
Fig. 10   Fig.	- 50 - - -		44.4 - 54.1	116	100	92	C-4 - 44.4'-47.0': Light gray to salmon pir PEGMATITE, very coarse grains (up to 2 quartz, pink and white feldspar, biotite, m close to moderate fracture spacing, except from 44.4' to 44.6'; slightly weathered; str horizontal, healed hairline fractures through breaks easily along mica concentrations.	" across) of suscovite; t very close cong; near ghout; rock			$\begin{array}{c} 25 \\ 45 \\ 10_{\mathrm{MB}} \\ 20 \\ 90 \\ 10 \\ 20 \\ \end{array}$	1.0 3.0 3.0 3.0 3.0 3.0	1.0 1.0 - 1.0 1.0 1.0	41.1 41.2 - 42.1 44.4 - 44.45 _
C-6	- - -			121	100	98	47.0'-50.0': Light gray to salmon-pink GR fine to coarse grains of quartz pik and whi muscovite and medium to coarse grained; wide fracture spacing; unweathered; strong; 50.0' to 54.4': Medium gray to dar IGRANITE; fine to medium grains of feld quartz, muscovite, mafic minerals; medium grained garnet; garnet enriched (?) red and in color at 50.6'-52.8' and at 53.0'-54.4'; minerals; medium grained garnet; spacing; unweathered to slig weathered; very strong; slight yellow stait 52.8'; core grinding at 53.4'; C-5 - Medium gray to dark pink GRANIT except wide fracture spacing throughout, of two very close fractures at 60.3'-60.4'; dar garnet (?) and quartz enriched at 54.4'-56.	ite feldspan, garnet;   g to very   k pink   spar,   m to coarse d dark pink noderate to ghtly   ming at   E, as above except for k-pink 8',			$\begin{array}{c} 30 \\ 30 \\ 25 \\ 35_{\text{MB}} \\ 30 \\ 50 \\ 20 \\ 15_{\text{MB}} \\ 20 \\ 0_{\text{MB}} \\ 5_{\text{MB}} \\ 80 \\ 30_{\text{MB}} \\ 35 \\ 20 \\ \end{array}$	3.0 3.0 3.0 1.5 2.0 1.5 - 2.0 - 3.0 3.0 3.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 - 1.0 - 1.0 - 1.0	44.9 46.4 49.1 50.3 - 52.2 52.8 - 53.1 - 53.2 53.4 - 54.15 - 58 - 59.1 59.4 - 60.3
white-pink pegmatite in vertical contact with granite   from 67.5' to 69.0'; Bottom of the core run (69.3' to 69.5 - 74.2   56   100   100   fed.9.0'; 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.    C-7	65 - - - -			64	100	100	C-6 - Light gray GRANITE; m-f grains of feldspar, quartz, muscovite, and scattered coarse garnet; wide fracture spacing exceptlosely spaced 40 fractures at 67.5'; slight weathered below 67.5'; very strong; very banding dipping~80; vertical, healed hairl	f white medium to pt two lly faint line			20 25 <sub>MB</sub> 30 40 40 15	2.0 2.0 2.0 2.0	1.0 - 1.0 2.0 1.0 1.0	61 64.2 64.8 - - 67.6 - 67.9 68.5 -
74.2 - 77.4 38 100 100   Salinon-plink FEGMATITE, coarse grains of plink and white feldspar, quartz, muscovite, maffic minerals; medium grained garnet; moderate fracture spacing; slightly weathered; strong; contact with loverlying granite along 80 seam at 70.8'; slight livellow staining. Core barrel jammed at 69.8'. Pulled livesumed. Bottom of borehole measured at 74.2' using limeasuring tape.  C-9 77.4 - 84.2 82 100 98   R4   Salinon-plink FEGMATITE, coarse grains of plink and white feldspar, quartz, muscovite, maffic minerals; medium grained at 70.8'; slight livellow staining. Core barrel jammed at 69.8'. Pulled livesumed. Bottom of borehole measured at 74.2' using limeasuring tape.  C-9 77.4 - 84.2   82   100   98   R4   R5   R5   R5   R5   R5   R5   R5	-			56	100	100	white-pink pegmatite in vertical contact w   from 67.5' to 69.0'; Bottom of the core rur   69.5') stuck in the catcher. Hammered ver   get the core. Retrieved all broken up rock   pieces.   C-7 - 69.5'-70.9': Light gray GRANITE; r	vith granite n (69.3' to y hard to in small m-f grains	II	R4/R5	$ \begin{array}{c} 15_{\text{MB}} \\ 20_{\text{MB}} \\ 0_{\text{MB}} \\ 80 \end{array} $	3.0	2.0 1.0	69.2 69.5 - 69.8 70.9 -
R4   15 <sub>MB</sub>   -   -   77   10verlying granite along 80 seam at 70.8'; slight   10verlying granite along 80 seam at 70.8';	75 - 75			38	100	100	fracture spacing; slightly weathered; very thick pegmatite bands dip 70 to 80°; 70.9' Salmon-pink PEGMATITE; coarse grains and white feldspar, quartz, muscovite, ma minerals; medium grained garnet; modera	strong; 0.5 " -74.2': s of pink fic te fracture	II	R5	10 10	3.0 2.0	1.0 1.0	74 74.2— - 76.6 -
	80			82	100	98	overlying granite along 80 seam at 70.8'; yellow staining. Core barrel jammed at 69 lout core barrel and tap the diamond bit an Iresumed. Bottom of borehole measured at Imeasuring tape.  C-8 - 74.2'-74.8': Pink PEGMATITE, as a 74.8'-77.4': Light gray GRANITE; fine to grains of white and pink feldspar, quartz, biotite and medium grained garnet from 7 wide fracture spacing; unweathered to slight	slight		R4	45 <sub>MB</sub> 70 <sub>MB</sub> 20 <sub>MB</sub> 30 15 20	2.0 2.0	1.0 1.0	77.1

DD	Parsons Brinckerhoff
TIJ	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	IT: M	ITA				INSF	PECTOR	TOR: N. Shah						
	(ft/min)					PERCENTION AND DESIGNATION			DIS	CONTI	NUITY	DATA		
DEPTH (feet)	CORING RATE (ft/n	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	ANGLE (deg)	Jr	Ja	DEPTH (feet)		
85 - -						75.6'. Core barrel jammed at 77.4'. Pulled out cobarrel. Cored rock stuck into the rock catcher. Hammered very hard to take it out. Retrieved rock broken up into small pieces. C-9 - 77.4'-78.5': Pink PEGMATITE, as above 78.5'-84.2': Medium gray to dark pink GRANITI	¦ III ckall II _	R4 R4	10 <sub>MB</sub> 25 10 30 45 <sub>MB</sub>	2.0 2.0 1.5	3.0 3.0 1.0	84.2_ 84.4 85.5 - 85.7 86.8		
- - 90 -		C-10 84.2 - 94.1	118	99	96	Igrained to 81.5' m-f grained below 81.5'; white a pink feldspar, quartz, muscovite, sparse mafic minerals; dark pink garnet (?)enriched 81.5'-82.7 wide fracture spacing except two closely spaced, stained fractures at 78.0'-78.2'; unweathered; ver strong; no natural fractures.	nd	R5	$\begin{array}{c} 40_{\mathrm{MB}} \\ 0_{\mathrm{MB}} \\ 30 \end{array}$	2.0	1.0	87.95 <sup>-</sup> 88.6 - 89.25		
- - - 95						C-10 - 84.2'-85.1': Medium to light gray GRANI m-f grained; two very closely spaced fractures at 84.4' and 84.5'; slightly weathered, except moder weathered at 84.3'-84.6'; fracture surfaces have s coatings; light yellow and red staining; 85.1'-89. White to salmon-pink PEGMATITE, c-m grains	rately andy 7':   I	R4	20 15 <sub>MB</sub> 20 <sub>MB</sub> 20	2.0	1.0 - - 2.0	92.4 _ 93.6 - 94.1 94.15		
- - -		C-11 94.1 -	119	100	100	feldspar, quartz, muscovite, biotite, other mafic minerals; wide fracture spacing; slightly weather strong; 89.7'-94.1': Medium gray GRANITE;c-f grains of feldspar, quartz, muscovite, mafic mine wide fracture spacing; unweathered; very strong; bands of salmon-pink pegmatite, 0.5" wide throughout dipping 70 to 80°; some coarse graine	erals;		10-15 25 <sub>MB</sub>	2.0	1.0	96.9 - 98.3 -		
100 - -		104.0	11)	100		lgarnet in pegmatite; no natural fractures. Possibl loss of recovery at 84.4 to 84.6.  C-11 - Medium gray GRANITE, with 0.5" bands PEGMATITE, as above; pegmatite near vertical mostly pegmatite below 101.4; unweathered; str	e    s of		30 <sub>MB</sub> 10 20	2.0 1.5	1.0	98.8 — 100.3 100.9 —		
- - - 105 - -						C-12 - Light gray to salmon-pink GRANITE, becoming medium gray below ~109.0'; fine to medium grains of pink and white feldspar, quart: 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 pegma		R5	0 15 <sub>MB</sub> 25-30 <sub>MB</sub> 5-10 50 25 30	2.0 - 1.5 3.0 1.5 1.5	1.0 - 2.0 2.0 2.0 1.0	103.4 103.8 104 — 104.1 104.15 104.2 106.1		
- 110 - 115 - 115 - 15 - 15 - 15 - 15 - 15 -		C-12 104.0 - 114.0	120	100	98	0.5" thick and near vertical throughout.			20 20	1.5	1.0	108.6 -		
						C-13 - Medium gray to dark pink GRANITE,	I/II	R4/R5	10 15 <sub>MB</sub> 15 <sub>MB</sub>	2.0	1.0	- 112.6 - 113.6 - 114		
115						becoming light gray below 122.3'; near vertical to f pink PEGMATITE throughout; c-f grains of feldspar, quartz, muscovite, mafic minerals; garr up to 0.4" across at 119.9'-115.2'; many medium coarse grained garnets at 119.9'-120.3'; moderate	ets to		10 15	1.5	1.0	115.9 <sup>-</sup> 116.85 <sup>-</sup>		
- - -		C-13 114.0 -	114	100	98	fracture spacing, except two pairs of extremely c low angle fractures at 121.6'-121.65' and at 122.5'-122.6': unweathered to slightly weathered			0 <sub>MB</sub>	2.0	1.0	118.3		
Boring No. FD-208											of	4		

nd	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

	CLIEN	CLIENT: MTA INSPECTOR: N. Shah															
		(ft/min)					DESCRIPTION AND DEMARKS			DIS	DISCONTINUITY DATA						
	DEPTH (feet)	CORING RATE (ft/r	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	ANGLE (deg)	Jr	Ja	DEPTH (feet)				
	- 120 -		123.5				strong to very strong.			20 <sub>MB</sub>	1.5	1.0	118.9_ 120.3 _				
	- - - 125 -						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 stron coarse grained, quartz-feldspar PEGMATITE from 125.4'-126.6'; additional 1" to 2" pegmatites, near	2;	R4/R5	$\begin{array}{c} 10 \\ 0 \\ 5 \\ 5 \\ 15_{\mathrm{MB}} \\ 20_{\mathrm{MB}} \\ 10 \\ 10 \\ 20 \\ \end{array}$	1.5 1.5 1.5 1.5 1.5 2.0 3.0	1.0 1.0 1.0 1.0 - - 1.0 1.0	121.6 - 121.65 122.5 - 122.6 _ 123.2 123.5 - 124 125.9 - 126.3 _				
	- - 130 - -		C-14 123.5 - 133.5	120	100	98	vertical throughout.  128.2'-133.5': Dark to medium gray SCHIST; c-f grains of biotite, quartz, muscovite, feldspar; close 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 50° to 80°; contact with overlying granite dips 70°; intact, with uppermost one foot of	II II	R4	10 <sub>MB</sub> 0 35 *50 20 *60	2.0 3.0 1.5 2.0 1.5	1.0 1.0 1.0 1.0 1.0	128 128.4 - 128.9 129.3 129.4 129.9				
	- - 135 - - -		C-15 133.5 - 140.8	88	100	100	schist, coarse grained, mica rich and non-foliated; core sides slightly non-parallel, slightly wavy below ~130'; 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 schistosit dipping 60° to 90°; 136.9'-137.7' Light gray m-f grained GRANITE; intact contacts parallel foliation; slight waviness of	/ II	R4	55 15 *50 20 *50 30 25 <sub>MB</sub> *65	3.0 2.0 2.0 2.0 3.0 2.0	1.0 1.0 1.0 1.0 1.0 1.0	132.75- 132.8 133.5 133.55- 135.3 136.3 137 137.7 -				
9	- 140 - -						core sides above 136.9'; pink feldspar in schist fror 135.0'-136.2';  E.O.B at 140.8'.	n . –		5 10 10 <sub>MB</sub> 10	3.0 1.5 - 1.5	1.0 1.0 - 1.0	139 140 140.1 - 140.8				
PJ MAINLI~1.GLB 8/23/0	- 145 - - -												- - - -				
NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06	- 150 - - -												- - - - -				
ŎN.	_						Boring No.	FD-2	208	Shee	et 4	of	4				

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	100 YEAR	) s <sub>®</sub>	Οοι	ıgla	ıs,	Inc.							PROJEC	CT NUME	BER:								
						line Ex	tensio	n						ON: LIR									
LOCA			nh	atta	an								COORD. N: 214,165.4 E: 983,329.1										
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	Casing Split Spoon Shelby Tube Piston Grab Core Barrel														NDWATER								
Type/S	Type/Symbol HW S ■ U □ P □ G □ C □														Water	Casing	Hole						
I.D.													Date	Time	Depth (ft)	Depth (ft)	Depth (ft)						
O.D.		4 1.373 2.936 2.936 2 Date Time (ii) (ii)												(11)									
		4.3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3																					
_	9																						
	Hammer Wt.         300 lbs         140 lbs         Drill Rod Size         NWJ           Hammer Fall         24"         30"         I.D. (O.D.)         (2.938")																						
натт																							
	SAMPLE SOIL (Blows/6 in.)																						
DEPTH (feet)	GRAPHIC LOG	/s/ft)	Ī																				
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<u>.</u>	₽	98	Ì	3ER	ď	<del>*</del>			CORIN														
	ਾ	CASING (Blows/ft) CORING (Min./ft)	TYPE	NUMBER	SYMBOL	DEPTH (feet)	RUN				RQD												
	***	00	╀	Z	ဟ		(in.)	(in.	) %	(in.)	%	Elev.	Concrete coring.										
F	#\dagger		+			0.0 - 2.0							Used Air Compressor up to 10' depth										
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	\$0₫											L											
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			$ _{S}$	2		15.0 - 17.	7	12	. 7	8	6		Dark gray c Silt, mediur										
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20			$\left  \right _{S}$	3		20.0 - 22.	$\frac{1}{3}$	6	6	6	10		Grayish brown f SAND, and Silt, trace m-f Gravel, medium dense, wet (SM)										
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	son									BORING NUMBER: FD-4					
		_		cke ide		Off	B	OR	Contin	G l	_0	G	SHEET NUMBER: 2 of 2		
=	100 YEAR					Inc.		(	contir	nued)			PROJECT NUMBER:		
PRO	JECT:	No 7	Su	ıbv	vay	line Exte	ension	1					CONTRACTOR: Jersey Boring & Drilling		
LOC	ATION	: Mai	nha	atta	ın								DRILLER: C. Cruz		
CLIE	NT: M	TA											INSPECTOR: J. Thampi		
SAMPLE								SOIL	(Blows	/6 in.)			-		
feet)	GRAPHIC LOG	vs/ft)				_	0/6	6/12	12/18	18/24	REC.				
DEPTH (feet)	PHIC	(Blov		er.	7	(feet)	CORING				(in.)	FIE	ELD CLASSIFICATION AND REMARKS		
	GR/	CASING (Blows/ft) CORING (Min./ft)	TYPE	NUMBER	SYMBOL	DEPTH (feet)					RQD	Depth			
-		38	$\vdash$	ž	S		(in.)	(in.)	%	(in.)	%	Elev.	Brown m-f SAND, some Silt, very dense, wet.		
+			S			25.0 - 26.3	4	25	100/4	_	10		Hard drilling at 27'		
	- 1											27.5	Roller bit refusal and begin coring at 27.5'.		
1															
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		Pars 🗎	ons				BORING NUMBER: FD-4									
			kerho	off		CORING LOG	SHEET	NUME	BER:	1	c	of	4			
<u> </u>	10 YEA	<u></u> Quad <b>ເຂ</b> Douឲູ	de & glas, I	nc.			PROJEC	T NU	IMBEI	R:						
PROJ	ECT:	No 7 Su	bway	line I	Extens	sion	LOCATION	ON: L	IRR	yard- ˈ	Trk 1	4- via	duct			
		l: Manha					COORD.									
CLIEN							STN. NO.: OFFSET:									
_		TOR: Jei	rsey B	Boring	g & D	rilling	SURFACE ELEV.: 108.0 +/-									
		C. Cruz					DATUM:									
		R: J. Tha			1			\	. (1(1	) <i>5</i> 7	- IN A I	<b>6.00</b>				
		Acker 4:		mona	ariiii	ng with double core barrel	START [ FINISH [					6:00 ]				
IXIO I	11 L.	ACKCI 4.	<u> </u>				TINIOTE			WATEF			am			
CORE	FΑΔΕ	RREL DA	ТΔ.		NOT	FS.		<u> </u>		Water	Cas		Hole			
TYPE		VIVEE DA	ua.		1401	<b>LO</b> .	Date	Tim		Depth (ft)	De <sub>l</sub>	pth	Depth (ft)			
CORE		<b>=.</b> 2"					Date	1111	ie	(11)	(1)	ι)	(11)			
O.D.:		~														
I.D.: 2												+				
		ZE: 4" (4	5")													
CASIN		∠⊏. 4¨(4	)							Die	CONT	NUITY	DATA			
	(ft/min)	0.€	<u>e</u>	(%		DESCRIPTION AND REMARK		ڻ ن		סוט	CONTI	INUITY	DATA			
DEPTH (feet)	_E (£	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	(%)	(Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S	g, Size)	WEATHERING	STRENGTH	) jg)			et)			
	RATE	R. P.		/EF	RQD (		,	뿐		ANGLE (deg)	j	la	DEPTH (feet)			
<u> </u>	9	SRE ID C		000	R	* - Denotes discontinuity along foli	ation	EAI	STR	GLE		ي	<u>F</u>			
	CORING	25€	2	22		MB - Denotes mechanical brea	k	>		Ą			H			
	O					C-1 - Medium gray to dark gray SCHIST	coarse to	II	R4	0/15 <sub>MB</sub>	_	_	27.5			
		C-1	32	100	99	fine grains of muscovite, biotite, quartz, v garnets 0.1" to 0.2" across; moderate frac	with many	''		, 15 <sub>MB</sub>						
_ 20		27.5 - 30.2	~~			spacing; slightly weathered; strong; foliate	tion defined			*60 *65	1.5 1.5	1.0 1.0	29 29.6-			
<del>-</del> 30						by distinct schistosity, with crenulations of wave length; foliation dips 60 to 85°.	over 0.5"	II	R3/R4	40	3.0	2.0	29.7			
ſ						C-2 - Medium gray to dark gray SCHIST	, fine to			$\begin{array}{c} 25_{\text{MB}} \\ 10_{\text{MB}} \end{array}$	- -	-	30.2 31.4			
						coarse grains of muscovite, biotite, quartz minerals; many visible garnets 0.1" to 0.2	z, matic 2" across;									
		C-2				close to moderate fracture spacing except spacing from 36.4' to 36.8'; medium stror	very close			85 60	2.0 1.0	2.0 2.0	32.8 33.1			
		30.2 - 38.2	84	88	79	slightly weathered with slight yellow stai	ning;			*60	1.0	2.0	34.5_			
<del>-</del> 35						foliation defined by distinct crenulated so dipping 60° to 85°. 2-inch wide PEGMAT	thistosity TTE at									
						36.6' to 36.8' dipping parallel to foliation.	with coarse			*60 *50	1.0 1.0	1.0 1.0	35.6 35.7			
<b>T</b>						grains of quartz and muscovite; white cla fracture at 36.8'.	y along /0			*55 *65	1.5 1.0	1.0 2.0	35.8 35.9			
T .						C-3- Boring intercepted previously drille		III	R3/R4	15	2.0	2.0	36.4			
<b>.</b>						subparallel borehole. RQD shows only na fractures. Recovery and RQD data incom	atural			50 25	1.0 3.0	2.0	36.55			
<del>-</del> 40		C-3				discontinuities transverse to core axis are	recorded.			*70	1.5	4.0	36.8			
<u></u>		38.2 - 43.7	43	65	30	Medium gray to dark gray SCHIST, as all moderately weathered and medium strong				*70 *60	1.5 2.0	2.0 1.0	37.2 38.3			
-						39.6'; 1" to 2" pegmatites.	5 0010 W			*60 *20	1.5 3.0	1.0 1.0	38.7 39.6			
}										10	3.0	1.0	40			
<u> </u>						C-4 - Dark gray SCHIST, becoming blue		II	R4	*50 *60	1.5 1.5	1.0	40.2			
<b>–</b> 45		C 4				46.5'; fine to medium grains of biotite, que muscovite, scattered garnets up to 0.1" ac	cross, with			*50	1.5	1.0	40.8-			
<u>}</u>		C-4 43.7 - 48.0	52	100	100	nodules of hard, blue-gray mineral (cyani 0.2" across; close to moderate fracture sp	ite?) 0.1" to			20 30	3.0 2.0	1.0 1.0	41.2 41.4			
-	43.7 - 48.0					slightly weathered; strong except very str	ong below	II	R5	$\frac{85}{0/10_{MB}}$	3.0	2.0	41.5			
						46.5'; foliation defined by indistinct schist faint banding, except distinct schistosity is		II	R4	35	2.0	1.0	44.4			
<u>}</u>						biotite-rich zone 46.0' to 46.6'; foliation of	lips 40to	"	134	*40 *50	1.5 1.0	1.0 2.0	44.9 45.9			
<u> </u>						70°; healed hairline fracture dipping 70 act foliation at 45.6' with light orange infilling	ıg; j			*70 40	1.5 1.5	2.0	46.4_ 47.6			
<u> </u>						C-5 - Dark gray SCHISTOSE GNEISS; f medium grains of biotite, quartz, muscov	ine to			45	1.5	4.0	48			
:						sparse garnet: close to moderate fracture	snacing.			$50_{\rm MB}$	-	-	48.1			

Boring No.

FD-4

Sheet 1

of

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIENT: MTA INSPECTOR: J. Thampi													
	(ft/min)								DISCONTINUITY DAT				
DEPTH (feet)	CORING RATE (#/r	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	ANGLE (deg)	٦	Ja	DEPTH (feet)	
- - 55 - -		C-5 48.0 - 58.0	120	100	99	slightly weathered; strong; foliation defined by fair 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 wide; dark orange iron staining at 57.5'; Loss of water observed throughout the run.			*60 *65 *60 *65 *50 5/55 *70 *60 *80	1.0 1.5 2.0 1.5 3.0 3.0 1.0 1.5 3.0	2.0 2.0 2.0 2.0 1.0 1.0 2.0 3.0	49.6 - 50.9 51.7 - 52.5 - 53 - 53.2 - 54.5 - 54.9 - 57	
- - - 60 - -		C-6 58.0 - 68.0	120	100	98	C-6 - 58.0' to 63.2': Dark gray to black SCHIST, fit to coarse grains of biotite, quartz, muscovite, feldspar; moderate to wide fracture spacing; slight weathered; strong; foliation defined by faint foliati 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;	y on n,	R4	*85 60 35 30 <sub>MB</sub> 5 85 *65	3.0 2.0 1.5 2.0 3.0 1.5	3.0 3.0 2.0 1.0 3.0 4.0 2.0	57.2 - 57.5 - 58 59 - 60.3 - 61.2 61.6 - 62.7 -	
- 65 - -						parallel, healed hairline fractures from 61.6' to 62. light green soft mineral (chlorite) on foliation fracture at 61.6'; 63.2' to 68.0': Light gray GRANITE; fine to mediu grains of feldspar, muscovite, quartz; wide fracture spacing, except very closely spaced, low angle fractures from 67.8' to 68.0'; unweathered to slight weathered; strong to very strong; pegmatites, 1" the	m y	R4/R5	5 <sub>MB</sub> 70	1.5	2.0	63 63.8 63.85 - - 67.8	
- 70 - -		C-7 68.0 - 73.4	65	100	100	with coarse grained quartz and pink feldspar at 63. and 67.6'; very faint, near vertical banding.  C-7 - Light gray GRANITE; fine to medium grain 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	<u></u>	K4/K3	15 30 25 <sub>MB</sub> 20 40 <sub>MB</sub>	1.5 1.5 - 1.5	2.0 2.0 2.0	67.9 - 68 68.1 - 70.7 - 71.9 -	
- - 75 -		C-8 73.4 - 78.4	60	100	100	pegmatite~1" inch wide throughout; red staining o 20° fracture at 70.7', with adjacent subparallel heal fractures. Complete loss of drilling fluid - no circulation return throughout the run.  C-8 - Light gray to pink GRANITE; fine to coarse grains of white and pink feldspar, quartz, muscovi sparse medium garnet; wide fracture spacing; unweathered; strong to very strong; 2-inch thick	ed <sub>r</sub> .   I  -	R4/R5	5 <sub>MB</sub> 5/85 0/5 20	2.0 1.5 3.0	1.0 1.0 1.0	72.7 - 73.4 _ 73.5 74.2—	
- - 80 -						coarse grained pegmatite with quartz, microcline a biotite, near vertical 73.6' to 73.9'. Complete loss of drilling fluid - no circulation return throughout the run.  C-9 - 78.4' to 82.3': Light gray to tan GRANITE; to medium grains of white and pink feldspar, quart muscovite, sparse garnet from 81.5' to 82.3'; close wide fracture spacing; slightly weathered; strong to	f / / II ne z, to	R4/R5	$\begin{array}{c} 8_{\rm MB} \\ 5_{\rm MB} \\ 30_{\rm MB} \\ 15_{\rm MB} \\ 0/5_{\rm MB} \\ 25 \\ 10 \end{array}$	- - - 1.5 1.0	- - - 2.0 2.0	77 77.4 - 77.9 78.2 - 78.4_ 80.1 80.5 -	
- - - 80 - - - - 85 -		C-9 78.4 - 86.7	100	100	92	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 very close fracture spacing; slightly weathered; medium strong; foliation defined by distinct schistosity, dipping 50 to 60°; most fractures along	II	R3 R4/R5	5 60 35 *60	2.0 2.0 1.5 3.0 1.0 1.5 1.0	2.0 2.0 1.0 4.0 4.0 2.0 1.0	82.4 - 82.9 83.1 - 83.3 83.4 83.6 - 83.8 83.9	
						foliation; dark gray clay coating at 83.3'.  Boring No.	/  II <b>FD</b> -	R4 -4	90 Shee	2.0 et <b>2</b>	2.0 of	83.9 <b>-</b>	

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DEPTH (feet) DRING RATE (ft/min) CORE RUN NO. AND DEPTH (ft) RECOVERY (in)		DESCRIPTION AND REMARKS			DIS	CONTI	UI IITV	1
TH (feet)  RATE (ft/n RUN NO. EPTH (ft)  JERY (in)		DESCRIPTION AND REMARKS				CONTI	YUIIY	DATA
CORING F CORING F AND D RECON	RQD (%)	(Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)  * - Denotes discontinuity along foliation  MB - Denotes mechanical break	WEATHERING	STRENGTH	ANGLE (deg)	٦٢	Ja	DEPTH (feet)
- - 90 - C-10 - 86.7 - 96.9 122 100	82	\\\ 83.4' to 86.7': Light gray GRANITE, as above with schist inclusion 85.1' to 85.2'. \( C-10 - 86.7' to 90.7': Light-gray GRANITE; fine to medium grains of feldspar, muscovite, close to moderate fracture spacing; slightly weathered; strong; tightly healed hairline fractures dipping 70 Pure quartz at 90.4' to 90.6', above several low anglifractures with poor crack fit. \( 90.7' to 92.8': Black SCHIST, with healed brecciate	II	R3	20 20 25 30 30 40 40 55 30	1.5 1.5 1.5 1.5 2.0 3.0 1.5 2.0 3.0	2.0 2.0 1.0 1.0 1.0 1.0 1.0 1.0	85 - 86 86.7 - 87.7 - 87.9 - 87.95 - 88.2 89.3 - 90.4
- - 95 -		PEGMATITE; coarse grains of biotite and quartz in schist, with quartz and feldspar in pegmatite; very close to close fracture spacing; slightly weathered; medium strong; foliation defined by distinct schistosity, dipping 70 to 80°; 80° foliation fracture at 91.4' has thin (0.1") coating of gray-green clay; many healed hairline fractures from 92.2' to 92.8';	II	R4	*60 *60 70 80 70 40 50	1.0 1.0 1.0 1.0 3.0 3.0 3.0	4.0 4.0 2.0 4.0 1.0 1.0	90.8 91 - 91.1 91.4- 91.7 92.4 92.6 -
C-11 96.9 - 106.3	92	92.8 to 96.9': Light gray to pink -tan GRANITE; fi to medium grains of feldspar, quartz, muscovite; ve close to moderate fracture spacing; slightly weathered with slight iron staining; strong; healed fracture dipping 90 has soft, dark-red infilling; high-angle fractures from 93.4' to 95.0' have thin (<0.1') coatings of dark red mineralization (Hematite?) C-11 - 96.9' to 106.0': Dark-gray to black SCHIST; close to moderate fracture spacing, except extremel close spacing from 97.7' to 98.2'; slightly weathered	7 ;	R3/R4	*50 65 80 30 80 20 80 0 5 <sub>MB</sub> 50 *50	2.0 1.5 2.0 1.5 2.0 3.0 3.0 1.5 - 1.5	1.0 2.0 2.0 2.0 2.0 1.0 1.0 1.0 3.0	92.7 93.3 - 93.4 93.6 - 93.8— 94 94.8 - 96 96.6 - 96.8 - 97.6
C-12 106.3 - 71 100	100	medium strong to strong; core surface is pitted fron 97.7' to 98.7'; foliation defined by distinct wavy schistosity dipping 50 to 60°, becoming less schistose below 102.0" all fractures along foliation; several foliation fractures have softened mica on surfaces; scattered pegmatites, coarse grained feldspar and quartz, 0.5" to 1.0" thick along foliation 106.0' to 106.3': Light gray GRANITE medium to fine grained.	II I I	R4 R5	*65 *65 *65 *50 *50 *60 *60 *50	1.0 1.0 1.0 1.5 1.0 1.5 1.0 1.5	4.0 4.0 4.0 4.0 4.0 2.0 1.0 1.0 1.0	97.8 - 97.85 97.9 - 98.1 - 98.4 - 98.6 - 99.9 - 100.4 - 101 -
		C-12 - Light gray GRANITE: medium to fine grain of feldspar, quartz, muscovite, sparse medium grained garnet and mafic minerals; wide to very wi fracture spacing; unweathered; very strong; no natural fractures.  C-13 - 112.2' to 118.6': Light gray GRANITE, as above, except slightly weathered from 116.9' to 117.1'; less garnet below 114.0'; 118.6' to 121.7': Dark gray to black SCHIST; medium to fine grains of biotite, quartz, muscovite,		R5	$\begin{array}{c} 50 \\ 40 \\ *70 \\ 10_{\mathrm{MB}} \\ 0/5_{\mathrm{MB}} \\ 15_{\mathrm{MB}} \\ 0/5_{\mathrm{MB}} \end{array}$	1.5 2.0 1.5 - -	1.0 1.0 1.0 - - -	102.1— 102.4 106 1 106.3 - 108.8 109.6 - 111.3 112.2 —
C-13 112.2 - 114 100 100 - 120	100	moderate fracture spacing; slightly weathered; strong; foliation defined by indistinct schistosity dipping 60° to 80°. Intact upper contact with granite	II	R5 R4	15 <sub>MB</sub> 20/25 <sub>MB</sub> 10 5 0/5	3.0 2.0 2.0	1.0 1.0 1.0	115.8 - 116.1 - 116.9 117.1 - 118.1
2 120		C 14 Dealers COLUMN	II	R4	$     \begin{array}{c c}       40_{\text{MB}} \\       30_{\text{MB}} \\       30     \end{array} $	- 2.0	- - 1.0	120.2 120.9 121.1
ž		C-14 - Dark gray SCHIST, medium to fine grains of Boring No.	FD-	R4	Shee		of	4

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

CLIEN	IT: M	TA					INSPEC <sup>-</sup>	TOR:	J. Th	ampi			
	(nin									DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARK. (Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folion MB - Denotes mechanical brea	ig, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦٢	ь	DEPTH (feet)
- - - 125		C-14	122	0.0	00	biotite, quartz, muscovite, mafic minerals coarse grained garnet from 130.6' to 131. wide fracture spacing, except very close s from 131.4' to 131.6'; slightly weathered unweathered; strong; foliation defined by discontinuous schistosity dipping 60 to 90 pegmatites from 122.6' to 123.6' and 131.	0'; close to spacing to vindistinct, po; quartz 2' to 131.4';			5/30 <sub>MB</sub> 5 <sub>MB</sub> 0 *70 5	2.0 1.5 2.0	1.0 1.0 1.0	121.3 - 121.7 122.2 - 122.7 124.3
-		121.7 - 132.0	122	98	90	fine to medium grained granite from 129. with contacts at smooth foliation fracture schist; slight iron staining from 129.3' to Possible loss of recovery at 131.5' or at 1.	.3' to 129.5' s in adjacent 129.5'.			10 30 20	2.0 3.0 3.0	1.0 1.0 1.0	126.7 - 127.1 127.15 -
- 130 -										*80 *65 30 *75	1.5 1.5 2.0	2.0 2.0 1.0	129.3 129.5 130 -
- - - - 135						E.O.B at 132'.				*75 55 40 *50 <sub>MB</sub>	1.5 2.0 1.5 1.5	4.0 2.0 2.0 1.0	131.4 131.5 131.8 - 132
-													- - -
- - 140 -													- - -
- - - 145 - -													- - - -
150 - 1 - 150 - 15													- - - - -
- 155 - 155 - 155													- - - -
	Boring No. FD-4 Sheet 4 of 4												

		Parsons											BORING NUMBER: FD-402									
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<u>≡</u>				ade			D	Or	7114	Gı		G										
	100 YEAR	) s <sub>®</sub> [	Ͻοι	ugla	ıs,	Inc.							PROJEC	T NUMB	ER:							
PROJE	ECT:	No '	7 S	ubv	vay	line Ext	tensior	1					LOCATION	ON: Trac	k 26 und	er 11th	Ave					
LOCA	TION:	Ma	nh	atta	an								COORD. N: 214,296.4 E: 983,505.3									
CLIEN													STN. NO.: OFFSET:									
					y l	Boring &	Drilli	ng					SURFACE ELEV.: 107.8 feet									
DRILL					_								DATUM:									
INSPE															<del>-</del> -							
					Ro	tary Was	sh							DATE: 12			-					
RIG T	YPE: A				C :-	lit Connant	la allas / Ts	.la a	Dieten		-1-	lana Dannal	FINISH	DATE: 12/12/05 TIME: 2:00 am  GROUNDWATER DATA								
	Casing Split Spoon Shelby Tube Piston Grab Core Barrel  Type/Symbol HW S ■ U □ P G C □												GROUI	Water	Casing	Hole						
Type/S	symbo		HV			S	U 📗		P	G		C 🗏	-		Depth	Depth	Depth					
I.D.			4"			1.375"	2.938"	2	2.938"			2"	Date	Time	(ft)	(ft)	(ft)					
O.D.			4.5	"		2"	3"		3"			3"	12/7/05	12:00 am	5.5	16.0	70.6					
Length	1					24"	24"		24"				12/8/05	10:00 pm	6.0	16.0	120.0					
Hamm	er Wt	:. 3	00	lbs	]	140 lbs	Drill	Rod S	ize		NW	J	12/9/05	8:30 pm	5.6	16.0	125.7					
Hamm	nmer Fall 24" 30" I.D. (O.D.) (2.938")																					
	SAMPLE SOIL (Blows/6 in.)																					
] <del>(</del>																						
(fee	O/6 6/12 12/18 18/24 REC. (in.)  FIELD CLASSIFICATION AND REMARKS  CORING  COR																					
FIELD CLA  ORING													SSIFICAT	ION ANI	REMAF	RKS						
	RA RA	NG NG NG NG NG NG NG NG NG NG NG NG NG N	? <b> </b> ш	ᇤ	BO	Ĭ Ĕ				,		1										
	0	CASING (	TYPE	NUMBER	SYMBOL	)EP	RUN	REC.	REC.	L>4"	RQD											
-													18" - Concre	ete Slab								
}	ko		┨										Air-Tricone	from 1.5' to	10 feet;	6 C1	-					
-	* .		┨										Brown c-f S (observed in	AND, some cuttings)	Silt, trace	f-Gravel	-					
-			-											<i>O</i> /			-					
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			$\int_{\Omega}$			100 124		7	,		1.4		Brown m-f	SAND, som	e Silt, medi	um dense, v	wet					
Ī			$\int S$	1		10.0 - 12.0	7	7	4	6	14		(SM)				-					
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<b>†</b>			1														-					
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<u> </u>	· · ·		S	2		15.0 - 15.3	3 100/3"				3	1 <u>5</u> .5	Brown m-f	SAND, som	e Silt, little	c-f Gravel,	very ,					
50 -			┨									\	dense, wet ( -weathered	SM)			, , .					
5			┨									\	spoon		, -		/ ine / .					
-			┨									`\_	<u>Roller bit re</u>	<u>fusal and be</u>	gin coring	at_15'	/ -					
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20			1																			
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			Pars	ons				BORING	NUM	IBER:	FD-40	)2				
			\overline 🛮 Brind	kerho	off		CODINC LOC	SHEET N	NUME	BER:_	1	c	of	4		
			\overline Quad	de &			CORING LOG									
	<u> </u>	10 YEAR	<b>P</b> Doug	glas, I	nc.			PROJEC	T NU	MBEF	₹:					
	PROJE		No 7 Sul	bwav	line F	Extens	sion	LOCATION				ler 11	lth A	ve		
			l: Manha				/-V	COORD.								
	CLIEN							STN. NO.: OFFSET:								
			TOR: Jer	sev B	Boring	& D	rilling	SURFACE ELEV.: 107.8 feet								
			C. Cruz			,	8	DATUM:								
			R: <b>A. Z</b> a	bala												
DRILLING METHOD: Diamond drilling with double core barrel RIG TYPE: Acker 45								START D	DATE	: 12/6/	'05 T	IME:	7:00	pm		
								FINISH DATE: 12/12/05 TIME: 2:00 am								
									GF	ROUND	WATER	DATA	\			
	CORF	RΔF	RREL DA	ΤΔ:		NOT	FS:			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Water	Cas	ing	Hole		
-	TYPE:							Data	Time		Depth	Dep		Depth		
			T. 0"					Date	Tim		(ft)	(ft	<i>-</i>	(ft)		
	CORE		<b>=</b> : 2"					12/7/05	12:00		5.5	16		70.6		
	O.D.:							12/8/05	10:00	-	6.0	16		120.0		
	I.D.: 2							12/9/05	8:30	pm	5.6	16	.0	125.7		
	CASIN		ZE: 4" (4	.5")												
		CORING RATE (ft/min)						_			DIS	CONTI	NUITY	DATA		
	et)	(ft/r	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)		DESCRIPTION AND REMARK (Lithology, Structure, Weatherin		92	<u> </u>						
	DEPTH (feet)	Щ	몽늗	.∺ Y	\ Y	RQD (%)	Continuity, Strength, Color, Grain	Size)	딤	STRENGTH	(deb)			eet		
	TH.	₹	I RI	) VE		g	* - Denotes discontinuity along foli	ation	王	ZEN	) E (c	₽	a	I ±		
	DEF	N N	OR	Ŭ E	l Ö	<u>~</u>			WEATHERING	STI	ANGLE (			DEPTH (feet)		
		S. R	0∢	<u>~</u>	<u>~</u>		MB - Denotes mechanical brea	ıK	>		₹					
	_						C-1: Light gray to tan GRANITE; m-f gr	ains of	II	R4	0			15.0		
	_						quartz, feldspar, muscovite, and sparse m minerals; moderate to wide fracture space	ing except			$egin{pmatrix} 0_{ ext{MB}} \ 0 \end{pmatrix}$	1.5	1	15.8 16.2		
			C-1	54	100	85	very close spacing from 15.5' to 15.8'; sli weathered; strong; brick-red hematite on	ghtly			85 45	1.5 1.5	2.0 1.0	16.5 16.7		
	_		15.5 - 20.0				weathered; strong; brick-red hematite on fractures; weathered pieces of schist and	vertical			80	2.0	2.0	17		
	_						17.0' - 18.5' : Gray to salmon-pink PEGM	ÍATITE;								
	<del>-</del> 20						\ \tau \coarse grained; contacts intact, gradation C-2: Light gray to medium gray GRANI	al/	II	R4/R5	$0_{MB}$	-	_	20		
	-						of quartz, feldspar, muscovite, sparse me				0	1.5	1.0	20.1		
	-						grained garnet; moderate to wide fracture	e spacing;					1.0			
	_						slightly weathered; strong to very strong; gneissic compositional banding dips ~60	Except:			0 60	1.5 1.5	1.0 2.0	22.2 22.3		
	_						22.3' - 22.5' and 27.9' - 29.4': dark gray S	CHIST; fine			55	2.0	1.0	23.5		
	<del>-</del> 25		C-2	119	100	100	to medium grains of biotite, quartz, felds muscovite; close to very close fracture sp				$0_{\mathrm{MB}}$ $15_{\mathrm{MB}}$	-	-   -	24 24.5-		
	20		20.0 - 29.9	117	100	100	slightly weathered; medium strong; distir	nct			$0_{\text{MB}}$	-	_	24.9		
	_						schistosity dips 60 to 70°; all fractures h orange iron staining; 29.4' - 29.9': light gi	ave rav			$0_{ m MB} \ 0$	2.0	1.0	25.1 25.4		
							PEGMATITE band; coarse grained; cont	act intact				2.0	1.0			
							and parallel to schistosity; lower contact is near vertical.	with granite			30 *85	1.5 1.0	1.0	27.7 28.1		
90	-										*60	1.0	2.0 3.0	28.3		
3/23/0	<del>-</del> 30						C-3: 29.9' - 33.5': Light gray to medium		II	R4	*65	1.5	2.0	29 -		
LB 8	-						GRANITE; m-f grains of quartz, feldspai	r, and sparse	11	111	30 <sub>MB</sub> *45	1.0	2.0	29.9 30.7		
~1.G	L						mafic minerals; coarse grained pegmatite 29.9' to 30.5', in vertical contact with grain	band from								
INL							moderate fracture spacing; slightly weath				*50 <sub>MB</sub> 45	1.0 1.0	1.0 1.0	32 32.3		
J MA	strong; except:					strong; except: 30.6' - 30.7', 31.6' - 33.1', and 33.4' - 33.5	i. Dark oraș			35	2.0	1.0	33.4			
:GP,	「 <sub>~</sub>		29.9 - 38.1	98	100	100	SCHIST; fine to medium grains of quartz	z, biotite,			$0_{MB}$	-	-	33.9		
ZNE	<del>-</del> 35						feldspar, muscovite; close to moderate fra spacing; slightly weathered; strong; faint				$0_{MB}$	-	-	34.9		
8							dips 45° to 55°;	•			20 40	1.5 2.0	1.0 1.0	35.6 36		
LOG	-						33.5' - 36.9' Medium gray, almost pure Q very coarse grained; 1/2-inch band of ma	UARTZ;			20	1.5	2.0	36.8		
at 34.4' dipping 45°, with						at 34.4' dipping 45°, with irregular patches	s of yellow	т/тт	D 4/D 5	15 0	1.0 2.0	1.0 1.0	37.4 38			
NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06	-		C-4	26	100	100	metallic mineral (gold?) at quartz contact unweathered to slightly weathered; 36.9'	t;	I/II	R4/R5	$10_{\mathrm{MB}}$	-	-	38.1		
0.7	<del>-</del> 40		38.1 - 40.3		100	100	Light to medium GRANITE; as above; 1.				$15$ $30_{MB}$	2.0	1.0	38.7 39.3		
ž	10						h <sup>-</sup>				$\iota_{MB}$		_	) 37.3		

4

of

FD-402

Sheet

Boring No.

nn	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CLIENT: MTA

CONTRACTOR: Jersey Boring & Drilling

CLIEN	IT: M	ITA				INSPE	CTOR:	A. Za	bala			
	(ft/min)								DIS	CONTI	YUITY	DATA
DEPTH (feet)	CORING RATE (ft/r	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	ANGLE (deg)	Jr	Ja	DEPTH (feet)
- - - - 45 - - - - - 50		C-5 40.3 - 50.5	122	100	98	of schist dipping 20 at quartz-granite contact. C-4: Light gray GRANITE m-f grains of quartz, feldspar, muscovite, and scattered medium to coarse grained garnets; moderate fracture spacing; lunweathered 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 C-5: 40.3' - 40.5': Medium gray Quartz, coarse grained; 40.5' - 46.1': Light gray GRANITE; c-f grains of quartz, feldspar, muscovite, and scattered medium grained garnets; irregular PEGMATITES, 1/2-inch 3-inch thick throughout; moderate to wide fracture spacing; unweathered to slightly weathered; strong very strong; faint banding dips 40 to 60°. 46.1' - 50.0': Dark gray to black SCHIST; fine to coarse grains of biotite quartz feldspar and muscovite.	II	R4/R5	0 <sub>MB</sub> 10 <sub>MB</sub> 60 <sub>MB</sub> 0 <sub>MB</sub> 0 <sub>MB</sub> 80 40	3.0 - 1.5 2.0 2.0 3.0 1.0 2.0	1.0 - 1.0 2.0 1.0 3.0 4.0 1.0	39.8 - 40.3 - - 44.2 44.5 - 44.8 - 45.2 46.8 - 48.6 - 49.3 49.4
- - - - 55 - - - - -		C-6 50.5 - 60.6	121	100	100	grains of biotite, quartz, feldspar and muscovite; moderate fracture spacing; slightly weathered; 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';   50.0' - 50.3': Light gray PEGMATITE, coarse   grained;   50.3' - 50.5': Dark gray SCHIST, as above   C-6: 50.5' - 51.9': Light gray to salmon-pink   PEGMATITE; c grains of white and pink feldspar, quartz, muscovite; moderate fracture spacing; slight weathered; strong; in vertical contact with: light gray GRANITE, fine to medium grains of quartz, feldspand muscovite; healed hairline fractures along contact; 51.9' - 60.6': Dark gray to black SCHIST; m-f grain	II	R4 R4	25 <sub>MB</sub> *40 *40 *65 *70 10 <sub>MB</sub> 35 20 <sub>MB</sub>	1.5 2.0 1.0 - 2.0	1.0 1.0 1.0 2.0	50.2 - 50.5 - 51.9 - 53 - 54.2 - 54.9 - 57.2 - 58.4 - 59.2 - 59.7 -
- - - - - 65 -		C-7 60.6 - 70.6	120	100	100	of quartz, biotite, feldspar, muscovite, hornblende; 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. C-7: Dark gray SCHIST; fine to medium grains of quartz, biotite, muscovite, feldspar; wide fracture spacing; unweathered to slightly weathered; mediur strong to strong; crenulated schistosity is near-vertical, except at pegmatite contacts; many		R3/R4	20 20 <sub>MB</sub> 35 30 30 <sub>MB</sub> *50	2.0 - 3.0 2.0 - 2.0	1.0 1.0 1.0 - 2.0	60.1 60.6 62.4 63.9 64.4 65.8
- 65 - - - - 70 - -						jagged mechanical breaks across foliation; pegmatit bands from 65.6' - 66.3' and 67.0' - 67.6'.  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	$^{*60}_{15_{\mathrm{MB}}}^{}_{0_{\mathrm{MB}}}^{}_{25_{\mathrm{MB}}}^{}_{25_{\mathrm{MB}}}^{}_{40_{\mathrm{MB}}}^{}_{10}^{}_{0_{\mathrm{MB}}}$	2.0	1.0 - - - - 1.0	67.7 - 68.4 - 68.8 69 - 69.8 70.6 - 71.3 - 72.5 -
- 75						Boring No.	FD-4	102	Shee	et 2	of	4

AN	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER:	FD-402			
SHEET NUMBER:	3	_ of _	4	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Cruz

CLIEN	NT: M	ITA				ll l	NSPECT	OR:	A. Za	bala			
	(nin					-				DIS	CONTI	YTIUN	DATA
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 Siz  * - Denotes discontinuity along foliation MB - Denotes mechanical break	,	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
-		C-8 70.6 - 80.6	120	100	100					$0_{ m MB}$	-	-	75.8 -
-										15 <sub>MB</sub>	-	-	76.9 - -
- - 80										30	3.0	1.0	79.5 <u> </u>
- - -						C-9: Dark gray SCHIST; m-f grains of quar biotite, muscovite, feldspar; moderate to wi fracture spacing; unweathered to slightly we strong; indistinct, crenulated schistosity dip 90°; core sides slightly wavy.	ide eathered;	I/II	R4	25 *80 20 45 30 <sub>MB</sub>	2.0 1.5 2.0 2.0	1.0 2.0 1.0 1.0	80.6 - 80.9 81 - 81.8 82.3
- 85 -		C-9 80.6 - 90.7	121	100	100					*80	1.5	2.0	84.6—
-										$\begin{array}{c} 20_{\mathrm{MB}} \\ 10 \\ 0_{\mathrm{MB}} \end{array}$	2.0	2.0	86.7 - 87.2 87.5 -
- 90 - -						C-10 - 90.7' - 94.5': Dark gray to black SCF grains of biotite, feldspar, muscovite, black minerals; moderate to wide fracture spacing	mafic	I	R4	0 <sub>MB</sub> 50	2.0	1.0	90.7 - 90.8 -
- - 95 - - -		C-10 90.7 - 100.5	118	100	90	unweathered to slightly weathered; strong; s is crenulated, dips 75 to 90°, except at conta increased hornblende content below 92.6'; 1 wide contorted bands of quartz-feldspar at 92.6'; contacts intact dipping 45 to 75°, subp to foliation; core sides slightly bulging from 94.5'; 94.5' - 96.0': Medium gray GRANITE; c-f g quartz, feldspar, muscovite and garnet; sligh weathered; moderate fracture spacing; strongitted where large muscovite flakes are weather the strong part of the strong product of the strong product of the strong part of the	nets; 1/2-inch 92.2' - parallel in 92.6' to grains of htly ing; core is athered			*40 20 <sub>MB</sub> 30 0 <sub>MB</sub> 20 *45 80 25 25	2.0 2.0 1.5 2.0 2.0 2.0	1.0 1.0 1.0 3.0 1.0 1.0	92.7 - 94.5— 95.1 95.6 - 95.8 96.5 - 96.8 - 96.9 97.2 -
- 100 - 105		C-11 100.5 - 110.0	114	100	100	out; many irregular healed hairline fractures 96.0'-96.5': Dark gray to black SCHIST, as 796.5' - 99.3': Medium gray, pure QUARTZ; weathered; close fracture spacing; strong; the (<0.1") coatings of white soft mineral (calcimost fracture surfaces; most fractures dip 25 some open and partly open, near-vertical fragonal open, 100.5': Medium grained GRANITE-PEGMATITE; coarse grains of and white and pink feldspars in fine to medigrained matrix of muscovite and some garm moderate fracture spacing; slightly weathered is trong; faint, near-vertical compositional based C-11 - 100.5' - 103.8': Medium gray GRANITE-PEGMATITE; c grains of quart feldspar, in fine to medium grained matrix of muscovite and other minerals; coarser grain 102.0'; moderate fracture spacing; slightly weathered the surface of th	above. ; slightly   hin   ite?) on   5, with   actures;   quartz,   ium   et;    ed;    anding.   tz,   of   hed below weathered;	II	R3/R4	10 15 80 10 10 10 40 *40 30 0 <sub>MB</sub> 15 <sub>MB</sub> 40 <sub>MB</sub>	2.0 2.0 2.0 1.5 2.0 1.5 2.0 3.0 1.0 3.0	1.0 1.0 2.0 1.0 1.0 1.0 2.0 2.0 1.0 2.0	97.5 97.7 97.9 98.2 98.4 98.8 100.3 100.5 101.7 103.8 104.8 105 105.3 106
<u> </u>						With some pitting on core surface from 100.  Boring		FD-4	02	Shee	et 3	of	4

AN	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BURING NUMBER	FD-402		
SHEET NUMBER:_	4	of	4

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Cruz

CLIEN	IT: M	TA					INSPEC <sup>-</sup>	TOR:	A. Za	bala			
	nin)	_								DIS	CONTI	YUITY	DATA
DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folia  MB - Denotes mechanical brea	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
- - - - 115 -		C-12 110.0 - 120.0	120	100	100	102.8'; medium strong to strong; black bin-hornblende Schist in near-vertical contact 101.9' - 102.8', with contorted schistosity contacts; schistosity dips 40 to 90°; 103.8' - 110.0': Dark gray to black SCHIS grains of quartz, muscovite, and feldspar; to wide fracture spacing; unweathered to lweathered; strong; indistinct, crenulated for the second strong in the	et from along str; m-f smoderate slightly soliation scripts.	I/II	R4	10 <sub>MB</sub> *85 45 10 <sub>MB</sub> 10 <sub>MB</sub> 40 0 <sub>MB</sub>	1.5 2.0 - 1.5 -	2.0 2.0 2.0	110 - 110.4 110.6 - 113 - 113.4 - 114 114.9
- - 120 -		C 12				feldspar, hornblende; moderate to wide fr spacing; unweathered to slightly weathered crenulated to wavy schistosity dips 75to 9 jagged, low angle mechanical breaks; slig core of core sides from 114.0' to 117.0'; 117.0' - 120.0': Light gray to white GRAN to medium grains of quartz, white feldspar muscovite; few scattered medium grained	ed; strong;   90°; many   ghtly bulging NITE; fine   ur, and   I garnets;	I/II I/II	R5	10 40 20 40 40	2.0 1.5 2.0 3.0 2.0	1.0 1.0 1.0 2.0 2.0	117 - 119.6— 120 120.3 <sup>-</sup> 120.4 _
- - 125 -		C-13 120.0 - 125.7	68	100	99	wide fracture spacing; unweathered to sli weathered; very strong; upper and lower sharp, but intact, dipping 40. C-13 - 120.0' - 123.3': Dark gray SCHIST of quartz, biotite, muscovite, feldspar, ho sparse garnet; wide fracture spacing, exce very close fractures at 120.3'; unweathere slightly weathered from 120.0' to 120.5'; crenulated schistosity dips 80 to 90°;	contacts are			$\begin{matrix} 0 \\ 0_{MB} \\ 0_{MB} \\ 0_{MB} \end{matrix}$	1.5	2.0	124.2 124.9 125.4 - 125.7
- - 130 -						123.3' - 125.7': Light gray to white GRAN grains of quartz, feldspar, muscovite; wid spacing; unweathered to slightly weathere strong; upper contact with schist is sharp dipping ~80', subparallel to foliation in sc E.O.B at 125.7'.	le fracture ed; very and intact,						- - -
- - - 135 -													- - - -
- 135 - - - - 140 - -													- - -
- 145						Pori	ng No.	FD-4	02	Shee	et 4	of	4

		<b>Ì</b> F	ar	son	IS								BORING NUMBER: FD-403						
		_		cke		off	R	∩E	INI	G L	$\mathbf{O}$	G	SHEET	NUMBER	R:1_	of	1		
				ide			D	<b>O</b> r	711.4	GL		G							
	100 YEARS	) [	)ou	ıgla	ıs,	Inc.							PROJEC	T NUMB	ER:				
						line Ex	tensior	1					LOCATION	ON: Trac	k 26 und	ler 11th A	Ave		
LOCAT			nh	atta	an								COORD. N: 214,269.5 E: 983,554.0						
CLIEN.			_										STN. NO.: OFFSET:						
					ey l	Boring &	Drilli	ng					SURFACE ELEV.: 107.8 feet						
	RILLER: C. Deigert NSPECTOR: N. Shah										DATUM:								
												7ATE. 13	/C/05 T	INAE. 7.00	)				
	ORILLING METHOD: Rotary Wash RIG TYPE: CME-55													IME: <b>7:0</b> 0 IME: <b>9:3</b> 0	-				
1410 11	· · L. \		asir		Sn	lit Spoon S	helhy Tı	ıhe l	Piston	Gra	h C	ore Barrel	1 11410111		NDWATER		pin		
Type/S	Symbo	_	HW		-	S	U		PN	G		C			Water	Casing	Hole		
I.D.	4" 1.375"		2.938"	_	<u> </u>		7	2"	D.4.	Ti	Depth	Depth	Depth						
					3"		3"			3"	Date	Time	(ft)	(ft)	(ft)				
O.D.			4.5" 2"							3"									
Length				_		24"	24"		24"										
Hamme		_	00 1			140 lbs		Rod S			NW								
Hamm	er Fal		24"			30"	1.0	). (O.D.	.)		(2.93	8")							
	(D				SAI	MPLE		SOIL	(Blows	6/6 in.)									
eet)		s/ft) 'ft)					0/6	6/12	12/19	18/24	REC.	1							
<u>,</u> H	일	(Blows/ft) (Min./ft)				et)	0/0	0/12	12/10	10/24	(in.)	FI	ELD CLAS	SSIFICAT	ION ANI	O REMAF	RKS		
DEPTH (feet)	GRAPHIC LOG	10 10 10 10 10 10 10 10 10 10 10 10 10 1		3ER	g	¥		(	CORIN	G									
	9	浮方   生   方   美																	
	· <u>A</u> . · 4.	ΟŌ	Ϊ́	z	Ś	٥	(in.)	(in.)	%	(in.)	%	Elev.	16 in ah aan	amata alah					
-			-										16-inch concrete slab 4-inch bituminous asphalt Used Air-Tricone Method to bypass utilities						
ļ.	feet refusal encountered:								s utilities to	5									
-			-										1000 1010001		<del></del> ,				
L	**************************************		1																
<b>-</b> 5	***************************************		-										T : 141	4	CCAND 1'	ı1 G'1ı	. , -		
-	1 D ]		S	1		5.0 - 6.9	75	89	30	100/5"	20		Light brown concrete and	d wood frag	i SAND, iii ments, very	dense, moi	asionai st		
L	* 4		-										(SM) (FILL	)					
L	**************************************		1										(Brown c-f		Silt, trace f-	Gravel obse	erved		
L			-										in cuttings to Continued v	o 10 feet) ia Air-Trico	one Method	to 10 feet			
<del>-</del> 10	来4		-																
-	4		S	2		10.0 - 11.3	3 12	18	23	100/4	19		Brown c-f S trace Silt, de						
-			-									``_	spoon						
-			-									13.5							
			1									13.5	Roller bit re	fusal and be	egin coring	at 13.5'	//		
_ 15			1														_		
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	È₩	Pars	ons				BORING	NUM	IBEF	R: <b>FD-4</b> (	)3		
	<b>7</b>	Brind	kerho	off		CORING LOG	SHEET	NUME	BER:	1	0	of	4
=		Quad			,	COKING LOG							
			glas, I				PROJEC						
		No 7 Sul	•	line l	Extens	sion	LOCATION						
		l: Manha	ttan				COORD		14,20				0
CLIEN					0 D		STN. NC				)FFS	ET:	
		TOR: Jer		Boring	g & Di	rilling	SURFAC		EV.:	107.8 f	eet		
		C. Deiger					DATUM:						
	INSPECTOR: N. Shah  DRILLING METHOD: Diamond drilling with double core barrel							_ ^ TE.	. 12/	(/0 <i>5</i> T	· I N A I I .	7.00	
		CME-55		mona	arııı	ng with double core parrei	START I FINISH I						-
KIG I	IFE.	CME-33	,				FINISH			DWATER			hm
CORE	. D V I	DEL DA	ΤΛ.		NOT	F8.		GR	NOON	Water	Cas		Hole
		RREL DA	IA:		NOT	<u> </u>	<b>.</b>			Depth	De	oth	Depth
TYPE:							Date	Tim	е	(ft)	(f	t)	(ft)
CORE		E: 2"											
O.D.:													
I.D.: 2													
CASIN		IZE: 4" (4	.5")										
	(ft/min)					DECODIDEION AND DEMARK	· 0			DIS	CONTI	NUITY	DATA
et)	(£	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)		DESCRIPTION AND REMARK (Lithology, Structure, Weatherin	ng,	WEATHERING	ᆮ				
l (fe	RATE	NE	H.	A	(%)	Continuity, Strength, Color, Grain	Size)	ER	5	deg			feet
DEPTH (feet)	\ \S	A B O	Ŏ	8	RQD	* - Denotes discontinuity along foli	ation	<del> </del>	STRENGTH	ANGLE (deg)	≒	Ja	DEPTH (feet)
	CORING	ANA I	ZEC	ZEC	"	MB - Denotes mechanical brea	nk	WE	ြ	N <sub>S</sub>			<u> </u>
	000			"		WB Benetee meenanical bree	uv						
-						C-1: Medium gray to tan PEGMATITE; of quartz, feldspar, muscovite, biotite; more constant of the control of the	c-m grains	II/III	R2/R	.3			
<del>-</del> 15						very close fracture spacing; slightly weat except moderately weathered from 16.6'	thered,			20	3.0	2.0	14.6-
-		C-1 13.5 - 18.2	56	100	75	except moderately weathered from 16.6'	to 16.9';			50 20	2.0 2.0	1.0 2.0	15 15.4
-						weak to medium strong; bands of medium grained, light gray GRANITE, 2- to 6-inc	ches thick;			20	2.0	2.0	16.6
-						enriched in mafic minerals and mica from 17.4; iron staining on many fracture surf	n 16.0' to aces.			50	3.0 3.0	2.0	16.7 16.8
_								II/IV	R0/R	3 30	3.0	4.0	16.9
<b>–</b> 20						C-2: Medium gray PEGMATITE; extren moderate fracture spacing; slightly to mo				20 10	1.5 1.5	1.0 2.0	17.2 17.5-
						weathered; weak to medium strong;	•			80	1.5	2.0	17.7
		C-2				interlayered dark to brown gray SCHIST to 19.4'; 20.7' to 24.1' and 25.7' - 26.1', w	ith medium			10 10	2.0 2.0	2.0	17.8 18.2
		18.2 - 26.1	60	63	28	to fine grains of biotite, muscovite, quart close fracturing to soil-size particles; mo				20	3.0	3.0	18.3
						highly weathered; extremely weak and fr	iable to			70 50	2.0 3.0	2.0 2.0	18.4 18.45
<b>†</b> .						medium strong; throughout, core surface where micas have weathered out; iron sta	is pitted			70 80	3.0 2.0	3.0 2.0	18.5 18.7_
<del>-</del> 25						many fracture surfaces;	Č			50	2.0	2.0	18.8
<b>+</b>						-Possible loss of recovery between 21.2' -Drilling fluid loss, small amount, through		l II	R4	70 20	1.0 2.0	4.0 2.0	18.9 · 19.1
9						Сиз: Dark gray to tan to black SCHIST;	m-f grains of		1	*90	1.0	4.0	19.15
18723/						quartz, biotite, feldspar, muscovite, and be minerals; moderate fracture spacing; slig	black matic htly			*90 20	1.0 2.0	4.0 2.0	19.25 19.3
<u></u>						weathered; strong; foliation defined by ir	ndistinct,			50	2.0	3.0	19.4
2 - 30						crenulated schistosity and thin (<0.1") cobands of quartz and mica; foliation dips 8	ontorted ROto 90°			40 5	3.0 2.0	1.0 1.0	19.7 19.9
		C-3	120	100	100	except where contorted; light gray quartz	z-feldspar			10	2.0	2.0	20.2
N N		26.1 - 36.1	120	100	100	pegmatites from 28.7' to 29.3' and 30.0' t	o 31.4'.			85	1.5	4.0	20.4
										20 85	3.0 3.0	2.0	20.6 20.7
<u> </u>										85 20	1.5 3.0	4.0 2.0	20.75
2										10	3.0	1.0	20.9
_ 35										20 30	3.0 3.0	1.0 1.0	24.1 – 24.3
-						C-4: Dark gray SCHIST; m-f grains of q		II	R4	*70	1.5	4.0	25.7
<b>3-</b>						biotite, feldspar, muscovite; moderate to	wide	"		10 *75	2.0 1.5	2.0	25.8 25.9
<u>-</u>						fracture spacing; slightly weathered; stro indistinct schistosity is crenulated to way				*85	2.0	2.0	25.95
•						700 +- 000.	ina No.	FD-4	02	Shee	4 1	of	4

Boring No.

FD-403

Sheet

of

4

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	NT: M	ITA				INSPEC*	TOR:	N. Sha	ah			
	(ft/min)		_	_		PERCENTAGE AND DESCRIPTION			DISC	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (ft/r	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	ANGLE (deg)	٦٢	Ja	DEPTH (feet)
- - 40 - - - - - - - 45		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 *20 20 *45 *80 20 30 20 10 <sub>MB</sub> 5 <sub>MB</sub> 30 20	2.0 2.0 3.0 2.0 1.5 2.0 3.0 3.0 -	2.0 2.0 1.0 2.0 3.0 1.0 1.0 2.0 - 1.0 1.0	26 - 26.1 27.1— 28.5 29.2 - 29.3 - 30.2 30.6 - 31 31.1 31.6— 32.5
- - - - - - - - - - - - -		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 80to 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.		R4	$\begin{array}{c} 15_{\rm MB} \\ 40 \\ 20_{\rm MB} \\ 35 \\ 30 \\ 30 \\ 5\text{-}10 \\ *70 \\ *75 \\ 0\text{-}5_{\rm MB} \\ *60_{\rm MB} \\ 45_{\rm MB} \\ 0\text{-}5_{\rm MB} \\ 45_{\rm MB} \\ 30 \\ 0\text{-}5_{\rm MB} \\ 30 \\ \end{array}$	1.0 2.0 3.0 2.0 3.0 1.5 1.5 - - 2.0 - 2.0	2.0 2.0 2.0 2.0 1.0 2.0 1.0 - - - 1.0	33.6 - 35.1 - 36.5 - 37.4 - 38.75 - 39.4 + 40.5 + 41.1 + 41.15 - 42.9 + 44.2 - 44.9 - 44.9
- 60 - 65		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 60to 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;			20-25 <sub>MB</sub> 65 30 30 15-20 <sub>MB</sub> 25 50 35 *50 5-10 0 0 0 0 0 0 0 MB 0 0 MB 20 MB 20 MB	1.0 1.5 1.5 1.5 2.0 1.5 2.0 1.5 1.0 1.5 1.0	2.0 2.0 2.0 2.0 2.0 1.0 2.0 1.0 1.0 1.0	45.4 - 48.4 49.5 - 50.15 50.6 - 51.8 - 52.3 52.7 - 53.1 53.9 54.1 - 54.4 54.7 - 55.1 55.6 56 -
NO. 7 COKING LOG NO. 7 NE. GPJ MAINLY 1.GEB 8723/06		C-7 66.1 - 76.1	120	100	98	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 50to 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.	П <b>FD-4</b>	R3/R4	20 10 <sub>MB</sub> 10 10 30 0-5 10 10 15 *50 30 <sub>MB</sub> 10	3.0 3.0 3.0 2.0 2.0 1.5 2.0 2.0 1.0 30 2.0	0.75 1.0 1.0 1.0 3.0 1.0 1.0 2.0 2.0	56.1 56.3 - 57.2 - 58.2 - 59.5 - 59.85 60.9 - 60.95 - 61.9 - 64 - 64.55 -

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	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER: FD-403SHEET NUMBER: \_\_\_\_3 \_\_\_ of \_\_\_

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Deigert

CLIEN	LIENT: MTA					INSPECTOR: N. Shah							
	(uir								DISC	DISCONTINUITY DATA			
DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARK. (Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folion MB - Denotes mechanical brea	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦	ь	DEPTH (feet)
- 75 -						C-7. 66.1' - 71.1' Dark gray to black SCH near-vertical intrusions of light gray GRA 1/2-inch to 1-inch thick; schist has mediu grains of biotite, quartz, muscovite, felds mafic minerals; granite has fine to mediu	MITE, m to coarse par, black	I/II	R4/R5	5 *60 0 *70 30	1.5 2.0 2.0 2.0 3.0	2.0 1.0 1.0 2.0 2.0	65.1 - 65.7 65.75- 66.05 66.1
- - - - 80 -		C-8 76.1 - 85.9	118	100	100	quartz and feldspar; moderate fracture spinslightly weathered; medium strong to strong fractures and mechanical breaks across for jagged; foliation defined by wavy schistor contorted quartz bands; foliation dips 60t pure medium grained QUARTZ from 69. with thin (<0.1") mica veins and schist bar contacts dip 50 to 80°, with 1/4-inch control of mica. 71.1' to 76.1' Light gray GRANI medium grains of feldspar, quartz, musco	acing; ong; oliation are   sity and   o 90°;   3' to 70.2',   ands;   rentrations   TE; fine tolovite, and	1/11	K4/K3	15 30 0-5 <sub>MB</sub> *60 30 60 0 0 15 15	3.0 3.0 2.0 3.0 2.0 3.0 1.5 1.5	1.0 2.0 1.0 2.0 1.0 1.0 1.0	67.3 - 68 69.55 - 69.8 70.2 - 71 - 71.05 72 - 72.2 - 73.7
- - 85 -						Isparse garnet; moderate fracture spacing unweathered to slightly weathered; stron strong; 1-inch thick band of light gray to pegmatite at 73.4' dipping 80, with coars quartz, pink and white feldspar and medigarnet; additional pegmatites below 74.0 to 1/2-inch thick, gradational contacts di	g to very salmon pink grains of um grained ~ 1/4-inch	I	R4	0-5 <sub>MB</sub> 15 <sub>MB</sub> 15 <sub>MB</sub> 0-5 <sub>MB</sub> 25 20 25	1.0 2.0 2.0	- - 1.0 1.0 1.0	74.1 - 74.5 75.5 - 76.1 76.65 77.1 - 77.6
- - - 90 -		C-9 85.9 - 95.9	120	100	100	C-8: Light gray to salmon-pink GRANIT of quartz, feldspar, muscovite, and scatter grained garnets; moderate fracture spacin unweathered to slightly weathered; strong strong; no rock wall contact at 25 fracture scattered pegmatites throughout, some wifeldspars up to 3 inches across; faint band	g;   g to very   at 76.65';   tth pink   ling dips ~			$\begin{array}{c} 0\text{-}5 \\ 0\text{-}5_{\text{MB}} \\ 5\text{-}10_{\text{MB}} \\ 0 \\ 5\text{-}10_{\text{MB}} \\ 20 \\ 20 \\ 10_{\text{MB}} \end{array}$	3.0 - 1.5 - 2.0 2.0	1.0 - 1.0 - 1.0 1.0	78.4 - 78.95 79.1 - 80.6 - 81.1 82.1 - 82.9 83.85
- - - 95 -						70° to 90°; inclusions of black schist, each thick and dipping 80° at, 78.3' o 79.7' and 85.3'; notable bulging of core sides from 83.3'; cored rock jammed inside inner bar hammer hard to take it out.  C-9: Light gray to dark pink to salmon-pi GRANITE c-f grains of pink and white for quartz, muscovite, scattered garnets; coa	84.2' to 80.8' to rel; had to nk			$\begin{matrix} 0 \\ 20_{\mathrm{MB}} \\ 10 \\ 5\text{-}10_{\mathrm{MB}} \\ 25 \\ 10_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ 15_{\mathrm{MB}} \end{matrix}$	2.0	1.0 - 1.0 - 1.0	84.3 - 84.7 85 - 85.5 85.9 - 86.9 - 87.25 87.7 -
- - - — 100		C-10				PEGMATITES throughout; moderate to structure spacing; unweathered to slightly strong; some healed hairline fractures par existing low-angle fractures; all pegmatit 94.8' to 95.9'; cored rock stuck inside innihad to hammer hard to take it out.	wide weathered; rallel to es from	I/II	R4/R5	$\begin{array}{c} 13_{\mathrm{MB}} \\ 20 \\ 5_{\mathrm{MB}} \\ 10 \\ 5_{\mathrm{MB}} \\ 15 \\ 15_{\mathrm{MB}} \\ 5\text{-}10_{\mathrm{MB}} \end{array}$	1.5 2.0 3.0	2.0	88.3 88.9 89.4 - 90 90.4 - 91.1 91.9
- - 100 - - - - - 105 -		95.9 - 105.8	119	100	97	C-10: 95.9' - 103.1 Light gray to salmon-GRANITE c-f grains of quartz, white and feldspar, muscovite, sparse garnet; light g pegmatites scattered throughout; wide fra spacing, except very close spacing from 101.2'; unweathered, except slightly weat 100.9' to 101.5'; strong to very strong; including the content from 101.6' to 103.1'; no requartz content from 101.6' to 103.1';	f pink gray to pink octure 100.9' to hered from creased ock wall			$\begin{array}{c} 5_{\text{MB}} \\ 10\text{-}15_{\text{MB}} \\ 15\text{-}20_{\text{MB}} \\ 0\text{-}5_{\text{MB}} \\ 20 \\ 20 \\ 80 \\ 20 \end{array}$	2.0 1.0 3.0 1.0	2.0 2.0 2.0 1.0 2.0	92.9 - 95 95.9 - 97.7 100.9 - 101 - 101.05 101.1—
- - -						contact on 20 fractures from 100.9 to 10 silt coatings on sub-parallel healed hairlin 103.1 - 105.8 Dark gray SCHIST; m-f gray quartz, biotite, feldspar; moderate fractures lightly weathered; strong; indistinct cren	1.2'; thin ne fractures rains of e spacing; ulated	II <b>FD-4</b>		10-15 <sub>MB</sub> 20 50 *45 30-35 <sub>MB</sub>	2.0 2.0 1.0	3.0 4.0 2.0	102.7 103.3 103.9 - 104.6 105.8 -

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BORING NUMBER:	BORING NUMBER: FD-403									
SHEET NUMBER: _	4	of _	4							

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Deigert

	CLIEN	JENT: MTA						INSPECTOR: N. Shah						
		(iir )									DISCONTINUITY DATA			
	DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)  * - Denotes discontinuity along foliation  MB - Denotes mechanical break		WEATHERING	STRENGTH	ANGLE (deg)	٦	Ja	DEPTH (feet)	
	- 110		C-11				schistosity dips 50 to 90°; thin (<0.1") gra coating on 50° non-foliation fracture at 10	3.9'.			45 *50 40	3.0 1.5 1.5	1.0 2.0 1.0	107.6 - 107.9 109.5
	- - - - 115		105.8 - 116.0	105.8 -   122   100   99		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 spangappearance.		red wide foliation o 75°; eper	R4	$^{*85}_{20}_{20}_{5-10_{\mathrm{MB}}}_{20_{\mathrm{MB}}}_{20_{\mathrm{MB}}}_{30}_{10}_{50}$	2.0 2.0 2.0 - - 3.0 3.0 2.0	1.0 2.0 1.0 - - 3.0 3.0 2.0	111.1 111.2 - 111.9 112.4 - 112.9 - 113.5 114.8 - 114.85_ 115.2
	- - - - 120 - -		C-12 116.0 - 125.9	119	100	100	C-12: Dark gray SCHIST m-f grains of qubiotite, muscovite, feldspar, and scattered to 0.2-inch across; wide fracture spacing; unweathered to slightly weathered; strong schistosity dips 50 to 80°; thin (<0.1") san coating on 20° non-foliation fracture at 12 has spangly appearance; coring was relating and easy;	garnets up g; indistinct ady silt 4.3'; rock			25-30 <sub>MB</sub> 20 <sub>MB</sub> 15 <sub>MB</sub> 25-30 <sub>MB</sub> *45	- - -	1.0	115.25 115.25 116 117.2 – 117.5 – 118.6 – 120.9 – 121.2 –
	- - 125 -						E.O.B at 125.9'.				20 5-10 <sub>MB</sub>	2.0	3.0	124.3_
90	- - - 130 -													- - - - -
NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06	- - 135 - -													- - - -
7 CORING LOG NO_7h	- 140 - -													- - - -
S							l Bori	ng No.	FD-4	03	Shee	t 4	of	4

Sheet Number: 1			<b>Ì</b> F	ar	son	IS								BORING NUMBER: FD-404								
PROJECT NUMBER:   PROJECT NUMBER:   PROJECT NUMBER:   COATION: Track 20 under 11th Ave   COATION: Mahahattan   COATION: Mahahattan   CORN 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 pm   FINI			_										G	SHEET	NUMBER	R:1_	of	1				
PROJECT: No 7 Subway line Extension   LOCATION: Manhattan   COORD. N: 214,215.6 F: 983,445.3	<u>=</u>							D	OI.	7114	G i		G									
COORD N: 214,215.6   E: 983,445.3   STN NO. OFFSET: SURFACE ELEV.: 107.7 feet DATUM:					_																	
STN NO. OFFSET: SURFACE FLEV.: 107.7 feet							line Ex	tensio	n													
SURFACE ELEV.; 107.7 feet   DATUM:   SURFACE E				nh	atta	an																
DATUM:   START DATE: 11/28/05 TIME: 6:00 pm				. т		,	n · .	D 111														
INSPECTOR: J. Thampi   DRILLING METHOD: Rotary Wash   Fill Type: Acker 45   Type:/Symbol   I.D.   4"   1.375"   2938"   2938"   2938"   2"   Date   Time   Date   Time   Depth   Cesing   Depth   (ft)   Depth   Depth   (ft)   Depth   Depth   (ft)   Depth   (ft)   Depth   (ft)   Depth   Depth   (ft)   Dept		• • • •													: 10/./ 1e	eet						
START DATE: 11/28/05   TIME: 6:00 pm						:								DATUM:								
RIG TYPE: Acker 45								ch						I START I	<b>ΛΔΤΕ: 11</b>	/28/05 T	IME: 6:00	nm .				
Casing   Split Spoon   Shelby Tube   Piston   Grab   Core Barrel   GROUNDWATER DATA						IXU	taiy vva	311														
Type/Symbol   Hw   S   U   P   G   C   Date   Depth   Depth   Chi   De						Sp	lit Spoon S	helby T	ube	Piston	Gra	ab C	ore Barrel					-				
I.D.	Type/S	Symbo				<u> </u>				PΠ			С⊟			Water	1					
O.D. Length Hammer Wt.   24"   24"   24"   24"		,	_						, ,					Date	Time							
Length   24"   2														Date	Tillic	(11)	(11)	(11)				
Hammer Wt.   Hammer Fall   24"   30"   LD. (O.D.)   C. (2.938")				т.Э																		
Hammer Fall   24"   30"   1.D. (O.D.)   (2.938")	ı -		.   _,	00.1	1				L D = 4 0			NIV	т									
SAMPLE   SOIL (Blows/6 in.)   Tolor   SAMPLE   SOIL (Blows/6 in.)   SAMPLE   SOIL (Blows/6 in.)   SAMPLE   SOIL (Blows/6 in.)   SAMPLE   SOIL (Blows/6 in.)   SOIL (Blows/6 in.			_																			
The lates of the	Hamm	er Fa	II	24			30"	1.1	J. (U.D	.)		(2.93	8") T									
S S E S S S S S S S S S S S S S S S S S		(7)				SAI	MPLE		SOIL	(Blows	s/6 in.)											
S S E S S S S S S S S S S S S S S S S S	feet)	Ĭ	's/ft)	Ì				0/6	6/12	12/18	18/24		1									
S S E S S S S S S S S S S S S S S S S S	E	일	Blow				eet)		0/12	12/10	10/21	(in.)	- FII	ELD CLAS	SSIFICAT	TION AND	REMAR	RKS				
S S E S S S S S S S S S S S S S S S S S	Ē	₹AP	99		3ER	쥖	) H.			CORING	G											
18-inch thick concrete slab - advanced via 6-inch, thin wall, single barrel  Advanced to 10 feet via Air-Tricone method - utility clearance  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)  Brown c-f SAND, little Silt, wet, very dense, micaccous (SM)(FILL)  Brown c-f SAND, little Silt, wet, very dense, micaccous (SM)(FILL)  Gray and Silver Decomposed Mica Schist, very dense Roller bit refusal and begin coring at 19.8:		9	ASIN	YPE	N N	XME	EPT															
thin wall, single barrel  Advanced to 10 feet via Air-Tricone method - utility clearance  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)  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  Gray and Silver Decomposed Mica Schist, very dense 19.8  Roller bit refusal and begin coring at 19.8".										and via 6 in	noh.											
Advanced to 10 feet via Air-Tricone method - utility clearance  Advanced to 10 feet via Air-Tricone method - utility clearance  Brown e-f SAND, little e-f Gravel, little Silt, medium dense, wet e-occasional concrete and cinder and decomposed mica fragments (FILL)  S 2 15.0 - 17.0 8 40 27 12 10 Brown e-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  S 3 18.0 - 18.3 100.4" 3 Gray and Silver Decomposed Mica Schist, very dense 19.8  Roller bit refusal and begin coring at 19.8".	ŀ			-												siau - auvaii	ceu via 0-iii					
Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet -occasional concrete and cinder and decomposed mica fragments (FILL)  S 3 18.0 - 18.3 100.4" 3  Gray and Silver Decomposed Mica Schist, very dense micaceous (SM)(FILL)  Gray and Silver Decomposed Mica Schist, very dense micaceous (SM)(FILL)  Roller bit refusal and begin coring at 19.8".	-	* .		4											o 10 feet via	Air-Tricon	e method -	utility .				
Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet cocasional concrete and cinder and decomposed mica fragments (FILL)  Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet cocasional concrete and cinder and decomposed mica fragments (FILL)  Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  Gray and Silver Decomposed Mica Schist, very dense  Roller bit refusal and begin coring at 19.8'.	-			4										clearance								
Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet cocasional concrete and cinder and decomposed mica fragments (FILL)  Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet cocasional concrete and cinder and decomposed mica fragments (FILL)  Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  Gray and Silver Decomposed Mica Schist, very dense  Roller bit refusal and begin coring at 19.8'.	L	** P		4																		
Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet -occasional concrete and cinder and decomposed mica fragments (FILL)  8 2 15.0-17.0 8 40 27 12 10 Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  8 3 18.0-18.3 100.4" 3 Gray and Silver Decomposed Mica Schist, very dense 19.8 Roller bit refusal and begin coring at 19.8' =	<del>-</del> 5	***		4														_				
Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet occasional concrete and cinder and decomposed mica fragments (FILL)  Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet occasional concrete and cinder and decomposed mica fragments (FILL)  Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  Gray and Silver Decomposed Mica Schist, very dense  20  Roller bit refusal and begin coring at 19.8'	ļ.	1 D 3	<u> </u>	-																		
Brown c-f SAND, little e-f Gravel, little Silt, medium dense, wet -occasional concrete and cinder and decomposed mica fragments (FILL)  S 2 15.0 - 17.0 8 40 27 12 10 Brown c-f SAND, little Silt, wet, very dense, micaecous (SM)(FILL)  S 3 18.0 - 18.3 100.4" 3 Gray and Silver Decomposed Mica Schist, very dense 19.8 Roller bit refusal and begin coring at 19.8".	L		-																			
Brown c-f SAND, little c-f Gravel, little Silt, medium dense, wet -occasional concrete and cinder and decomposed mica fragments (FILL)  8 2 15.0 - 17.0 8 40 27 12 10 Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)  8 3 18.0 - 18.3 100.4" 3 Gray and Silver Decomposed Mica Schist, very dense gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decomposed Mica Schist gray and Silver Decompo	L			1																		
S   1   10.0 - 12.0   6   20   13   18   8     dense, wet -occasional concrete and cinder and decomposed mica fragments (FILL)	L																	-				
S   1   10.0 - 12.0   6   20   13   18   8     dense, wet -occasional concrete and cinder and decomposed mica fragments (FILL)	<del>-</del> 10	<del> </del>																				
- 15 - 15 - 15 - 15 - 15 - 15 - 15 - 15		. L		$\int_{\mathbf{S}}$	1		10.0 - 12.0	0 6	20	13	18	8			AND, little	c-f Gravel,	little Silt, n	nedium				
15	L	45		Ĭ			10.0 12.							-occasional		d cinder and	d decompos	ed				
S   2   15.0 - 17.0   8   40   27   12   10   Brown c-f SAND, little Silt, wet, very dense, micaceous (SM)(FILL)	L	*												mica fragme	ents (FILL)							
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 Gray and Silver Decomposed Mica Schist, very dense 19.8  Roller bit refusal and begin coring at 19.8'		\$00d																				
S 2 15.0 - 17.0 8 40 27 12 10 Brown c-1 SAND, fittle Slit, wet, very dense, micaceous (SM)(FILL)  S 3 18.0 - 18.3 100.4" 3 Gray and Silver Decomposed Mica Schist, very dense 19.8  Roller bit refusal and begin coring at 19.8'.	15	4 - 7																				
S 3 18.0 - 18.3 100.4" 3 Gray and Silver Decomposed Mica Schist, very dense 19.8 Roller bit refusal and begin coring at 19.8'.	L 19	* -	4		1		15.0 17.	0	40	27	12	10				Silt, wet, v	ery dense,	_				
S 3 18.0 - 18.3 100.4" 3 Gray and Silver Decomposed Mica Schist, very dense 19.8 Roller bit refusal and begin coring at 19.8'.	_	@a _		$1^{\circ}$	2		15.0 - 17.0	8	40	27	12	10		micaceous (	SM)(FILL)			•				
- 20   19.8   Roller bit refusal and begin coring at 19.8'.   -				1																		
20   19.8   Roller bit refusal and begin coring at 19.8'.   -				S	3		18.0 - 18.	3 100.4'	' -	-	-	3			lver Decom	posed Mica	Schist, ver	y				
				1									<u>19</u> .8					_				
Boring No. FD-404 Sheet 1 of 1	- 20			1										Roller bit re	fusal and be	egin coring	at_1 <u>9.8'.</u>	/				
Boring No. FD-404 Sheet 1 of 1	F			1														•				
Boring No. FD-404 Sheet 1 of 1	-			1														-				
Boring No. FD-404 Sheet 1 of 1	-			1														-				
Roring No. FD-404 Sheet 1 of 1	-			1														-				
									1	1	1	1	Bor	ing No	FD-404	Sheet	1 1	of 1				

	Ì≢	Pars	ons				BORING	NUM	BER	:FD-4(	)4			
▮₽			kerho	off		CORING LOG	SHEET N	NUME	BER:	1	0	of	4	
<u> </u>	10	Quad	ae & glas, I	nc.			PROJEC	T NI I		D.				
PRO I		No 7 Sul			Tytone	yion.					lar 11	lth Ax		
		l: Manha		mic i	LATCHS	51011	LOCATION: Track 20 under 11th Ave COORD. N: 214,215.6 E: 983,445.3							
CLIEN			ttan				STN. NO		1 1,21		)FFSI		,	
		TOR: Jer	sey B	Boring	& D1	rilling	SURFAC		EV.: 1					
		C. Cruz			,		DATUM:							
INSPE	ECTC	R: J. Tha	ampi											
				mond	drilli	ng with double core barrel	START D							
RIG T	YPE:	Acker 45	5				FINISH [						am	
								GR	OUNE	WATER				
		RREL DA	TA:		NOT	ES:				Water Depth	Cas Dep	oth	Hole Depth	
TYPE							Date	Tim	е	(ft)	(ft		(ft)	
CORE		E: 2"												
O.D.:														
I.D.: 2														
CASIN	_	IZE: 4" (4.	.5")											
	RATE (ft/min)	6.0				DESCRIPTION AND REMARK	2			DISC	CONTI	NUITY	DATA	
et)	(ft/	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)		(Lithology, Structure, Weatherin	g,	WEATHERING	- 프				<b></b>	
<u>¥</u>	ATE	NUN EPT	ĒŖ	ER,	RQD (%)	Continuity, Strength, Color, Grain S	Size)	 	S N	) jep)			(fee	
DEPTH (feet)		NE F	δ	8	R Z	* - Denotes discontinuity along folio	ation	Y±	STRENGTH	ANGLE (deg)	٦	Ja	DEPTH (feet)	
	CORING	O N	RE(	RE		MB - Denotes mechanical brea	k	WE	S	ANG				
	8													
						C-1, 19.8' - 20.6': Dark gray to tan SCHIS grains of quartz, biotite, muscovite, felds	ST; m-f par; close	II	R3 R4	35	2.0	2.0	20.1	
		C-1	44	96	75	fracture spacing; slightly weathered; med	ium strong;		11.4	40 12	2.0 3.0	3.0 1.0	20.4 21	
		19.8 - 23.6				foliation defined by contorted and folded and some quartz bands< 1/4-inch thick; for	oliation dips			40	2.0	2.0	21.2	
						60° to 90°; possible recovery loss at 20.4'; with interlaying pegmatite is parallel to co	contact	II	D.4	10			22.6	
Ī						foliation; 20.6' - 23.6: Light gray to salmo	on-pink	11	R4	$10_{\mathrm{MB}}$	-	-	23.6	
<del>-</del> 25						PEGMATITE; medium to coarse grains of white and pink feldspar, muscovite, spars	e medium			0	2.0	1.0	24.9	
-						grained garnet; very close to wide fractur slightly weathered; strong; orange iron str				25	2.0	1.0	26	
						fracture surfaces	il			5 <sub>MB</sub>	_	_	27.2	
T .		C-2	121	100	95	C-2: Medium gray to salmon-pink PEGM grains of quartz, pink and white feldspar,								
<b>†</b>		23.6 - 33.7				mafic minerals, sparse garnet and yellow- mineral (muscovite?); close to wide fracti	green platy			30	1.5	3.0	28.6	
<del>-</del> 30						except extremely close spacing from 30.2	' to 30.35';			$20_{MB}$	2.0	3.0	29.8	
†						slightly weathered; strong; red silt coating fractures at 28.6', 30.2' to 30.35' and 31.5				10 25	2.0	3.0	30.2 30.25	
t						medium gray QUARTZ from 31.6' to 32.	2' and 32.8'			20 15	2.0 2.0	3.0 2.0	30.3 30.35	
٥						to 33.1'; very large pink feldspar crystals inches across) from 25.2' to 26.4', 30.2' to	(up to 3 31.6' and			30	2.0	3.0	31.5	
0007						7.32.6' to 33.7' C-3, 33.7' to 40.0': Light gray to salmon-	í	II	R4	20 15	1.5 2.0	2.0	32.15 32.95	
_ 35						PEGMATITE c-m grains of quartz, white	and pink			20 20	2.0 2.0	2.0 2.0	33.1- 33.6	
_ [-						feldspar, muscovite, sparse medium grain and mafic minerals; pink feldspar crystals	ed garnet			25	3.0	1.0	33.7	
<b>-</b>						inches across; wide fracture spacing, exce	ept			15 15	2.0 3.0	2.0 2.0	36.1 36.11	
GPJ MAINLI		C-3				extremely close spacing from 36.1' to 36. 39.05' to 39.1'; slightly weathered, strong	2" and ; 40.0' -			70	2.0	1.0	36.14	
<u>.</u>		33.7 - 43.7	120	100	91	43.7: Dark gray SCHIST; fine to coarse g	rains of			15 15	2.0 2.0	2.0 3.0	36.17 36.2	
₹ - 40						biotite, quartz, muscovite, black mafic mi close to moderate fracture spacing; slight	ly			10	1.5	3.0	38.3_	
Ž D −						weathered; strong; foliation defined by di contorted schistosity and 1/8-inch thick q	stinct,			35 25	1.5 2.0	3.0	38.7 39.05	
						foliation dips 30 to 50°; red silt on some f	racture			12 *45	2.0 1.5	2.0 2.0	39.1 40	
						surfaces; except: 40.8' to 41.3': coarse to medium grained				*50	1.5	3.0	40.4	
<u> </u>						quartz-feldspar 41.8' 43.7: rock is fine to medium grained	l: madium [	II	R3/R4	5-10 <sub>MB</sub> 4 *40	2.0	2.0	40.7	
2						gray SCHIST, enriched in quartz and mus	seevite,			*30	2.0	1.0	41.7	
						with Bori	ng No.	FD-4	04	Shee	t 1	of	4	

DD	Parsons Brinckerhoff
TIJ	Quade &
100 YEARS ®	Douglas, Inc.

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

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Cruz

	CLIEN	IT: M	ITA					INSPEC <sup>*</sup>	TOR:	J. Tha	ampi			
Γ		(nir									DIS	CONTI	NUITY	DATA
	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 Structure)  * - Denotes discontinuity along folion  MB - Denotes mechanical brea	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	ьl	DEPTH (feet)
	- 50		C-4 43.7 - 53.7	119	99	92	lindistinct foliation. C-4: Dark gray SCHIST m-f grains of que muscovite; sparse garnet up to 0.1 inch act to moderate fracture spacing, except extrespacing from 45.2' to 45.3' and 53.3' to 53 weathered; medium strong to strong; folia defined by indistinct schistosity and plans bands 1/4 inch thick from 43.7' to 45.7' at wavy schistosity from 45.7' to 53.6'; folia 50° to 70°; 46.4' to 47.1': rock is enriched in black m minerals, with yellow metallic mineral (girregular patches up to 0.2 inch across; m from from 47.1' to 47.3', also with yellow mineral; light gray quartz PEGMATITES	eross; close emely close 3.6'; slightly ation ar quartz and distinct, tion dips afic old?) in ostly quartz emetallic			*45 *60 *70 *55 *55 *60 *50 *40/50 *45 30 *65 20 <sub>MB</sub> 35 30 25	2.0 1.5 2.0 1.0 1.0 2.0 2.0 2.0 1.5 2.0 2.0 3.0 3.0	2.0 2.0 1.0 4.0 4.0 1.0 1.0 1.0 1.0 1.0 1.0	41.8 42.6 - 43.7 45.2 - 45.3 45.8 - 46.6 - 47.3 47.7 48.25 48.4 - 48.8 49.3 - 50.1
	- 55		C-5 53.7 - 63.6	112	94	81	to 44.2' and 49.9' to 52.1'; contacts paralle C-5, 53.7' - 53.9': Dark gray SCHIST, as 53.9' - 56.2': Light to medium gray PEGN c-m grains of quartz and white feldspar w inclusions of dark gray SCHIST, as above 55.1' to 55.5' very close to moderate fract slightly weathered; medium strong; 0.1-ir veins of soft, white mineral (muscovite?) parallel to foliation in schist; schist-pegm contacts dip ~ 70', parallel to foliation; 56 61.7': Dark gray to black SCHIST; fine to grains of biotite, quartz, feldspar, muscov moderate fracture spacing, except very cl 60.4' to 60.7'; slightly weathered; strong; defined by indistinct schistosity, dips 50to 59.5' to 60.0', a 1/2-inch thick contorted of	el foliation above.  AATITE, with e; from ure spacing; neh thick dip ~ 70 atite2' to o medium rite; close to ose from foliation o 90°; at puartz vein		R4	25 55 50 30 *70 60 *70 30 40 25 30 *60 *65 80 75/80 45 *60	1.5 1.5 3.0 1.5 3.0 1.5 1.5 1.5 2.0 3.0 1.0 2.0 1.0 2.0 1.5	2.0 2.0 1.0 4.0 1.0 3.0 4.0 2.0 1.0 4.0 2.0 1.0 2.0 2.0 2.0	50.5 - 50.6 - 51.2 - 53.3 - 53.4 - 53.6 - 53.7 - 54.1 - 54.3 - 55.3 - 56.5 - 58.4 - 59 - 5
90	- 65		C-6 63.6 - 73.3	116	100	91	rimmed by concentration of black mafic in 60.8' to 60.85' and 61.4' - green-gray mice GOUGE; contact parallel to contorted fol 60.85' to 61.4' - Possible zone of recovery to 63.6': Light to medium gray GRANITH to coarse grains of quartz, white feldspar muscovite; close fracture spacing; slightly strong; muscovite seams 0.1-inch thick distance.	aceous clayliation; At loss; 61.7 st. medium and weathered; p 30 J		R4	0 *60 *60 10 20 *40 *50 20 30	2.0 2.0 2.0 1.5 2.0 1.5 1.0 1.0 2.0	2.0 2.0 2.0 1.0 1.0 4.0 6.0 6.0 3.0	59.1 _ 59.6   59.85—   59.9   60.4
JPJ MAINLI~1.GLB 8/23,	- 70						C-6 - 63.6' to 69.6': Medium gray GRAN grains of white and pink feldspar, quartz, and black mafic minerals; close to moder spacing, except extremely close spacing f 64.7', 65.7' to 65.8' and 69.4' to 69.45'; sli weathered; strong; includes 6-inch zones grained PEGMATITE throughout; biotite 7 65. 1' - 65.3', 65.7' -65.8', and 69.2' - 69.5	muscovite, ate fracture from 64.6' to ghtly of coarse SCHIST at		R4/R5	35 <sub>MB</sub> 20 25 15 10 20 30 20	1.5 2.0 3.0 2.0 2.0 1.5 1.5	1.0 2.0 1.0 1.0 1.0 1.0	62.6 - 63.1 - 63.3 - 63.6 - 63.9 - 64.6 - 64.65
NO.7 CUKING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06	- 75		C-7 73.3 - 83.3	120	100	98	quartz from 66.0' - 66.3'.  169.6' - 73.3: Light gray GRANITE m grain quartz, white feldspar, and muscovite; more wide fracture spacing; strong to very strong weathered; 1/4-inch wide quartz bands di 80° in opposite directions; overdrilled from 73.3'.  C-7 - 73.3' to 82.2': Light gray GRANITE	ins of oderate to ng; slightly p 30 and m 72.8' to	1/11	K4/K3	30 25 40 *45 10 25 <sub>MB</sub> 30 <sub>MB</sub> 40 <sub>MB</sub>	1.5 1.5 1.5 1.0 2.0	1.0 2.0 2.0 2.0 2.0 - - 2.0	64.7 - 65.1 65.4 - 65.8 66.65 - 68.2 69.4 - 69.45 _
2							of quartz, white feldspar and muscovite; s	•	FD-4	04	20 <sub>MB</sub>	- t 2	- of	70.4 <b>4</b>

DD	Parsons Brinckerhoff
TIJ	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER: FD-404
SHEET NUMBER: \_\_\_\_3 of \_

PRO.	JECT	NUM	IBFR:
1110	$\cup$	INCIV	IDLI \.

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Cruz

	CLIEN	IT: M	ITA				IN	NSPECT	OR:	J. Tha	ımpi			
		(ft/min)									DISC	CONTI	YUITY	DATA
	DEPTH (feet)	CORING RATE (ft/n	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	<i>'</i>	WEATHERING	STRENGTH	ANGLE (deg)	٦L	Ja	DEPTH (feet)
	 - - - 85 -						medium grained garnet; light green, platy mi (muscovite?); close to wide fracture spacing; unweathered to slightly weathered; strong to strong; 1/2-inch to 1-inch thick pegmatite ve 80°; tightly healed hairline fractures dipping throughout, spaced 1-inch to 2 feet; 82.2' to 8 Dark gray to black SCHIST; fine to medium of biotite, quartz, and black mafic minerals; infracture spacing; slightly weathered; strong; indistinct schistosity dips 30 to 60°; contact woverlying granite is intact, dips 50 parallel to foliation.	; very sins dip 35 83.3': grains moderate vith	II	R4	5-10 5-10 5 <sub>MB</sub> 30 30 35 5 <sub>MB</sub> 30 50 10 <sub>MB</sub> 15 <sub>MB</sub> 30 35	3.0 3.0 2.0 2.0 1.5 2.0 2.0 2.0 1.5	1.0 1.0 - 1.0 1.0 2.0 - 1.0 1.0 - 1.0 2.0	72.5— 72.65 _ 73.3   74.9 - 75.3   76  - 77.3   77.7— 78.3   78.7   79.9   79.95
	- - 90 - - -		C-8 83.3 - 93.3	120	100	98	C-8: Dark gray to black SCHIST; m-f grains biotite, quartz, feldspar, black mafic minerals moderate to wide fracture spacing, except for closely spaced fractures at 89.3' to 89.4; sligl weathered; strong; foliation defined by conto indistinct schistosity dipping 40 to 70°; bands GRANITE as in run C-7, with contacts dippi to 70° at 83.6' to 83.8', 84.3' to 84.4', 89.4' to 90.7' to 92.7' and 93.2' to 93.3'; foliation is subparallel to contacts; scattered healed hairl fractures, iron-stained, dip 50 to 70°, opposite	s; r two htly orted, s of ing 50 89.6',	I/II	R4	35 25 *25 *60 *55 35 <sub>MB</sub> 20 <sub>MB</sub> *60 10 15 *65	1.5 1.5 1.5 1.5 1.5 1.0 2.0 2.0 1.0	1.0 1.0 3.0 3.0 1.0 - 2.0 1.0 1.0 3.0	80.5 - 83 83.3 - 84.4 - 85.2 87.6 - 88.1 88.8 - 89.3 - 90.9 -
	— 95 - -						C-9: Dark gray SCHIST; m-f grains of quart: biotite, muscovite, feldspar, sparse coarse gra	z,			15 <sub>MB</sub> 25 <sub>MB</sub> *50 25 90	2.0 2.0 2.0 2.0	2.0 2.0 1.0	92.3 92.8 93 93.1 93.2 -
	- - 100 -		C-9 93.3 - 103.4	121	100	100	garnet; wide fracture spacing; unweathered to slightly weathered; strong; indistinct schistos 50° to 80°; bands of light gray GRANITE, 1-i 2-inch thick, with medium grains of quartz, v feldspar, and muscovite, dipping 60 to 70°, at to 93.5', 98.5' to 99.8' and 100.0' to 100.6'; co are subparallel to foliation.	sity dips inch to white t 93.3'			25 <sub>MB</sub> *55 *50 40 <sub>MB</sub> *60 30 25 <sub>MB</sub>	1.5 2.0 - 1.5 2.0	2.0 2.0 1.0 1.0	93.3 96.3 - 97.1 - 98.2 98.5 - 98.6 98.9 -
ILB 8/23/06	- - — 105						C-10: Dark gray SCHIST; m-f grains of quar biotite, muscovite, feldspar, sparse medium garnet; wide to very wide fracture spacing;		I/II	R4	25 30 <sub>MB</sub> *60	2.0	1.0	102 103.1 103.4 -
7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06	- - -		C-10 103.4 -	114	100	100	unweathered to slightly weathered; strong; for defined by indistinct schistosity dipping 50 to bands of light gray GRANITE, with medium of quartz, white feldspar and muscovite at 10	o 80°; n grains 06.6' to			$0-5_{\mathrm{MB}}$ $20_{\mathrm{MB}}$	-	- _	- 106.5 - 108
G NO_7NE.GF	- 110 -		112.9				108.6', 111.2' to 111.2'' and 112.2 to 112.9'; a has 1/2-inch thick pegmatite bands dipping 7 parallel to contacts; schist-granite contacts are and dip 70°; foliation is subparallel to contact	70 re intact.			30 <sub>MB</sub>	-	-	108.4 - 
JG LO	_										*50	1.5	1.0	111 -
NO. 7 CORIN	-						C-11: Light gray GRANITE: m grains of qua white feldspar and muscovite; moderate to w	vide		R4/R5	15 15 10	1.5 2.0 3.0	1.0 1.0 1.0	112.35_ 112.9 113.05-
							Boring	No. ]	FD-4	04	Shee	t 3	of	4

nd	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER: FD-404 SHEET NUMBER: \_\_\_4 of \_\_\_

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Cruz

DESCRIPTION AND REMARKS (Limbology, Structure, Weathering, Octorium), Weathering, Octorium), Weathering, Octorium), Weathering, Octorium), Structure, Weathering, Octorium), Weathering, Octorium), Weathering, Octorium), Weathering, Octorium), Weathering, Octorium), Weathering, Octorium), Weathering, Octorium, Weathering, Octorium), Weathering, Weathering, Octorium, Weathering, Octorium, Weathering, Octorium, Weathering, Octorium, Weathering, Octorium, Weathering, Weathering, Octorium, Weathering, Octorium, Weathering, Octorium, Weathering, Weathering, Weathering, Weathering, Weathering, Weathering, Weathering, Weathering, Weathering, Weatherin	CLIEN	IT: M	TA					INSPEC <sup>*</sup>	TOR:	J. Th	ampi			
Color   Colo		(nir									DIS	CONTI	NUITY	DATA
C_11	DEPTH (feet)		CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	(Lithology, Structure, Weathering Continuity, Strength, Color, Grain S * - Denotes discontinuity along folia	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦٢	Jа	DEPTH (feet)
- 125	- - - - - 120 -		112.9 -	120	100	99	strong to very strong; a few 1/2-inch thick quartz rich pegmatite, dipping 70, dark gra SCHIST, with fine to medium grains of be quartz, and muscovite at 117.3' to 119.4', 121.2' and 121.6' to 122.9'; contacts are in dipping 40' to 80°, except contact at 117.3 along biotite band; most contacts are subp foliation, except from 121.0' to 121.6', whe contacts crosscut foliation; weathered, par fracture at 115.45', dipping 15; slightly bu	c bands of ay iotite, 121.0' to ntact and 'which is parallel to nere rtly open			20 *25 *25 <sub>MB</sub> *35	1.5 1.5 - 2.0	2.0 3.0 - 1.0 2.0	116.5 - 117.3 117.9 - 119.3 - 120.9 -
and dip 50 to 80°; subparallel to foliation; slightly wavy core sides in schist; E.O.B at 127.9.  - 135  - 140	- - - 125 - -		122.9 -	60	100	97	biotite, muscovite, feldspar, and garnets u 0.1-inch across; moderate to wide fracture unweathered to slightly weathered; strong Light gray GRANITE with medium grain white feldspar and muscovite at 124.2' to 127.0' to 127.9'; 1/2-inch thick band of pe	e spacing; g; ss of quartz, 125.6' and egmatite at	I/II	R4	5-10 10 <sub>MB</sub> 25 22 <sub>MB</sub>	2.0	1.0	123.1 - 124.4 - - 126.5 - 127.1
- 140 - 145 - 145 - 145	- - 130 -						and dip $50^{\circ}$ to $80^{\circ}$ ; subparallel to foliation; wavy core sides in schist;	e intact ; slightly						
	- - 135 -													
	- - - - 140													- - - - -
	145 - 145													- - - - -
	-						D	n a N -	ED 4	04	Chai			

		<u></u> P	ars	son	ıs										NUMBE						
		=			erho	off	I	R/	)P	IN	CI	$\cap$	G	SHEET	NUMBER	R:1_	of	1			
				de		l		<b>_</b> \	J11	711 <b>4</b> ,	J		J								
	100 YEARS			_		Inc.								PROJEC							
					•	line Ex	ktens	ion									ler 11th A				
LOCAT			nha	atta	an									COORD. N: 214,174.3 E: 983,518.9 STN. NO.: OFFSET:							
CONT			Jο	ren	λ <sub>V</sub> , Ι	Rorina .	& Dr	illin	ıσ					STN. NC	).: CE ELEV.						
	CONTRACTOR: Jersey Boring & Drilling  ORILLER: C. Deigert												DATUM:		10/.0 16	.ci					
INSPE					1									DATOW.							
						tary Wa	ısh							START [	DATE: 11	/28/05 T	IME: <b>6:0</b> 0	) pm			
RIG TY																	IME: <b>6:0</b> (				
		Ca	asir	ıg	Spl	it Spoon	Shelby	/ Tub	e F	Piston	Gra	ab C	ore Barrel		GROU	NDWATER	DATA				
Type/S	Symbo	ol 🗔	HW			S 📕	U			P	G [		С			Water Depth	Casing Depth	Hole Depth			
I.D.	4" 1.375"				1.375"	2.9	38"	2	.938"			2"	Date	Time	(ft)	(ft)	(ft)				
O.D.		4	4.5"	'		2"	3	"		3"			3"								
Length	l					24"	24	4"		24"											
Hamm	er Wt	. 30	00 11	bs	1	40 lbs		Orill F	Rod Si	ze		NW.	Г								
Hamm	er Fal		24"			30"		I.D.	(O.D.)	)		(2.93	B")								
					SAN	MPLE			SOIL	(Blows	/6 in.)			=							
et)	90	£ (	$\vdash$		**		+					DEC	-								
l (fe	IC L	ows/ in./ft				)t)	0,	/6	6/12	12/18	18/24	REC. (in.)	<b> </b>								
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)		ik.	پـ	DEPTH (feet)				ORING	3		<b>1</b> ⊢‼	ELD CLAS	SSIFICAI	ION ANI	J KEMAH	KKS			
DE	GRA	NING NING	핏	MBE	MBC	규		181				DOD									
		S S	TYPE	NUMBER	SY	DE	RU (ir		REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.								
	*2													0.0'-1.5' - C	oncrete Sla	b - Advance	ed through v	via			
_														6-inch single				· via			
=	**************************************													1.5' - 10.0': Air-Tricone	method to	bypass the i	itilities ( up	to 10			
-	**************************************													feet, as requ	ired);			-			
_	**************************************													Dark brown	o f CAND	soma Cile	little f Cass	-a1			
<del></del> 5	<b>₩</b> ₽													moist (becar	ne wet at 8	feet) (SM)		CI, —			
-	* 4													observations	s in cuttings	5)		-			
-	□∆ ´																				
_	**************************************																				
	**																				
<del>-</del> 10													<b> </b>	Dark brown	to black c-	f SAND, so	me Silt, littl	le			
_	· · ·		S	1		10.0 - 12	.0	5	5	5	4	2		f-Gravel, we	et, Ioose (SN	M)					
_																		-			
<del> </del>																		-			
_																		-			
<del></del> 15			S	2		15.0 - 15	.8 2	3	100/3			6		Dark brown		, some Silt,	trace f-Gra	vel,			
_													<b>-</b> -\	wet, very de (Decompose	ense(SM)	ıs rock frac	ment at tip o	of /			
_														` ` `		•		′			
_																		-			
-													19.8					-			
<del>-</del> 20	-													Roller bit re	fusal and be	egin coring	at_19.8'	/-=			
_																		-			
	'		-		1 1													_			
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	È₩	Pars	ons				BORING	NUM	1BER	8: FD-4	05			
	₹	Brind	kerho	off		CORING LOG	SHEET N	IUME	BER:	1	c	of	4	
<u>≡</u>		■ Quad				COKING LOG								
	10 YEA	<b>o</b> Doug	glas, I	nc.			PROJEC	T NU	MBE	R:				
PROJ	ECT:	No 7 Sul	bway	line l	Extens	sion	LOCATION	ON: T	rack	20 un	der 11	lth A	ve	
LOCA	AOIT.	l: Manha	ttan				COORD. N: 214,174.3 E: 983,518.9							
CLIEN	IT: M	ITA					STN. NO	.:		(	OFFS	ET:		
CONT	RAC	TOR: Jer	sey B	Boring	g & D1	rilling	SURFAC	E EL	EV.:	107.8 f	eet			
DRILL	ER:	C. Deiger	:t				DATUM:							
INSPE	CTC	R: <b>N. Sh</b>	ah											
DRILL	ING	METHOD	Dia	mond	drilli	ng with double core barrel	START D	ATE	: 11/2	28/05	ΓΙΜΕ:	6:00	pm	
RIG T	YPE:	<b>CME-55</b>	5				FINISH D	ATE	: 12/2	2/05	ΓΙΜΕ:	6:00	am	
								GF	ROUNI	OWATER	R DATA	١		
CORE	BAI	RREL DA	TA:		NOT	ES:				Water	Cas		Hole	
TYPE:						-	Date	Tim	e l	Depth (ft)	De <sub>l</sub>		Depth (ft)	
CORE		□· 2"					Date			(11)	(1)	.,	(11)	
		L. 2												
O.D.:														
I.D.: 2														
CASIN	_	ZE: 4" (4.	.5")							1				
	RATE (ft/min)	🔾				DESCRIPTION AND REMARK	C			DIS	CONTI	NUITY	DATA	
et)	<b>(</b>	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)		(Lithology, Structure, Weatherin		WEATHERING	E					
(fe	1	NE	띪	l R	(%)	Continuity, Strength, Color, Grain	Size)	ER	5	deg			leet	
DEPTH (feet)		E R	S I		RQD	* - Denotes discontinuity along foli	ation	F	STRENGTH	Щ.	느	a		
DE	N	S C	Ü	EC E	Œ			VE/	ST	ANGLE (deg)			DEPTH (feet)	
	CORING	04	<u> </u>	<u> </u>		MB - Denotes mechanical brea	К			₹				
_						C-1: Dark gray to tan SCHIST m-f grains	s of biotite,	II	R3				_	
-		C-1		100		quartz, muscovite, feldspar; close to mod fracture spacing; slightly weathered; med	erate			*70	2.0	3.0	20.4	
Į.		19.8 - 23.2	41	100	93	foliation defined by wavy schistosity dip	ping 70to			45	2.0	2.0	21.6	
L						foliation defined by wavy schistosity dipp 80°; soft mica on foliation fractures.				15	3.0	2.0	21.7	
L						C-2, 23.2' - 31.2': Medium to dark gray S		II	R3/R	4 20 10	3.0 3.0	2.0 2.0	23 23.2	
0.5						grains of quartz, biotite, feldspar, muscov up to 0.2-inch across from 23.2' to 25.2';	/ite; garnets   close to			20	2.0	2.0	23.8	
<del>-</del> 25						moderate fracture spacing, except very cl	ose spacing			90 30	1.0 3.0	4.0 2.0	23.9 <sup>-</sup> 24.1	
T .						from 23.2' to 24.0'; slightly weathered; m strong to strong; foliation defined by way				45	2.0	2.0	24.5	
ŀ		C-2 23.2 - 31.2	90	94	75	schistosity dipping 60 to 80°; 1/2-inch th	ick			45 20	2.0 3.0	1.0	25.3 26.2	
<b>-</b>		25.2 - 51.2				pegmatites at 26.7' and 28.6'; many fractustained;	ires are iron			*60	2.0	2.0	26.2	
-						30.8' - 31.2': Medium gray PEGMATITE	c-m grains			20	2.0	2.0	27.3	
<del>-</del> 30						of quartz, feldspar, mafic minerals; conta	ct with			15 *70	3.0	2.0	27.5 28.1-	
						overlying schist is along foliation fracture recovery loss at 23.2' to 23.8'.	e, possible			*70	1.5	1.0	29.3	
						C-3: Dark gray SCHIST: fine to coarse g		II	R3/R	4 *70 35	2.0 3.0	1.0	29.7 30.2	
						quartz, feldspar, biotite, muscovite, scatte to coarse garnets; very close to wide frac				40	1.5	1.0	30.3	
<b>ا</b>						slightly weathered; medium strong to stro	ong; wavy			30 10	1.5 2.0	2.0	30.5	
- -						schistosity dips 30 to 80°;	-			*60	1.0	3.0	30.8	
- 35						Medium gray to dark pink PEGMATITE to 32.1'; contacts dip 30, subparallel to fo	liation;			10 <sub>MB</sub> 30	2.0	3.0	31.2_ 31.6	
<u> </u>		C-3	120	100	89	light gray GRANITE from 32.5' to 34.3'	and 34.5' to			*45	1.5	2.0	31.6	
		31.2 - 41.2	120	100	07	35.9', with PEGMATITE; contacts dip 30 intact; subparallel to foliation.	πο 70°,			30	1.0	1.0	32.4	
Σ Σ						mae, suspainier to rollation.				30 20	2.0 3.0	1.0	32.5 33.3	
GPJ MAIN										30	2.0	2.0	33.5	
į –										30 *65	3.0	2.0	33.6 34.3	
⊋ <mark> </mark>										30	1.5	1.0	34.6	
<u>-</u>						C 4. Doubt array SCHIST C		TT	D 2 /D	$\begin{array}{c c} 20 \\ 30_{\text{MB}} \end{array}$	1.0	2.0	35.9 36.1	
						C-4: Dark gray SCHIST c-f grains of qua feldspar, biotite, and muscovite; many ga	rnets, up to	II	R3/R	30	3.0	1.0	36.2	
<u> </u>						0.3-inch across; close to moderate fractur	e spacing;			55 30 <sub>MB</sub>	3.0	1.0	37.6 39.5	
<u> </u>						slightly weathered, except moderately we from 45.4' to 45.8'; medium strong to stro	ong, except			$45_{MB}$	-	-	41.2	
2						weak from 45.4' to 46.5'; distinct wavy so				40	3.0	1.0	42.2	

FD-405 Sheet of

Boring No.

41.2 4

DR	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Deigert

CLIEN	T: M	ITA					INSPEC	ΓOR:	N. Sh	ah			
	nin)									DIS	CONTI	NUITY	DATA
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 S  * - Denotes discontinuity along folia  MB - Denotes mechanical break	j, iize) tion	WEATHERING	STRENGTH	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°50.2', with 30° upper contact and 70° lower single near-vertical, wavy foliation fractur from 43.1' to 45.6', with clay and soft mica fracture surface; continuous, slow water lo observed throughout the core run.	r contact; re extends a on	III	R2 R3/R4	70 *80 *90 20 *75 *60 *60 15 25 <sub>MB</sub>	1.0 1.0 1.0 1.0 1.5 1.5 2.0 1.5	4.0 3.0 4.0 4.0 2.0 4.0 2.0 2.0	43.1— 44.5 45.2 - 45.4 45.6 - 46 - 47 48.1—
- - - - 55		C-5	116	100	100	C-5: Dark gray to dark blue gray SCHIST of quartz, biotite, muscovite and feldspar; garnets, up to 0.2-inch across; close to wide fracture spacing; slightly we strong; wavy schistosity dips 70to 90°; all are across foliation; continuous, small wat observed throughout the core run; depth of borehole confirmed via measuring tape at	eathered; fractures ter loss f the	II	R4	*30 10 *70 45 <sub>MB</sub> 40 40 35 <sub>MB</sub>	1.0 2.0 1.0 - 2.0 2.0	2.0 1.0 2.0 - 1.0 1.0	49.4 50.1 - 50.2 - 51.1 - 53.4 - 53.9 54.4-
- - - - 60		51.1 - 60.8		100	100	C-6: Dark gray SCHIST c-f grains of quar		I/II	R4	$40 \atop 40_{\rm MB}$ $15_{\rm MB}$	2.0	1.0	55.9 - 56.3 - - - - 60.8 -
- - - 65 -		C-6 60.8 - 71.2	125	100	96	muscovite, biotite, feldspar; many garnets 0.2-inch across; wide fracture spacing; und to slightly weathered; strong; crenulated so dips 70° to 90°; 1/2-inch thick quartz bands near-vertical, between 63.3' and 64.3'; schi contorted around quartz bands; slightly was sides from 63.3' to ~65.0'; rock is muscovi with spangly appearance; at the bottom of core was jammed in core barrel; had to hat to take it out; bottom of the borehole confi	weathered chistosity s, istosity is avy core ite-rich the rock mmer hard			$40_{\rm MB}$ $30_{\rm MB}$	-	-	63.4 _
- - 70						measuring tape at 72.1';				60 10	3.0 2.0	2.0	67.6 -
- - 70 - - - - 75 - -		C-7 71.2 - 81.2	120	100	100	C-7: Dark gray SCHIST c-f grains of quar muscovite, biotite, feldspar, and scattered to 0.3-inch across; wide fracture spacing; unweathered to slightly weathered; strong; schistosity dips 60 to 90°, except where co around quartz nodules and large garnets; s wavy core sides; rock is muscovite-rich, w appearance; medium to fine grained below	garnets up ; crenulated ontorted slightly vith spangly	I/II	R4	$^{*80}_{60}_{45}_{45}$ $^{*70}_{15\text{-}20_{\mathrm{MB}}}^{}_{60}_{30}$ $^{60}_{\mathrm{MB}}_{40_{\mathrm{MB}}}$	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 - 76.1 - 78.8 - 78.8 - 78.8 - 78.8 - 78.8 - 70.9 - 70.
							ng No.	FD-4	05	Shee	t 2	of	4

AN	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER:	FD-405	5		
SHEET NUMBER:	3	of	4	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

CLIEN	NT: N	<b>ITA</b>				INSPEC	TOR:	N. Sh	ah			
	(ft/min)					DESCRIPTION AND DEMARKS			DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#/r	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	ANGLE (deg)	٦	ь	DEPTH (feet)
_									30 <sub>MB</sub>	-	-	80.2
-						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	I	R4	25 <sub>MB</sub> 10 <sub>MB</sub>	-	-	81.2 81.8
- - 85 - -		C-8 81.2 - 91.2	120	100	100	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.			$\begin{array}{c} 40_{MB} \\ 35_{MB} \\ 20_{MB} \\ 25_{MB} \\ 10_{MB} \\ 15_{MB} \end{array}$	- - - -		84.1 84.8 85 85.9 86.2 86.6
- 90 -									$15_{\rm MB} \\ 20_{\rm MB} \\ 25_{\rm MB} \\ 15_{\rm MB} \\ 40_{\rm MB}$	- - - -	- - -	88.4 88.5 89.3— 89.5 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 68 to 80°; irregular contorted quartz	I/II	R4	20 <sub>MB</sub>	1.0	2.0	91.2 _ 93.1 _
- 95 -						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			20 <sub>MB</sub>	-	-	94.85
- - - 100 - -		C-10 96.5 - 106.0	105	92	79	03.10, 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;		R4	$\begin{array}{c} 30_{\text{MB}} \\ 10_{\text{MB}} \\ 5\text{-}10_{\text{MB}} \\ 5\text{-}15_{\text{MF}} \\ 15 \\ 10_{\text{MB}} \\ 20 \\ 25 \\ 25 \\ 80 \\ 40 \\ 10 \\ \end{array}$	3.0 2.0 2.0 2.0 2.0 2.0 2.0	1.0 2.0 2.0 2.0 2.0 1.0	96.5 - 97 97.6 - 98 98.2 - 98.5 - 98.9 - 98.9 - 98.95 99.4 - 99.8 - 100.1
7676 — 105						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;		R4	$\begin{array}{c} 50 \\ 0_{\text{MB}} \\ 20_{\text{MB}} \\ 15 \\ 15_{\text{MB}} \end{array}$	2.0	2.0 - 1.0 -	100.9 - 101_ 101.2 104.1 - 104.3
		C-11 106.0 - 116.1	121	100	97	unweathered; strong; foliation defined by indistinct schistosity and contorted 1/4-inch bands of quartz, both dipping 80' to 90°; core sides are parallel; 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; lrock core catcher was not catching	I/II	R5	15 <sub>MB</sub> 10-15 <sub>ME</sub> 20 10 <sub>MB</sub> 30 30	3.0	1.0	105.4 - 106 _ 108.4 _ - 110.2 110.9 111.1 _
			-			Boring No.	FD-4	05	Shee	t 3	of	4

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	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

<b>BORING NUMBER</b>	FD-405			
SHEET NUMBER:	4	of _	4	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

**CONTRACTOR: Jersey Boring & Drilling** 

CLIE	NT: M	TA					INSPEC <sup>-</sup>	ΓOR:	N. Sh	ah			
	uin)									DIS	CONTI	NUITY	DATA
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 S  * - Denotes discontinuity along folia  MB - Denotes mechanical breal	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	ጎ	Ja	DEPTH (feet)
-						cored rock; redrilled cored-rock observed	between			35 <sub>MB</sub>	-	-	114.8
- - - - 120 -		C-12 116.1 - 126.1	120	100	100	99.0' and 100.0'.  C-11, 106.0' - 109.1': Dark gray to black sabove, except with scattered medium grain and greater number of quartz bands; 109.  - Dark gray SCHIST; fine to medium grain quartz, biotite, muscovite, and feldspar; with spacing, except for two pairs of closely spacing,	ined garnets 1' to 116.1'  ins of   vide fracture baced d to slightly by	I/II	R4/R5	80 40 30 <sub>MB</sub> 20 <sub>MB</sub> 25-30 <sub>MB</sub> 5-10 10	2.0 2.0 - 2.0 2.0 2.0 2.0	1.0 1.0 - - 1.0 1.0 1.0	115.8 115.9 116.1 117.6 - 119 119.9 120.5 - 121.1
- 125 -						C-12: Dark gray SCHIST m-f grains of question biotite, muscovite, feldspar; moderate to very fracture spacing; unweathered to slightly strong to very strong; indistinct foliation of to 90°;  122.8' to 123.3' - black SCHIST c-m grain	wide weathered; dipping 75 ns of			10 30 <sub>MB</sub> 50 40 <sub>MB</sub> *75 <sub>MB</sub>	2.0	1.0 - 1.0 -	123.8 <sup>-</sup> 124.6- 125.1 125.15 <sup>-</sup> 125.2 <sup>-</sup>
- - - 130 - -						hornblende, quartz, biotite, with white, 0. phenocrystals; 123.3' - 123.6': Light gray quartz-feldspar near-vertical band; wavy core sides from 123.6'; - Rock-core was jammed inside core barre hammer hard to pull it out; - A lot of mechanical breaks between 125 125.25 due to hammering; E.O.B at 126.1'.	123.3' to el; had to			$40_{\mathrm{MB}}$ $0_{\mathrm{MB}}$	-	-	125.25 126.1 - - - -
- 135 - -													-
- 140													- - - -
													- - - - -
							. N.	ED 1	0.5				
						Bori	ng No.	FD-4	U5	Shee	t 4	of	4

		₽	ars	son	S								ROKING	NUMBE	K: FD-40					
		=				off	R			C I		C	SHEET NUMBER:1 of1							
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	100 YEARS	e C	)ou	ıgla	s, l	Inc.							PROJEC	T NUMB	ER:					
					•	line Exte	ension						LOCATION	ON: <b>W33</b> 1	rd St & 1	11th Ave	-viaduct			
			nh	atta	an												1.5			
	Quade & BORING LOG   PROJECT NUMBER:   PROJECT NUMBER:   PROJECT NO 7 Subway line Extension   COATION: M33rd St & 11th Ave-viadue   COQRD. N: 214,433.2																			
													DATUM:							
						***	1							NATE: 0/1	1 <i>51</i> 05 T	INAT: 1 00				
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KIG I	IFE. I						olby Tu	ho [	Dictor	Gra	h C	oro Barrol	FINISH				, biii			
T. m a /C	's made a			-										GROUI			Hole			
1 .	Binckerhoff Quade &   PROJECT NUMBER:   1																			
								$\frac{1}{2}$								, ,	. ,			
		<u> </u>	4.5'	'		_						3"		6:30 am		12.0				
Length			Brinckerhoff		141.4															
Hamm	er Wt	. 30	00 1	bs	1	40 lbs	Drill	Rod Si	ize		NWJ	ſ								
Hamm	er Fal	I	24"			30"	I.D	. (O.D.	)		(2.938	8")								
					SAN	MPLE		SOIL	(Blows/	6 in.)										
ef (	90	£	⊢						·		DEC	ł								
(fe	IC L	ows/ in./ft				et)	0/6	6/12	12/18	18/24		_,,								
	H	<u>Š</u>	l	24	ايرا	е)		(	CORING	}		-"	ELD CLAS	SIFICAT	ION AND	) KEMAF	KKS			
DE	3R/	SING SING	Щ	WE.	/BC	УTН	5				<b>DOD</b>	<b> </b>								
		SAS	Ľ	Ę	SYI	DEF			1 1											
	*\dag{\sqrt{1}}		T				,			( /			Hand Auger	ed to 6'.						
-			1										0.0' to 0.4' -	Asphalt pay Dark brown	vement n to brown o	:-f Sand an	- d m-f			
-	* 4		ł										Gravel, som	e Silt, occas	sional brick	s and cobble	es -			
-			ł										(SM) (FILL	)			-			
-	<b>1</b>		┨														-			
	₩₽		ł														_			
-			ł										Dark gray to	black of S	AND some	a organic Si	1+ -			
_			S	1		6.0 - 8.0	48	20	15	11	14		little c-f Gra	vel, occasio	nal wood c	hips, wet, d	ense -			
-			1									1	. , .	,	CC 1	CC	, -			
-	45 4		S	2		8.0 - 10.0	11	8	9	17	17		some Silt, or	ccasional we	ood chips, o	concrete and	avei,			
L 10	<u></u>			2		10.0 10.4	100/5"				1				, , ,					
_	1		ľ			10.0 - 10.4	100/3				•									
_	4											12.0	spoon, wet (	SM) (FILL)	) Lto 12 foot	•				
1			1									\ \	Roller bit re	ig advanced f <u>usal and b</u> e	gin coring	at 12'				
1														_			_			
o _ 15																				
13																				
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		\overline 🛮 Brind	kerho	off		CODINC LOC	SHEET I	NUME	BER:_	1	c	of	5
		Quad	de &			CORING LOG							
	10 YEA	Doug	glas, I	nc.			PROJEC	T NU	MBE	R:			
PROJ	ECT:	No 7 Sul	bway	line I	Extens	sion	LOCATION	ON: <b>V</b>	/33rd	St &	11th	Ave-v	viaduct
LOCA	AOIT.	l: Manha	ttan				COORD	N: 2	14,42	3.2 I	E: 983	,574.	5
CLIEN							STN. NC				OFFS	ET:	
		TOR: Jer	sey B	Boring	g & D1	rilling	SURFAC	E EL	EV.: 1	107.5 f	eet		
		D. Keith					DATUM:						
		OR: <b>N. Sh</b>											
						ng with double core barrel	START [						
RIG T	YPE:	Ingersol	l Ran	d A 3	00		FINISH [					3:30	pm
								GF		WATER			
CORE	BAI	RREL DA	TA:		NOT	ES:				Water Depth	Cas De		Hole Depth
TYPE	: NX						Date	Tim		(ft)	(f		(ft)
CORE	SIZ	E: 2"					8/25/05	6:30	am	35.8	12	.0	141.4
O.D.:	3"						8/31/05	12:05	pm	32.8	12	.0	141.4
I.D.: 2	2"												
CASIN	NG S	IZE: 4" (4	.5")										
	(uir									DIS	CONTI	NUITY	DATA
<del>2</del>	RATE (ft/min)	ð.€	(in)	RECOVERY (%)		DESCRIPTION AND REMARK (Lithology, Structure, Weatherin		٥					
DEPTH (feet)	世	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	\₹	RQD (%)	Continuity, Strength, Color, Grain S	g, Size)	WEATHERING	STRENGTH	ANGLE (deg)			DEPTH (feet)
F	₹	I RI	) E	) NE	Q	* - Denotes discontinuity along folia	ation			E (c	'n	Ja	<del>"</del>
	N N	ND ND	EC		<u>~</u>	, c		VEA	STI	J			H
	CORING	0∢	<u>~</u>	<u>~</u>		MB - Denotes mechanical brea	k	>		₹			
- 15 - 15 20 25		C-1 12.0 - 22.0 C-2 22.0 - 32.0	116	97	64	C-1 - Medium gray to yellow-brown to de GRANITE; m-f grains of feldspar, quartz biotite, and garnet; very close to moderate spacing; slightly weathered; strong; rock and garnet enriched from 12.3' to 12.9' and 15.3'; rock has yellow-brown iron staining closely fractured; no rock wall contact at fractures from 13.0' to 13.6' and 20.3' - 20 salmon-pink, very coarse grained pegmat 19.5' to 20.1'; Core barrel was not advancing - changed took 90 minutes to core first two feet of recoring rate between 19' and 20.5'; possible recovery between 20.3' and 20.6'.  C-2 - Medium gray to yellow-brown to de GRANITE; m-f grains of quartz, feldspan biotite, and garnet; moderate to wide fract spacing, except very close spacing at 23.6 unweathered, except slightly weathered felds. 24.2'; very strong, except strong from 23. sparse garnet agglomerates up to 0.3" acred ark pink and garnet enriched from 22.4' 24.2' to 26.0'; core has yellow-brown iron	g, muscovite, the fracture is dark pink and 14.6' to g where low-angle 0.6'; itte from core bit; ock; faster e loss of the fracture is to 23.7'; muscovite, ture is to 23.4' to 4' to 24.2'; oss; rock is to 23.8' and a staining	I	R4	0-5 <sub>MB</sub> 30 35 20 15 20 15 40 40 40 5 <sub>MB</sub> 25 35 35 30 35 10 5-10 25 30 40 20 <sub>MB</sub> 10 <sub>MB</sub> 25 10 <sub>MB</sub>	2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 1.5 1.5 3.0 3.0 3.0 2.0 2.0 1.5	1.0 2.0 2.0 2.0 1.0 1.0 1.0 2.0 2.0 2.0 1.0 3.0 3.0 3.0 1.0	12.5 - 13 - 13.4 - 13.6 - 13.8 - 14.1 - 15.1 - 16.5 - 16.9 - 18.65 - 19.2 - 19.5 - 19.6 - 20.7 - 21.3 - 21.8 - 22.5 - 23 - 22.5 - 23
30 30 35		6.2				from 23.4' to 24.2'; no rock wall contact a fractures at 23.6' and 28.7'; bottom of the jammed in barrel; hammered hard to take rock catcher; bottom of borehole measure at 32.0'.  C-3 - Medium gray to yellow-brown to de GRANITE m-f grains of feldspar, quartz, biotite, and garnet; sparse agglomerates of to 0.2" across; moderate to wide fracture except close spacing from 35.3' to 35.9'; if from 32.4' to 34.8'; slightly weathered wi staining from 34.8' to 42.0';	ark pink muscovite, of garnets up spacing, unweathered		R5	$\begin{matrix} ^{\rm MB} \\ 70 \\ 80 \\ 20 \\ 15_{\rm MB} \\ 20_{\rm MB} \\ 10_{\rm MB} \\ 5\text{-}10_{\rm MB} \\ 10 \\ 5 \\ 10_{\rm MB} \\ 15_{\rm MB} \\ 70_{\rm MB} \\ 60_{\rm MB} \\ 10_{\rm MB} \\ 30 \\ \end{matrix}$	2.0 1.5 1.0 - - 1.0 1.5 - - - 2.0	1.0 2.0 2.0 2.0 - - 1.0 1.0 - - - 1.0	23.5 - 23.55 23.55 23.6 - 25.2 25.9 - 27 27.9 - 28.7 - 29.3 31.1 - 31.75 31.8 - 32 35.3 -

Boring No. FD-406w

Sheet 1

of **5** 

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER:	FD-406	W		
SHEET NUMBER:	2	of	5	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

OLIENT, META

CONTRACTOR: Jersey Boring & Drilling

DRILLER: D. Keith

	<b>ИТА</b>				INSPEC	TOR:	N. Sh	ah			
et) (ft/min)		(			DESCRIPTION AND DEMARKS			DIS	CONTI	NUITY	DATA
DEPTH (feet)	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	ANGLE (deg)	٦Ĺ	Ы	DEPTH (feet)
- 40	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 50 15 80 70 15 20 5	3.0 2.0 2.0 3.0 2.0 2.0 2.0 2.0	2.0 4.0 1.0 4.0 4.0 1.0 1.0	35.4 35.8 35.9 36.2 36.7 37 37.2 37.8
- 45 - 50	C-4 42.0 - 52.0	120	100	98	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';	II	R5 R5 R5	40 40 35 90 20 20 60 30 5-10 10 <sub>MB</sub> 20 5-10 <sub>MB</sub> 25	2.0 1.5 2.0 2.0 2.0 2.0 2.0 2.0 1.0 1.5 2.0	1.0 1.0 4.0 1.0 1.0 2.0 1.0 2.0 2.0 2.0 2.0 4.0	38.6 39.1 40 40.2 40.9 41.4 41.5 41.6 42 42.2 42.7 42.8 46.9 47.9 49.1
- 55					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		R5	$\begin{array}{c} 15 \\ 20_{\mathrm{MB}} \\ 5_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ 15 \\ 10\text{-}15 \\ 20_{\mathrm{MB}} \end{array}$	1.0 - - 2.0 2.0	4.0 - - 1.0 1.0	49.5 50.7 51.85 52 52.05 52.1 53.1
- 60	C-5 52.0 - 62.0	118	98	97	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.		R4	5-10 <sub>MB</sub> 25 <sub>MB</sub> 10-15 5-10 80	- 1.5 1.0 1.0	1.0 2.0 2.0	57 57.9 59.85 59.9 59.95
- 65	C-6 62.0 - 72.0	120	100	100	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	$\begin{array}{c} 5\text{-}10 \\ 20 \\ 15\text{-}20 \\ 25 \\ 10_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \\ 5\text{-}10_{\mathrm{MB}} \\ 20 \\ 5 \\ 10_{\mathrm{MB}} \end{array}$	2.0 1.0 2.0 2.0 - - 1.5 2.0	1.0 2.0 2.0 2.0 2.0 - - 2.0 1.0	60 60.75 60.8 61.3 61.8 61.9- 62 63.35 65.7 67
- 70											

Boring No. FD-406w Sheet 2 of

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

DESCRIPTION AND REMARKS (Ulhology, Structure, Weathering, Cooling and Structure, Wea	CLIEN	IT: M	ITA				INS	SPECTOR	R: <b>N. Sh</b>	ah			
Section   Part	nin)								DIS	CONTI	YUITY	DATA	
Total	DEPTH (feet)	RATE	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	(Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)  * - Denotes discontinuity along foliation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
Total	- - 75 -						m-f grains of feldspar, quartz, biotite and musc with sparse garnet up to 0.1" across; wide fract spacing; unweathered except slightly weathere adjacent to fracture at 73.8; strong; no rock wa contact and red silt coating on 10 fracture at 73. 78.0' - 81.0'. Light gray to salmon pink	covite, cture ed II vall 73.8';		5-10 <sub>MB</sub> 10	-	-	72.05 - 73.35 _
Solution   Solution	- - - - 80 -			120	100	100	feldspar, quartz, muscovite; pink feldspar up to across; moderate to wide fracture spacing; unweathered to slightly weathered; strong; in near-vertical contact with granite above and be 81.0' - 82.0': Medium gray GRANITE, as above core barrel jammed at 78.65'; coring was slowed between 78.0' and 82.0'; bottom of the borehold	to 3" lelow; ve; ver		$\begin{array}{c} 5\text{-}10 \\ 5\text{-}10_{\mathrm{MB}} \\ 15\text{-}20_{\mathrm{MB}} \\ 30_{\mathrm{MB}} \\ 15_{\mathrm{MB}} \end{array}$	2.0	1.0	78 78.65 - 79.2 79.9 80.65 -
C-9	- - -			124	100	99	of pink and white feldspar, quartz, biotite, mus with sparse garnet up to 0.1" across; moderate wide fracture spacing, except two extremely cl fractures at 85.5'; unweathered, except slightly weathered near fractures; strong to very strong rock wall contact and silt coatings at near-horiz fractures at 87.9' and 90.6'; rock is dark pink at enriched in medium to coarse grained garnet fr 91.4' to 91.6'; scattered near-vertical pegmatite to 1.0" thick; complete water loss around 87.9' got water back in entire core run; bottom of bo	scovite, e to elose y g; no izontal ind from es 0.5" II		10 5-10 10-15 <sub>MB</sub> 20 <sub>MB</sub>	2.0 3.0	1.0 2.0	82 - - 85.5 - 85.6 86.3 - 86.8
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 99.5'; white to salmon pink pegmatite, 22' thick, in near-vertical contact at low-angle fractures at 96.4' - 96.5'; white to salmon pink pegmatite, 21' 25' 1.0 2.0 96.45 10' 96.9' 2' thick, in near-vertical contact with granite from 93.8' to 96.4'; lost water throughout the core run.    C-10   C-10   To 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 fractures 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; 20 <sub>MB</sub> 106.25	- 90 - -									0-5 <sub>MB</sub>			91.35 _
C-9   92.3 - 102.0   116   100   99   99   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							grains of quartz, feldspar, biotite, muscovite, w scattered agglomerates of garnet up to 0.3" acre wide to very wide fracture spacing, except two extremely close fractures at 96.3'- 96.5';	with ross; o	R4/R5		-	-	
C-10   quartz, feldspar, muscovite, and maric minerals, with sparse garnet; wide to moderate fracture spacing;   20 <sub>MB</sub> 106.25	- 100		92.3 -	116	100	99	97.3'; strong to very strong; rock is dark pink a enriched in medium to coarse grained garnet fr 92.3' to 93.2', 98.5' to 99.5'; iron staining, silt c and no rock wall contact at low-angle fractures 96.4' - 96.5'; white to salmon pink pegmatite, ~ 2" thick, in near-vertical contact with granite	and III from coating I sat te from		35 25	1.0 1.0	1.0	96.4 96.45 _
C-10   quartz, feldspar, muscovite, and maric minerals, with sparse garnet; wide to moderate fracture spacing;   20 <sub>MB</sub> 106.25							grains of pink and white feldspar, quartz, biotit muscovite and sparse garnet up to 0.1" across; fracture spacing (no fractures); unweathered; v	ite, ; wide	R5	5-10			102
	= 105 = =		C-10				106.8 - 110.2: Light gray PEGMATITE; c graquartz, feldspar, muscovite, and mafic mineral sparse garnet; wide to moderate fracture spacing	ls, with ng;	10.6		-	-	

MM	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

 $\hbox{BORING NUMBER:} FD\text{-}406w$ SHEET NUMBER: 4 of 5

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CLIENT: MTA

CONTRACTOR: Jersey Boring & Drilling

DRILLER: D. Keith

CL	IEN	T: <b>M</b>	TA				INSP	ECTOR:	N. Sh	ah			
		(ft/min)								DIS	CONTI	YUITY	DATA
(+c/3) UTGUG	DEPTH (feet)	CORING RATE (ft/r	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	ANGLE (deg)	Jr	Ja	DEPTH (feet)
- - - 1	10		102.0 - 112.2	122	100	100	unweathered; strong; in vertical contact with gran throughout; 110.2' - 112.2': GRANITE, as above except medigray 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'; entire core run was in two pieces, one 8.5' long ar remaining was other; had to break the core to fit i	um II	R4	5-10 <sub>MB</sub> 10 <sub>MB</sub> 5 15 <sub>MB</sub>	1.0	1.0	107.4 _ 108.25 _ — 110.4 _ 110.5
-  -  - 1  -	15		C-11 112.2 - 122.0	118	100	98	the core box; coring was easy and even except ha between 107' and 112'; lost water throughout the run; core barrel was not advancing at the start of trun; changed core bit.  C-11 - 112.2' to 113.0: Medium gray GRANITE, above; 113.0' - 116.0': Medium gray to salmon pink PEGMATITE; coarse to very coarse crystals of w and pink feldspar, quartz, muscovite, biotite, and other mafic minerals; pink feldspars up to 2" acro	rder II core II as hite I	R4	10 <sub>MB</sub> 40 <sub>MB</sub> 25 <sub>MB</sub> 15 20 10-15 10 5 <sub>MB</sub> 30	2.0 3.0 3.0 1.0 1.0	1.0 1.0 1.0 1.0 2.0	111.25- 112.2 112.25- 113.1 _ 113.7 _ 113.8- 115.1 _ 116 _ 116.4 -
- - 1 -	20	•					close to moderate fracture spacing; slightly weathered; strong; no rock wall contact at low-an fractures at 115.1' and 113.8'; some 1" granite interlayers; 116.0' - 122.0': Medium gray to dark pink GRANITE; fine to coarse grains of quartz, feldsp biotite and muscovite; sparse garnet up to 0.2" across; wide fracture spacing; unweathered; very		R4/R5		-	-	121
- - - 1 -	25		C-12 122.0 - 132.0	120	100	100	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'; lowater throughout the core run.  C-12 - Medium gray to pink GRANITE c-f grains quartz, pink and white feldspar, biotite and muscovite; sparse garnet up to 0.1" across; wide t moderate fracture spacing, except very close space from 128.0' to 129.9'; unweathered to slightly	of o		5 5 5 20 5 5 5 5-10 5-10 5	2.0 1.5 1.0 3.0 1.5 2.0 1.5 1.5	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	122.2 - 122.4 123.3 - 124.6- 125.2 125.6 - 125.8 _ 126.7 127.45-
	30						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 cor barrel; lost water in entire core run; rig was chattering between 127.0' and 130.0'; drilling was very hard between 127' and 130'.	e I	R5	5-10 0-5 25 20 0 0-5 0-5 0-5	3.0 2.0 1.0 3.0 1.5 1.5	1.0 1.0 1.0 1.0 1.0 1.0 1.0	128 128.1 - 128.2 128.3 128.5 - 128.7 128.85 - 129
NG LOG NO ZNE.GPJ	35		C-13 132.0 - 141.4	113	100	100	C-13 - Medium gray to salmon pink GRANITE c grains of quartz, pink and white feldspar, biotite, muscovite; sparse garnet up to 0.2" across; very v fracture spacing; unweathered; very strong; scatte bands of pegmatite, 0.5" to 1.0" thick; core barrel was not advancing at 133.0'; bottom of the core rejammed in rock catcher; had to hammer hard to tait out; lost water throughout the core run; End of boring at 141.4'	ride red n		0-5 0-5 0-5 0-5 0-5 5-10 15 <sub>MB</sub> 5 <sub>MB</sub> 75 <sub>MB</sub> 15 <sub>MB</sub> 15 <sub>MB</sub>	1.5 1.0 1.0 1.0 1.0	1.0 1.0 1.0 1.0 1.0 1.0	129 - 129.2 129.4 - 129.6 129.8 - 129.9 132 133.05- 133.2 133.75- 138.2
7 – 1 - 202 	40						E.O.B at 141.4'.			$25_{\mathrm{MB}}$ $20_{\mathrm{MB}}$	- -	- -	 140.7 - 141.15
							Boring No	FD-4	06w	Shee	t 4	of	5

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER:	FD-406	ów		
SHEET NUMBER:_	5	of	5	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: D. Keith

CLIEN	NT: M	TA					INSPEC	TOR:	N. Sh	ah			
	nin)	_		_						DIS	CONTI	VUITY	DATA
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 S  * - Denotes discontinuity along folia  MB - Denotes mechanical break	g, Bize) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦٢	вГ	DEPTH (feet)
										$30_{\mathrm{MB}}$	-	-	141.4
- - 145 -													- - - - -
- - 150 -													- - - -
- - 155 -													- - - -
- - 160 - -													-
- 165 - 165													- - - -
NO. 7 CORING LOG NO_7 NE.GPJ MAINLI.~1.GLB 8/23/06													- - - -
NO. 7 CORING LOC						Rori	ng No.	FD_40	16w	Shee	t 5	of	5

<u>5</u> of \_

		<u></u> P	ar	son	S								BORING	NUMBE	R: FD-40	8			
		<u> </u>	Brinckerhoff Duade & BORING LOG										SHEET I	NUMBER	:: <u> </u>	of	1		
≣			Qua	ide	&		D	Un	ZIIA.	GL	_0	G							
	10C YEAR	e C	)ou	ıgla	s,	Inc.							PROJEC	T NUMB	ER:				
PROJE	ECT:	No 7	Sı	ıbv	vay	line Ext	ension						LOCATION	ON: <b>W34</b>	th St & 1	11th Ave-	-viaduct		
LOCAT													COORD. N: 214,485.0 E: 983,631.1						
CLIEN.	T: <b>M</b>	ГΑ											STN. NC	).:	C	FFSET:			
CONTI	CONTRACTOR: Jersey Boring & Drilling												SURFAC	E ELEV.	:107.5 fe	eet			
DRILLI	RILLER: D. Keith												DATUM:						
INSPE	NSPECTOR: N. Shah																		
						tary Was	h									IME: 12:3	-		
RIG TY	/PE: ]					1d A 300							FINISH [			IME: 2:00	) pm		
		С	asir	ng		lit Spoon Sh			Piston	Gra		ore Barrel		GROU	NDWATER				
Type/S	Symbo	ol 🔃	ΗW	7		S	U 📗		P 🛛	G		С			Water Depth	Casing Depth	Hole Depth		
I.D.			4"			1.375"	2.938"	2	.938"			2"	Date	Time	(ft)	(ft)	(ft)		
O.D.			4.5'	'		2"	3"		3"			3"	8/25/05	6:35 am	35.5	19.0	141.6		
Length	1					24"	24"		24"										
Hamm		30	00 1	bs	1	140 lbs	Drill	Rod Si	ze		NW.	J							
Hamm			24"			30"		. (O.D.			(2.938								
Hamm		··	Ť		_		<u>.</u>		-		(2.73)	, , 	<u> </u>						
	U				SAI	MPLE		SOIL	(Blows	/6 in.)									
feet	2	/s/ft)					0/6	6/12	12/18	18/24	REC.								
<u> </u>	O/6   O/6												RKS						
EPI	CORING   C																		
^	<u> </u>	CASING ( CORING	TYPE	Ĭ	ME	ΕPT	RUN	REC.	REC.	L>4"	RQD	Depth							
	1· A · 4	99	F	ž	တ်	□	(in.)	(in.)	%	(in.)	%	Elev.		1					
_	Hand-Augered to 6 feet; 0.0' to 0.4' - asphalt																		
	***************************************												0.4' to 6.0' B	Brown c-f SA	AND and c	-f Gravel, so	ome		
L						0.0 - 6.0		Hand		Augor			Silt, occasio chips (FILL)		e, brick irag	gments and	wood		
	***					0.0 - 0.0		TTanu		Auger			1 \	,					
	<del> </del>		1														•		
<del>-</del> 5	* 6		1_														_		
	* 4		S	1		6.0 - 6.1	100/1"				1		Reddish-bro	wn c-f SAN	ND, little Si	lt, wet (SM)	)		
<b>-</b>			1																
-			1									<b></b> -	Reddish-bro		JD, some S	ilt, little m-	 f		
-			S	2		8.0 - 10.0	17	18	26	90	24		Gravel, dens	se (SM) decompose	d rock frage	ments			
<del>-</del> 10			1			100 112	0	20	100/48		_		Reddish-bro	-	•		- f		
-			S	3		10.0 - 11.3	9	30	100/4"		5		Gravel, very -decompose	dense (SM	)	•			
-			ł										-decompose	u lock at the	e up or me	spoon			
-			┨																
-			1									<b> </b>							
– 15			1														_		
L			1																
<u> </u>			1																
												<u> 19</u> .0					•		
00													Roller bit re	fusal and be	gin coring	at 19'	/		
<del>-</del> 20			1														_		
: <b> -</b>			1																
<u>;</u>  -			1																
} <b> </b>			1																
<b> </b>			1																
i	1											D =	ing No.	FD-408	Shee	t 1 c	of 1		
												Bor	111(1 IN()	r 17-4UX	2066		) I		

		Pars	ons				BORING	NUM	IBER:	FD-4	08		
		\overline 🛮 Brind	kerho	off		CORING LOG	SHEET N	NUME	BER:_	1	(	of	4
		Quad	de &			CORING LOG							
	10 YEA	Doug	glas, I	nc.			PROJEC	T NU	MBEF	₹:			
PROJ	ECT:	No 7 Sul	bway	line I	Extens	sion	LOCATION	ON: <b>V</b>	V34th	St &	11th .	Ave-v	iaduct
		l: Manha	•				COORD.	N: 2	14,485	5.0 1	E: 983	3,631.	1
CLIEN	IT: M	<b>ITA</b>				STN. NC	).:		(	OFFS	ET:		
CONT	RAC	TOR: Jer	sey B	Boring	& D	SURFAC	E EL	EV.:1	07.5 f	eet			
DRILL	ER:	D. Keith					DATUM:						
INSPE	CTC	R: <b>N. Sh</b> :	ah										
DRILL	ING	METHOD	Dia:	mond	drilli	ng with double core barrel	START [	DATE	8/22/	<b>'05</b> 7	ГІМЕ:	12:30	) pm
RIG T	YPE:	Ingersol	l Ran	d A 3	00		FINISH [	DATE	: 8/25/	05	ΓIME:	2:00	pm
								GF	ROUND	WATEF	R DATA	١	
CORE	BAF	RREL DA	TA:		NOT	ES:				Water	Cas		Hole
TYPE:	: NX						Date	Tim		Depth (ft)	De <sub>l</sub>		Depth (ft)
CORE	SIZI	E: 2"					8/25/05	6:35	am	35.5	19	0.0	141.6
O.D.:													
I.D.: 2													
		IZE: 4" (4	£!!)										
CASIN		ZE. 4 (4.	.5 )							BIO	OONT	NU UTN	DATA
	(ft/min)	o. €	<u></u>	9		DESCRIPTION AND REMARK	S	(D		DIS	CONTI	NUITY	DATA
DEPTH (feet)	(f)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	<u> </u>	(Lithology, Structure, Weatherin	g,	WEATHERING	I I	<u> </u>			Ţ.
<u>#</u>	RATE	NS I	ËŖ	ER.	(%)	Continuity, Strength, Color, Grain S	Size)	岸	STRENGTH	(deí			(fee
Ġ.	B	SE F	Š	Š	Rab	* - Denotes discontinuity along folia	ation	Ι¥		Щ	누	Ja	끝
	CORING	ANA	ZEC	) H	-	MB - Denotes mechanical brea	k	WE	S	ANGLE (deg)			DEPTH (feet)
	<u>5</u>			_		MB Benetse meenamear brea							
						C-1 - Dark gray to black SCHIST; m-f gr	ains of	II	R3	2.5	4.0	3.0	19
<del>-</del> 20						biotite, quartz, feldspar, amphibole; close moderate fracture spacing, except extrem	to elv close			25 20	2.0 2.0	2.0	19.6- 19.9
<b>-</b>		C-1	50	83	50	spacing at 19.0' and 20.3'; slightly weather moderately weathered at 20.3'; medium s	ered, except			*70	1.5	2.0	20.3
-		19.0 - 24.0				foliation defined by indistinct, wavy schi	trong; stosity.			90 *60	2.0 2.0	2.0	20.6 20.9
-						dipping $60^{\circ}$ to $70^{\circ}$ ; from 20.8' to 22.3', alte	ernating			35	2.0	1.0	21.4
-						bands of schist and light gray granite all dipping parallel to foliation; possible loss	~l" thick, of recoverý			40 30	2.0 2.0	1.0	21.7 21.8
<b>–</b> 25						between 19.0' - 19.6' and 20.3'-20.6'; bore	ehole depth			50	2.0	1.0	22.3_
						<u>measured with tape at 24.0'.</u> C-2 - Dark gray to black SCHIST m-f gra	ins of			35 *50	3.0 2.0	1.0	23.5 23.7
						biotite, quartz, feldspar, amphibole, musc	ovite;			60	2.0	1.0	23.8
						sparse garnets, up to 0.2" across; close to fracture spacing, slightly weathered, exce				30 70	2.0	1.0	24 24.4
<b>-</b>		C-2				moderately weathered 28.3' to 28.7'; strong	ng; foliation	III	R3	$50_{MR}$	-	-	25.5
-		24.0 - 33.8	118	100	90	defined by indistinct, wavy schistosity dig 75°, with sparse irregular bands of quartz.		111	IX3	$25_{MB}$	-	-	26.7 27.4
<del>-</del> 30						1/2" to 1" wide parallel to foliation; pure				30 <sub>MB</sub> 45	2.0	2.0	28-
-						33.3' to 33.8'.	•			45	2.0	4.0	28.3
L										40 30	3.0 2.0	2.0 2.0	28.55 28.7
90_										45	2.0	1.0	29.15
3/23/										45 30	2.0 3.0	2.0	29.6 29.9
®  - 8  - 9  - 35						C-3 - 33.8' to 41.9': Dark gray to black So grains of biotite, quartz, feldspar, muscov	CHIST m-f	II	R3	20	2.0	1.0	30.25
ੁੰ – 35						garnet up to 0.2" across; moderate to wid	e fracture			*60 *60	1.5 1.5	1.0 2.0	32.3 <b>–</b> 33.3
<b>]</b> -						spacing; slightly weathered; foliation defi	ined by			*60	2.0	1.0	33.8
<b>∀</b> _						indistinct, wavy schistosity dipping 50to 41.9' to 42.3': Dark gray FAULT GOUGI				40 30	2.0	1.0	34 34.5
Ą.						sandy clay with no visible rock structure;	light green,			*45	2.0 2.0	1.0	34.5
Z.		C-3	112	92	82	soft mineralization on 70 fracture surface no contact. 42.3' to 44.0': Dark gray to bla				*50	2.0	1.0	35.5
Q 		33.8 - 44.0		-	~~	SCHIST, as above, except close to extren	nely close			$30_{\mathrm{MB}}$ $30_{\mathrm{MB}}$	- -	-	36.9 38.2_
- 40						fracturing; medium strong to friable and weak.	extremely			10	3.0	1.0	39.3
NG L										30	3.0	1.0	39.85 -
NOS -								II	R3/R0	70	1.0	4.0	41.9
<u>`</u>  -			1					111	NJ/KU	10	1.5	4.0	42.1

Boring No.

FD-408

Sheet 1

4

of

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	NT: M	ITA				INS	SPECTO	OR:	N. Sh	ah			
	(ft/min)					DECODIDATION AND DEMARKS				DISC	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#//	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	ANGLE (deg)	٦٢	Ja	DEPTH (feet)
- 45 - - - - - 50 - -		C-4 44.0 - 54.0	120	100	48	C-4 - 44.0' to 51.6': Dark gray to brown SCHIS grains of biotite, quartz, feldspar, muscovite; v close to moderate fracture spacing, except extr close spacing from 47.2' to 49.7'; moderately weathered, except only slightly weathered from to 47.2'; medium strong, except very weak to extremely weak and friable from 47.3' to 49.7'; foliation defined by indistinct, crenulated schis with contorted quartz bands 1/2" thick, dipping to 90°; core has orange-brown iron staining bet 47.2' and 49.7'; 51.6' to 54.0': Dark gray SCHIST m-f grains of biotite, quartz, feldspar, muscovite; moderate f spacing; slightly weathered; strong; foliation d by near vertical schistosity; in vertical contact 51.6' to 52.9' with m-f grained granite; slight in staining on some fracture surfaces; rock core in staining on some fracture surfaces; rock core	remely m 44.0' ; stosity, g 70 tween f ffracture lefined from ron	III III	R3 R1/R0 R4	30 *70 20 20 *70 30 25 40 40 50 50 50 90 90 80 *85 *75	1.5 2.0 3.0 2.0 3.0 3.0 1.0 3.0 1.0 1.0 1.0 1.0 1.0 1.0	4.0 3.0 3.0 2.0 2.0 3.0 3.0 3.0 3.0 4.0 4.0 4.0 4.0 3.0	42.4 42.6— 43.1 44.5 - 45.2 - 45.4 46.7 - 46.9 47.2 - 47.4— 47.7 47.9 - 48.2 48.4 - 48.8 - 49.2 49.5 -
- - 55 - - - - - 60 -		C-5 54.0 - 63.7	116	100	100	staining on some fracture surfaces; rock core we stuck inside core barrel; had to hammer the rock hard to take it out.  C-5 - Dark gray to black SCHIST c-f grains of biotite, quartz, feldspar, muscovite; moderate to fracture spacing; unweathered to slightly weath strong; foliation defined by indistinct, wavy schistosity dipping 70 to 90°; non-vertical contraplite bands, 1" thick between 55.0' and 58.4'.	ck very   f  to wide  hered;	I/II	R4	*/5 *80-90 *75-90 *80 *85/60 25 25 30 20 <sub>MB</sub> 25 40 <sub>MB</sub> 15 <sub>MB</sub> 50	2.0 1.5 2.0 3.0 2.0 3.0 1.5 1.5 - 2.0	3.0 4.0 4.0 1.0 1.0 2.0 1.0 2.0 1.0	49.5 - 50.2 51.2 - 52.2 - 53.1 54 - 55.3 56.4 - 57.8 - 57.8 - 58.5 - 58.9 - 60.6 -
- 65 70		C-6 63.7 - 73.9	122	100	92	C-6 - Dark gray to dark blue-gray SCHIST c-f of quartz, biotite, feldspar; moderate to wide fr spacing, except closely spaced from 73.4' to 73 unweathered to slightly weathered; strong; foli defined by indistinct, wavy schistosity dipping 90°, locally 60°; a few contorted coarse grained quartz-feldspar bands less then 0.5" thick; no r wall contact at 73.7'; cored rock was stuck insi core barrel; had to hammer hard to take out the Bottom of the borehole measured with tape at 7	racture 3.6'; iation g 80to l rock ide the e rock;	I/II	R4	30 <sub>MB</sub> 40 45 <sub>MB</sub> 30 <sub>MB</sub> 35 <sub>MB</sub> 25 <sub>MB</sub> *80 70	- 1.5 - - - 1.5 1.0	2.0 - - 2.0 3.0	63.7 - 64.85 - 66.8 - 68.1 - 68.6 - 69.1 - 70.3 - 70.5 -
- 70		C-7				C-7-73.9' to 82.7': Dark gray m-f grained SCF interlayered with medium gray, fine grained GRANITE; schist minerals: biotite, quartz, felogranite minerals: feldspar, quartz, muscovite; of moderate fracture spacing; slightly weathered unweathered; strong; foliation in schist defined crenulated, near vertical schistosity; faint band granite dips 60' to 80°; schist-granite contacts a	dspar; close to to d by ling in are	II/I <b>D-4</b>	R4	30 <sub>MB</sub> *60 20 90 10 35 25 10 <sub>MB</sub> 15 <sub>MB</sub> 20 40 <sub>MB</sub>	1.5 1.5 2.0 2.0 2.0 2.0 1.5	1.0 1.0 1.0 1.0 2.0 - 1.0	72.45 _ 72.95

DR	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

	CLIENT: MTA						INSPECTOR: N. Shah								
	et) (ft/min) NO. I (ft) (in) (%)						DESCRIPTION AND DEMARKS			DIS	CONTI	NUITY	DATA		
	DEPTH (feet)	CORING RATE (#/r	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	C L	STRENGTH	ANGLE (deg)	٦	Ja	DEPTH (feet)		
	80 - - -		73.9 - 83.9	120	100	87	intact and gradational; thin coating of black clay 70° fracture at 82.7'; wavy core sides from 76.8' 78.3'. 82.7' to 83.9': light gray PEGMATITE; c grains quartz, feldspar, garnet; very close to moderate fracture spacing; slightly weathered; medium str. 1/4" near-vertical black schist inclusions; possib mylonitic texture below 83.6'; coring very slow	to s of trong; ble	I R3	$\begin{array}{c} 30 \\ 35 \\ 35_{\text{MB}} \\ 35_{\text{MB}} \\ 20 \\ 30 \\ 20 \\ 15_{\text{MB}} \end{array}$	2.0 2.0 - 3.0 1.5 3.0	1.0 1.0 - 1.0 1.0 1.0	76.55 77.55— 78.5 79 - 79.5 80.1 80.5 - 81.35		
	- 85 - - - - - - 90		C-8 83.9 - 93.9	120	100	87	between 82.0'-83.9'; depth of borehole measured with tape at 83.9'.  C-8 - Medium gray GRANITE, with schist and pegmatite m-f grains of feldspar, quartz, musco and sparse garnets up to 0.2" across; close to moderate fracture spacing, except very close spa from 90.9' to 91.2'; strong, except medium stron from 90.9' to 91.2'; slightly weathered, except moderately weathered from 90.9' to 91.2', no ro wall contact on any fractures from 90.9' to 91.2' slight iron staining and rounded core pieces; also	d / ]	I R4	35 15 <sub>MB</sub> 20 *60 *70 20 *80 45 10 90 *50	3.0 - 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1.0 1.0 1.0 4.0 1.0 2.0 1.0 1.0 2.0	81.55 - 81.9 _ 82.2 82.5 - 82.7 83.2 - 83.5 _ 83.7 83.9 - 84 84.05		
	- - -						iron staining and and no contact at 85.6' and 86. black schist inclusions from 84.0' to 84.4', 86.7' 88.3' and 92.1' to 92.2', with contorted schistosist dipping ~70°, parallel to contacts; pegmatite with coarse grains of white and pink feldspar, quartz, garnet from 85.6' to 86.3' and 89.5' to 91.5', with	.4'; ' to I ity th z, and h	II R3 I R4	20 30 35 20 15 25	1.5 1.0 1.5 1.5 1.0 1.0	2.0 4.0 4.0 1.0 4.0 1.0	84.15 - 84.25 - 84.85 - 85.1 - 85.6 - 86.4 -		
3/23/06	- 95 - - - - - 100 - -		C-9 93.9 - 103.9	120	100	98	vertical contacts; biotite seams in pegmatite from 90.5' to 91.5'.  C-9 - Medium gray to yellow brown to dark pin GRANITE m-f grains of feldspar, quartz, muscon 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 and garnet enriched from 95.5' to 97.3' and 99.8 100.4'; 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-vertice pegmatite, 1" thick, with coarse grains of quartz white and pink feldspar; all fractures and breaks ~35°; core barrel was not advancing at 99.7'; changed core bit after finishing the run.	ik ovite, ppt very I/S' to m ecal z and	TI R4	35 45 10 20 20 5 80 5-10 15 45 15 20 5-10 <sub>MB</sub> 0-5 <sub>MB</sub> 55 10-15	1.5 1.5	1.0 1.0 1.0 1.0 1.0 2.0 2.0 2.0 2.0 2.0 2.0	87 88.5 89.9 - 90.6 - 90.95 91 - 91.1 91.15 - 91.2 - 91.4 92.05 - 92.7 - 93.85 - 93.9		
NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06	- - 105 - - - - - 110 - -		C-10 103.9 - 114.0	121	100	97	C-10 - Medium gray GRANITE m-f grains of q feldspar, biotite, muscovite, sparse medium grai garnet with sparse agglomerates up to 0.4" acros wide fracture spacing, except for pairs of very c fracture spacing at 106.3' - 106.5', 108.7' -108.9 110.1' - 110.3'; unweathered, except slightly weathered at very close fractures; very strong; n 0.1" garnets from 112.4' to 112.7'; no rock wall contact and thin silt coatings on 3 fractures at 11 and 110.1'; all fractures are low angle; 0.5" near-vertical pegmatite at 112.4' and 113.1'; dril very slow between 108.0' and 110.0' - took over min/ft; core barrel was jammed at the beginning the run; core bit was changed at the end of the c run.	ined oss; close b', and many 10.3' lling r 35 g of	TII R5	5 15 30 15-20 <sub>MI</sub> 10 <sub>MB</sub> 5 25 20 <sub>MB</sub> 20 35 15 25 5 5 15	1.5 1.5 2.0 1.5 2.0 2.0 1.5 1.5 1.5 1.5 1.5 1.5	1.0 1.0 1.0 1.0 1.0 1.0 2.0 1.0 1.0 1.0 1.0 1.0	94.15 - 94.3 94.7 - 95.6 - 96.5 96.8 - 97.45 97.85 - 98.25 - 98.6 99 - 99.7 - 99.75 - 100.75 101.1 - 101.7		
							Boring N	lo. FI	<b>)-408</b>	Shee	et 3	of	4		

nd	Parsons					
	Brinckerhoff					
	Quade &					
100 YEARS ®	Douglas, Inc.					

BORING NUMBER:	FD-408			
SHEET NUMBER:_	4	_ of _	4	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

**CONTRACTOR: Jersey Boring & Drilling** 

DRILLER: D. Keith

CLIEN	IT: M	TA					INSPEC <sup>-</sup>	ΓOR:	N. Sh	ah			
	(ft/min)					DECORIDATION AND DEMARK	2			DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#//	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folia  MB - Denotes mechanical break	g, Bize) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦L	Ja	DEPTH (feet)
- 115 - - - - - 120 - -		C-11 114.0 - 124.0	120	100	100	C-11 - 114.0' - 116.8': Medium gray GRA grains of quartz, feldspar, muscovite, biot coarse grained garnet from 114.7' to 114.9 moderate fracture spacing; unweathered tweathered; very strong; no rock wall cont fracture at 116.2'; 116.8' - 124.0': Medium gray to salmon-p GRANITE c-f grains of pink and white fe quartz, biotite; medium to coarse grained below 122.7'; wide fracture spacing; unweyery strong; 1" pegmatite bands dipping 7 - 124.0'; no rock wall contact at 10 fractur 117.0'; Put a new core bit; lost water alon core run; could not retreive entire run at fi about 2.5' long rock core piece was left in borehole; picked up rock core at second reattempt.	ite, with 9'; close to o slightly act at 5' ink eldspar, garnet eathered, 70at 123.2 e at g entire irst attempt; the	I/II	R5	5 10-15 <sub>MB</sub> 0 5 10 <sub>-15</sub> 20 20 5-10 <sub>MB</sub> 5-10 <sub>MB</sub> 30 15 5 5	2.0 1.5 2.0 1.5 1.5	1.0 1.0 1.0 1.0 1.0 1.0 1.0 2.0 2.0	102.25 102.8 103 103.5 103.9 104.2 106.35 106.5 106.9 107.35 107.65 108.1 108.7 108.9 110.15 110.3 112.6
- 125 - - - - - 130 - -		C-12 124.0 - 133.8	118	100	100	C-12 - Medium gray to salmon pink GRA above, with scattered medium grained gar few garnet agglomerates up to 0.2" across unweathered throughout; wide fracture sp scattered 70° pegmatite bands 1" thick; los along entire core run; drilling was harder to previous run; bottom 1" rock core piece in to rock catcher.	rnets and a s; pacing; st water compared	I	R5	${}^{10_{\rm MB}}_{10_{\rm MB}}$ ${}^{30}_{15}$ ${}^{5}_{10}$ ${}^{5-10_{\rm MB}}_{15_{\rm MB}}$ ${}^{20}_{25_{\rm MB}}$ ${}^{15_{\rm MB}}_{10_{\rm MB}}$ ${}^{5_{\rm MB}}_{10_{\rm MB}}$	1.5 1.5 1.0 1.0 1.0 - 2.0	1.0 1.0 1.0 1.0 1.0 - - 1.0 - - - - 1.0	114 114.65 114.85 116.25 117 - 117.5 119.9 - 121.05 121.65 122.3 - 122.5 124 - 124.1 127.9 132 - 132.6
- 135 140		C-13 133.8 - 141.6	94	100	100	C-13 - Medium gray to salmon pink GRA grains of quartz, white and pink feldspar, muscovite, sparse garnet from 134.0' to 13 fracture spacing; unweathered; very strong water along entire core run.	biotite, 37.0'; wide	I	R5	10 <sub>MB</sub> 20 <sub>MB</sub>	2.0	1.0	133.7 - 133.8_ 135.55- - -
						E.O.B at 141.6'.				$10_{ m MB}$	-	-	- 141.6 - - - - -
2						Bori	na No.	FD-4	08	Shee	et 4	of	4

Boring No.

FD-408

Sheet

	Parsons										BORING NUMBER: FD-5									
		<b></b>	3rir	ncke	erh	off	D	BORING LOG					SHEET I	NUMBER	R:1_	of	1			
<u> </u>				ade			D	Ur	7114	G	_0	G								
	100 YEAR		Οοι	ugla	as,	Inc.							PROJEC	T NUMB	ER:					
PROJE	ECT:	No 7	7 Sı	ubv	vav	line Ext	ensio	n					LOCATION	ON: Trac	k 14 und	er 11th-l	Bridge			
LOCA														N: 214,1						
CLIEN	T: <b>M</b>	ГΑ											STN. NO.: OFFSET:							
CONT	RACT	OR	: Je	erse	ey l	Boring &	Drill	ing					SURFAC	E ELEV.	: 108.0+/	-				
DRILL	ER: C	. De	eige	ert									DATUM:							
INSPE	NSPECTOR: C. Burzynski																			
DRILL	· · ·												START [	DATE: 6/0	6/05 T	IME: <b>7:1</b> 5	5 pm			
	· ·												FINISH [	DATE: <b>6</b> /1	10/05 T	IME: 2:00	0 am			
		С	casi	ng	Sp	lit Spoon S	helby Tı	ube l	Piston	Gra	ıb C	ore Barrel		GROUI	NDWATER	DATA				
Type/S	Symbo	ы	HV	V		S	U		PN	G	<del>a  </del>	С			Water	Casing	Hole			
I.D.	, , , , , , , , , , , , , , , , , , ,	·	4" 1.3		1.375"	2.938" 2.938"		2"	Date	Time	Depth (ft)	Depth (ft)	Depth (ft)							
							3"		3"			3"	Date	111116	(11)	(11)	(11)			
O.D.			4.5			2"						3"								
Length						24"	24"		24"											
Hamm	er Wt	. 1	40 1	lbs		140 lbs	Drill	Rod Si	ze		NW	J								
Hamm	er Fa	II	24'	"		30"	1.0	D. (O.D.	)		(2.93	8")								
					SAI	MPLE		SOII	(Blows	/6 in )										
<b>₽</b>	စ္က	<u> </u>	L		<u>-</u>	VII LL		JOOIL	(DIOWS	70 111.)		1								
(fee	1 2	ws/f					0/6	6/12	12/18	18/24	REC.									
	CORING   C									FII	ELD CLAS	SSIFICAT	TION ANI	O REMAP	RKS					
L																				
	9	ASIN ORI	TYPE	Įξ	SYMBOL	H	RUN	REC.	REC.	L>4"	RQD	Depth								
	1.0.1	ပဲပဲ	F	Ž	က်	□	(in.)	(in.)	%	(in.)	%	Elev.								
Hand Augered through railroad ballast 0'										last 0' to 1.5	5' .									
								Tri cone roller bit with air hose 1.5' to 6.0' thr									nigh			
	*		1										concrete foo	_						
ļ	**************************************		1										Grayish-blue matrix	e stone chip	s evident w	within concrete				
F			1											Dark gray,	GRAVEL	and c-f SAND				
<del>-</del> 5	₩₽		1										NOTE: spun 3" dian	natar casino	r 0' to 10'	-				
-	( P)		-										spuii 5 dian	neter casing	,0 10 10.		-			
<b> </b>	* 4	-	-														-			
L	1 <del>2</del> ₩ 1		1														-			
	<b>→ ○ ○</b>																			
	*		1																	
<del>-</del> 10	· · ·		1.										Gray m-f SA	AND, some	c-m Gravel	, little Silt,	_			
l l	4		S	1		10.0 - 12.0	16	17	12	16	12		medium den NOTE:	ise, wet (SN	1)		-			
ŀ	**************************************		1										Spun 3" casi	ing 10' to 15	5'		-			
ŀ	14 7		1														-			
F	***		-				1										-			
15	4 - 3		1				1						D1 1 C	1 .	ca 1	0.1: 1	(GP) -			
	* -		- <sub>S</sub>	2		15.0 - 17.0	37	18	23	27	2		Black c Gravel, a NOTE:		f Sand, trace	e Silt, dense	e (GP) -			
3	(D)		٥	_		13.0 - 17.0	31	10	23	21			Spun 3" casing 15' to 20'.							
2	* -5		1														-			
<u> </u>			1				1					<b> </b>								
<u> </u>			1				1										-			
20			1			200			10000				Yellow brov	vn m-f SAN	ID some c-	f Gravel little				
<b>!</b> -			S	3		20.0 - 21.3	87	25	100/4	-			Clayey Silt,							
<u> </u>	•		$\bot$		<u> </u>		1	1					NOTÉ: Spun 3" casi	ing 20' to 2'	)'	<sub>/</sub>				
<u></u>			1				1					\	Spuil 5 Casi	5 20 10 22			, <sup>′</sup> -			
			]				1					\	Roller bit re	fusal and be	egin coring	at 22'	,′ -			
							<u></u>					L `				<u> 22</u>				
												Bori	ing No.	FD-5	Shee	t 1 (	of 1			

	È≣	Pars	ons				BORING	NUM	IBER	: FD-5							
	₹≣	\overline 🖺 Brind	kerho	off		CODINC LOC	SHEET NUMBER:1 of4										
		Quad	de &		1	CORING LOG											
	10 YEA	Doug	glas, I	nc.			PROJEC	T NU	MBE	R:							
PROJ	JECT:	No 7 Su	bwav	line I	Extens	sion	LOCATION	ON: T	rack	14 un	der 1	1th-B	ridge				
		l: Manha					COORD.										
	CLIENT: MTA								STN. NO.: OFFSET:								
		TOR: Jer	sev B	Boring	2 & D1	rilling	SURFACE ELEV.: 108.0+/-										
		C. Deiger			·	8	DATUM:										
		R: C. Bu		ski													
					drilli	ng with double core barrel	START [	DATE	6/6/	05	TIME:	7:15	nm				
		CME 55				and when mounted out of warren	FINISH [										
										DWATER							
	= <b>B</b> AI	RREL DA	ΤΛ.		NOT	EQ.				Water	Cas		Hole				
		NEL DA	IA.		NOI	<u> </u>				Depth	De	pth	Depth				
TYPE							Date	Tim	е	(ft)	(f	t)	(ft)				
CORE		E: 2"															
O.D.:	3"																
I.D.:	2"																
CASII	NG S	IZE: 4" (4	.5")														
	in)						•			DIS	CONT	NUITY	DATA				
<b>₽</b>	(ft/min)	ō,∉	(in)	(%)		DESCRIPTION AND REMARK		<u>0</u>	_								
DEPTH (feet)	<u> </u>	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	(%)	(Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S	ig, Size)	WEATHERING	STRENGTH	(ge			et (				
1 E	RATE	L P E	VEF	Ä	RQD (		ŕ	出	Š	(p)	   5	l a	(fe				
Ш	9	RE ID C	00	8	R S	* - Denotes discontinuity along foli	ation	E	) TR	ANGLE (deg)	٦	ي	DEPTH (feet)				
	CORING	O A	R	R		MB - Denotes mechanical brea	k	>	0)	Ž							
	S																
_						C-1 - Dark-gray to black SCHIST, c-m g	rains of fic minerals:	II	R3/R	*60	1.5	2.0	22.2				
						muscovite, quartz, biotite other black mamany garnets, up to 0.2" across; close to	moderate										
Γ <sub></sub>		C-1	63	98	98	fracture spacing; slightly weathered, med to strong; foliation defined by wavy, cren	lium strong			*70	1.5	1.0	24				
<del>-</del> 25		22.0 - 27.3				distinct schistosity, dipping 50 to 70°, frac surfaces across foliation are jagged and in	cture			50 *70	1.5	1.0	24.65 24.65				
<b>-</b>						surfaces across foliation are jagged and in poor crack fit and clay coatings at 24.6'-2	rregular,			*70	1.0	3.0	25.1				
-						probable zone of non recovery				40	3.0	4.0	26 26.9				
-						C-2- Dark-gray to black SCHIST, c-m gr	ains of	II	R3/R	4 40	3.0	2.0	27.3				
-						muscovite, quartz, biotite other black ma many garnets, up to 0.2" across; close to	moderate										
<del>-</del> 30		C-2 27.3 - 32.3	60	100	95	fracture spacing; slightly weathered, med	lium strong			20 50	3.0	2.0 4.0	29 29.6-				
		21.3 - 32.3				to strong; foliation defined by wavy, crendistinct schistosity, dipping 80 to 90°, frac	iuiatea, eture										
						surfaces across foliation are jagged.				50 10	3.0	1.0	30.7				
Ī						C-3 - Dark-gray to black SCHIST, c-f gra		II/I	R4	50	2.0	3.0	31.7				
F						muscovite, quartz, biotite other black ma	fic minerals;	11/1	11.7	30 <sub>MB</sub> 10	3.0	1.0	32.3 32.6				
-						garnets, up to 0.1" across; close to moder spacing; unweathered to slightly weather				$10_{\mathrm{MB}}$	-	-	33.2				
<b>–</b> 35						foliation defined by wavy, distinct schiste	osity and			10	2.0	3.0	33.6_				
90/2						few thin (0.1") quartz bands; foliation dip 90°;	os 70to			50	1.5	4.0	35.4				
8/23		C-3				39.0' to 40.3': Medium-gray fine to coarse	e grained			40 40	1.5	2.0	35.8 36.4				
al B		32.3 - 42.3	120	100	92	GRANITE, in near vertical contact with s	schist, with			*70	1.5	1.0	36.5				
<u>.</u>						bands of quartz and muscovite dipping ~ parallel to foliation. Slight iron staining b	85contact below 40 3'			*70 40	1.0	1.0	37.2 38.3				
						Bulging core sides through most of the ru	in.			*90	1.5	2.0	39				
≥ 40										50 *85	1.0	2.0	39.5- 39.8				
<u> </u>										0	3.0	3.0	40				
Z L			L_	<u></u>		L				20	3.0	2.0	40.5				
						C-4 - 42.3' to 43.2': Medium gray GRAN			R4	$10_{\mathrm{MB}}$ $10$	1.5	1.0	41.5 41.7				
0						grains of feldspar, quartz, muscovite; slig weathered; strong; faint banding of quart				*85	2.0	4.0	42.1				
						muscovite; core surfaces pitted; banding	and contacts			10 *90	2.0	1.0 2.0	42.2 42.3_				
<u>7</u> – 45						both dip 60°, parallel to foliation in under schist.	rıyıng			70	1.5	4.0	42.4				
\ <u>-</u> 0						43.2' to 45.5': and 48.2' to 52.3': Dark-gra	ay to black			20 50	1.5 2.0	1.0	42.7 44.1				
<b>∠ L</b>	1				1				1		1		1				

Sheet 1

Boring No.

**FD-5** 

4

of

DR	Parsons Brinckerhoff
	Quade &
100	Douglas, Inc.

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

	CLIENT: MTA							INSPECTOR: C. Burzynski							
	et) (ft/min) NO. 1 (ft) ((in) (%)										DISCONTINUITY DATA				
	DEPTH (feet)	CORING RATE (ft/r	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folia  MB - Denotes mechanical break	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Р	DEPTH (feet)	
	- - 50 -		C-4 42.3 - 52.3	118	98	73	SCHIST, fine to medium grains of musco biotite and garnet up to 0.1" across; close moderate fracture spacing; slightly weather strong; foliation defined by wavy schistos (0.1") contorted quartz bands, and discont quartz nodules; foliation dips 60 to 90°; so fractures along foliation have softened, we muscovite on surfaces; slightly bulging courses (SPANITE of 15.2"). Medium gray CPANITE of 15.2" to 48.2"	to ered; ity, thin inuous me eathered ore sides.			*70 20 *70/75 10 *80 10 10 10	1.5 3.0 1.5 2.0 1.5 1.5 1.5	4.0 3.0 4.0 1.0 4.0 1.0 1.0	44.3 44.7 - 45.4 45.6 - 45.8 46.2 46.3 - 46.5	
	- - 55 - - - - - 60		C-5 52.3 - 61.0	104	100	81	45.2' to 48.2': Medium-gray GRANITE, n quartz; close to very close fracture spacing weathered; strong; upper and lower contact schist are irregular, with Schist inclusions Idip 60° to 90°, very faint, near vertical ban Ivertical, healed hairline fractures; numero Ihorizontal fractures in quartz rich zones.  C-5 - Dark-gray to black SCHIST, c-f gra biotite, muscovite, quartz, biotite, with space up to 0.1" across; very close to wide fract unweathered to slightly weathered, strong defined by crenulated schistosity dipping 59.5' to 60.6': Medium-gray GRANITE, fi coarse grains of feldspar, muscovite, quart moderate fracture spacing; contact is dip	g; slightly   cts with   ; contacts   ding; near  us   ins of   arse garnets ure spacing; ; foliation 80to 90°; ine to tz; close to	II/I	R4	0 0 *70 50 20 0 0 10 0 <sub>MB</sub> 30 *60 *40 60 30	2.0 1.5 3.0 1.5 1.5 1.5 3.0 1.0 3.0 - 2.0 1.5 2.0 1.5	1.0 1.0 4.0 2.0 3.0 1.0 1.0 1.0 2.0 2.0 2.0 2.0	46.8 - 47.4 - 47.6 - 48.2 - 49.2 - 49.9 - 50 - 51.1 - 51.8 - 51.9 - 52.1 - 52.2 - 52.3	
	- - - 65 - - - - 70		C-6 61.0 - 71.2	122	100	83	790°. C-6 - Dark-gray to black SCHIST, m-f grabiotite, muscovite, quartz; close to modera spacing; slightly weathered, medium stror foliation defined by indistinct schistosity a contorted bands of quartz-feldspar 0.1" to with ptygmatic folds; foliation dip 45to 70 softened mica on some foliation fractures; staining on fractures from 70.7' to 71.2'; Medium-gray medium to fine grained GR 63.2' to 63.7', 63.8'-63.9' and 64.1'-65.4'; contorted and irregular but intact.	ate fracture ng to strong; and 1.0"thick, o; Tron ANITE at,	II	R4	*80 10 30 10 50 40 0 <sub>MB</sub> *0 10 *50 *80 40 10 <sub>MB</sub> 5 5 40	1.5 3.0 3.0 1.5 3.0 3.0 2.0 1.5 3.0 2.0 1.5 3.0	1.0 1.0 2.0 3.0 1.0 1.0 2.0 4.0 1.0 2.0 4.0 4.0	52.6 - 53.1 - 53.2 - 53.3 - 54 - 55.9 - 56.2 - 57.9 - 58.4 - 60.8 - 61.6 - 62.4 - 63.2 -	
NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/23/06	- - - - 75 - - - -		C-7 71.2 - 80.7	114	100	84	C-7 - 71.2' to 76.0': Dark-gray to black SC grains of biotite, quartz, muscovite, sparse close to moderate fracture spacing; slightl weathered; strong; foliation defined by we schistosity and contorted bands of quartz 0.75"thick; foliation dips 70 to 90°. 76.0' to 80.0': Intermixed fine to medium gneissic SCHIST and QUARTZ and GRA inclusions in black, fine grained matrix; myide fracture spacing; unweathered to slig weathered; quartz-granite fragments are 0 gold metallic mineral at quartz-matrix cor 77.5' to 79.7'; bands in schist dip 60 to 90° 80.0' to 80.7': Dark-gray to black SCHIST	e garnet; y avy 0.1" to black MITE noderate to ghtly .5" to 4.0"; ttacts from	II I/II	R4	30 *60 30 50 0 <sub>MB</sub> *50 40 60 <sub>MB</sub> 5 *80 *70 40 40 *80 5 *80	1.5 1.5 3.0 3.0 3.0 - 1.5 2.0 - 2.0 1.5 1.5 3.0 3.0 3.0	2.0 3.0 1.0 1.0 2.0 - 1.0 4.0 4.0 1.0 4.0 1.0 3.0	63.4 - 64.2 - 65.6 - 65.6 - 66.1 - 67 67.7 - 68.3 68.6 - 69.1 - 69.2 69.9 - 70.6 70.7 - 71	
NO. 7 CO	-						C-8 - Dark-gray to black SCHIST m-f gra biotite, quartz, muscovite, other black mai minerals.	fic	II	R4	5 *85 60	1.5 1.5 3.0	1.0 4.0 1.0	71.2 71.3 71.4	
							Bori	ng No	FD-	5	Shee	et2	of	4	

DD	Parsons Brinckerhoff
TIJ	Quade &
100 YEARS ®	Douglas, Inc.

DURING NUMBER. FD-3										
SHEET NUMBER:	3	of	4							

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

	CLIEN	T: M	ΙΤΑ				INS	SPECT	OR:	C. Bu	rzyns	ki		
T		(uir					•				DIS	CONTI	YTIUN	DATA
	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	ANGLE (deg)	٦Ļ	Ja	DEPTH (feet)
-	- 85		C-8 80.7 - 89.2	102	100	80	sparse garnet, except fine grained from 84.8' to and medium gray from 88.5' to 89.2'; close to moderate fracture spacing; slightly weathered, moderately weathered from 88.5' to 89.2'; stron except very weak from 88.5' to 89.2', where int core can easily be broken with the hands; foliat defined by faint schistosity and thin (<0.1') ban below 84.8'; foliation dips 40 to 80°; near vertic quartz inclusions from 81.4' to 82.2', with gold metallic mineral at edges.	except ng, tact tion nding cal	III	* R1	10 40 10 40 <sub>MB</sub> 30 50/20 <sub>MI</sub> *50 *70 30 40 30 40	3.0 3.0 2.0 - 3.0 3.0 1.5 1.5 3.0 3.0 3.0 1.5	1.0 1.0 1.0 - 1.0 - 1.0 2.0 2.0 1.0 1.0 2.0	72.1 72.9 - 73.7 74.3 - 75.2 _ 75.5 75.7 - 75.9 77.9 - 78.1 - 78.8 80.3 -
	- 90 - 95		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; modera wide fracture spacing except close to very close spacing at 92.9' to 93.7'; unweathered to slightly weathered; strong; foliation defined by indisting discontinuous schistosity; foliation dips 50 to 75	ate to se ly nct,	I/II	R4	5 20 40 40 20 40 10 <sub>MB</sub> 30 <sub>MB</sub> *45 40 20 10 <sub>MB</sub> 30	1.5 3.0 1.5 3.0 2.0 - 1.5 2.0 2.0 - 1.5 2.0 2.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 2.0 4.0	80.3 - 80.7 - 80.8 - 81.4 - 82.2 - 82.5 - 82.8 - 84.6 - 85.3 - 86.4 - 87.4 - 88.3 - 88.3 - 88.5 -
23/06	- 100 - 105		C-10 98.4 - 107.7	110	99	84	C-10 - Dark-gray to black SCHIST m-f grains obtite, quartz, muscovite, other black mafic minerals, sparse coarse grained garnet; modera fracture spacing except very close to extremely spacing from 100.6' to 101.1'; slightly weathered to unweathered, except moderately weathered from 100.6' to 101.1'; strong, except medium strong 100.6' to 101.1'; foliation defined by faint schist and thin (<0.1') quartz bands; foliation dips 50th 60°; from 101.3' to 104.8', almost pure quartz, where the control of	ate y close pieces, om from stosity to with com ore	I/II III I/II	R4 R3 R4	20 50 50 20 20 20 30 45 *50 30-40 30 45 *60 <sub>MB</sub>	1.0 2.0 3.0 3.0 1.5 3.0 3.0 3.0 2 2.0 1.5 3.0	4.0 4.0 1.0 4.0 3.0 3.0 1.0 1.0 2 1.0 1.0	88.9 89.2 - 91.8 - 92.8 92.9 - 93.1 93.3 - 94 95 - 97.7 97.9 - 98.4 - 99.7
7 CORING LOG NO 7NE.GPJ MAINLI~1.GLB 8/23/06	- 110 - 115		C-11 107.7 - 117.7	120	100	91	infill.  C-11 - 107.7' to 108.5': Dark-gray to black SCF as above.  108.5' to 115.2': Light to medium gray PEGMA c-m grains of feldspar, quartz, muscovite, spars garnet; very close to moderate fracture spacing unweathered to slightly weathered; strong to vestrong; inclusions of dark-gray schist and light-granite, 6" to 12" long, with near vertical contaslight orange iron staining 110.8' to 111.1'.  115.2' to 117.7': Medium gray to black SCHIST above	HIST,  ATITE se g; ery -gray acts;	I/II I/II	R4 R4/R5 R4	*40 60 90 30 30 <sub>MB</sub> 80 60 30 85 10 50 0 <sub>MB</sub> 40 10 40 30	1.5 1.5 2.0 2.0 1.5 1.5 3.0 2.0 1.5 3.0 2.0 1.5 3.0 2.0	2.0 2.0 2.0 2.0 2.0 1.0 1.0 1.0 1.0 1.0 1.0	100 - 100.6 100.7 - 100.75_ 100.8 100.9- 101 101.05- 101.1_ 101.15 101.3 - 102.5 103.1 - 104.3_ 104.35 105.2 - 106.2
ġ Z							Boring N	<u>_</u> √o.	FD-	 5	Shee		of	4

DR	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER:	FD-5			
SHEET NUMBER:_	4	_ of _	4	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: C. Deigert

	CLIEN	IT: M	TA				INSP	PECTO	)R: <b>(</b>	C. Bu	rzyns	ki		
		in)									DIS	CONTI	VUITY	DATA
	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	ANGLE (deg)	٦	Гр	DEPTH (feet)
Г											40	3.0	1.0	107.1
-  -  -  -	120		C-12 117.7 - 124.0	75	100	97	C-12 - Medium-gray to black SCHIST m-f grains biotite, muscovite, quartz, other mafic minerals, v scattered garnets up to 0.1" across; unweathered, moderate to wide fracture spacing; strong; foliation defined by faint schistosity, dipping 40to 60°.	with	I	R4	*60 50 <sub>MB</sub> *60 20 20 30 50 50 50 5	1.0 1.5 2.0 2.0 2.0 3.0 1.0 1.5 3.0	1.0 1.0 1.0 1.0 1.0 1.0 3.0 4.0 1.0	107.4 - 107.7 108.2 - 108.9 110 110.2 - 110.6 111 - 111.1 - 112
-  -  -  -	125						E.O.B at 124.0'.				60 5 30 40 *50 *40 *50 20 30	3.0 1.5 3.0 2.0 2.0 1.0 1.5 1.5	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	112.7 - 112.8 112.9 113.7 - 115.4 116.3 - 116.8 117.4 - 117.7 -
- - -	130										*60 30 <sub>MB</sub> *40 30 <sub>MB</sub> *40 35 10 <sub>MB</sub>	1.3 2.0 1.5 1.5 2.0 3.0	1.0 2.0 1.0 - 1.0 - 1.0 1.0	117.7 - 118 - 118.9 - 120.3 121.1 - 121.8 - 123 - 123.6 - 124
-	135													
INLI~1.GLB 8/23/06	140													 - - -
NO. 7 CORING LOG NO 7NE.GPJ MAINLI~1.GLB 8/23/06	145													-
NO. 7 CC	. 33						Boring No		F <b>D-5</b>		Shee	t 4	of	4

		<b>Ì</b> F	ar	sor	าร								BORING	NUMBE	R: <b>FD-6</b>		
		=		ick		off	R	OF	RIN	CI	$\cap$	G	SHEET	NUMBER	R:1_	of	2
≣				ade			ם	OI.	7114	Gi		G					
	100 YEARS	e C	)οι	ıgla	as,	Inc.							PROJEC	CT NUMB	BER:		
					•	line Ex	tensio	n						ON: Trac			
LOCA			nh	att	an									. N: 214,			1.5
CLIEN								_					STN. NC			FFSET:	
					ey ]	Boring &	& Drill	ing						CE ELEV	: 108.0+/	-	
DRILL			$\sim$										DATUM:	•			
INSPE					_								<u> </u>				_
					Ro	tary Wa	sh							DATE: <b>5/</b>			-
RIG T	YPE: (	$\neg$			C :-	lit C C	Ne alley T	ula a	Distan		h C	ana Dannal	FINISH	DATE: 6/4		IME: 2:30	) pm
		-	asir		Sp	lit Spoon S		ube	Piston	Gra		ore Barrel		GROUI	NDWATER Water		Hole
Type/S	symbo		HW			S	<u>U</u> []		P	G [	<u> </u>	С			Depth	Casing Depth	Depth
I.D.			4"			1.375"	2.938'	'   2	2.938"			2"	Date	Time	(ft)	(ft)	(ft)
O.D.			4.5'	"		2"	3"		3"			3"					
Length	1					24"	24"		24"								
Hamm	er Wt	. 30	00 1	bs		140 lbs	Dril	Rod S	ize		NW	J					
Hamm	er Fal	I	24'	'		30"	1.1	D. (O.D	.)		(2.93	8")					
					SAI	MPLE		SOIL	. (Blows	/6 in.)							
et)	90.	£	H		Т		+		·	· ·	REC.	-					
– (fe		(Blows/ft) (Min./ft)				et)	0/6	6/12	12/18	18/24	(in.)	] [,,	ELD CLAS	SSIEICAT	LIUN VVII	) DEMAG	oke.
DEPTH (feet)	GRAPHIC LOG	<u>@</u> ≥		띪	7	(£			CORING	<b>3</b>		] ["	ELD CLA	SSIFICAT	ION AND	JINEWAR	MO
	GR	CASING (CORING	TYPE	NUMBER	SYMBOL	DEPTH (feet)	RUN	REC.	REC.	L>4"	RQD	Depth					
	1.0.2	80	⊭	ž	တ်	<u> </u>	(in.)	(in.)	%	(in.)	%	Elev.					
L	**************************************		1										Concrete co		•		
L	***				$\downarrow$								Forced Air- 10 feet	Tricone met	thod used to	clear utilit	ies to
L			G	G-	IX	1.6 - 3.0	-	-	-	-			Brown m-f	SAND, little	e m-f Grave	el, moist (SN	M)
	**************************************												(FILL) Dark-gray c	-f SAND, se	ome f-Grav	el, little Silt	: &
_ _ 5	**				$\mathbb{N}$								Clay, occasi	ional wood	fragments (	SM) (FILL)	)
	1 60 X		1		V												_
	*		G	G-2	2 \	3.0 - 10.0	) -	-	-	-							
			1														•
	**************************************		1		$\  \cdot \ $												•
<u>ا</u> ،	***		1														•
<del>-</del> 10	Г. И		1										(Top 6 inch		SAND, litt	le c-f Grave	el,
<b> </b>	***		S	S-1		10.0 - 12.	0 2	10	20	27	8		dense (SM) (Bottom 2 ii	(FILL) nches) Grav	SILT & CI	LAY, slight	lv
			1										organic (OF				
-	<b>│                                    </b>		ł														
-			1														
<del>-</del> 15			ł										Gray CLAY	Z & SILT. so	ome f- Sand	l. little c-f G	aravel. –
<b>5</b> -			S	S-2	2	15.0 - 17.	0 4	2	11	51	20		slightly orga			.,	
-			ł														
:  -			ł														
<b> </b>			1														
<b>–</b> 20			1										0 0 1	, o cu	2 ~	1 11	
L			$ _{S}$	S-3	3	20.0 - 22.	0 65	20	8	12	6		Gray CLAY very stiff (C	′ & SILT, so 'L)	ome m-f Gr	avel, little f	Sand,
			<b>]</b>										J = 1 == (C	,			
L																	
			L														
												Bor	ing No.	FD-6	Shee	t 1 c	of 2

			=		son									BORING NUMBER: FD-6
			_		cke ide		off	В	OR	RIN	GI	_0	G	SHEET NUMBER: 2 of 2
		100 YEAR					Inc.		(	(contir	nued)			PROJECT NUMBER:
P	ROJE		_	Su	ıbv	vay	line Ex	tension	1					CONTRACTOR: Jersey Boring & Drilling
$ _{L}$	OCAT	ΓΙΟΝ:	Maı	nha	atta	an								DRILLER: C. Deigert
	CLIEN													INSPECTOR: C. Burzynski
F						211	MPLE		90II	. (Blows	/6 in )			INOI LOTOIX. C. Bui Zyliski
	et)	90.	t) #(	$\vdash$			VIFLE			1	· ·	REC.		
	DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)				eet)	0/6	6/12	12/18	18/24	(in.)	FIE	ELD CLASSIFICATION AND REMARKS
	DEP.	RAP	ING (	Ш	NUMBER	SYMBOL	DEPTH (feet)			CORING				
			CAS	TYPE	Ş	SYN		RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	Depth Elev.	
Г		1		S	S-4		25.0 - 25.	0 100/0	-	-	-	0		No recovery
$\downarrow$														
ŀ													29.0	Hard drilling 24.5' to 29'.
	30													Hard drilling 24.5' to 29'. 3-inch casing advanced to 27'.  Roller bit refusal and begin coring rock at 29'.
-	30													
ŀ														
ŀ														
L	35													_
ŀ														
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t														
L	40													· -
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Ĺ														
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3/06	50													_
LB 8/2														
SPJ MAINLI~														
E GPJ	55													_
<b>₹</b>  -														
90] _														
30RING LOG														
<b>т</b>					<u> </u>			-			<u> </u>		L Bori	ing No. FD-6 Sheet 2 of 2

	È <b>≣</b>	Pars	ons				BORING	NUM	IBER:	<b>FD-6</b>			
		Brind	kerho	off		CORING LOG	SHEET	NUME	BER:_	1	c	of	3
<u> </u>		Quad	de &			COKING LOG							
-	10 YEA	<b>P</b> Doug	glas, I	nc.			PROJEC	T NU	MBEF	₹:			
PROJ	ECT:	No 7 Sul	bway	line l	Extens	sion	LOCATION	ON: T	rack 2	21-40'	W of	f 11th	Ave
LOCA	TION	l: Manha	ttan				COORD	N: 2	14,26	1.2 I	E: 983	3,394.	5
CLIEN	IT: M	<b>TA</b>					STN. NC	).:		(	DFFSI	ET:	
CONT	RAC	TOR: Jer	rsey B	Boring	g & D	rilling	SURFAC	E EL	EV.:1	08.0+	/_		
DRILL	ER:	C. Deiger	rt				DATUM:						
INSPE	CTC	R: <b>C. Bu</b>	rzyns	ski									
DRILL	ING	METHOD	D: Dia	mond	drilli	ng with double core barrel	START	DATE	5/31/	<b>/05</b> 7	IME:	8:30	pm
RIG T	YPE:	CME-55	5				FINISH I	DATE	6/4/0	5 7	IME:	2:30	pm
								GF	OUND	WATEF	R DATA	4	
CORE	BAF	RREL DA	TA:		NOT	ES:				Water	Cas		Hole
TYPE:	: NX						Date	Tim		Depth (ft)	Dep (fi		Depth (ft)
CORE	SIZI	Ξ: 2"											
O.D.:	3"												
I.D.: 2	2"										+		
		ZE: 4" (4.	.5")								+	-+	
07 10 11										DIS	 CONTI	NUITY	DATA
_ ≘	(ft/min)	<u>o</u> :€	.E.	(%		DESCRIPTION AND REMARK		ڻ ن	_				
DEPTH (feet)	Щ	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	(%)	(Lithology, Structure, Weatherin Continuity, Strength, Color, Grain		WEATHERING	STRENGTH	) (Be			et)
ΙĚ	RATE	L SE		Ä	RQD (		•	뽀	N N	) (q	<u> </u>		l (fe
U	9	A C	8	8	X	* - Denotes discontinuity along foli	ation	A	) TR	ANGLE (deg)	_ ا	Ja	DEPTH (feet)
	CORING	88	8			MB - Denotes mechanical brea	k	≥	0,	Ā			吕
	ŭ					C-1 - 29.0' to 31.5': Dark-gray to black S	CHICT a ma	II	R3	5	2.0	2.0	29
<b>–</b> 30						grains of biotite, quartz, other black mafi	c minerals,	11	KS	25	1.5	1.0	29.1-
1						very close to moderate fracture spacing; weathered, medium strong; foliation defi	slightly ned by wayw			*60	1.5	1.0	29.2
L						contorted schistosity and thin (<0.1") disc	continuous [	II	R4	*70 *75	1.5 1.0	2.0	31.1 31.5
L		C-1	98	100	97	contorted schistosity and thin (<0.1") disquartz bands; foliation dips 75 to 90°; 1"-intrusions of light-gray, fine grained GRA 29.0' -29.1' and 29.5' - 29.6'; from 31.5' to	inch thick			5	2.0	1.0	32.1
		29.0 - 37.2	98	100	9/	29.0' -29.1' and 29.5' - 29.6'; from 31.5' to	o 37.2':			5 5	2.0 1.5	1.0	32.3 32.8
Ī						Light-gray GRANITE, f- grains of proba muscovite, quartz and feldspar; close to r	ble			70	1.5	4.0	33.3
<del>-</del> 35						fracture spacing, lightly weathered, except	ot			5 <sub>MB</sub> 20	1.5	2.0	33.8- 34.4
ŀ						moderately weathered at 36.9'-37.2', stroi medium strong at 36.9'-37.2'; light-gray t	ng, except			30	1.5	2.0	34.7
<b>+</b>						Isalmon-pink, c- grained PEGMATITE fr	om 34.0' to	II	R3	5 20	3.0 2.0	3.0	35.7 36.1
-						34.7' and 35.3' to 36.1'; contacts with grading dipping; white clay on mica-rich fracture		II	R4	5	2.0	2.0	36.4
+						33.3'; red clay on steep fractures at 36.9'-	37.2' [	III/II	R3	70 80	1.0 1.0	4.0	36.9
<del>-</del> 40						C-2 - 37.2' to 38.7': Medium-gray GRAN grains of probable quartz, feldspar, musc				10	1.5	1.0	37.2_
Į.						vertical contact with gray to salmon-pink	: i			20 *50	1.5 1.0	2.0	37.3 37.4
L		C-2	120	100	0.4	PEGMATITE, with coarse grains of feld and medium grained garnet; dark-gray bi				45	2.0	1.0	37.6
9		37.2 - 47.2	120	100	84	SCHIST from 37.2' to 37.4'; very close to	moderate			5 <sub>MB</sub> 5	1.5	1.0	38.8 39.1
1/23/1						In fracture spacing, slightly weathered, strong in schist dips 50°, parallel to contact with		II	R4	5	1.5	1.0	39.2
~ 						38.7' to 43.0': Dark-gray to black SCHIS	T, medium			40 20	1.0 1.5	4.0	39.3 39.4
_ 45						to coarse grains of biotite, quartz, musco mafic minerals; close to moderate fractur	vite, other	:		20	2.0	1.0	39.6
						slightly to moderately weathered, mediun	n strong; 🗒	,,,	D2	*85 75	1.0 1.5	4.0	39.8 40.3
<u> </u>			ļ			foliation defined by wavy schistosity dip 90°; light-gray PEGMATITE in vertical of	ping 80to ∥ contact from	II	R3	45	2.0	1.0	41 -
<u></u>						¶41.1' to 46.0'; quartz-PEGMATITE at 39	.2'-39.5' ha	II	K3/K4	*75-85 10	2.0 3.0	1.0	42.4 42.9
Ž <b> </b> _ -						pitted core surface with numerous healed open fractures, most dipping 20. 43.0' - 4	, partly 5 0' and			$5_{\mathrm{MB}}$	-	-	43.4
50						45.8'-46.4' Medium-gray GRANITE, as a	above,			30	2.0 3.0	1.0	45.3 45.8-
						except wide fracture spacing. 45.0' - 45.8' and 46.4'-47.2': Dark-gray to	black			20	1.5	1.0	46.3
		C-3	l , .			SCHIST, as above except extremely clos	e fracturing			*40 30	1.0 1.5	1.0	47.05 47.1
Š		47.2 - 57.2	120	100	98	at 47.0'-47.2' C-3 - 47.2' to 53.4': Dark-gray to black S	CHIST c-f			20	1.0	1.0	47.2
)  - 						grains of biotite, quartz, feldspar, muscov		11	R4/R5	60 5	1.0	1.0 2.0	48.2 48.5
				1		ļ .	:		+N+/NJ				

Sheet

of

3

**FD-6** 

Boring No.

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER: FD-6 SHEET NUMBER: 2 of 3

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CLIENT: MTA

CONTRACTOR: Jersey Boring & Drilling

CLIEN	IT: M	TA				INSP	ECTOR	C. Bu	rzyns	ki		
	(ft/min)								DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#//	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	ANGLE (deg)	٦	Ja	DEPTH (feet)
55 - -						black mafic minerals, very close to moderate frac spacing; slightly weathered, medium strong to str rock breaks easily along 1/4-inch thick biotite sea wavy, contorted foliation defined by schistosity a thin (<0.1") ptygmatically folded quartz bands;	ong, ms¦;		5 5 *55 *45 <sub>MB</sub> *50	1.5 2.0 1.5 -	2.0 2.0 2.0 - 1.0	49.1 49.2— 51.4 52.2 — 52.4 _
- - 60 - -		C-4 57.2 - 67.2	120	100	90	foliation dips 40 to 90°. 53.4′ - 57.2′: Light gray   GRANITE, uniform, fine to medium grains of while 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 about a schibal to medium-gray GRANITIC GNEISS c-f grains of feldspar, quartz, muscovite; moderat	d,   	R4/R5	60 20 20 <sub>MB</sub> 20 20	1.5 1.5 2.0 2.0 2.0 1.5	2.0 1.0 1.0 1.0 1.0	53.7 54.2 - 55.9 57.2 - 57.9 - 60.5 - 61.6 -
- - 65 - -		57.2 - 67.2				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': Bla SCHIST, medium grains of biotite and quartz, very close fracture spacing to crushed; weak to extrem	ry elyj II	R2/R1	5 *70 25 25 5 <sub>MB</sub> 35 40 20 20	3.0 1.5 2.0 3.0 - 1.5 1.5 1.5	2.0 2.0 1.0 1.0 3.0 1.0 1.0	62 62.1 - 62.2 - 62.9 - 63.3 - 64.1 64.3 - 64.35 - 64.5
- - 70 - -		C-5	120	100	68	weak, friable; foliation defined by schistosity, dipping 70 to foliation defined by schistosity, grains of quartz, biotite, other mafic minerals, ver close to moderate fracture spacing, except extrem close from 70.15' to 70.4'; foliation defined by, w discontinuous quartz bands and irregular schistosidipping 50' to 90°; fine grained quartz band from 69.2' to 70.15'; dark-gray, sandy clay FAULT	ely avy ty II	R4/R3 R0/R2	20 *70 5 30	1.5 1.0 1.5 1.5 1.0 - 1.0 1.5	4.0 1.0 2.0 2.0 4.0 - 4.0 1.0	66.4 - 66.7 66.8 - 67.1 67.2 - 67.4 67.7 -
- - 75 - -		67.2 - 77.2	120	100	00	GOUGE from 70.2' to 70.3'; 75 healed fracture at 68.1'; 71.8' to 77.2': Medium-gray PEGMATITE, mediu 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. 73.1', 73.7' to 74.6' and 75.9' to 76.5', with near	um                         		5 55 *60 55 *50 15 20 50	3.0 1.5 1.5 1.5 1.0 1.5 1.5 1.0	1.0 3.0 1.0 4.0 4.0 2.0 2.0 3.0	68.35 _ 68.6 68.9 - 69 69.05 69.5 _ 69.7 69.9 -
- - 80 - -		C-6	120	100	93	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 of grains of quartz, feldspar, muscovite, garnet, som epidote (?) along fractures; moderate fracture	e	R3/R4 R3/R4	5 5 5	1.0 1.5 1.5 1.5 2.0 2.0 1.5 3.0 3.0	2.0 6.0 4.0 4.0 4.0 1.0 1.0 1.0	70 70.15 - 70.4 - 70.45 70.6 - 71.4 71.5 - 72 - 72.2
- - 85 - -		77.2 - 87.2		700		spacing, except very close spacing from 77.7' to 7 and 79.5' to 79.9'; slightly weathered, except moderately weathered from 79.5' to 79.9'; mediur strong to strong; banded inclusions of black schis 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.	n   t   o	D 4	55 5 5 30 10 70 *70 5 <sub>MB</sub>	1.5 1.5 1.5 1.5 2.0 2.0 2.0	1.0 2.0 2.0 2.0 1.0 3.0 1.0	73.2 - 73.8 74.6 - 74.9_ 75.3 75.4 - 76 77.2 -
_						l'quartz, biotite, muscovite; close to wide fracture spacing; slightly weathered, medium strong to str	ong;	R4	55 5 Shee	1.5 1.5	1.0 3.0	77.7 77.9

DR	Parsons Brinckerhoff
	Quade &
100	Douglas, Inc.

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

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

Foliation defined by wavy, discontinuous quartz	CLIENT: N	MTA	_			INSPE	CTOR:	C. Bu	rzyns	ki		
Section   Figure	min)		(			DESCRIPTION AND DEMARKS			DIS	CONTI	NUITY	DATA
Section   Sect	TH (fe	CORE RUN NO AND DEPTH (ft	RECOVERY (in	RECOVERY (%	RQD (%)	(Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Size)  * - Denotes discontinuity along foliation	WEATHERING	STRENGTH	ANGLE (deg)	٦	Ы	DEPTH (feet)
C-8 Orange of the content of the con		C-7 87.2 - 97.2	120	100	98	bands and faint schistosity; foliation dips 60to 80°. 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			5 30 5 5 5 *35 *50 5 30 90 10 50	2.0 2.0 2.0 2.0 2 1.0 1.0 2.0 3.0 2.0 3.0 3.0	1.0 3.0 3.0 3.0 3.0 1.0 2.0 2.0 2.0 2.0 2.0	78.7 79.4— 79.5 79.55 - 79.6 - 79.65 79.9 - 80.2 81.8 - 81.9— 82.1 82.2 - 82.7
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.    C-9	- 100	97.2 -	60	100	95	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	II	R4	*50 20 50 *65 20 5 <sub>MB</sub> 40	1.5 2.0 3.0 2.0 3.0	2.0 2.0 2.0 1.0 1.0	83.6 - 85.2 - 85.8 - 87.2 - 88.3 - 90.8 - 91.4 - 92
C-10		102.2 -	119	100	97	medium fine grains of quartz, biotite and other mafi 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 metalli mineral at quartz contacts; wavy core sides		R4/R5	*60 *50 *50 *40 *50 40 30 <sub>MB</sub> *60 *55 *50 *50 5 30 5 <sub>MB</sub> 40	1.5 1.5 1.0 1.0 3.0 - 1.5 1.5 1.5 1.5 1.5	1.0 3.0 1.0 2.0 1.0 1.0 2.0 1.0 1.0 1.0 1.0	92.2 - 92.4 92.7 - 93.2 - 94.8 95.2 - 96.7 97.7 - 98.4 - 99.2 101.2 - 101.8 102.2 103.3 - 104.5
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		112.1 -	98	100	96	grains of quartz, biotite, muscovite, other mafic minerals; scattered garnet up to 0.2" across; modera 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	re II I	R4	15 20 5 <sub>MB</sub> 50 5 5 5 *50 *75 35 80 5	1.5 2.0 2.0 2.0 2.0 1.5 1.5 2.0 2.0 1.5	4.0 2.0 - 1.0 3.0 1.0 4.0 1.0 2.0 1.0	106.3 - 106.55_107.2 - 108.7 - 109 - 109.6_110.15 - 111.8 - 111.6 - 112.3_112.4
Boring No. FD-6 Sheet 3 of 3	- 120						ED	6	*60 25 5 <sub>MB</sub> 10 <sub>MB</sub> 30 10	1.5 2.0 - 3.0 2.0	2.0 1.0 - 1.0 1.0	113.4— 113.6 114— 117.1— 117.4 120.2— 120.3

# MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 1 of 2 BORING NO. MG-819

					BORII	NG LOG				FILE NO.	4840
PROJECT: V	VEST S	IDE HIGH	WAY	DO	OT. CONTR. NO	D.: D 2	250002	)		ELEVATION:	116 2
COORDINAT	ES: N	192230.	6	E	199887		.50002	<del>-</del>	<del></del>	DATUM: Mar	+16.3
BORING LOC	CATION:	MTA Yar	d, MABSI	OA Garao	re.						
INSPECTOR:			erjee (M		,	·			·		D: 04/01/82
CONTRACTO	PR:		George,							DATE COMP.:	04/01/82
DRILLER:		J. Stev				HELPER:	C. S	oto			<del></del>
TYPE OF RIC	: TRUCK	∑ si	KID∏ BA	RGE MOUNT	FD TRIP	<del></del>	HER []	000.			<del> </del>
CASING: DIA	. 4	IN, FROM	0.0 то 3	4.5 FT.; C	DIA.	N. FROM	TO		FT.		· · · · · · · · · · · · · · · · · · ·
DRILLING M											
SAMPLING		D-\$A	MPLER: S	plit Spo	on, 2"0	D			DRILL	Y BIT DIA. 3	
		U-SA	MPLER: DIA		TYPE	.D.	<del></del> -		DRILL	HOD BY	<u> </u>
(TYPE	& SIZE)		BIT Diam			<del>-</del>		<del></del>	<del></del>	· · · · · · · · · · · · · · · · · · ·	
FEED DURIN	G CORIN	G: MECHAN	IICAL [7]		AULIC 😡	0751155		<del></del>	CORE	BARREL Doub	le Barrel
SAMPLER HA					AOLIC B	OTHER [				<del> </del>	
CASING HAM		<del></del>		140	<del></del>	AVG. FALL		IN.			
NO. OF U-TU			OF VANE TO	300	<del></del>	AVG. FALL		IN.			
			OF VANE 1	·····		о воск 33		FT. D	EPTH TO	COMP. 47.2	FT.
	T		<del></del>	WA	TER LEVEL C	BSERVATIO	NS			**	
DATE	TIME	DEPTH OF	DEPTH OF	DEPTH TO	ELEVATION						
		HOLE	CASING	WATER	OFTIDE	1		CONDIT	IONS OF C	BSERVATION	-
04/01/82	1400	47.2	34.5	11.7		At comp	letio	n of r	ock dr	illing	
04/01/82	1410	47.2	29.5	12.9			10010	. 0. 1	OCK GE	TTTIIG.	<u>`</u>
04/01/82	1420	-	0.0	12.9		<u> </u>					<del></del>
						<del></del>			·		· · — · · · · · · · · · · · · · · · · ·
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						,					

DAILY	CASING		SAMP	LE	644015 0500000	Γ .	T	T
ROGRESS	BLOWS	NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0715		1D	1.5			*	0	*Concrete
	5	10	3.5	4-3 5-4	Dk gray c-f sand, sm gvl, cndrs	0.7	Γ -	W = Water
	9		3.5	5-4	silt (Fill) (SM)	0.7		content in %
	11		<del> </del>	·····		<b>3</b> 2.	[- <u>-</u>	concent in *
i	13	2D	5.0	3-5	D- 2D	us.	_ 5_	
	14	20	7.0	3-3	Do 1D, tr brick (Fill) (SM)	, ;		]
	34	_	<del>  ``</del>	3-3		sand (Fil	L _	į.
	25		<del>                                     </del>			8a (F	L _	
Ì	12				·	Ψ.,	L _	İ
		NR	10.0	6-4		o-f Lok	10-	·
. [	6		12.0	4-4		brn c-		
. [	8	3D	12.0	3-2	Brn gilty met good to a	, H		
> -	7		14.0	2-2	Brn silty m-f sand, trace gvl	cpt ]		
Sunny	25				(Fill) (SM)	ועו		
ns L		4D	15.0	6-3	Brn f-c sand, sm silt, tr gvl	med .	<b>-</b> 15 -	
-	6		17.0	1-1	(Fill) (SM)			·
·	5				(1111) (511)	gg 1		
. ŀ	4					Sm		
`., <b>-</b>	20					0.1		
- 66 - 166		5D	20.0 22.0	17-13	Top: Do 4D (Fill) (SM)	I I E	- 20 -	
경누	19 17		22.0	7-5	Bot: Lt brn m-f sand, sm silt	21.0	<b>-</b> . ┐	
04/01/82	13				(SM)	Sa, sm sitt		
0 -	12		<del></del>	<del></del>	į.	깇힌댔늰	_	
<u> </u> -		in.	75.0				- 25 -	26.0'-27.0'
<u> </u>	22		25.0 27.0	11-13 2-3	Brown m-f sand, sm organic silt, trace gravel (SM)	2 4 0 L		26.0'-27.0' Organic silt,
	24		<del>~/•V</del>	4-3	, , , , , , , , , , , , , , , , , , ,			mixture.
<u> </u>	25				1	27.0		***Med cpt red-
. –	24	_			ŀ	***		brn silt, sm fine sand

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET\_2 of 2 BORING NO. MG-819

	•		•		BORING LOG	· .	BORING NO			
DAILY	CASING		SAMP	· · · · · · · · · · · · · · · · · · ·				1101		
PROGRESS		<del></del>	DEPTH	BLOWS/6"		STRATA	(FT)	REMARKS		
	44	7D.	30.0	3-10	Top:Red-brn silt, sm mic fine	7D Top 31.5*	_ 30 _	W = 24 (Top)		
	131	<del> </del>	32.0	7-11	sand (ML)	31.5*		*Decomposed mica		
	125	<del> </del>	<del> </del>	<del> </del>	BOT: Lt gray micaceous f-m			schist		
	125/6"			<del> </del>	sand (SP)	T C		34.5		
Σt		1C	34.5	Rec=100%	Lt gray garnite mica schist, tr quartz inclusions, mdjtd, UnWIncJts	ica schist, sm qtz inclusions, mdjtd Jts to UnWExJts	<b>—</b> 35 <b>—</b>			
Sunns			39.5	ROD=92%	quartz inclusions, mditd,	S, S		·		
Ω			ļ	·	UnWIncJts	Lst lon InW				
		<u> </u>	ļ			chi usi o C				
N1		20	20 5	<b>5</b> 1000		C. D. M.	- 40-	Core barrel		
/8		2C	139.5	Kec=100%	Light gray mica schist, sm quartz veins, jtd, UnWExJts	mica tz ind reJts	L " -	blocked in run		
04/01/82			4.7	RQD-00-6	* J · · · , J · · · · · · · · · · · · · ·	tz ini		2C.		
74						grt r qt nwin				
_		3C		Rec=100%	UD IC : 1	ורפעג	- 45-	ļ		
	·		47.2	RQD=100%	· .	Lt qry veins, to jtd,				
ļ		·	<u> </u>			갽谎				
1500	<del></del> -					rei to i		1		
					La constant de la con	47.2		į		
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## MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 1 of 2 BORING NO. MG-820

**BORING LOG** FILE NO. 4840 PROJECT: WEST SIDE HIGHWAY DOT. CONTR. NO.: D 250002 COORDINATES: N 192373.6 ELEVATION: +9.1 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 IN. FROM 0.0 TO 10.0 FT.; DIA. CASING: DIA. A IN. FROM 0.0 TO 23.2 FT. DRILLING MUD UTILIZED: MUD TYPE ROTARY BIT DIA. 3 3/4 IN. D-SAMPLER: Split Spoon. SAMPLING EQUIPMENT, 2" O.D. DRILL ROD U-SAMPLER: DIA. (TYPE & SIZE) 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.

		·	T	W	ATER LEVEL C	DBSERVATIONS 33.7 FT.
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	<del>                                     </del>	Orrowald D. 111
03/18/82	1030	33.7	23.2	9.0		Overnight. Drill rods in hole.
03/18/82		33.7	10.0	6.9		At completion of rock coring.
03/18/82	1100		0.0	6.5		After 3" dia casing completely withdrawn
						After all casing completely withdrawn

DAILY	CASING		SAM	PLE		<del></del>		
ROGRESS		NO.	DEPTH	BLOWS/6	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
71300 <sup>5</sup>	<del>-</del> -	1.0	<del> </del> _	<u> </u>		* 0.3	0	*Asphalt
loud.	<u> </u>	1D	1.5		Gray c-f sand, sm cndrs,gvl,	0.3		pc
וזיי ר	23 64		3.2	12-62/3"	brk, silt (Fill) (SM)			
1500	12			<del> </del>	<u> </u>	מי		•
0700	43	2D	F 0		<b>-</b>   · · · ·	ry gvl,sm cndrs,wood	1	
	77	20	5.0 6.0		Gray gvl, sm c-f sand, tr silt	gv1 rs,	5 <del>-</del>	
	69		0.0	<del> </del>	(Fill)(GP)	្រក្		
	83			<del> </del>	<del>-</del>	gry		
	95			<del> </del>	<del>-{</del>	l <b>-</b> ~-L	. ]	
		3D	10.0	46-76	Piocos of	보다.		Drilled ahead
Rain	TED		12.0	29-18	Pieces of gravel, trace coarse to fine sand (Fill)(CP)	Cpt sil	10 1	casing
Ra	3				to fine sand (Fill)(GP)	tt 🕻	- 4	15.0'-23.0'.
	H.				1	\$ -		Wash water col
Light	Ď				1	771 1	- 4	red-brown at
1	14	4D	15.0	15-38	Pieces of wood (Fill)	cpt san( ks,	-15-	18.0'
7	26		17.0	18-25	The second (FIII)	ril		Telescoped 3"
3/11/8	20			<u>-</u> -		Med G-f bric		casing in 4"
- 5	_28						• -	casing at 10.0
33	60					节다	• 🚽	
			20.0 22.0	53-41	Top: Red-brn m-f sand, sm gvl	일 다 한	20~	
300	49		22.0	48-81	silt (SM)	n c-f o	· 🚽	Piece of diabas
_	107				Bot: Brn gravelly f-c sand,tr	cpt, j brn rg, si	• -	gravel in wash
٤	5/2"		22 7			뙲	· 🚽	at 23.0'.
2				Rec=96%	TOP: Do gry garnet mica schistle	23.5		
2 2			28.7	RQD=80%	Cilta, UnWEx.Tta	23.5	25	
3/18/ Suppy		<del>- </del>			Bot: Lt gry garnet mica schist	ic Top clitchiky Unwextes		
03/18/82 Suppy		C	28.7		blky,UnW	당감절[	]	
~ F				ROD=88%	Lt gry garnet mica schist, mdjtd, UnWExJts	Tage	7	

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

SHEET 2 of 2

BORING NO. MG-820

FILE NO. 4840

DAILY	CASING		SAMPI	F	BORING LOG	· · · · · · · · · · · · · · · · · · ·		NO. 4840
ROGRESS	CASING	NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
						1.0	30	· · · · · · · · · · · · · · · · · · ·
Same						1C Bottam	┝ ┥	•
as				<del></del>			├	
Above					4	cljtd to	┡ -	
1100	<del></del>			<u> </u>	-{	blky UnWExJt	<u> </u>	
					4			
[						33.7	35	
					]		$\vdash$ $\dashv$	
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#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 1 of 2 BORING NO MG-824

NW

DRILL ROD

At completion. Water in hole.

· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	DOMME 110
	BORING LOG	FILE NO. 4840
PROJECT: WEST SIDE HIGHWAY	DOT. CONTR. NO.: D 250002	ELEVATION: +5.7
COORDINATES: N 192491.8	E 1998852.4	
BORING LOCATION: MTA Yard, Ramp		DATUM: Manhattan
INSPECTOR: Y.K. Chan (MRJD)		DATE STARTED: 04/07/8
CONTRACTOR: Warren George, Inc.		DATE COMP.: 04/08/8
DRILLER: J. Farrell	HELPER: G. Mccar	tar
TYPE OF RIG: TRUCK 🖾 SKID 🗋 BARGE	MOUNTED TRIPOD THER []	tal
CASING: DIA. 4 IN. FROM 0.0 TO 5.0	FT.; DIA. 3 IN. FROM 0.0 TO 29.5 FT	T
DRILLING MUD UTILIZED: MUD TYPE Quic	1 - 1	OTARY BIT DIA. 3 7/8 IN.
D 041171 55 5 5		7.1.1.1 DIA. 3 7/0 IN,

1 1175 0	SIZE										
		CORE		iamond,	NX				CORE BARREL	Double	Barrel
FEED DURING	CORIN	G: MECHAN	ICAL	HYDE	AULIC 🔀	OTHER [			TOTAL DAMINEL	DOMPTE	Darrer
SAMPLER HAM	MER: V	VEIGHT (LB	s) 14			AVG. FALL	30	IN.		<del></del>	<del> </del>
CASING HAMM		IGHT (LBS)	30	0		AVG. FALL	18	IN.		<del></del>	
NO. OF U-TUE	BES	_ NO.	OF VANE T			ROCK 27.		FT.	<b>DEPTH TO COMP. 39</b>	.5 FT.	
		<del></del>	,	w	ATER LEVEL O	BSERVATION	1S		· ·	1.	
DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE			COND	ITIONS OF OBSERVA	TION	
04/08/82	0730	20.0	5.0	0.0	<del></del>	Overnig	ht		mud in hole.		
04/08/82	1120	39.5	29.5	5.0	J	At comp			Water in hole	<del></del>	

D-SAMPLER: Split Spoon, 2" O.D.

U-SAMPLER: DIA.

SAMPLING EQUIPMENT,

		· · · · · · · · · · · · · · · · · · ·	T		·				
	AILY OGRESS	CASING BLOWS	NO.	SAMP DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
130	00	10 15 17	1D	2.0	6-8 9-8	Dark brown f-c sandy gravel, some silt, trace glass	tr	_0 _	W = Water content in %
	Sunny, Windy	31 17 Ω				(Fill) (GM)	brn, f-c , sm silt ss (Fill	 - 5 -	
	Sunny	हर स	NR 2D	5.5 7.5 7.5 9.5	6-8 5-6 9-9 16-13	Dark brown f-c sand, sm silt,	pt ak & gvl, , glas	- I	
	04/07/82	<u>н</u>		10.0 12.0 12.0	3-3 3-4 5-3	trace brick (Fill) (SM)  Black organic clayey m-f sand	Med sand bric	- 10 	
1530 0700	0		4D	14.0 15.0 17.0	4-6 1-1 1-1	(Fill)(SC)  Medium dark gray organic silty clay, tr fine sand, decomposed wood (OH)	tion 1 Loose Cilly 0 (Fill)	15	W = 72
	Sunny			20.0	1/12"	Do 4D, trace vegetation (OH)	4D, trace vegetation	20	W ≈ 57
. 00/ 00/ 70	04/08/82	6	-	25.0	6-5 5-6	Red-brn silty f-m sand, sm silty clay layers, tr gravel, mica (SM)	24.0	25-	Decomposed rock fgmts, in wash at 27.5'.

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

SHEET 2 of 2 BORING NO. MG-824

	BORING LOG						FILE NO4840		
DAILY PROGRESS	CASING BLOWS	NO.	SAMP DEPTH		SAMPLE DESCRIPTION	STRATA		REMARKS	
		1C	29.5		Green to light gray hornblende	<del> </del>	30		
٨.		<u> </u>	34.5	RQD=84%	mica schist, tr quartz veins &		- ~~		
Sunny				1	mica schist, jtd, UnWExJts.	1C	├ ┤		
Ä				1	, jou, com <u>and</u>	-	$\vdash$ $\dashv$		
01						24 5	<del>┆</del> ╴┤		
22		2C	34.5	Rec=96%	Light gray mica schist, trace	34.5	35		
× ×			39.5	RQD=84%	quartz inclusions, mdjtd,		$\vdash$ $\dashv$		
ő.					UnWExJts		<u> </u>		
04/08/82	<u> </u>					2C	<b>-</b> -		
						39.5	$\vdash$ $\dashv$		
1200						33.3	40		
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#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLY

825

-' AOLUMOLON OF DESIMONE	CHEET 1 _ 2
DE CONSULTANTS, INC.	SHEET 1 of 2
DE COMSOLIAMIS, INC.	BORING NO
DINALA	

FILE NO4840
ELEVATION: +6.2
ратим: Manhattan
DATE STARTED: 04/02/82
DATE COMP.: 04/05/82
DATE COMF.: 04/03/02
RY BIT DIA. 3 3/4, 2 15/16 IN
·
ROD BW
BARREL Double Barrel
сомр. 68.0 гт.

	<u> </u>	<del></del>		WA	TER LEVEL O	BSERVATIONS
DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	ELEVATION OF TIDE	CONDITIONS OF OBSERVATION
04/05/82		60.0	49.5	3.0		Over weekend
04/05/82		68.0	49.5	4.9		At completion of rock coring
04/05/82		68.0	35.0	9.0		tie compaction of lock coring
04/05/82		68.0	20.0	4.5		
04/05/82	1510		0.0	5.2		

DAILY	CASING	<u> </u>	SAME	LE		T	<del></del>	
PROGRESS	BLOWS	NO	. DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0700		1D	0.5	12-12	Dk gryc-f cinders, sm silt	<u></u>	(+1)	<u></u>
	16		2.5	8-9	(Fill) (SM)	0.3	<b>├</b>	*Asphalt
	14			""	(1111/(04)	]	<u> </u>	W = Water
	31				1	e	<b>-</b>	content in %
	32	<u> </u>			•	', some	├ <sup>^</sup> -	
	14	2D	5.0	7-4	Dk gray c-f cinders, some		- 5-	
	_ 11		7.0	4-5	organic silt (Fill) (SM)	nd (F)	├ -	
	14				organic silt (Fill)(SM)	sand		
Ĺ	13					0 0		
į	18.					o coarse fragments	<b></b>	
	11	3D	10.0	2-1	Gray fine sand on annual	ag gar	- 10 -	
ļ	16		12.0	1-2	Gray fine sand, sm organic silt	ပြည်		Lost all drill;
	82			-	(Fill) (SM)	t t	{	
	87						- 4	water at 12.0'.
Sunny	45					fine rock	- 4	
g L	28	4D	15.0	12-11		44 . P	- 15 🚽	
ω	_30		17.0	30-32	Dk gray c-f sand, sm silt, gvl	27		
Ļ	62				(Fill) (SM)	ck gray gravel,	- 1	
7	45					7 # 1		
8	46					dark ce gr		
05	30 1	NR	20.0	15-21	i	က်ပြို့ မြ	- 20 -	
04/02/82	56	i	22.0	6-3	1	it, dan trace		
0	42	5D	22.0	5-12	Grv mic silty for sond	U i		
_	44		24.0	17-20	Gry mic silty f-c sand, some rock fragments (Fill) (SM)	나면	- 4	
<u> </u> _	48				rock fragments (Fill) (SM)	compact, silt, tr	- 4	•
_	<u> 26 (</u>	5D	25.0	14-1.9	ļ	· I	25-	
<u> </u>	51		27.0	3-21	(m: 11) (mu)	ါ ႏှင်		-
بإ	13				(Fill) (SM)	ფ. წ.  -		
2	76				•	cinder	- 4	
<u> </u>	82	1			] •	ăö ⊨	30	

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 2 of 2 MG-825 BORING NO.

**BORING LOG** 4840 FILE NO.\_ SAMPLE DAILY CASING STRATA DEPTH SAMPLE DESCRIPTION REMARKS PROGRESS NO. DEPTH BLOWS BLOWS/6" 30.0 WR/12" 46 Top: Soft blk org silty clay, tr 30 \* | \*7D Top , some cd, fine. 30 32.0 4-4 mica Top: W = 5239 Bot: Med gry org silty clay, sm Bot: W =55 36 shells, fine sand (OH) 39 8D 35.0 Medium gray organic silty clay, 1-1 W = 4837.0 2-2 some shells, trace fine sand (OH) Med gry org silty clay, tr fine by sand partings, veg (OH) U 9D 40.0 1/12" W = 5342.0 2-2 Med gry o shells, t sand part 10D 45.0 WH -1 Do (OH) Top: W = 3447.0 Bot: Gray f-m sand, sm organic 1-2 46.0 silt, trace peat, shells (SM) 10b Boti 50.0 Rec=94% Lt gry to white granitic 49.5 55.0 RQD=46% pegmatite, cljtd, UnW to SlW 04/02/82 ite granitic quartzite, 2C 55.0 Rec=98% New diamond bit 60.0 RQD=26% at 55.0'. <del>-1538</del> to whit 3C 60.0 Rec=93% MIS 60 Do 2C, trace quartzite Core barrel 63.0 RQD=50% blocked at 63.0 Light gray to pegmatite, to itd, UnW to 04/05/82 4C 63.0 Rec=98% Lt gray to white quartzite Sunny 68.0 RQD=84% and granitic gneiss, jtd, UnW 1530 68.0

MG-825 BORING NO.\_\_\_

BORING NO.\_\_

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

-	SHEET 1 of	2
	BORING NO	MG-826
•		

	DOMING NO							
PROJECT: WEST SIDE HIGHWAY POT COURT NO. D. 250003	FILE NO. 4840							
1001. CONTR. NO.: D 230002								
COORDINATES: N 192690.5 E 1998436.2	ELEVATION: +5.7							
BORING LOCATION: MTA Yard, MABSTOA Garage	DATUM: Manhattan							
INSPECTOR: Y. K. Chan	DATE STARTED: 04/01/82							
CONTRACTOR: Warren George, Inc.	DATE COMP.: 04/02/82							
DRILLER: J. Farrell								
HELPER: G. MCCartar								
- INPODIT OTHER!								
CASING: DIA. 4 IN. FROM 0.0TO 11.0 FT.; DIA. 3 IN. FROM 0.0 TO 71.0 FT.								
DRILLING MUD UTILIZED: MUD TYPE ONE IN C. 7								
D CAMPIED.	Y BIT DIA. 3 7/8IN.							
SAMPLING EQUIPMENT, U-SAMPLED, DISTILL SPOON, 2" C.D. DRILL	ROD NW							
YPE & SIZE) U-SAMPLER: DIA. IN.: TYPE								
CORE BIT Diamond My								
EED DURING CORING: MECHANICAL HYDRAULIC MOTHER TO THERE								
AMPLER HAMMER: WEIGHT (LDC)								
NG HAMMER: WEIGHT (LRS) 200								
NO OF IL-TUBES NO OF VALUE 18 IN.								
DEPTH TO	COMP. 82.0 FT.							
WATER LEVEL OBSERVATIONS								
DATE TIME DEPTH OF DEPTH TO ELEVATION	<del></del>							
HOLE CASING WATER OF TIDE CONDITIONS OF	OBSERVATION							
04/02/82 0710 82 0 71 0 6								
04/02/82 0815 82.0 0.0 6.9 Overnight								
0.0 0.9								

DAILY	CASING			LE				<u> </u>
ROGRESS	BLOWS	NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0700						*	0	*Asphalt
		1D	. 1.0	23-16	Gray c-f sand, sm gravel, trace	0.3	<b>├</b> ~	W = Water
			3.0	14-11	silt (Fill)(SP)	1	<b>├</b> -	content in %
	<del></del> i				, , , , , , , , , , , , , , , , , , , ,	ms:	<u>-</u> -	concent in &
						, a	<u> </u>	
<u> </u>		2D	5.0	6-8	Gray silty fine to medium	sand,	- 5 -	
			7.0	7-7		ν -	<del> -</del> -	
Ļ					sand (Fill)(SM)	(F1		
						44	├ -	
						blk wood	├ -	
> -		NR	10.0	7-5	•	ğ	-10 -	**Tried for
Sunny			12.0	3-3			⊢     -	sample twice.
Su	- }	3D	12.0	3-3	Black cof cond on odd to	Œ.	┝╶┤	No recovery.
_			14.0		Black c-f sand, sm silt, tr gravel (Fill)(SM)	gry , d		
_					gravel (Fill) (SM)	Ø.	<del>-</del> ⊢	
L		4D	15.0	3-3	Blk for cond on the	compact gvl, sl	<b>⊢</b> 15 →	
82			17.0		Blk f-c sand, sm silt, tr gvl	ĝ :		
7					decomposed wood, sls(Fill) (SM)	com gv1		
04/01/82					ļ			
40					·	# #		
L		5D	20.0	6-3	Gray-brn clayey fine to medium	Loose silt,	-20 -	•
L			22.0		sand, trace gravel (Fill)(SC)	ğ H	-~~ -	
					stace graver (FIII) (SC)	고 12 년		Color of mud w
L					ŀ	23.0		black at 23.0'
						23.0		
		6D	25.0	2-2	Soft black organic silty clay,	-	-25 -	W 50
· L			27.0	3-3	trace fine sand (OH)	6D -		W = 72
<u></u>					(On)	-		Soft-med,dk gr
					-	28.0		org silty clay
		T.			ļ·	28.0		tr f sa, f sa

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

SHEET 2 of 2 BORING NO. MG-826

<b>B</b> • • • • •	1	·		:	BORING LOG	· · · · · · · · · · · · · · · · · · ·		E NO4840
DAILY PROGRESS	CASING BLOWS	NO.	SAMPI DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
<del></del>		<del> </del>	30.0	WH/12"	Soft dark gray organic silty		30	W = 69
	M		32.0	2-3	clay, tr fine sand seams (OH)		_	, , ,
	U D							<u>.</u>
		<u> </u>			<del>-</del>			
	ַ	8D	35.0	WH-1	Do 7D, trace shells, veg (OH)	, si	-35-	W = 46
	S		37.0	1~2	bo 'b', trace shells, veg (on)	seams		W = 46
ĺ	Е							1
.	D					sand		
		OD	40 0	1 /1 0 11	D 00		- 40 <del>-</del>	]
}		עפ	40.0	1/12" WH/12"	Do 8D (OH)	fine		W = 52
]			12.0	111/12		1,1		
.[						Ħ		
·			45.0	2-2	Do 8D (OH)	clay	<b>-</b> 45 <b>-</b> - ·     -	W = 52
ŀ			47.0	2-2				
·  -	<del></del>			· · · · · · · · · · · · · · · · · · ·		silty		
						si]		·
_		11D	50_0	1-2	Medium dark gray organic silty	P	- 50 -	W = 57
-			52.0	2-3	clay, trace fine sand (OH)	organic n.		" - 37
-			-			rgs		·
-	<del></del>					. 01		
		12D	55.0	WR/24"	Do 11D, some fine sand, trace	ark gray vegetatio	<del>-</del> 55-	
			57.0		shells (OH)			W = 35
ļ.					, , , , , , , , , , , , , , , , , , , ,	dark vege		
-				<u> </u>	·	יס		
1		120	60.0	WH/12"	Modium danis	medium shells,	-60-	
2			62.0	3-3	Medium dark gray organic silty clay, tr fine sand, shells,	le di	- ` -	W = 41
01/82					veg (OH)			
<u></u> 6					(0.1)	2		
04/		145		75.75.011		<u>ا</u> بړ		·
-		14D	67.0	WH/18"	Medium dark gray organic silty	Soft	-65-	W = 33
		<del></del>	37.0	3	clay, tr fine sand, veg (OH)			
						-		Telescoped 3"
						69.0		casing inside 4"
-					; •	* [		casing to 72.0'
-		10.	72 0 1	2000		72.0	_ ]	*Possible
				Rec=98%	Top: Gray garnet mica schist, jtd, UnWExJts	놟		decomposed rock
H			77.0 1	.QD-00*	Bot: White quartzite, mdjtd.	schist ite, chwexJts	- ᅴ	İ
					U1111 p	S ti B	- 75	Mica schist is
		_			· 1	t t g		very micaceous.
				Rec=98%		mica sch quartzite mdjtd,unwe		-
<b> </b> -	<del></del>	-   -	32.0 F	RQD=96%		ו ע	- 7	
<u> </u>			<del> </del>		cobjet maita unum.rt.	3 –	80-	·
530					Johnson, majea, onwexits	Tto F	• +	
						82.0		
<u> </u>								
1	- 1		1	7	·	}	·—	

## MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 1 of 3

BORING NO. MG-827

FILE NO. 4840

									20/11/10 110, 130 027
222.55			<del></del>		BORI	NG LOG			FILE NO. 4840
PROJECT:				D(	OT. CONTR. NO	o.: D 2500	002		ELEVATION: +5.5
COORDINAT		192663.	3	Ę	1998186.				
BORING LO	CATION:	MTA	Yard F	Ramps					DATUM: Manhattan
INSPECTOR:	I	Mukhe		(MRJD)				-	DATE STARTED: 04/07/82
CONTRACTO			eorge, I		<del></del>		<del></del>		DATE COMP.: 04/09/82
DRILLER:		Steven	son			lugi see		Coto	
TYPE OF RIC				RGF MOUNT	ED TRIPO	HELPER:		Soto	
			0.0 то 4	0.0 FT.;			ER [		
DRILLING M	UD UTIL	IZED: MUD	TYPE		<i>71</i> 7. 3 1	N. FROM O	.0 1	0115.3	
		D 64		Split Sp	00p 3" (	0.D.			ROTARY BIT DIA. 3 3/4 IN.
SAMPLING		NT	MPLER: DIA			U.D.			DRILL ROD BW
(TYPE	& SIZE)	CORE			TYPE	·			
FEED OURIN	G CORIN			iamond,					CORE BARREL Double Barrel
SAMPLER HA					AULIC 🔀	OTHER [			
				140	<del></del>	AVG. FALL	30	IN.	
CASING HAM	MEH: WE	IGHT (LBS)		300		AVG. FALL	18	IN.	
NO. OF U~TL	-BES	_ NO.	OF VANE T	ESTS _	DEPTH TO	D ROCK 115	.3	FT. D	ертн то comp.135.0 FT.
		· · · · · · · · · · · · · · · · · · ·	,	WA	TER LEVEL C	BSERVATION	vs		133.0 11.
DATE	TIME	DEPTH OF	DEPTH OF		ELEVATION	F			
		HOLE	CASING	WATER	OF TIDE			CONDIT	IONS OF OBSERVATION
04/08/82	0730	62.0	40.0	4.6		Orrownia	h.	<del>""</del>	
04/09/82	0715	115.3	115.3	6.0		Overnig	ΠĘ		
04/09/82			115.3	2.0		7.1			
04/12/82		_	15.0	5.7		AT COMP.	<u>leti</u>	on at	rock coring
04/12/82		_	0.0			Over t	ne w	eekend	
	~~~		<u> </u>	5.0	: 1				

· <del></del>		-			•			
DAILY	CASING		SAMP	LE		Т		T
PROGRESS 0830	BLOWS	NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0630		1 <u>D</u>	0.75	32-19	Brown cinders, sm c-f sand,	*-	-0	*Asphalt
	28	<u> </u>	2.75	10-30	silt, tr gravel (Fill) (SM)	0.2	├ <sup>*</sup> -	W = Water
•	48	<u> </u>			]		├	content in %
	37		ļ <u>.</u>			e gray-brown and, trace	╟	
	56		<u> </u>			oro Fro	<del> -</del> -	
Cold	31	2D	5.0	9-16	Gry-brn silty f-m sand, tr gvl	Ja h	<b>j-</b> 5-	
ប	27	<u> </u>	7.0	9-10	cndrs, brick, mica (Fill) (SM)	a day	<del> -</del> -	
_	34		<u> </u>			19.09		
Cloudy,	13					se x	<u>-</u>	
ă						10.78		·
Ř	29 25	_3D	10.0	11-17	Top: 18" Do 2D (Fill) (SM)	7 8 7	-10-	
5	38		12.0	12-8	Bot: 6" Red-brn silt, sm fine	to loc coarse s, bric	<b>-</b> -	
Ţ	29				sand (Fill) (ML)	1 0 8		•
; Partly	17				•	act to den		
i A	15	45	15.0			ורט. מ	15	
	15		17.0	1-3	Dark gray c-f sand, sm gravel,	com ine		
04/07/82	16	<del></del> -	<del>-1</del> /•U	3-5	silt, tr cndrs, mica (Fill)(SM)	l¤₩⊒		
7	18				•	Medium silty gravel		
2	16				•	r i i		•
9	*19	5D	20.0	WR-13	Mod blasta and a	} [	- 20 -	
	18		22.0	9-6	Med black organic silty clay,	20.0	_	₩ = 58
. [	12			<del></del>	tr fine sand, wood, bricks (OH)	g,		*20.0'-25.0'
	26		-		İ	5D Medium	- 1	drilled ahead of
	27		-			, je	_	casing.
[	28	6D :	25.0	30-19	Gray-hrn mig gilter 5 m as a		- 25 -	
. [	43		27.0		Gray-brn mic silty f-m sand, sm rock fragments (SM)			6D rock fgmts
ļ	80				rock fragments (SM)	Med ot (1)		are decomposed
<u>[</u>	69					<i>-</i>		mica schist.
	90	$\Box$				O g E	- 30 -	(Fill)

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

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

		~			DOMING LOG			112	: NO
DAILY PROGRESS	CASING BLOWS		SAMP DEPTH	BLOWS/6"	SAMPLE DESCRIPTION		STRATA	DEPTH (FT)	REMARKS
	44	NR	30.0	100/4"			<del> </del>	30	
1	22	1	30.3					<u> </u>	ļ ·
	32	┼	150.5	<del></del>			Same as above	<u> </u>	
ĺ		<del> </del> -	<del> </del>	ļ	· ;		Same as abov		
ł	34	<del></del>	<del></del>		:		a a a		
	35	<u> </u>	<u>.                                    </u>	<u>-</u>	*			1	·
	* 42	70	35.0	10-14	Stiff black organic clay,	frace	25.0	35-	W = 64
	26	1	37.0	8-9	vegetation		35.0	<b>├-</b> ⊣	
		<del> </del>	37.0	6-9	vegetation	(OH)	រូប	<b>⊢</b> –	*35.0'-40.0'
	26	<del> </del>	<del> </del>				Stiff blk org		drilled ahead
	_25	<u> </u>	ļ:			*		1	of casing.
ਾਲ	_25_	1	<u>l</u>				Ly Ed C	$\Gamma$ . $\Box$	
Cold	A	8D	40.0	1-1	Medium gray organic silty	clav.	40.0	<del> - 40-</del>	
ု ႘ ၂		!	42.0	2-4	trace shells	(OH)	40.0	├ <b>-</b>	W = 69
					CLUCC DICTED	(011)		<b>├</b>	
		<del> </del>	<del>  </del>					┡╶┤	
<del>-</del> 6		┝─┈	<del> </del>	<del></del>				┝╺┥	
8	4	<u> </u>	<b></b>					- 45-	·
큠	H	9D	45.0	1-1	Medium gray organic silty	clay,		- 457	W = 53
, č.,[	Д		47.0	1-1	trace shells	(OH)		┌╶┤	
1,7	<u>بي</u>				<del> </del>	,,		├ ┤	
t l	Д		<del>                                     </del>				ι.	⊢⊢	
Partly Cloudy,	田		<del>  </del>				17	├ -ฝ	
				<del></del>		·	shells	50-	į
ļ	μ,	10D	50.0	1-1	Do 9D, some fine sand	(OH)	ŝ	20	W = 47
- [	山		52.0	1-1					:
· L	≽						35	├ -{	
82	0	-					, r		4.
04/07/82	ப						partings,		
0 1	<del></del>					ĺ	뀵	55	·
4	<del> </del>	-1.1D	55.0	1-1	Medium gray organic silty	clay,	Ď,		W = 47
° 1	<del>  </del>		57.0	2-2	trace shells	(OH)	יס		
_							sand		
L						- 1	ŭ		i
	1 1				•	İ	ø,		•
r		105	60.0	2-2	Do 11D	, o	fine	- 60	
1530		20			Do 11D	(OH)			W = 53
0700	<del>- -</del>		62.0	3-4		1	trace		
0,00	_						or I	ĺ	
Ļ						1	법		i
						· i	T.		
<u> </u>	<del>-   -  </del>	125	65.0	1 1/17	Ma 32	, ]	>	- 65-	j
<u> </u> -	<del>-1</del> -	النديد		_1-WH	Medium gray organic silty		clay		W = 57
1			67.0		tr shells, fine sand part:	ings	υ		1
ļ.					_	(OH)	ا بج	1	
L							silty		
Ĺ		T					냈		1
F		14D	70.0	WH-1	Do 13D	(OH)		<del>-</del> 70-	W = 34
F			72.0		20 130	(On)	19		w = 34
<u> </u>	<del>-  -</del>		12.0	1-2	•	İ	E L		. ]
a H	_						Ď [		1
Sunny		<u>.                                      </u>				į	organic	$\overline{}$	i
L					•				!
- Г		15D	75.0	1-1	Do 13D	(OH)	, ,	<b>-</b> 75-	W ≈ 50
F	7		77.0	2-2		(011)	ᄧ		" ~ 30
, F			77.0			- 1	e		l'
₩ <del> </del>		<del></del>					<u> </u>		1
- % ⊢	<del>-  -</del>						ਰੂ [		
ĕL							Medium gray	٦	1
04/08/82		16D	80.0	2-3	Do 13D	(OH)	_	-80-	W = 39
0			82.0	4-2	-				
		-	<del></del> -			f	.		j
<del> </del>	<del></del>		<del></del>				J	_	
<b> </b>	<del></del>	-				ļ			1
	₩					1	Ī	85	4

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 3 of 3 BORING NO. MG-827

						<del></del>	BORING LOG			E NO. 4840
PROG	ILY RESS	CAS		NO.	SAM	<del></del>	SAMPLE DESCRIPTION	STRATA	DEPTH	REMARKS
( <del></del>					85.0	2-2	Medium gray organic silty clay,	1.	(FT) 85	
					87.0	6-5	some fine sand (OH)		<u> </u>	W = 59
' <b>i</b>					-		4	t t		
					<del> </del>	+	<u>_</u>	, "		
				18D	90.0	WH-6	Medium gray organic silty clay,	sand,	<b>−90 −</b>	W = 39
					92.0	3-2	trace fine sand partings (OH)		<del> -</del>	, " - 35
			_		ļ	<del> </del>		fine		]_
Í							•		<u> </u>	
	Sunny			19D	95.0	WH-1	Medium gray organic silty clay,	His o	95-	
	Sur				97.0	59	some fine sand (OH)	+	<u> </u>	W = 40
	F	-				<del> </del>		다		
	t					<del> </del>	<b>,</b>	\ \hat{\state}	<del>-</del> -	·
		$\perp$		20D	100.0	WR-2	Medium gray organic silty clay,	clay,	100-	W = 45
	2 F				102.0	2-11	trace fine sand partings, peat	1 1		
	% E	_	+		<del></del>	<del></del>	(OH)	silty	<b>→</b>	
	04/08/82									
	ŏ	_	$\dashv$		105.0		1 3 3 3 3 3 3 3	nic gs,	<del>-</del> 105	W = 32
	-	-+	-		107.0	16-16	fine sand and clay (OL)	gui		
								organic vartings,		
.1	-		-		·			m gray sand pe		W = 52
	-		╌╁╴	- 1	110.0	2-5 7-10	Stiff gray organic clay, some	n g	_110_	W = 73 (Peat
					<del>ĬĸŊĿŹĿŢ</del> Ţ	7-10	peat, trace decomposed wood (OH)			portion of the sample)
	-	83	$\perp$				(OII)	Medium fine s		sampte)
1500		A	+	230 1	115.0	100/4"	7 - 1.1	115.0	 115-	
0700					115.3		Light gray micaceous f-m sand, tr c sand, silt (SP)*	ο <del>Χ</del> .	-"-	* Decomposed
	·  _					Rec=88%	Light gray garnet mica schist,	Dec Rock		mica schist.
	-		- -	1	21.0	RQD=12%	broken, SlW to HiW	118.0	]	
	$\vdash$		╁	-				at 1	-120-	·
W.C. D.				2C ]	121.0	Rec=82%	Light gray garnet mica schist,	mica tz		Run #2C
Ì	ğ  -	<del></del> .	+	<u> </u>	25.0	ROD=25%	trace quartz veins, cljtd,	775 1.31		Core barrel
1 5	٦ ├		+		<del></del>	·	UnWExJts.	grt Mexica	_ ]	blocked.
1				3C1:	25.0	Rec=92%	Top: Light gray mica schist, tr	Tte,	125	
82	70		<del> </del>			ROD=30%	quartz veins, broken, UnWExJts	it is is		1
04/09/82			- -				Bot: White mic quartzite, cljtd	guar quar		
1 4			_	$\dashv$	$\neg \dashv$		*	m A		
°	, <u> </u>					Rec=100%	Light gray mica schist & mic	mica mic c	-130-	Ì
	-		+	<u> </u>	35.0	RQD=88%	quartzite, mdjtd, UnWExJts			
,,,,,			<u> </u>		+		į	gry hist inst		
1430			I				1	sch vei		
•	$\vdash$		+-				Ţ	135.0	135	İ
1	-		+	-			-	-	- ]	·
								-		[
<u></u>									140	ļ

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 1 of 2 BORING NO. MG-827P

FILE NO. 4840 **BORING LOG** PROJECT: WEST SIDE HIGHWAY DOT. CONTR. NO.: D 250002 ELEVATION: +5.5 COORDINATES: N 192674 1998158 DATUM: Manhattan BORING LOCATION: MTA Yard, MABSTOA Garage DATE STARTED: 04/12/82 B. Mukherjee (MRJD) INSPECTOR: DATE COMP.: 04/12/82 CONTRACTOR: Warren George, Inc. DRILLER: HELPER: C. Soto Stevenson TYPE OF RIG: TRUCK SKID BARGE MOUNTED TRIPOD OTHER CASING: DIA. 4 IN. FROM 0.0 TO 20.0 FT.; DIA. IN. FROM DRILLING MUD UTILIZED: MUD TYPE ROTARY BIT DIA. 3 3/4 IN. D-SAMPLER: Split Spoon, DRILL ROD 2" O.D. BW SAMPLING EQUIPMENT, U-SAMPLER: DIA. IN.: TYPE (TYPE & SIZE) CORE BIT CORE BARREL FEED DURING CORING: MECHANICAL HYDRAULIC [ OTHER [ SAMPLER HAMMER: WEIGHT (LBS) AVG. FALL 30 IN. 140 CASING HAMMER: WEIGHT (LBS) 300 AVG. FALL 18 IN. NO. OF U-TUBES - NO. OF VANE TESTS -DEPTH TO ROCK -FT. DEPTH TO COMP. WATER LEVEL OBSERVATIONS DEPTH OF DEPTH OF ELEVATION DEPTH TO DATE CONDITIONS OF OBSERVATION HOLE CASING WATER OF TIDE 04/12/82 1000 20.0 20.0 2.0 04/12/82 1300 15.5 15.0 3.9 Inside piezometer

DAILY	CASING		SAMP	LE		F -	DERTH	
PROGRESS	BLOWS	NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
0700	13					<del>                                     </del>	0	<del></del>
	18				1 .		F ~ -	
	16						├- ┤	
	34				· ·		├ ┤	
. 1	12				1		<del> </del>	
	20				1	-	- 5 -	
ri.	110							
Sunny	88			·			⊢ ⊢	
5.	19				•		├ -	
Partly	10							
됩	25				·		-10-	
Ä	20						<b>⊢</b>	
1	20					😭		
22	18			· · · · · ·		(F111)	⊢ -	
~ [	12			<del></del> -		(E	⊢ -	^
04/12/82	11	1D	15.0	3-3	Gray-brown medium to fine		<del>-</del> 15 -	
4,	11		17.0	4-5	sand, trace gravel (Fill)(SP)		<b>├</b>	
	13				, , , , , , , , , , , , , , , , , , ,		⊢ ⊣	
Ī	12			· · · · · · · · · · · · · · · · · · ·				
300	12			· · · · · · · · · · · · · · · · · · ·				•
		<u> </u>					<del>-</del> 20 <del>-</del>	
						20.0		
ŀ								
ľ								
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F					·		<b>-</b> 25 <b>-</b>	
1		$\neg$				}		
			··			-		
<u> </u>						}		
-	<del></del>					L	- 30	

SHEET\_2\_OF\_2 FILE NO. \_\_4840\_

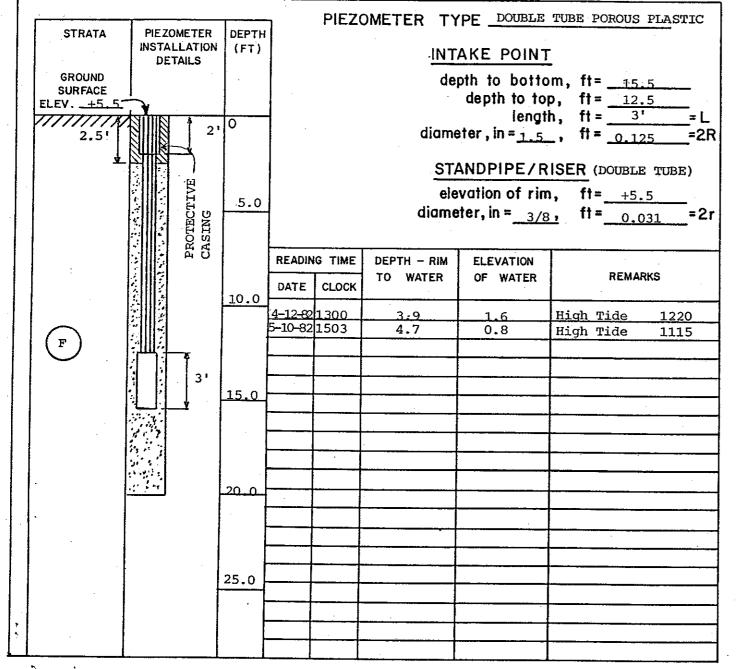
SUBCODE \_\_SMBST

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE

CONSULTING ENGINEERS

#### PIEZOMETER RECORD

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



Sand Bentonite

A P A Gravel Grout

GROUND SURFACE ELEV . +5.5

PIEZOMETER NO. MG-827P

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET \_\_\_\_ of \_\_\_\_ BORING NO. \_\_\_\_ MG-828 EVENIO 4840

**BORING LOG** FILE NO. PROJECT: WEST SIDE HIGHWAY DOT. CONTR. NO.: D 250002 ELEVATION: +5.3 COORDINATES: N 192784.1 £ 1998289.0 DATUM: Manhattan BORING LOCATION: MTA Yard, Ramp DATE STARTED: 04/02/82 Y. K. Chan 04/07/82 DATE COMP.: Warren George, Inc. CONTRACTOR: DRILLER: J Farrell HELPER: Mr. G. McCartar TYPE OF RIG: TRUCK 🔀 SKID BARGE MOUNTED TRIPOD OTHER CASING: DIA. 4 IN. FROM 0.0TO 10.0 FT.; DIA. 3 IN. FROM 0.0 TO 105.0FT. DRILLING MUD UTILIZED: MUD TYPE ROTARY BIT DIA. 3 7/8 IN. D-SAMPLER: Split Spoon, 2" O.D. DRILL ROD SAMPLING EQUIPMENT, U~SAMPLER: DIA. IN.: TYPE (TYPE & SIZE) Diamond, NX CORE BARREL Double Barrel FEED DURING CORING: MECHANICAL HYDRAULIC 🔀 OTHER [ SAMPLER HAMMER: WEIGHT (LBS) 30 IN. 140 AVG. FALL CASING HAMMER: WEIGHT (LBS) 18 IN. AVG. FALL NO. OF U-TUBES NO. OF VANE TESTS FT. DEPTH TO COMP.115.0 FT. DEPTH TO ROCK 103.0 WATER LEVEL OBSERVATIONS DEPTH OF DEPTH TO ELEVATION CONDITIONS OF OBSERVATION HOLE CASING WATER OF TIDE 04/05/82 0750 57.0 Over weekend with drilling mud inside the hole 10.0 4.4 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	CASING		SAMP	LE	CAMBLE DECORIDATION		DEPTH	
PROGRESS	BLOWS	NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	(FT)	REMARKS
0830	-					0.3	0	*Asphalt
	21	1D	0.5	10-8	Dark gray c-f sand, sm cinders,	0.3	<b>-</b>	W = Water
	17		2.5	6-5	silt, tr gvl (Fill)(SM)	9 9		content in %
	22					coarse	_	
	13					coarse		
	21	2D	5.0	22-17	Black c-f sandy gravel, trace			
	30		7.0	6-13	silt (Fill)(GP)	V SWI		
	26					brown gravel	Γ -	
1	30					to brown		
	28					ָ הַ דְּ		
		3D	10.0	17-13	Dark brown c-f sand, some	k gray cinders	-10 -	
[ 달			12.0	9-5	cinders, trace gvl (Fill)(SP)	gr	_ =	
Windy						A C		
						dark me c		
}		** NR	7.5.0				-15 -	**Attempted
Sunny,		NR	15.0	5-3		compact sand, sc (Fill)		sample twice.
H H		4D	17.0 17.0	1-3		ng gr		No recovery.
ng.		4D	19.0	5-5 8-9	Black c-f sand, sm endrs, tr	com san (Fi		Sample 4D is
İ			19.0	8-9	silt, gvl (Fill)(SP)			probably wash.
_,		5D	_20.0	4-1	Black c-f sand, sm cndrs, tr	Medium o fine ilt	-20 -	
8		<del>-</del>	22.0	2-4	organic silty clay, gravel	ed 1t		
72					(Fill) (SP)	S C K		
04/02/82					(1111) (51)	23. N		
Ŏ [						Med blk org n siltyclay,tr fsa,wod,veg		
		6D	25.0	2-1	Medium black organic silty clay,	OK VV	-25 -	W = 71 •
			27.0	1-2		A ii g		M = \T =
Ţ					trace fine sand, veg, wood (OH)	b]		
						Med silt fsa,		

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 2 of 3 BORING NO. MG 828

#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 3 of 3 BORING NO. MG-828

	· ·		0.0145		BORING LOG		FILE	NO. 4840
DAILY PROGRESS	CASING BLOWS	NO.	SAMP DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
		7D	30.0	1-WH	Med dark gray organic silty		30	W = 62
			32.0	2-2	clay, tr fine sand, sls (OH)			
				<u> </u>	1			
					<u> </u>		<b>-</b> -	
		8D	35.0	1-WH	Do 7D, trace veg. (OH)		<b>-35</b> -	W = 69
			37.0	1-2	-	ß		
						shells	-	
		05	40.0			S C	40	
>		9D	40.0	5-4 1-1	Do 7D (OH)	S		-
Sunny			1210	<u> </u>		partings,	┝╶┤	
<u>ر</u> م						ärt		
}		100	45.0		Do 70 1 2		L <sub>45</sub> –	
,82		100	47.0	1-WH 3-4	Do 7D, tr fine sand partings (OH)	sand	┝╺	W = 53
02/					(OII)		┝╶┤	
04/02/82				-		fine	F ]	
, [		11D	50.0	1-WH	Do 7D, tr fine sand partings		-50 -	W - F4:
1	-		52.0	5-4	(OH)	sand,	<b>-</b> -	W = 54
		$\dashv$		<del></del>				
. [						fine	├ -	
				WR - WH	Do 7D, tr fine sand partings		-55-	W = 53
1500 0700			57.0	2-4	(OH)	trace		
					•			
-						clay,		
-			60.0	2-3 5-7	Do 7D, tr fine sand partings	cla B	60	
			02.0	<u> </u>	(OH)	74		
						ilty		
<u> </u>						o o	<b>-</b> 65 <b>-</b>	
ð L		- 1	65.0 67.0	9-7 7-10	:	organic	- 3	
Windy		40	67.0	7-2	Med dk org silty clay, sm fine	r ga		W = 36
-			69.0	5-4	sand, tr sls, gvl, veg (OH)			
、上	1	.5D '	70.0	WR/24"	Med dk gray org silty clay, tr	gray	-70	м — 20
Sunny,			72.0		fine sand, sls (OH)			W = 39
ns –						dark		
			-+	<del></del>				
	1		75.0	WR/24"	Do 15D, tr fine sand partings	Medium	-75 <b>-</b>	W = 34
- E			77.0		(OH)	Me		
)2/s		_				-		
04/05/82						ŀ		
°	1		30.0 W		Med dk gray org silty clay, tr	Ĺ	80 -	W = 41
-		-   -	32.0	6-9	m-f sand, fine sand partings,		- 7	
					shells (OH)	-  -		·
							85	

			-	-		BORING LOG	<b>.</b>		ING NO. <u>MG-828</u> NO. <u>4840</u>
DAIL		CASING	115	SAMP		SAMPLE DESCRIPTION	STRATA	DEPTH	REMARKS
PROGR	ESS	BLOWS	NO.	DEPTH				(FT)	REMARKS
		<del></del>	NR	85.0 87.0	5-12 11-14		ည်း ထို	_ <sup>85</sup>	
ļ			18D	87.0	9-6	Med dark gray organic silty	A H	<u> </u>	
				89.0	11-14	clay, sm m-f sand, tr shells	> E _		
						(011)			
	Windy		19D	1	WR - 6	Med dark gray corganic silty	유. 15년,	90-	W = 43
İ	Wi		<u> </u>	92.0	6-9	clay, some m-f sandy silt lyrs	Med si c tr s		
			<del></del>	ļ	<u> </u>	(OH)		_	
	2			<u> </u>		·	93.0 ≻		•
	Sunny		20D	95.0	11-18	Dark gray silty fine to medium	ge g	95	
	ω.			97.0	22-25	sand, tr mica (SM)	f-m f-m mica		3" dia casing
			:					_	was placed
	/82	——— <u> </u>					t si		inside hole.
	5		215	100.0			99.0	100	
	04/05/		71D	100.0 102.0	2-6 8-11	Stiff dark gray organic silty	Д		W = 53
	ŏ			102.U	0-1T	clay, tr f-m sand, veg (OH)	21D		
							103.0		
1530 0700							*		
0700	ļ			105.0	Rec=100%	Light gray garnet mica schist,	105.0	105	*Possible
	≥			110.0	RQD=84%	21.3 ee veen m.	. m [		decomposed
	Windy						7 de la la la la la la la la la la la la la	_	rock.
	3						lar.		
	7		2C	110.0	Rec=96%	Do 1C	ist	-110-	Highly
	//82				RQD=80%	20 10	t gry garnet schist, jtd kJts		micaceous rock.
-	04/07/						T X		
1130	8					·	Light mica UnWEx.	_ ]	
	<del>-</del>						4 8 5	-115	•
	-						15.0		[
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							·		· •
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								エザひ ー	

## MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC.

SHEET 1 of 2 BORING NO. MG-831

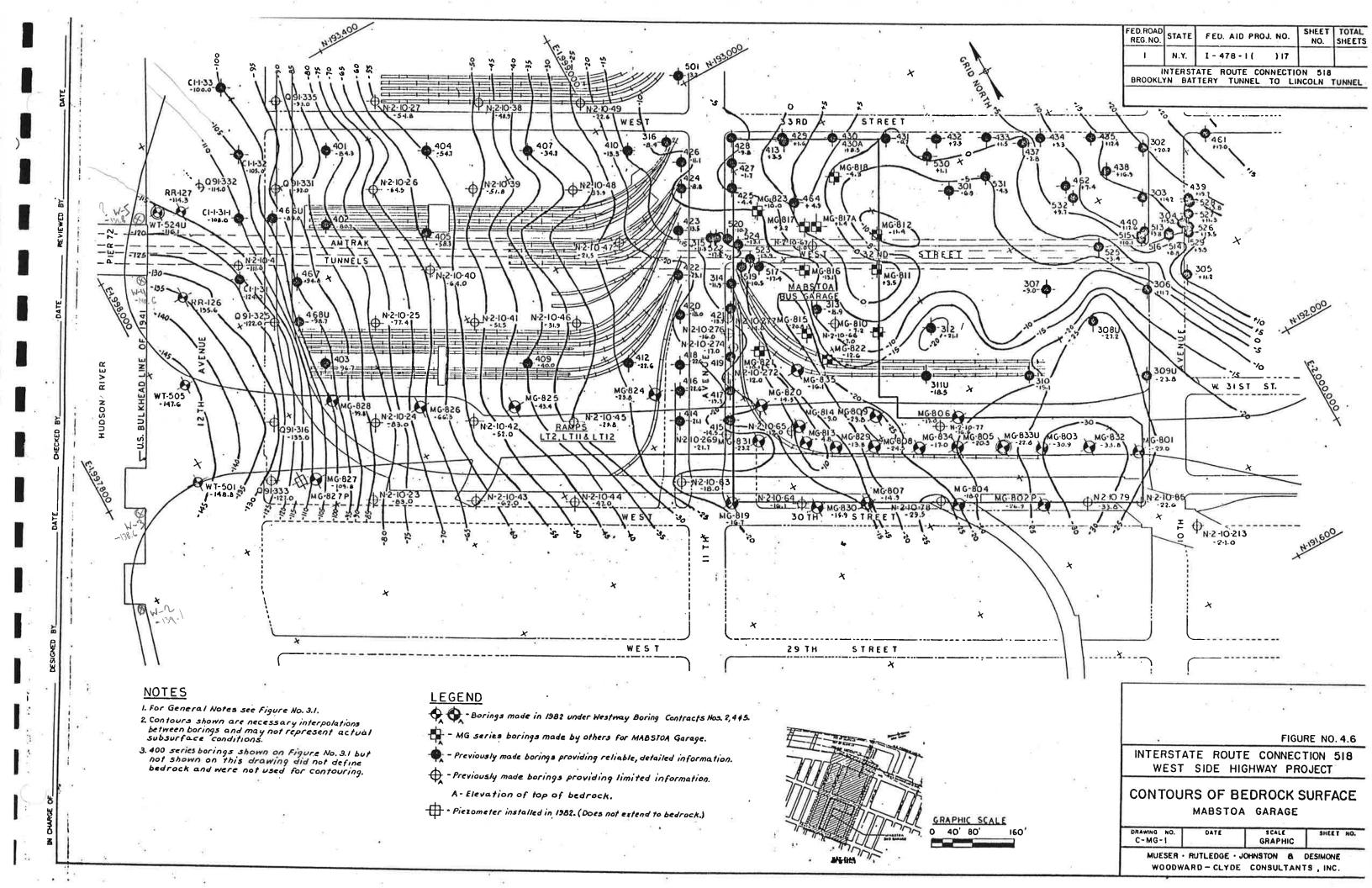
					BORII	NG LOG	FILE NO. 4840
PROJECT:				DC	OT. CONTR. NO	D.: D 250002	ELEVATION: +10.8
COORDINAT	ES: N	192313.3		Ε	1998985.	3	
BORING LOC				STOA Gar		<u> </u>	DATUM: Manhattan
INSPECTOR:		Y.K.	Chan (N	(R,TD)	490		DATE STARTED: 04/09/82
CONTRACTO	R:		n George		<del>_</del>		DATE COMP.: 04/12/82
DRILLER:				7 11101	·		
TYPE OF RIG	. TRUCK	J. Fa				HELPER: G McCartar	<b></b>
				RGE MOUNT		OD OTHER	
CASING: DIA	<u>· 4</u>	IN. FROM	0.0 10 5	.0 FT.; C	DIA. 3 1	N. FROM 0.0 TO 33.5	FT.
DRILLING MI	UD UTIL	IZED: MUD	TYPE	Quick-Ge	1		ROTARY BIT DIA. 3 7/8 IN.
SAMPLING E	OURPME	D-SA		Split Sp		O.D.	DRILL ROD NW
		111-54	MPLER: DIA		TYPE	<u></u>	INW
(I TPE )	SIZE)	CORE		amond, N			Tanan
EED DURIN	G CORIN	G: MECHAN	IICAL []		AULIC 🔀	07:15- 17	CORE BARREL Double Barrel
SAMPLER HA					YOU'C D	OTHER [	
CASING HAM				·		AVG. FALL 30 IN.	
NO. OF U-TU						AVG. FALL 18 IN.	
10. OF 0=10	BES	– NO.	OF VANE TI	STS -		D ROCK 33.0 FT. DE	РТН ТО СОМР. 44.0 FT.
				WA	TER LEVEL C	BSERVATIONS	
DATE	TIME	DEPTH OF	DEPTH OF	DEPTH TO	ELEVATION		
		HOLE	CASING	WATER	OF TIDE	CONDITIO	ONS OF OBSERVATION
04/12/82	0800	27.0	5.0	5.8		2 2 2 2	7.1
04/12/82	1410	44.0	5.0	11.5			ling mud in hole
04/12/82		44.0	0.0			At completion Wat	er in hole
,,		33.0	0.0	7.5			
		<u> </u>					

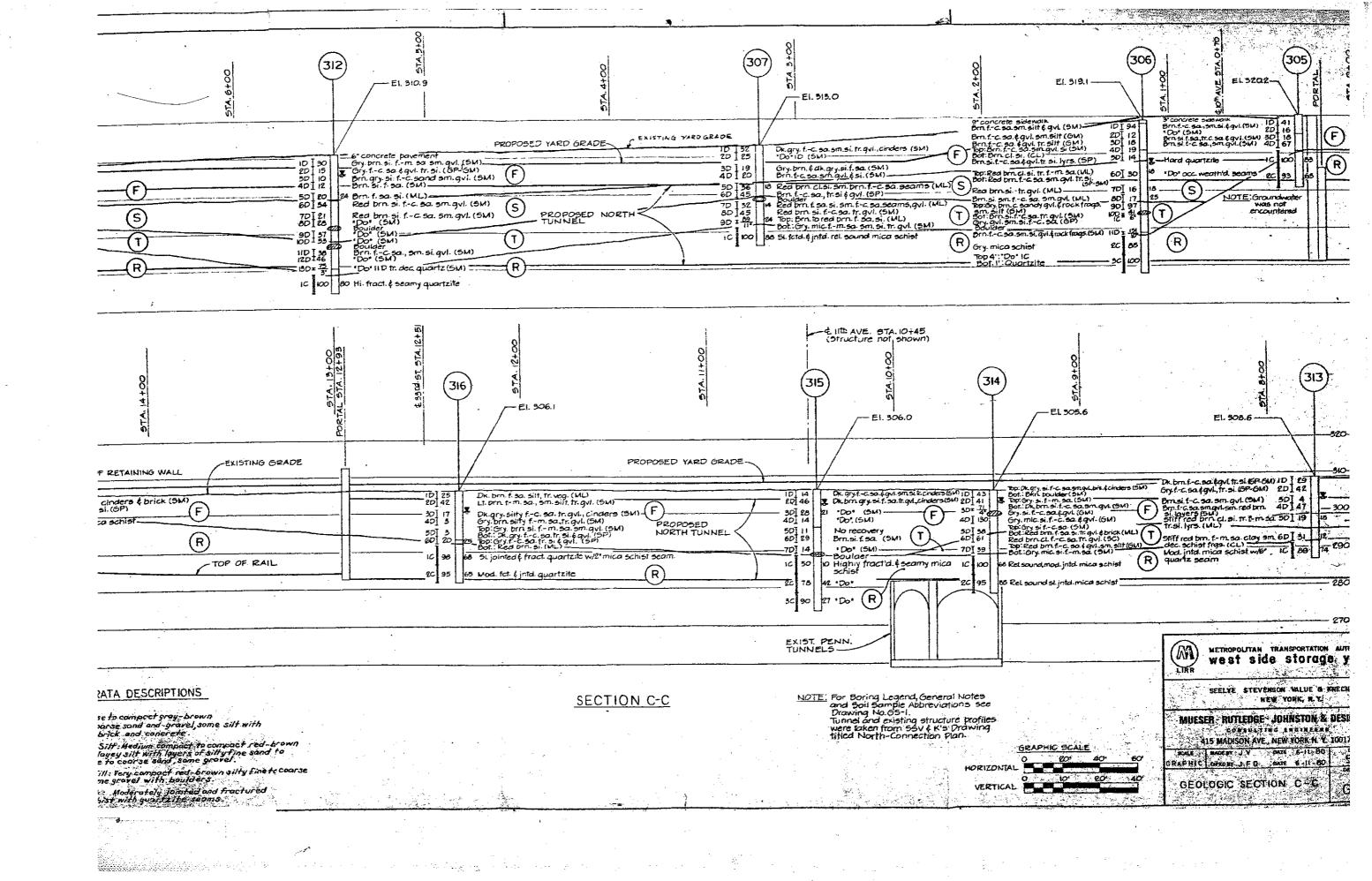
DAILY	CASING		SAMP	LE				
PROGRESS	BFOM2	NO.	DEPTH	BLOW\$/6"	SAMPLE DESCRIPTION	STRATA	DEPTH (FT)	REMARKS
1215		1D	0.5	12-11	Dark brown f-c sand, sm silt,	-o <del>*</del>	0	*Concrete
	4		2.5	6-4	gravel, cinders (Fill) (SM)	U.	├ <i>ॅ</i> -	W = Water
	8 .				(2-2)	۲ پ		content in %
	7		-			ı or :	<b>⊢</b> −	concent in a
	6					brn ndr		
		_2D	5.0	4-3	Gray-brown f-m sand, sm silt,	ı nəi	- 5 -	
	Ω		7.0	3-3	tr decomposed wood (Fill) (SM)	국 구		
	臼				(2222) (222)	dark %11		
	民							
	闰				:	loose lt,tr wood		
	3	30	10.0	7-1	Gray-brown f-m sand, sm silt,	100 1t,	-10 -	
≥	0		12.0	12-15	tr gravel (Fill) (SM)	I •~−I Ł	- 1	
Snow	H				. (1111) (614)	اۋ ب با	- 1	
ω [						n. n.		
1						D 5 6	- 4	
		4D	15.0	4-4	Top: Do 3D (Fill)(SM)	Med cy sand, decom	-15 -	
82			17.0	4-2	Bot: Soft black organic silty			4D Bot: $W = 58$
6				}	clay, tr fine sand (OH)	16.5		•
04/09/82					(011)	4D Bottom		
4						4 4		
<u> </u>		NR	20.0	7-14		20.0	-20 <del>-</del>	
Ĺ			22.0	17-23		1		
		5D	22.0	29-29	Brown silty f-m sand, tr gravel	u l		
			24.0	38-44	(SM)	f t		
L					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		-	•
-		6D	25.0	28-36	Red-brown f-c sand, sm silt,	ZZ -	-25 -	
<u> </u>			27.0	32-41	gravel (SM)	# # F		
<u> </u>					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	red-brn		
<u> </u>						Cpt r sand, grave		
	V			7		면많밥	-30 -	

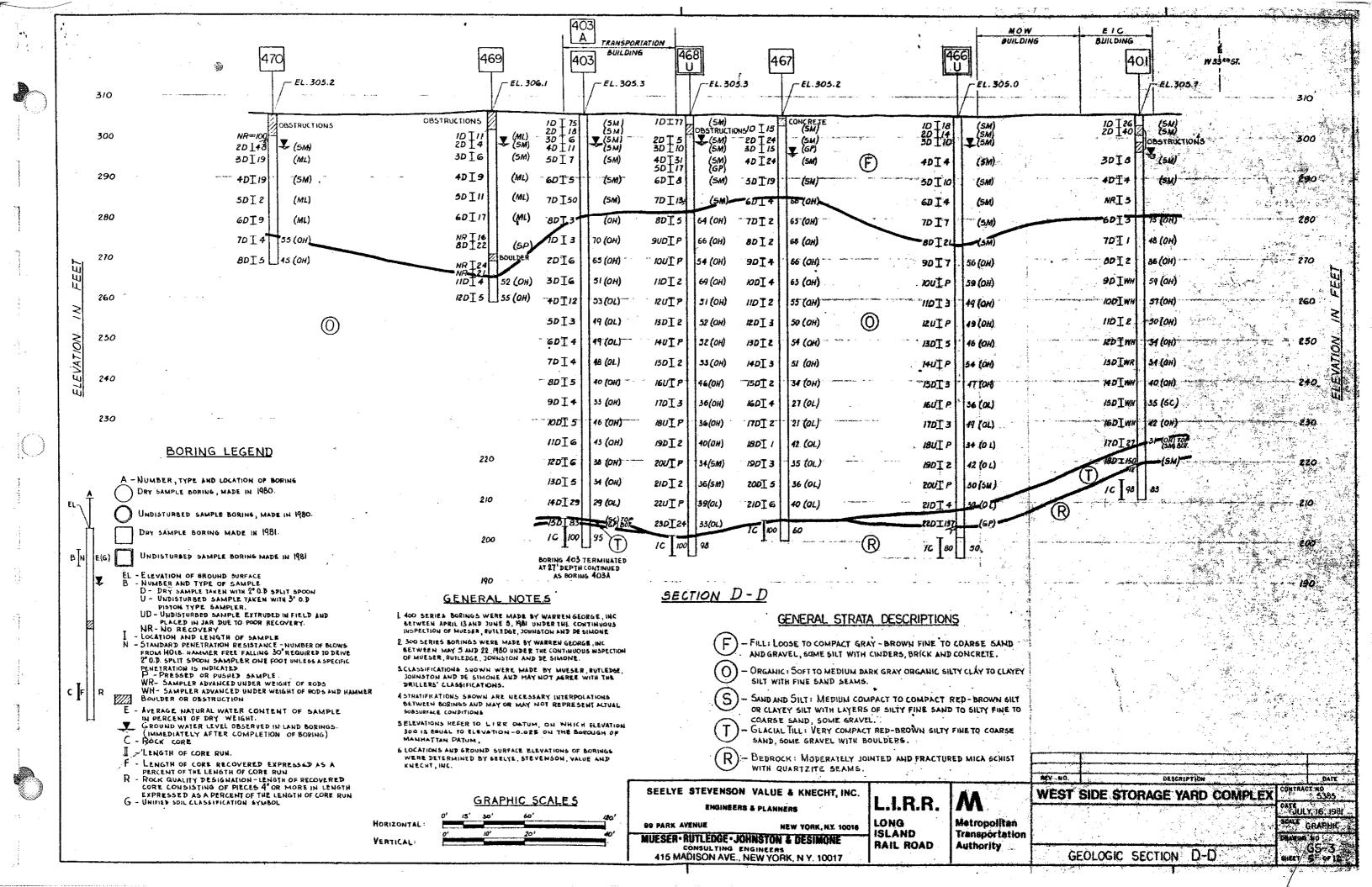
#### MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD-CLYDE CONSULTANTS, INC. BORING LOG

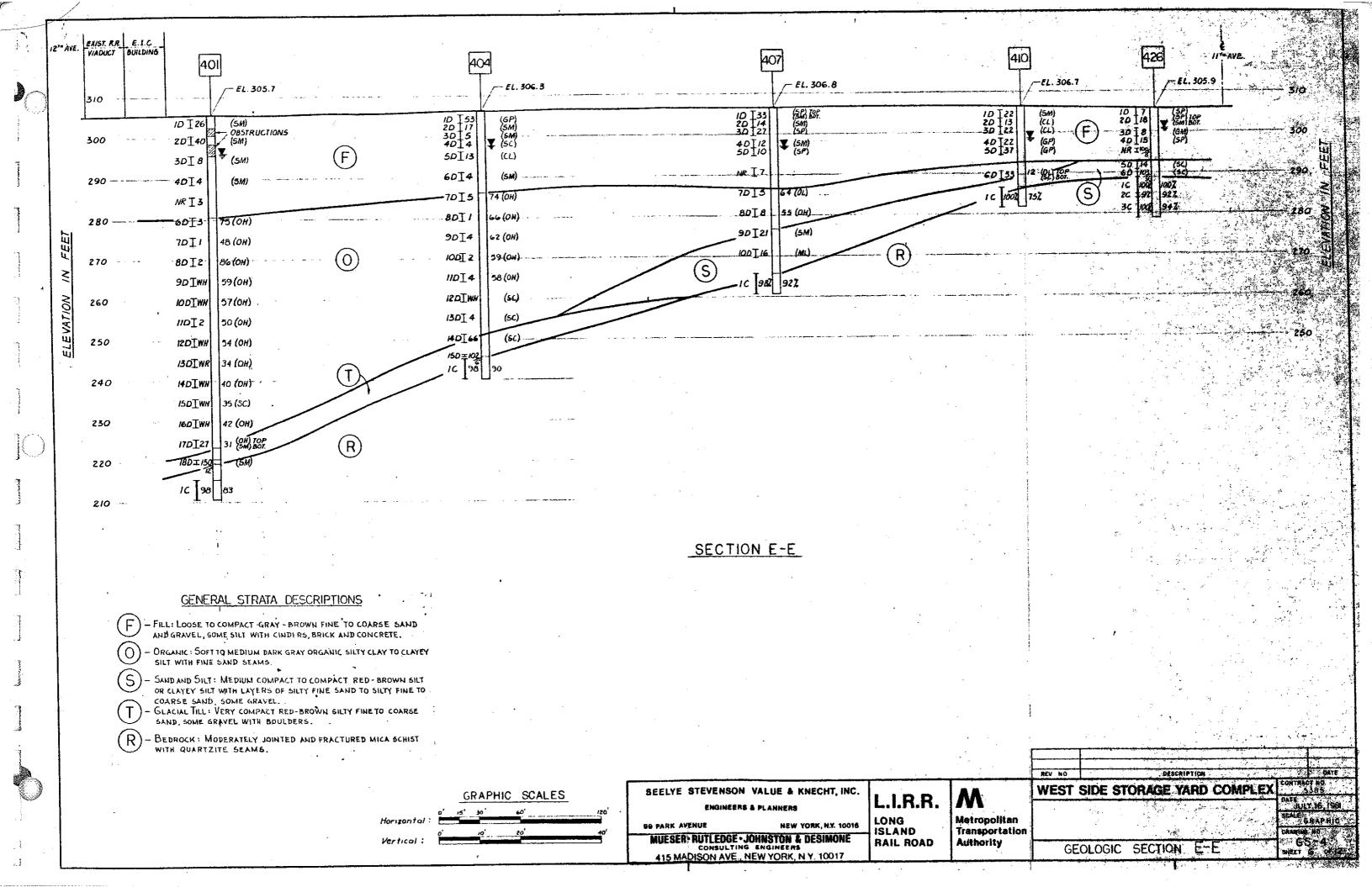
SHEET 2 of 2 BORING NO. MG-831 FILE NO. 4840

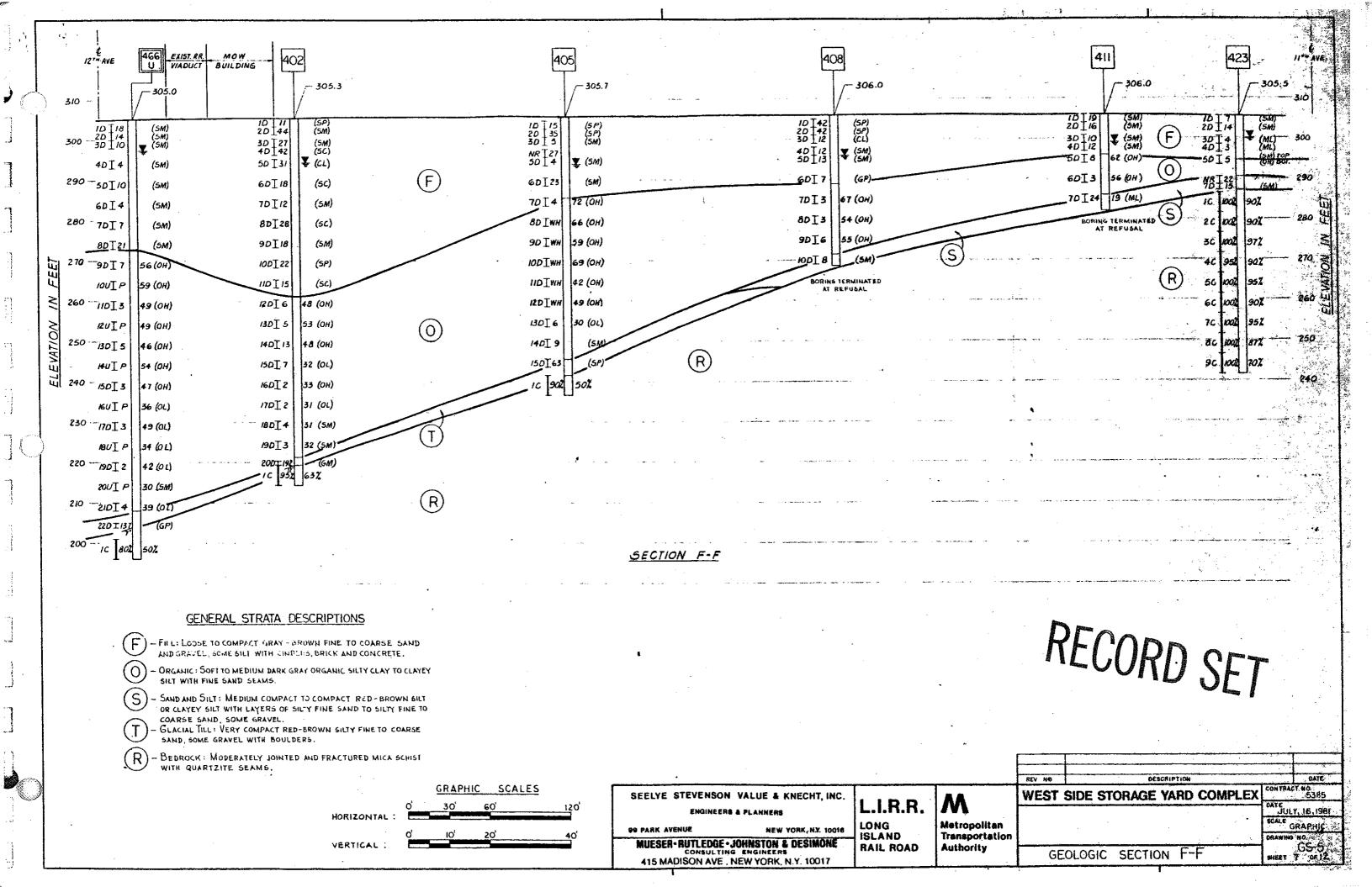
		<u>.</u> ,					·	BORIN	G L	JG			FILE	NO4840
DAILY PROGRESS	CAS		NO.	SAMPI DEPTH	BLOWS/6"		SA	MPLE D	ESCR	IPTION		STRATA	DEPTH (FT)	REMARKS
HOGHESS		775	7D	30.0		Dro	£	Cana		cil+	gravel		30	
1	$\vdash \vdash \mid$		10	32.0	62-37	PLOMII	T-G	Sana,	SIII	Sill,	(SM)	1		
	$\vdash$	-		32.0	02-31						(BPI)	V cpt	<b>-</b> -	
1	$\vdash \forall$							1				33.0		*
	<del></del>	$\dashv$	1C	34.0	Rec=98%	Light	t are	are-web i	ta 1	nicace	on G	34.0		*Decomposed rock
Sunny				39.0			t yra	bloc	LE 1	HEACE.	Jus	it.	<b>—</b> 35 <del>—</del>	
l ng				33.0	102-30 8	quar	L21 LL	DIOC	~Y #	CIII		걸 .		Core barrel was
												ca schistω mass,		blocked at
73						-			-			∣ਲ ੬		35.5.
			2C	39.0	Rec=100%	Do	1C					mica te ma		
] []				44.0		-						H	40 -	
04/12/82												Lt gry mic Guartzite O UnW		
]. [	<u> </u>											; da ≥		
1530												다 등급		
1.						•			-			44.0	- 4r -	•
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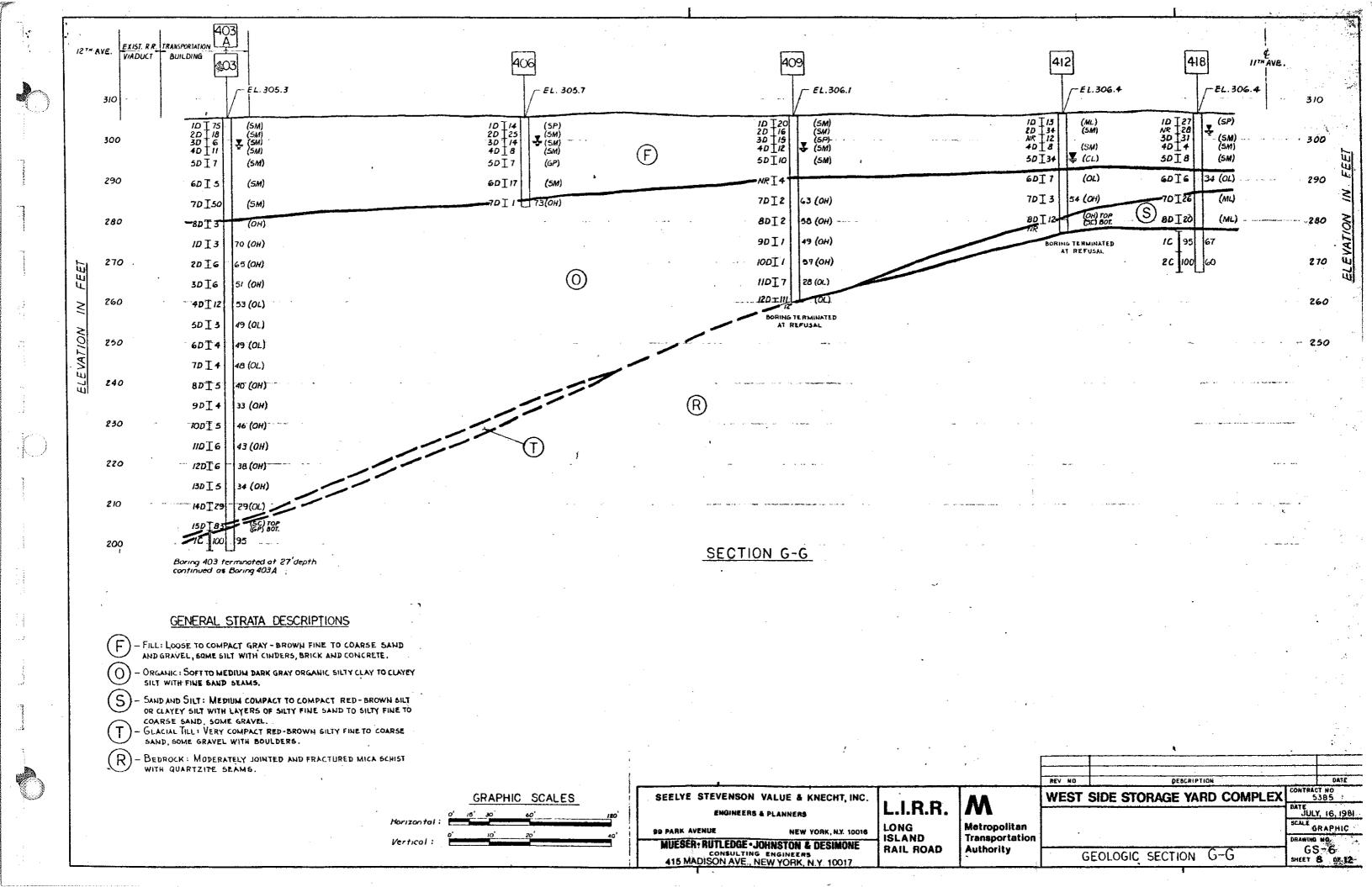


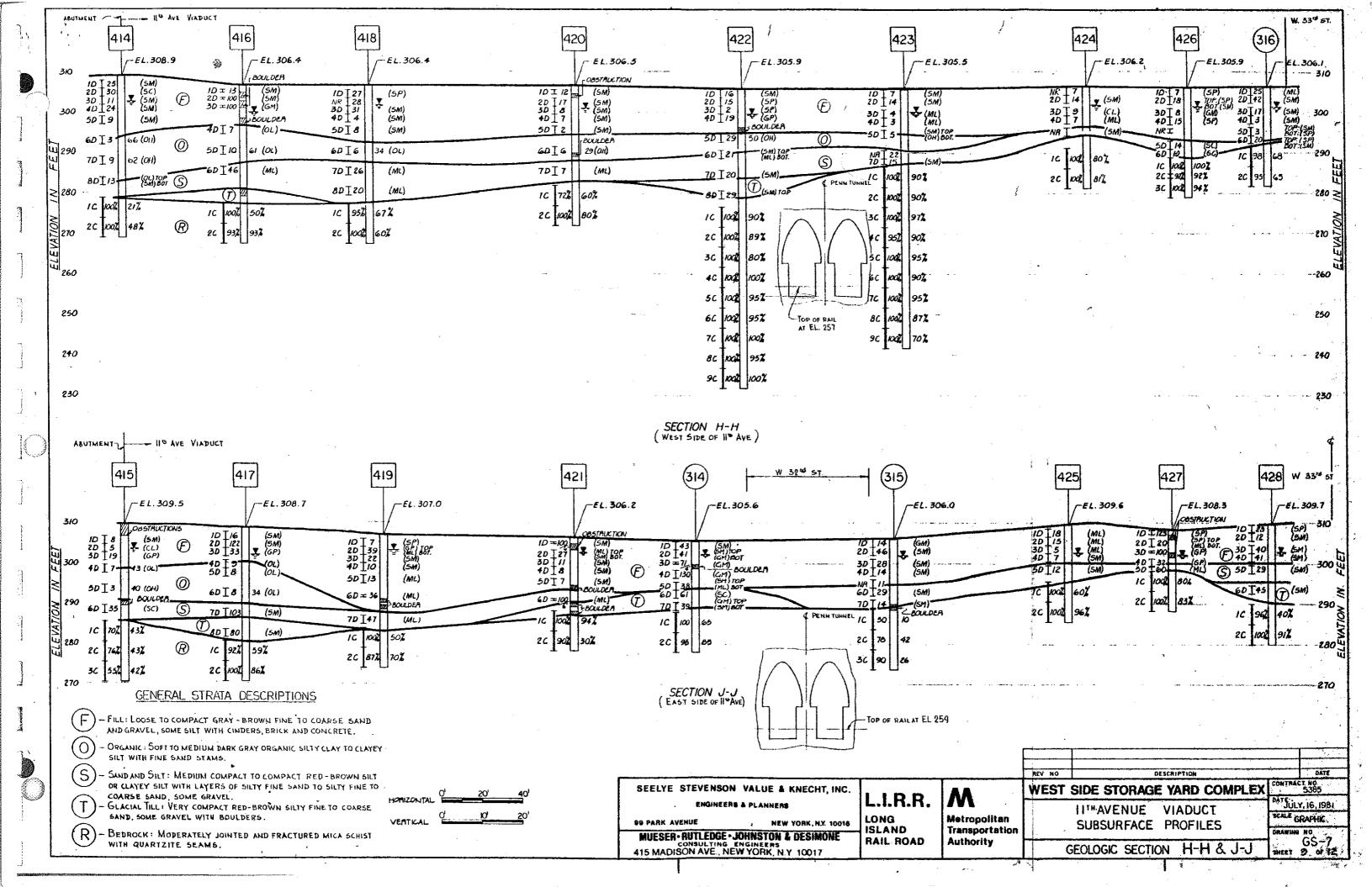










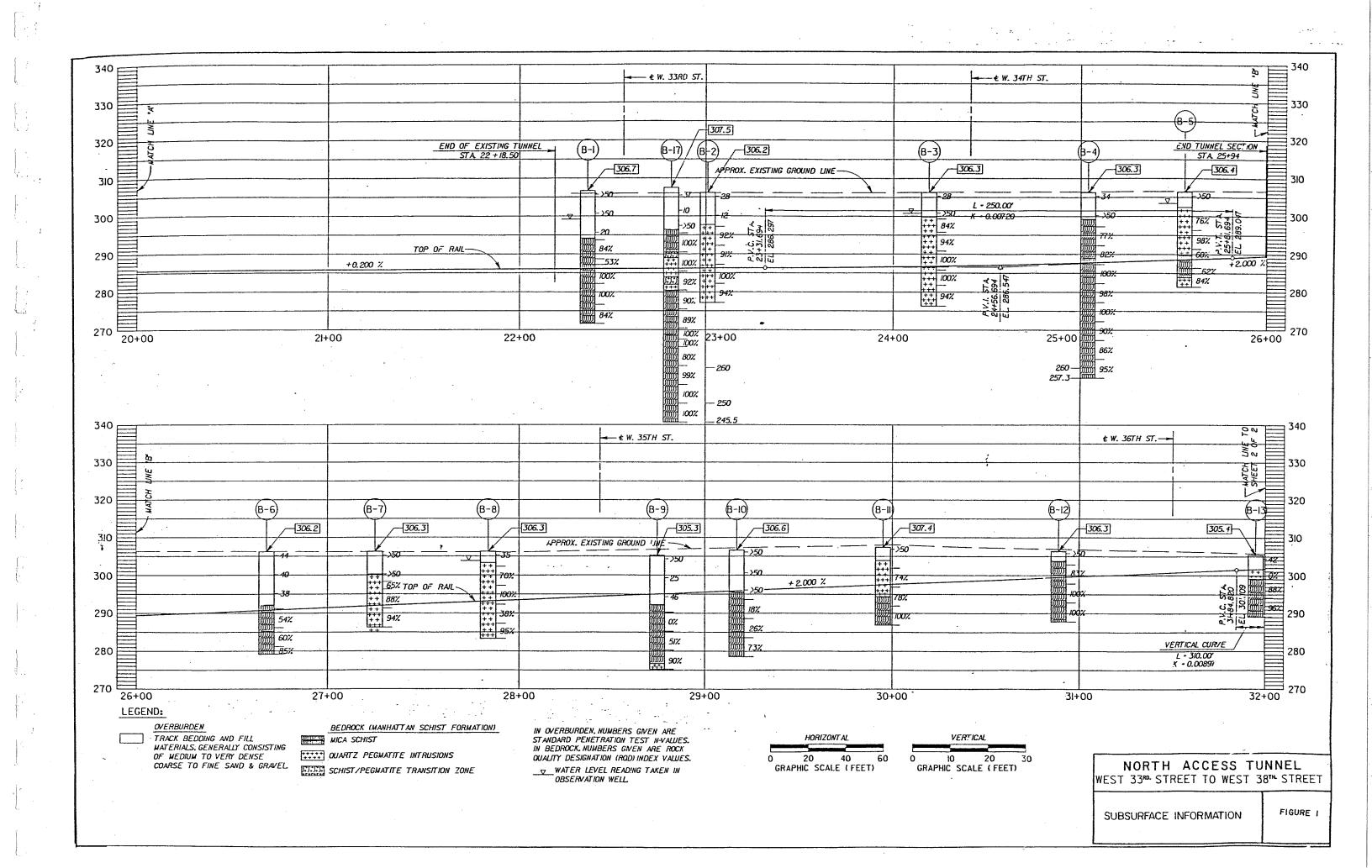


		K No	rth Access	W	AF	RE FOO	T OF.	SEO JERSEY	' AVENUE	INC.		SHEET 1				
	Connec						RSEY (	CITY, N	.J. 07303			N 19921.73 W 15120.80				
	Yew Yo			FOR:				Brinck		/2/86		GROUND ELEVATION 306.7				
DEF	РТН <u></u>		FT FT. C	ASING ING OU	I TUO AO TI	DATE:		DATE,	START: _3/ FINISH: 9/	/13/86	_ G	GROUND WATER ELEVATION. 299.4				
					1					00-140	LBS.	HAMMER FALL				
SAM	PLER 0.	D	NW 1.0	3/8"	-  ,	NSIDE	LENGT	H OF SA	MPLER 2	4	_ ( N <sub>1</sub>	CASING 24" SAMPLER 3	0.			
SURFACE	CASING BLOWS PER	SAMPLE	SAMPLE DEPTHS ELEV. / FEET		SAMPLE RECOVERY	ON	OWS PER	ER	DENSITY OR CONSIST.	1	FII	ELD IDENTIFICATION  OF  SOILS  REMARKS				
5 0	FOOT		01 1 11		<u>~</u> ∆"	0-6			MOISTURE	SS-1	Bro	wn Sandy medium to coarse	F			
}		SS-1	0'-1.1'		4	.1			-	33-1	BAI	AVEL, very dense dry (FILL+ LLAST)	L			
					3"	3-	2	50/0'		SS-2	Bro som den	wn medium to fine SAND, ne Gravel, little Clay very se west: (fill)				
		SS-2	51-61		3"	3-	_3=_	J. U U		0'-12.5	fine	ay coarse to fine SAND, little e Gravel, trace Silt, medium use, very moist	-			
10										SS-3						
		SS-3	10'-12'		10"	5=	10-	1.0-	4	12.5'-1	3' So	ft rock	丰			
									-	13'-35'	dar	nhattan Schist Formation, k gray Mica Schist 13.0'-				
		R1	13'-18'	·	4.75	R	D=84 D=5				13. wea	5', Highly to moderately athered low to moderate doncess				
20		R2	18'-19.5'		1.1	100	7 D - 0.						-			
20					<u></u>				<del>- </del>			.5'-35.0' Slightly weat <del>h</del> - ed, moderate hardness,	-			
• ]		R3	19.5'-24.8'		5.3'	- R	D=1	00%				ose to wide fracture acing.	-			
													}			
30		R4	24.8'-30'		5.2	R	QD=1	00%								
									<u>-</u>							
·  -		R5	30'-35'		4.9	' R	ပြ QD=8	4%		127-05	:   -		_			
											19	ote: Pressure test at 14.0'- .6', 1 gpm at 24 psi, ezometer installed at 23'				
Ł,																
4(    _								Dr	iller:			reg Marney				
н.	oils Eng cillina		. Б	eter T	ani			He	lper:		No	orman Burgess				

Drilling Inspector: \_

Connecti New Yor PEPTH	on Tu	th Access innel	WAI	7 <b>KL</b> F00	T OF J	ERSEY	AVENUE	INC.	LOCATION New York City B-2
Connecti New Yor PEPTH	on Tu	1		, 00	, ., .,				
New Yor	k Cit	uuei			P. 0.	BOX 4	13		N 19986.60
EPTH		ì		. JEF	RSEY C	ITY, N.	J. 07303		W 15104.10
EPTH			FOR:		ns Brir				
EPTH		FT FT. C/	ASING OUT	DATE: _		DATE, S	START: _9/	<u> 10/86                                    </u>	GROUND ELEVATION 306.2 GROUND WATER ELEVATION 301.3
		FT. ALL CAS	NG OUT DA	TE:		DATE, I	-1 M 1 2 M :		
ASING O.	D	NW_1.0						<u>10-140</u> [	
AMPLER 0.1	D	2"1.0.1=1 NX	3/8"	INSIDE	LENGTH	OF SA	IPLER	24	
W CASING				BLO	OWS PER 6	5	DENS ITY	PROFILE	FIELD IDENTIFICATION OF
CASING BLOWS PER	SAMPLE	SAMPLE DEPTHS ELEV. / FEET	SAMPLE	ON	SAMPLE	R	OR CONSIST.	CHANGE DEPTH	SOILS
PER	SAN	•	SA	0-6	6-12	12-18	MOISTURE	Í	REMARKS
+ 1001					1.0	15 06	i	0'-85'	SS-1 Black brown coarse/fine SAND
	SS-1	0'-2'	11"	4-	13	13-20	1		and coarse/medium GRAVEL,
+									little CLay, slightly moist, very slightly plastic, very stiff, (Fill
		· · · · · · · · · · · · · · · · · · ·		<del> </del>			1		& Ballast)
	SS-2	5'-7'	4"	3-	5-	7-14	1		
				+			-	-	Black brown coarse/medium
							-	SS-2	GRAVEL, some medium/fine Sand, wet, stiff(Fill & Ball ast)
0					<del> </del>	<u> </u>	1	1	
							•	8.5'-9	Decomposed rock
	R1	9'-14'	4.6	3' RQI	)=92%. 	-			
							_		
						-	-	9'-29'	Manhattan Schist Formation
	R 2	14'-19'	4,	9' RQI	)=91%	-			light gray quartz pegmatite coarse to medium-grained,
20	102			_		<del> </del>	-		slightly weathered, hard to ver
	<del> </del>								hard moderately close to wide fracture spacing
			51	PO	D=100°	%			Tracture spacing
	R3	19'-24'	9.	Tr on	D-100	9			
					1				
						<u> </u>	<del>-</del>		
	R4	24'-29'	51	RQ	D=94%	5	-	\$1 21°	
30									10 11 1
	1						_		Note: Pressure test at 10-1'-1 no take at 30 psi
									10 0000 == == ==
·	-								
							_		
	+	<del> </del>	-						
	1								
-40									Greg Marney
Soils Engi	neer:.	7.:					iller: ilper:		NOrman Burgess

JOB LOCATION:  AMTRAK North Access  Connection Tunnel  New York Cfry  EPTH FT FT. CALL CAS	FOR:	FOO JE Pars DATE:	P. O RSEY (	JERSEY DE	( AVENU 413 1.J. 07303 rhoff start:	9/11/86	G	SHEET			
ASING O.D. NW I.D	/8"	WEI GHT	OF HA	MER	300-140	24	LBS.	HAMMER FALL CASING 24" SAMPLER 30"			
CASING SAMPLE DEPTHS BLOWS PER SWIND FLET FOOT  TO SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY 7		OWS PER SAMPLE	ER	DENSITY OR CONSIST. MOISTURE		FIE	LO IDENTIFICATION  OF  SOILS.  REMARKS	بسمود		
SS-1 0'-2'	1"	12-	14-	14-8		SS-1:	and S	ht brown coarse CRAVEL, ILT, dry, medium dense ast & Fill)			
SS-2 5'-6.25'  R1 6.5'-10'			19- =84%	28/3"		0'-6.25' SS-2	coa	nt brown SILT, little rse/medium Sand, trace vel, Wet, Dense, decompose k	<u>а</u>		
R2 10'-15'	4.8'	RQD	=94%			6.25'-3	0'				
R3 15'-20.3'	5.31	RQD	=100%	0			Mon	hattan Schist Formation,			
R4 20/3'-24.2'	3.9'	RĄD	=100%				Ligh light	t gray quartz pegmatite, ly weathered, hard to very moderately close fracture			
R5 24.2'-30'	5.7	RQD	=97%	· ·		0.09-35	Note	: Pressure test at 14.4'-20.0	-		
	-							gpm at 20 psi ometer installed at 30'			
orilling Inspector:	er Tani			Drill Helps		Greg Ma Norman		ess			



		<u></u> F	ar	son	S								BORING	NUMBE	R: PE-23							
		₹ E	3rir	icke	erh	off	D	ΛD	INI	G L	$\mathbf{\cap}$	C	SHEET I	NUMBER	:: <u>1</u>	of	1					
<u> </u>			Qua	ade	&		D	UN	7114	GL	_0	G										
	10C YEAR	) s <sub>®</sub> [	Οοι	ıgla	s,	Inc.							PROJEC	T NUMB	ER:							
PROJE	ECT:	No 7	Sı	ıbv	vay	line Exte	ension	]					LOCATION	ON: LIRI	R-Trk 26	5-11th Av	e (40'E)					
LOCA														N: 214,2		: 983,592	,					
CLIEN	T: M	ГΑ											STN. NC			FFSET:						
CONT	RACT	OR	: Je	erse	y l	Boring &	Drilli	ng					SURFAC	E ELEV.	: 108.0 fe	eet						
DRILL	ER: D	). Ke	eith	1									DATUM:									
INSPE	CTO	R: <b>A</b>	. Z	aba	la																	
DRILL	ING N	/IETI	НО	D: I	Ro	tary Wasl	h						START [	DATE: <b>8</b> /2	26/03 T	IME: 11 <b>:</b> 3	30 am					
RIG T	YPE:	CMI	E 5	<b>5</b> (1	Hiş	gh Rail)							FINISH DATE: 9/9/03 TIME: 4:00 pm									
		С	asi	ng	Sp	lit Spoon Sh	elby Tu	ıbe F	Piston	Gra	b C	ore Barrel		GROU	NDWATER	DATA						
Type/S	Symbo	ol 🗌	НИ	7		S	U		P	G		С			Water	Casing	Hole					
I.D.	•		4"			1.375"	2.938"	2	.938"			2"	Date	Time	Depth (ft)	Depth (ft)	Depth (ft)					
O.D.			4.5	"		2"	3"		3"			3"	9/8/03	9:00 am	20.0	17.0	138.5					
Length	,					24"	24"		24"					7 10 0 11-11								
_			00.1	h a							NIW	т										
	mer Wt.         300 lbs         140 lbs         Drill Rod Size         NWJ           mer Fall         24"         30"         I.D. (O.D.)         (2.938")																					
Hamm																						
	SAMPLE SOIL (Blows/6 in.)																					
eet)		₩£	F				0.10	0/40	40/40	40/04	REC.	1										
<u>₩</u>	2	(Blows/ft) (Min./ft)				et)	0/6	6/12	12/18	18/24	(in.)	] [	ELD CLAS	SCIEICAT			oke.					
DEPTH (feet)	GRAPHIC LOG	<u>@</u> €	1	జ	占	DEPTH (feet)		C	ORING	G		l '"	LLD OLAC		ION AIN		VIVO					
	GR/	N N	J۳	NUMBER	SYMBOL	) TF	DUN		REC.		DOD	D 41-										
		CASING (	TYPE	₽	SYI	DEI	RUN (in.)	(in.)	KEC.	L>4" (in.)	RQD %	Depth Elev.										
	***		T										Hand Auger	ed Material								
<b> </b>			1										Hand Augered Material: 0' to 1.1' - Concrete 1.1' to 1.5' - Asphalt									
<b>F</b>	* 4		ł										1.5' to 2' - C	oarse Grave	el	~	-					
<b>-</b>	**************************************		┨			0.0 - 6.0		Hand		Auger			2' to 4' - Lig 4' to 6' - Bro	ht brown m wn/reddish	-f SAND, s m-f SAND	ome Silt	-					
ŀ			┨										1 to 0 Bio	wii/icacisii	111 1 57 11 12		-					
<b>-</b> 5	***		1														_					
-	1 D 7		1										A () 1.485	D (	10 A 3 ID 11	1 011						
L	* 4		$ _{S}$	1		6.0 - 8.0	10	23	29	25	24		A. (top 14") dense (SP)	Brown m-1	SAND, litt	tle Silt, mois	st,					
L			ľ			0.0 0.0	10						B. (bottom 1	0") Brown/	goldish m-	f SAND, tra	ice					
	<b>★</b>												Silt, dense (	Pyrite) (SP)								
<del>-</del> 10													White/reddis	sh Granitic	GNEISS (b	oulder)	_					
†			C	1		10.0 - 12.6	31	31	100								-					
<b> </b>			1														-					
-			<sub>S</sub>	2		13.0 - 14.0	32	100/6"			12	<b></b> -	Brown c-f S	AND. little	Silt. little n	n-f decomp	 osed					
F			+	_		15.0 - 14.0	32	100/0	-	-	12		Pegmatite, n	noist, very	dense	- 2000mp						
15			$\frac{1}{S}$	3		15.0 - 15.8	40	100/3"			5		White and b	rown m fd	ecomposed.	rock some						
77/0			+	3		13.0 - 13.8	40	100/3	-		5	1 <u>6</u> .0	Sand, little f	- Gravel, ve	ery dense		·/					
3												_ `\_	Roller bit re	<u>fusal and be</u>	gin coring	<u>at 16.'</u>	-/ .					
																	=					
			1														-					
_ 20			1														_					
<b>: -</b>			1														-					
<u></u>			1														-					
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-			1														-					
3 <b></b>																						
												Bori	ing No.	PE-23	Shee	t 1 c	of 1					

		Pars	ons				BORING	NUM	BER:	PE-23	3		
		Brind	kerho	off		CORING LOG	SHEET	NUME	ER:_	1	(	of	5
		Quad			,	COKING LOG							
	10 YEAI	Doug	glas, I	nc.			PROJEC	T NU	MBE	₹:			
		No 7 Sul	•	line I	Extens	sion	LOCATION						` /
		: Manha	ttan				COORD		14,249			-	0
CLIEN					0 D	•11•	STN. NC		_, 1		DFFS	ET:	
		TOR: Jer	sey B	Soring	g & Di	rilling	SURFAC		EV.: I	08.0 1	eet		
		D. Keith R: A. Za	hala				DATUM:						
				mond	drilli	ng with double core barrel	START I	)VIE	8/26	/03 7	ΓΙΝ <i>Λ</i> Ι⊑•	11.30	) am
		CME 55				ing with double core barrer	FINISH						
1410 1	··· <u>-</u> ·	CIVIL 33	(IIIS	II IXAI	<u>,                                     </u>		THINGTT			WATEF			<del>)</del>
CORE	FΑ	RREL DA	ТΔ.		NOT	FS·				Water	Cas		Hole
TYPE		WEE DA	17.				Date	Tim		Depth (ft)	De		Depth (ft)
CORE		=· 2"					9/8/03	9:00		20.0	(f	'. <b>0</b>	(ft) 138.5
0.D.:							3/0/03	9.00	a111	20.0	17	.0	136.3
I.D.: 2													
		70- 411 (4	511)										
CASIN	_	ZE: 4" (4	.5")							510	00117		
	RATE (ft/min)	£.	<u></u>	(6)		DESCRIPTION AND REMARK	S	(D		DIS	CONTI	NUITY	DATA
DEPTH (feet)	= (ft	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	9	(Lithology, Structure, Weatherin	g,	WEATHERING	<sub></sub>	<u>a</u>			<del>-</del>
<del>"</del> ±	K	AUN EPT	ÆR	Ē,	(%) C	Continuity, Strength, Color, Grain	Size)	単	STRENGTH	ANGLE (deg)			DEPTH (feet)
I III		RE I D DI	00	000	RQD	* - Denotes discontinuity along foli	ation	EAT	TRE	J.E	누	Ja	L T
	CORING	CO	RE	RE		MB - Denotes mechanical brea	k	×	S	ANG			
	8									<u> </u>			
						Pink/light gray Granitic GNEISS, slightly sound, wide fracture spacing, very strong	weathered,	II	R5	10	1.5	1	16.2
						grained	10¢k, 111-1			$\begin{array}{c} 0\\10_{\mathrm{MB}} \end{array}$	1.5	1 -	16.4 16.6
						-Scattered Garnets up to 3/8" -Foliation faint, dips 70				$10_{\mathrm{MB}}^{\mathrm{MB}}$	-	-	18
		C-2				•			·				•
<del>-</del> 20		16.0 - 24.3	100	100	96	19.7' to 24.3' - Pink/light gray PEGMATI grained, slightly weathered, wide fracture	TE, c- e spacing.	II	R4	5 <sub>MB</sub>	-	-	20
<b>-</b>						strong, some iron staining 23' to 36.5'	- T			5 <sub>MB</sub>	1.5	1.0	20.6
<b> </b>										20	1.5	1.0	21.5
-										20	1.5	2.0	22.9
-						24 21 to 25 21 Dialylight array DECMAT		1/11	R5	$\begin{array}{c c} 0 \\ 20 \end{array}$	2.0	2.0	23.3
<del></del> 25						24.3' to 25.3' - Pink/light gray PEGMATI unweathered to slightly weathered, sound	l, wide	I/II			1.0	1.0	24.3
-						fracture spacing, very strong rock, c- grain 25.3' to 33.1' - Pink/light gray Granitic G	ned	I	R5	$0_{\mathrm{MB}}$	-	-	25.25
-						grained, wide fracture spacing, unweathe							
-		C 2				strong, foliation dips 70 -Pegmatite 1" wide at 29.7', 30.2', 30.7'				$0_{\mathrm{MB}}$	_	_	27.7
-		C-3a 24.3 - 33.1	106	100	100	-1 egiliatite 1 wide at 27.7, 30.2, 30.7							
§ — 30													_
8/25										20	1.5	1.0	30.1
GLB _										$0_{MB}$	-	-	30.9
										$0_{ m MB}$	_		32.6 -
MAINI L		C-3b 33.1 - 33.9	10	100	100	C-3 continued - Gray/pink Granitic GNE	ISS,	I	R5	$20_{MB}$	_	-	33.1
7		<u> </u>				\underset unweathered, strong rock - rock recovere \of C-4 core run	i	I	R5	$0_{\mathrm{MB}}$	-	-	33.9
Ö — 35		$C_{\Lambda}$				Gray/pink Granitic GNEISS, unweathere strong rock, medium to fine grained	d, very						
9 2		C-4 33.9 - 38.6	56	100	100	-Faint banding dips 70-80							
										$0_{ m MB}$	_	_	37.3
						 				$0_{\mathrm{MB}}$	-	-	37.9
NOS -						Gray/pink Granitic GNEISS, slightly wea medium to fine grained, few brown Garn		II	R4	0 <sub>MB</sub> 5	- 1.5	1.0	38.6 39.2
<del>-</del> 40						present				5	1.5	3.0	39.6

PE-23

Boring No.

Sheet

5

of

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	IT: M	ITA				11	NSPECT	OR:	A. Za	bala			
	(ft/min)		_							DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (ft/r	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	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' PEGMATITE -46.1' to 46.4' contact with Gneiss near verti-Drill locked up after first 0.6 ft, core stuck is pulled rock and continued drilling -Lost entire tub of drilling fluid, rig chatter willing continued -No rock wall contact at 39.2', 39.6', and 40Break along Quartz vein with sand particles -Frequent staining on joint walls 39' to 41' (yand red)	ical in barrel, when .8' s at 40.5'	I	R4	20 0 0 30 <sub>MB</sub>	1.5 1.5 1.5	2 3.0 3.0	40.5 40.8 - 41 42.8 - - -
- - 50 - - - - - - 55		C-6 48.0 - 58.0	120	100	98	Light gray Granitic GNEISS, very strong ros slightly weathered to unweathered, medium grained, foliation dip 75-80 -Rock is light red Garnet rich or Hematite st -51.4' to 51.7', 52.1' to 52.6', and 54.2' to 54. grained Garnets constitute 10% of rock -57.1' to 58' - 1/8" wide bands of Garnet para foliation, spaced approx. 2" apart -Lost entire tub of drilling fluid three times Note: Depth of 48' was measured using drill (tape was sticking to side of boring wall and not be used)	to fine tained .5' - m- rallel to	II	R5	0 0 20 0 5 5 5 5 0 <sub>MB</sub> 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 - 51.1 - 51.8 - 53.1 -
- - - - 60 - -		C-7 58.0 - 66.5	102	100	99	Pink/gray Granitic GNEISS, slightly weather sound, wide fracture spacing, very strong rougrained -58.2' to 59.8' and 65.2' to 65.5' - Pink/white PEGMATITE, coarse to very coarse grained -Lost two tubs of water	ck, c-m	П	R5	$\begin{array}{c} 10 \\ 10_{\text{MB}} \\ 0_{\text{MB}} \\ 10_{\text{MB}} \\ 20 \\ 20_{\text{MB}} \\ \end{array} \\ \begin{array}{c} ^{\text{MB}} \\ 10 \\ 20 \\ 15 \\ 5 \\ 10_{\text{MB}} \\ 0_{\text{MB}} \end{array}$	1.5 - - 1.5 - 1.5 1.5 1.5 1.5	1.0 - - 1.0 - 1 1 1.0	55.1 55.8 - 55.9 - 56.4 56.6 - 57.1 57.4 - 58 - 60.1 60.2 - 61.1 61.4 62 - 63.3
- - 65													65.2
- 65 - 70 - 75 - 75 - 75 - 75 - 75 - 75 - 7		C-8 66.5 - 70.2	44	100	100	Pink/gray Granitic GNEISS, unweathered, s wide fracture spacing, very strong rock, c-f g foliation dips 50-60 -Garnets up to 3/4" -Scattered Pegmatite 1" wide parallel to folia -Stopped drilling at 70.2' due to need for new	grained,	I	R5	20 <sub>MB</sub> 0 0 10 5 <sub>MB</sub> 5 <sub>MB</sub> 5 <sub>MB</sub>	1.0 1.0 1.0 -	1.0 1.0 1.0 -	66.5 - 66.6 66.8 - 67.2 68.9 69.5 -
00 00 00 00 00 00 00 00 00 00 00 00 00		C-9	122	100	100	Pink/gray Granitic GNEISS, slightly weather unweathered, sound, very wide fracture spacestrong rock, m-f grained, foliation dips 50 - White/pink Pegmatite, 1" to 2" wide, at 75.: 76.9', and 77.8' parallel to foliation -Quartz enriched 78.5' to 80.4' -Lost two tubs of water	cing, very	I/II	R5	$0_{\mathrm{MB}}$ $0_{\mathrm{MB}}$ $10_{\mathrm{MB}}$	-	-	70.2 71.3 72.3
2		70.2 - 80.4	1 44	100	100	Boring	No.	PE-2	3	Shee	et 2	of	5

DR	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

DESCRIPTION AND REMARKS (Continuity, Strength, Color, Grain Size)  * - Denotes discontinuity along foliation  MB - Denotes mechanical break  MEATHERING  WEATHERING  WEATHERING  MB - Denotes mechanical break  10  0  0  0  0  0  0  0  0  0  0  0  0	1.5	1.0 - 1	76.3 76.9
Continuity, Strength, Color, Grain Size)  * - Denotes discontinuity along foliation  MB - Denotes mechanical break  * AND DEPTH (fe  WEATHERI	1.5	1.0	76.3 76.9
lacksquare		-	76.9
-			77.7 -
Pink/light gray Granitic GNEISS, unweathered, sound, very wide fracture spacing, very strong rock, m-f grained, foliation dips 40-50 -Scattered Garnets to 3/8" -Pink/white, m-c grained PEGMATITE from 80.4' to	1.5	1.0	80.4 80.5
C-10 80.4 - 89.8 113 100 100 80.9', 82.5' to 85.6', and 87.5' to 88' -Loss of water 0 <sub>MB</sub>			83.9 - 85.4 _ 86.1
Light gray Granitic GNEISS, as above   I   R5   O <sub>MB</sub>   Except: 92' to 92.4' - Black SCHIST, foliation 40   degrees   -Contacts concordant with Gneiss foliation   -Pink/white PEGMATITE from 92.6' to 94', 95.5' to 96.2', 97.5' to 97.6', and 99' to 99.6'   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>   O <sub>MB</sub>	1.5 -	3.0	89.8— 91.3— 92.1— 92.8— 93.5— 94.7—
20 10 <sub>M1</sub> 10 <sub>M1</sub> 15	1.5 B - 1.5	1.0	96.6 - 96.9 97.9 - 98.8 - 99.6—
Sound, very wide fracture spacing, very strong rock, c-f grained, foliation dips 50 -Pink/white PEGMATITE from 101.8' to 102.1'. 106.1  74 100 100 sound, very wide fracture spacing, very strong rock, c-f grained, foliation dips 50 -Pink/white PEGMATITE from 101.8' to 102.1'. 102.8' to 103.1', and 104.2' to 104.3'  0 <sub>MB</sub> 0 <sub>MB</sub>	B - B - B - B - B - B - B - B - B - B -		99.9 100.1 - 100.7 _ 101.9 102.9 - 104.4_
Pink/gray Granitic GNEISS, unweathered, sound, wide fracture spacing, very strong rock, m-f grained Except: 107' to 108.5' - Black SCHIST, foliation 50 degrees, contacts contorted -Rig blocked up  -Bit shoe broke off	- B -	-	105.3 _ 106.1
The state of the s	-	- - of	109.1 109.2

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	IT: M	TA				INSPEC <sup>-</sup>	TOR:	A. Za	bala			
	(ft/min)		_	_		DECORPORTION AND DESCRIPTION			DISC	CONTI	VUITY	DATA
DEPTH (feet)	CORING RATE (ft/n	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	ANGLE (deg)	٦L	Ja	DEPTH (feet)
_		C-14 109.2 -	66	100	100	grained, foliation dips 40-60 (faint banding) Except:			30 <sub>MB</sub> 20	- 1.5	1.0	109.6 110.5 -
-		114.7				111' to 111.3' - Pink/gray PEGMATITE -Roller bit before coring this run due to problem with bit in previous run			25 <sub>MB</sub>	-	-	112.8
_ 115						114.7' to 121.6' - Pink/gray Granitic GNEISS, unweathered, sound, very wide fracture spacing, very	I	R5	20 <sub>MB</sub> 25 <sub>MB</sub>	- -	- -	114.2 114.7
ŀ						strong rock, m-f grained, foliation dips 60-70 -1/8" thick Mica seam dipping 70at 120.7' -30° fracture at 122.6' cuts across foliation			15 <sub>MB</sub>	-	-	116.5 _
-		C-15	112	100	100				0	1.5	2.0	118.3 119
<del>-</del> 120		114.7 - 124.0	112	100	100				$0_{\mathrm{MB}}$	-	-	119
-						121.6' to 124' - Dark gray to black, Biotite-amphibole	II	R4	0	1.5	4	121.6 -
-						SCHIST, slightly weathered, wide fracture spacing, strong rock, c-f grained, wavy foliation dips 60 -Friable at upper contact with Gneiss			30	1.5	4.0	122.6 -
- - 125						Dark gray to black Biotite-amphibole SCHIST, slightly weathered, sound, wide to moderate fracture spacing, medium strong to strong, foliation is wavy	I	R3/R4	15 20	1.5 1.5	1.0 4.0	124 124.6
						(crenulated in places) and dips 60-80 -Irregular xenoliths of light gray Gneiss and pink Pegmatite, 2" to 6" across, with healed contacts, some parallel to schistosity			10 <sub>MB</sub>	- 1.5	3.0	126.5 _ 127.7 -
- - 130		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 <sub>MB</sub> 25 0	1.5 1.5 1.5	1.0 1.0	127.7 128.9 129.4 129.9
<u>-</u>						-Near vertical Mica seam, 1/2" wide, 130.5' to 131.2' -Mica-chlorite seam, approx. 1/2" wide, at 133.1', dips 70° -Broken up rock from 133.7' to 134', angular			25 <sub>MB</sub> 10 <sub>MB</sub> 20	- - 1.5	- - 2	131.3 131.8 132.8
-						fragments, extremely close fracture spacing  Pink/gray Granitic GNEISS, slightly weathered,	II	R5	60 70-30	1.5 1.0	4.0 1.0	133.1 <sub>-</sub> 133.7
135		C-17				sound, moderate to wide fracture spacing, very strong rock, c- grained			60 40-30 <sub>MB</sub>	4	1	134 — 134.1
		134.1 - 138.5	53	100	68	-2 long vertical fractures: (1) 136.5' to 137' (2) 137.2' to 138' -5" wide band of pink Pegmatite 134.3' to 134.7'	II	R4	25 20 80 25 <sub>MB</sub>	1.5 1.5 1.5	1.0 1.0 1	135.8 - 136.2 - 136.7 -
- 135 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140 - 140		C-18 138.5 -	25	100	100	-1/8" wide band of Garnet, dipping 60 from 135.8' to 136.5' \ 136.7' to 138.5' - White/gray/pink PEGMATITE, \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	III	R3	80 20 80	1.5 1.5 1.5	1 1.0 1.0	137.6 138.5 138.6
140		140.6				close fracture spacing, slightly weathered, strong, Quartz rich Pink/gray PEGMATITE, moderately weathered,	II	R5	20 5 25	1.5 1.5 1.5	1.0 1.0 1.0	138.7 139 - 139.6
		C-19 140.6 - 145.2	55	100	96	close fracture spacing, medium strong rock, c j grained Pink/gray PEGMATITE, slightly weathered, moderate fracture spacing, strong rock, c- grained			$ \begin{array}{c c} 25_{\text{MB}} \\ 25_{\text{MB}} \\ 20 \\ 15_{\text{MB}} \end{array} $	1.5	1.0	140.4 - 140.6 - 140.9 141.3 -
<b>-⊢</b> 145						Except: 143.7' to 144.9' - Light gray Granitic  GNEISS, m-f grained			$10_{MB} \\ 10_{MB}$	-	- -	141.5 141.7
<u> </u>						Boring No.	PE-2	23	Shee	1.5 t <b>4</b>	1.0 of	141.9 <b>5</b>

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER: PE-23 SHEET NUMBER: 5 of 5

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

DRILLER: D. Keith

CLIE	NT: M	TA					INSPEC <sup>-</sup>	TOR:	A. Za	bala			
	nin)		_			DECCRIPTION	0			DISC	CONTI	VUITY	DATA
DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARK (Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folion MB - Denotes mechanical brea	ig, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
- - - 150 -						-Mica seam at 142.3' -144.9' to 145.2' - Concrete with piece of E.O.B. at 145.2'.	tie rod _ j			$\begin{array}{c} 20 \\ 0 \\ 10_{\mathrm{MB}} \\ 0_{\mathrm{MB}} \\ 35 \\ 5 \end{array}$	1.5 1.5 - 1.5 1.5	2.0 1 - 1.0 2	142.1 142.2 - 142.8 143.4 - 144.3 _ 144.9 -
- - 155 - -													- - -
- 160 - -													- - - -
- 165 - -													- - - -
- 1770 - 1770 - 1770													-
NO. 7 CORING LOG NO. 7 NE.GPJ MAINLI1.GLB 8/22/06													- - - -
						Pori	ing No.	PE-2	03	Shee	t 5	of	5

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	100 YEARS	e C	)οι	ıgla	s,	Inc.							PROJEC	T NUMB	ER:						
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CLIEN			_				<b>.</b>						STN. NO.: OFFSET:								
	CONTRACTOR: Jersey Boring & Drilling												E ELEV.	: 108.0 fe	eet						
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						tary was gh Rail)	11							DATE: <b>8</b> /1 DATE: <b>8</b> /2		IME: 9:00					
1110 1			asir	$\overline{}$	_	it Spoon Sh	nelby Ti	ıbe F	Piston	Gra	b C	ore Barrel	I II II II I		NDWATER		o am				
Type/S	Symbo		HW	_	-	S	U []		PN	G		C			Water	Casing	Hole				
I.D.	уннос	"	4"			1.375"	2.938"	_	.938"		7	2"	Data	Time	Depth	Depth	Depth				
			<del>4</del> 4.5'			2"	3"		3"			3"	Date 8/21/03		(ft)	(ft)	(ft) 74.5				
O.D.			4.3			_						3		8:30 am	5.0	27.5					
Length			00:	1		24"	24"		24"		3.777.	-	8/25/03	9:00 am	5.0	27.5	165.2				
Hamm			00 1		1	40 lbs		Rod Si			NW.										
Hamm	er Fa		24'	'		30"	1.0	). (O.D.	)		(2.938	S'') <b>I</b>									
	(D				SAI	MPLE		SOIL	(Blows	/6 in.)											
DEPTH (feet)	SRAPHIC LOG	s/ft) /ft)					0/6	6/12	12/18	18/24	REC.	1									
±   ±	일	3low Min.				eet)	-0/0	0/12	12/10	10/24	(in.)	FII	ELD CLAS	SSIFICAT	ION ANI	O REMAF	RKS				
FPI	KAPI	9 9 9 9 9		3ER	SOL.	¥) H		C	CORING	3											
	G.	CASING (Blows/ft) CORING (Min./ft)	TYPE	NUMBER	SYMBOL	DEPTH (feet)	RUN	REC.	REC.	L>4"	RQD	Depth									
	- <u>A</u> - 4.	ΟŬ	ŕ	Z	Ś		(in.)	(in.)	%	(in.)	%	Elev.	TI1 A	4 M-4:-1	. 0 4- 1 11	C					
_	***		1										Hand Augered Material: 0 to 1.1' - Concrete								
-	****		1										1.1' to 1.5' - Asphalt 1.5' to 2' - Coarse Gravel								
-			1			0.0 - 6.0		Hand		Auger			2' to 4' - Lig	ht brown m	-f SAND, t	race Silt	-				
F	1 - 0 * - 1 · 1 · 1 · 1 · 1 · 1 · 1 · 1 · 1 · 1		1										41.4 (L.D.	CCA	NID ( C		-				
<b>-</b> 5	***		l										4' to 6' - Bro	own m-1 SA	ND, trace S	olit, moist	_				
-	1 D Z		1										D	CC A	ND	C:14 1:441	_				
F	* -		S	1		6.0 - 8.0	11	10	4	4	18		Brown/dark Gravel, m-d		, some	ын, пше m	1 <del>-</del> 1 /				
F			-														-				
F			1														-				
<b>–</b> 10			1										D 1	COLUM	6.6	1	—				
<b>L</b>			S	2		10.0 - 12.0	2	1	2	2	9		Dark gray c- loose (plant		ace t-Grave	ei, trace Silt,	, moist,				
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			S	3		15.0 - 17.0	4	5	3	3	14		Black Organ (OH).	nic CLAY a	nd SILT, tr	ace SAND,	stiff -				
						15.0 - 17.0			5		17		(011).				_				
<u>.</u>	$  \parallel \parallel $																_				
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<del>-</del> 20			C	1		20.0 22.0		11	11	10	1.5		A. (top 8") I		AND, some	e Clayey Sil	t,				
2			S	4		20.0 - 22.0	2	11	11	19	15	dense, moist B. (bottom 7") Brown m-f SAND, trace Silt, dry					ry, /				
	200		1										m-dense				/ -				
			1														_				
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<u> </u>	100 YEARS			ide Iala		lnc.		•	(contir	nued)		PROJECT NUMBER:
PROJ						line Ext	ensior	<u> </u>				CONTRACTOR: Jersey Boring & Drilling
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	1111				C A I	4DL F	T	COIL	/Dlavva	/C : \		INGFECTOR. A. Zabaia
et)	90	£ (;		,	SAN	MPLE	₩		(Blows		REC.	
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)				eet)	0/6	6/12	12/18	18/24	(in.)	
)EPT	RAPI	NG (E		NUMBER	SYMBOL	DEPTH (feet)		(	CORING	G		
	9	CASI	TYPE	N	SYM	DEP	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	D Depth Elev.
	0)(		S	5		25.0 - 25.0		-	-	-		26.0 No recovery
-												
<del>-</del> 30												_
-												
<b>†</b>												
<b>–</b> 35												-
+												
ţ												
-												
<del>-</del> 40												-
<b> </b>												
-												
<del>-</del> 45												-
-												
+												
90777												
8 B B												
NL ~1.  -												
~ 55												
6 – 55 -												
0 N -												
BORING LOG												
BORIN -												
												Boring No. PE-24 Sheet 2 of 2

	È≣	Pars	ons				BORING	NUM	BER:	PE-24	ŀ			
			kerho	off	(	CORING LOG	SHEET	NUME	BER:_	1	c	of	5	
	10	<u></u> Quad ເຂື່ Quad	de & glas, I	nc				<b>&gt;</b> T NII I	MDE	Π.				
DPO I		No 7 Su			Extone	vion	PROJEC				1 11+1	h Avo	(45'W)	
		l No 7 Sui I: Manha		mie i	LXUEIIS	51011	LOCATION: LIRR-Trk 11-11th Ave(45'W) COORD. N: 214,120.0 E: 983,309.0							
CLIEN			ıtan				STN. NO.: OFFSET:							
		TOR: Jer	sev B	Boring	2 & D1	rilling	SURFACE ELEV.: 108.0 feet							
		D. Keith			·		DATUM:							
INSPE	ECTO	)R: <b>A. Z</b> a	bala											
DRILL	ING	METHOD	): Dia	mond	drilli	ng with double core barrel	STARTI	DATE	8/18	/ <b>03</b> T	IME:	9:00	am	
RIG T	YPE:	CME 55	(Hig	h Rai	<u>l)</u>		FINISH I	DATE:	8/26	<u>/03</u> T	IME:	10:30	) am	
								GR		WATER				
-		RREL DA	TA:		NOT	ES:				Water Depth	Cas De		Hole Depth	
TYPE	: NX						Date	Tim		(ft)	(f		(ft)	
CORE	E SIZ	E: 2"					8/21/03	8:30	am	5.0	27	.5	74.5	
O.D.:							8/25/03	9:00	am	5.0	27	.5	165.2	
I.D.: 2	2"													
CASI		IZE: 4" (4	.5")	•										
	(ft/min)	-: <u>-</u>	_			DESCRIPTION AND REMARK	c			DIS	CONTI	NUITY	DATA	
et)	(ft/	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)		(Lithology, Structure, Weatherin	g,	WEATHERING	푸	<u>(</u>			₽ ₽	
DEPTH (feet)	RATE	NUN EPT	ÉR	ER.	(%)	Continuity, Strength, Color, Grain S	Size)	#	STRENGTH	э́р)			(fee	
FPT	B	ZE F	Š	000	RQD	* - Denotes discontinuity along foli	ation	I ∀	I RE	J.E	占	Ja	l E	
	CORING	ANE	REC	REC		MB - Denotes mechanical brea	k	W	ν.	ANGLE (deg)			DEPTH (feet)	
	8													
_						Dark gray to black Biotite/Amphibole/Qu SCHIST, slightly weathered, sound, mod	arata ta	II	R4	40	1.5	1.0	26.5 _	
						wide fracture spacing, strong rock, c-f gra Except: 26.8' to 27.4' and 29.5' to 30.8' - Muscovite PEGMATITE, m-c grained	ained			*60 *40	1.5 3.0	4.0 2.0	26.8 27.5 -	
L						Muscovite PEGMATITE, m-c grained	White			*50	1.5	4.0	27.9 28.4	
						-Abundant Garnets (1/8" to 3/8") -Foliation 50 to 65 degrees				$^{*60}_{MB}$	1.5	1.0	28.4	
<del>-</del> 30		C-1	112	100	100	-27.5' - Yellow stain on joint wall				$55_{MR}$	-	-	30	
		26.0 - 35.3				-31.4' - Red stain on joint wall				50 <sub>MB</sub> *55	1.5	4.0	30.7 - 31.2	
-										0	1.5	1.0	31.4	
<b>-</b>										15 <sub>MB</sub> *40 <sub>MB</sub>	-	-	32 -	
<b> </b>										*45 <sub>MB</sub> 40	1.5 1.5	1.0	33.4 -	
<del>-</del> 35						Dark gray to black Biotite/Amphibole SC		II	R4	*50	1.5	1.0	34.7	
-						slightly weathered, sound, wide to moder		11	N4	*60 60 <sub>MB</sub>	1.5	4.0	35.3 - 35.9	
-						spacing, strong rock, c-f grained -Abundant Garnets (1/8" to 3/8") constitu							-	
-						5% of rock core	up to			*55 *55	1.5	4.0	37.5 - 37.9	
-						-Wavy foliation, dipping 60-90 -44' - Yellow joint stained				45	1.5 1.5	4.0 2.0	38.3 -	
90/22/8		C-2	115	100	98	<ul> <li>Rock breaks easily along foliation in An</li> </ul>	nphibole			2.5	1.5	2.0	40.1	
		35.3 - 44.9				rich zones				35 30	1.5 1.5	2.0	40.1	
ele Ble										40	1.5		41.9	
<u>-</u>										40	1.3	1.0	41.9	
GPJ MAINLI~1.GLB										5	1.5	1.0	43.8	
- 45						Doub const to black COLUCE 1: 14		,,	D 4	0	1.5	1.0	43.9_	
<b>Z</b>						Dark gray to black SCHIST, slightly wea sound, wide to very wide fracture spacing	merea, g, strong	II	R4	$15 \ 0-40_{MB}$	1.5	1.0	44 44.4 -	
ଥ୍						rock, c-f grained -Abundant Garnets (1/8" to 3/8") above 4				$0-40_{MR}$	-	-	44.9	
901						Garnets below 49.8'				$30_{\mathrm{MB}}$	-	-	46.5	
CORING LOG NO						-Wavy foliation from 44.9' to 49.8', near -49.8' to 53' - 60 degree foliation, planar	vertical			20	1.5	2.0	48.6 -	
50 50		C-3	122	100	96	Except:	Granitia				1.3	2.0		
2 0 0 0		44.9 - 55.1	122	100	90	51.5' to 52.4' and 53' to 54.4' - Light gray GNEISS, faint banding dips 70, f-c grains	ed			*45 <sub>MB</sub> 20 <sub>MB</sub>	-		49.8 50.2	

**PE-24** 

Sheet

of

5

Boring No.

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER: PE-24 SHEET NUMBER: 2 of 5

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

CLIEN	NT: M	ITA				INSPEC	TOR:	A. Za	bala			
	(ft/min)					DESCRIPTION AND DEMARKS			DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#/	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	ANGLE (deg)	Jr	Ja	DEPTH (feet)
	J								0 *55	1.5 1.0	2.0 4.0	50.5 50.9 -
- - 55						55.1' to 56.5' - Dark gray SCHIST, slightly weathered, sound, wide to moderate fracture spacing	II	R4	*40 <sub>MB</sub> 50 <sub>MB</sub> 45 0 *50	- 1.5 1.5 1.0	4.0 1.0 4.0	52.7 - 53.4 - 53.6 53.8 - 54.3 54.4 -
- - - 60 - -		C-4 55.1 - 64.7	115	100	97	strong rock, c-f grained, foliation dips 50 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 -Faint Gneissic banding dips 70-80 -Friable at 56.5' (Schist/Gneiss contact)	I/II	R4/R5	40 25 *55 35 20 15 60 30 <sub>MB</sub> 10 <sub>MB</sub> 10 <sub>MB</sub>	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1.0 1.0 2.0 2.0 3.0 1.0 2.0 2.0	54.4 55.1 _ 55.6 55.8 - 56.4 56.5 - 56.9 _ 57.1 57.8 - 58.4 58.9 - 59.3 - 59.7 60.1 -
- 65 - - - - - - 70		C-5 64.7 - 74.5	118	100	97	Light gray Granitic GNEISS, unweathered, sound, very wide fracture spacing, very strong rock, m-f grained, foliation dips 60-80 -1" wide PEGMATITE running throughout run Except: 73.6' to 74.5' - Dark gray to black Biotite/Amphibole SCHIST, foliation dips 60-90 upper contact along foliation	I	R5	$\begin{array}{c} 10_{\text{MB}} \\ 50_{\text{MB}} \\ 50_{\text{MB}} \\ 10_{\text{MB}} \\ 70 \\ 15 \\ 65 \\ 20_{\text{MB}} \\ 0_{\text{MB}} \\ 10_{\text{MB}} \\ 55 \\ 10 \\ 20 \\ 0_{\text{MB}} \\ \end{array}$	1.5 1.5 1.5 1.5 - - 1.5 1.5 1.5	1.0 1.0 1.0 1.0 2.0 1.0	60.1 - 60.4 - 60.9 - 61.5 - 61.9 - 63.3 - 64.1 - 65.9 - 67.8 - 68.3 - 68.3 - 68.9 -
- 75 80 80		C-6 74.5 - 84.5	120	100	98	Dark gray to black Biotite/Amphibole SCHIST, slightly weathered, sound, wide to very wide fracture spacing, strong rock, c-f grained -Wavy Foliation - 50 to 60 degrees -Quartz veins, ductile folded, 1" wide at 79.7' to 80.5 -Rock breaks easily along foliation in Amphibole rich zone (75.5' to 77.2')		R4	$\begin{array}{c} 20_{\text{MB}} \\ 20 \\ 65 \\ 20 \\ 20 \\ 70 \\ 30_{\text{MB}} \\ *50 \\ \\ *50_{\text{MB}} \\ 50 \\ 25_{\text{MB}} \\ 30 \\ \\ *45 \\ 25_{\text{MB}} \\ *45 \\ 35_{\text{MB}} \end{array}$	1.5 1.5 1.5 1.5 1.5 1.5 1.5 - 1.5 - 1.5 - 1.5	1.0 2.0 2.0 2.0 2.0 2.0 2.0 - 2.0 - 2.0 3.0 - 4.0	71.85 - 71.9 - 73 - 73.5 - 73.6 - 74.5 - 74.8 - 75.4 - 76.6 - 77.1 - 78.2 - 79.4 - 79.9 - 80.4 - 81.4 -
— 85						Dark gray SCHIST, slightly weathered, c-f grained, foliation 60°  Boring No.	II PE-	R4	40 *45 30 40 0-45	1.0 1.5 1.5 1.5 1.5 1.5	1.0 1.0 2.0 1.0 1.0	83 83.4 - 83.9 84.5 84.8

AN	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

1	CLIEN	IT: M	ITA					INSPEC	ΓOR:	A. Za	bala			
T		(ft/min)									DIS	CONTI	YUITY	DATA
	DEPTH (feet)	CORING RATE (#/r	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folia  MB - Denotes mechanical break	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
-	- 90		C-7 84.5 - 94.3	118	100	90	87.4' to 90.6' - Light gray to pink Granitic f-m grained, foliation dips 60	GNEISS,			*60 *60 20 25 <sub>MB</sub> 30 0 10 <sub>MB</sub> 25 50 *40 *50 45 30	1.0 1.0 1.5 - 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.0 1.0	4.0 4.0 3.0 - 1.0 3.0 2.0 - 2.0 3.0 4.0 4.0 4.0	85.2 85.3 - 86.9 87.8 - 88.4 - 88.6 89.1 - 89.2 89.9 - 91.2 92.6 - 92.7 93.3 -
-	- 95 - 100		C-8 94.3 - 103.6	112	100	95	Dark gray SCHIST, as above 94.5' - Light gray to pink Granitic GNEIS unweathered to slightly weathered, sound, close fracture spacing, strong rock, m-f gr foliation dips 50' 96.4' to 96.5', 99.1' to 99.2', and 102.4' to grained PEGMATITE	, wide to rained, faint	I/II	R4	*45 0 <sub>MB</sub> 25 45 40 40 50 10 <sub>MB</sub> 20 <sub>MB</sub> 10 0 <sub>MB</sub> 0 45	1.5 - 1.5 1.0 1.5 1.5 1.5 - 1.0 - 1.0 1.5	2.0 2.0 3.0 3.0 3.0 1.0 - 1.0 - 2.0 2.0	93.6 94.3 94.9 96.2 96.3 96.4 96.6 97.2 98.6 98.8 99.1 99.45 100.7 101.5 101.6
-  -  -	- 105		C-9 103.6 - 107.7	49	100	94	103.6' to 106.9' - Light gray/pink Granitic unweathered to slightly weathered, sound to wide fracture spacing, strong to very stim-grained, foliation dips 50 -Pink Pegmatite, 1" wide, parallel to folial 103.9' and 106.8'	, moderate rong rock,	I/II II	R4/R5	10 <sub>MB</sub> 60 70 55	1.5 1.5 1.5 1.5	1.0 1.0 1.0 1.0	102.1 _ 103.5
NO. 7 CORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/22/06	- 110		C-10 107.7 - 115.9	98	100	100	106.9' to 107.7' - Dark gray to black SCHI slightly weathered, moderate fracture space to medium strong rock, c-f grained Dark gray to black SCHIST, unweathered wide fracture spacing, strong rock, c-f gra -Wavy Foliation 40 to 50 degrees -1/2" to 1" wide bands of white Quartz pty folded at 108.2', 112.3', 113', and 115.2'	cing, weak  , sound, ined	I	R4	10 <sub>MB</sub> *55 *40 0 25 <sub>MB</sub> 40 30 <sub>MB</sub> 40	1.0 1.5 1.5 1.5 - 1.5	4.0 4.0 3.0 - 3.0 - 1.0 2.0	106.6 - 106.9 107.5 - 107.7 - 110.1 110.5 - 111.4 - 112.6 - 113.5 -
7NE.GPJ	- 115						115 0) to 117 2! Dork area to block SOU		т	D4				$\dashv$
CORING LOG NO	100						115.9' to 117.3' - Dark gray to black SCH unweathered, sound, wide fracture spacing rock, m-f grained, planar foliation dips 4'S 117.3' to 125.5' - White/pink Granitic GN unweathered, sound, wide to very wide fractionary spacing, strong to very strong rock, c-f grant Except:	g, strong EISS, acture	I	R4 R4/R5	30 10 <sub>MB</sub> 5 10	1.5 - 1.5 1.5	2.0 - 1.0 1.0	115.9 116.4 - 117.8 - 119.2
NO.7	- 120		C-11 115.9 -	115	100	100	121.1' to 121.9' and 123.2' to 125.5' - Pink	x/gray			10	1.5	2.0	120.4
							Borii	ng No.	PE-2	24	Shee	t 3	of	5

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER: PE-24

SHEET NUMBER: \_\_\_4 of \_\_\_5

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

CONTRACTOR: Jersey Boring & Drilling

	CLIEN	IT: M	TA					INSPEC <sup>-</sup>	TOR:	A. Za	bala			
ſ		lin)									DISC	ONTI	NUITY	DATA
	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 S  * - Denotes discontinuity along folia  MB - Denotes mechanical breat	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦٢	Ja	DEPTH (feet)
ļ			125.5				PEGMATITE, coarse to very coarse grain and Feldspar	ned, Quartz			20 20	1.5 1.5	1.0 1.0	120.7 121 -
ŀ											20 15	1.5 1.5	1.0 1.0	122.8 <del>-</del> 123 <u>-</u>
-	- 125 - 130		C-12				125.5' to 127' - Dark gray to black SCHIS weathered, sound, moderate fracture space rock, m-f grained, foliation dips 50 127' to 135.5' - Pink/light gray Granitic Gunweathered, sound, wide fracture spacin very strong rock, c-m grained, faint Gneis dips 50° Except:	ing, strong SNEISS, g, strong to	II	R4 R4/R5	20 0 40 10 *50 *45	1.5 1.5 1.5 1.5 1.5	1.0 2.0 4.0 1.0 4.0 4.0	125 125.4 - 125.5 126.1 - 127 - 127.9 -
-			125.5 - 135.5	120	100	100	128.4' to 129.5', 130.4' to 130.5', and 131 Pink/gray PEGMATITE, coarse to very grained	6' to 131.7' coarse			20 <sub>MB</sub> 0	1.5	1.0	130.1 131.1
-	- 135						135.5' to 139' - Dark gray SCHIST, unwe sound, wide fracture spacing, strong rock grained, foliation dips 40	athered, , c-f	I	R4	30 <sub>MB</sub> 20 20 *45	1.5 1.5 1.5	2.0 1.0 1.0	134.8 135.4 135.5 136.2 -
-	- 140		C-13 135.5 - 145.6	121	100	100	139' to 145.6' - Light pink to gray Graniti unweathered, sound, wide fracture spacin strong rock, m-f grained, faint foliation di-Black Schist xenoliths 1" x 2" at 141.2' a	g, very ips 40	I	R5	$\begin{array}{c} 40_{\text{MB}} \\ 50_{\text{MB}} \\ 15_{\text{MB}} \\ 15_{\text{MB}} \\ 10_{\text{MB}} \\ 0 \\ 35 \end{array}$	- - - 1.5 1.5	- - - - 1.0 1.0	138.9 - 139.2_ 140.2 140.6 - 141 _ 141.1 141.5 -
90/2	- 145										20 <sub>MB</sub> 50 <sub>MB</sub>	-	-	143.9 <sup>-</sup> 145 <sup>-</sup>
NLI~1.GLB 8/2			C-14 145.6 -	61	100	74	145.6' to 146' - Granitic GNEISS, as above 146' - Dark gray to black SCHIST, slightly weathered, moderate fracture spacing, we rock, c-f grained	y ak to strong	II	R2/R4	40 <sub>MB</sub> 30 <sub>MB</sub> *50 <sub>MB</sub>	- - -	- - -	145.6 - 146 146.7 -
NE.GPJ MAI	- 150		150.7	V1	100	, '	147.2' to 147.9' - White Quartz PEGMAT possible healed breccia 148.2' to 149' - Light gray Granitic GNEI 149.5' to 150.7' - White PEGMATITE, sl weathered, close fracture spacing, weak re	SS ightly	II	R2	*50 *50 *60 *50	1.5 1.5 1.5 1.5	1.0 4.0 4.0 4.0	148.1 149 149.4— 149.5
NO. 7 CORING LOG NO 7NE.GPJ MAINLI~1.GLB 8/22/06	- 155		C-15 150.7 - 155.4	56	100	79	grained 1-150' - Yellow stained joint wall (Micaceous seal-150.2' - Red stained joint (Micaceous seal-150.4' to 150.7' - Rock broken up 1-Rig jammed at 150.7' Dark gray to black SCHIST, slightly weal moderate fracture spacing, strong rock, c-	ous seams) ams) thered,	II	R4	*50 *50 30 45 *50 *50 *50 35 *50	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1.0 3.0 2.0 2.0 4.0 2.0 1.0 4.0	149.8 - 150 _ 150.2 150.4 - 150.7 151.3 - 151.4 151.6
2							7 Foliation: planar to 153', wavy below 153	odipping ☐  ng No.	PE-2	R4 <b>24</b>	Sheet		of	5

	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

BORING NUMBER:	PE-24			
SHEET NUMBER:	5	of _	5	

PROJECT NUMBER:

PROJECT: No 7 Subway line Extension

LOCATION: Manhattan

**CONTRACTOR: Jersey Boring & Drilling** 

DRILLER: D. Keith

CLIEN	IT: M	TA					INSPEC <sup>-</sup>	TOR:	A. Za	bala			
	lin)									DIS	CONTI	NUITY	DATA
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 S  * - Denotes discontinuity along folia  MB - Denotes mechanical breat	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
- - - 160 - - -		C-16 155.4 - 165.2	118	100	99	40-70° -154.5' to 155.4' - Rock is black, Amphib friable along foliation -Slickensides at 152.2' -Extremely close fracturing 155' to 155.4' Dark gray SCHIST, slightly weathered, so moderate to wide fracture spacing, strong grained, wavy foliation 40 to 80 degrees Except: 159' to 160.8' - Pink/white PEGM mostly c- grained Quartz	ound,			*60 10 <sub>MB</sub> *65 30 45 50 60 50 30 <sub>MB</sub> 40 <sub>MB</sub> 20 40 0	0.5 - 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 3.0	4.0 1.0 4.0 4.0 4.0 2.0 4.0 - 1.0 1.0 3.0 2.0	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 -
- 165 - -						E.O.B. at 165.2'.				5 <sub>MB</sub> 20 <sub>MB</sub> 65 30 0 40	1.5 1.5 1.5 1.5	4.0 2.0 2.0 4.0	161.2 161.5 162.4 - 162.6 162.8 - 165.2 _
- 170 													-
- 175 - -													-
- 180 - 180 - 180 - 185													- - - - - - -
- 185 - 185 - 190 - 190													-
						Pori	na No.	PE-2	24	Shee	.t 5	O.f.	5

Boring No. PE-24 Sheet 5 of

		F	Par	son	ıs								BORING	NUMBE	R: PE-25	)				
		_		ıcke		off	R	<b>∩</b> R	INI	G L	$\mathbf{O}$	G	SHEET I	NUMBER	:1_	of	2			
≣				ade			D	OIN	7114	GL		G								
	100 YEAR		Οοι	ıgla	ıs,	Inc.							PROJEC	T NUMB	ER:					
					•	line Exte	ension	1								th Ave (S				
LOCA			nh	atta	an											: 983,250	).3			
CLIEN							ъ						STN. NC			FFSET:				
-					•	Boring &	Drilli	ng						E ELEV.	: 115.1 fe	eet				
DRILLI INSPE						_							DATUM:							
						e tary Wasl	h						I CTADT I	7/TE: 7/2	) 2 /02 T	'IN/E: 11.(	)() am			
						tary wasi Truck Mo		1					START DATE: 7/22/03 TIME: 11:00 am FINISH DATE: 8/5/03 TIME: 3:00 pm							
14.0 1			asi			lit Spoon Sh			Piston	Gra	b C	ore Barrel	1 11110111		NDWATER		, pin			
Type/S	Symbo		- 401	9	<u> </u>	S	U		PN	G		C			Water	Casing	Hole			
I.D.	уппос	<b>"</b>  -	4"			1.375"	2.938"		.938"		7		Data	Time	Depth	Depth	Depth			
						2"	3"		3"			5"	Date	Time	(ft)	(ft)	(ft)			
O.D.			4.5			_						3	7/29/03	7:30 am	18.0	34.0	137.2			
Length						24"	24"		24"				7/30/03 7/31/03	7:15 am 7:30 am	16.1	34.0	150.0			
	Iammer Wt.         300 lbs         140 lbs         Drill Rod Size           Iammer Fall         24"         30"         I.D. (O.D.)														16.0	34.0	150.0			
Hamm	er Fa		24'	<u>'</u>		30"														
	(D				SAI	MPLE														
eet)	DEPTH (feet)  O/6   6/12   12/18   18/24   REC. (in.)  FIELD CLASS  CORING  CORING  CORING  FIELD CLASS  FIEL																			
H H	을	Slow:				eet)	ELD CLAS	SSIFICAT	ION ANI	O REMAF	RKS									
EPT	\ \AP!	1000 1000 1000 1000 1000 1000 1000 100		ZER.	占	H (fe														
	<u> </u>	CASING ( CORING	TYPE	NUMBER	SYMBOL	DEPTH (feet)														
	- A - 4.	Ο̈́O	┡	z	S	Δ	(in.)	Hand Augan	Motorial fr	om 0! to 6!										
-	**************************************		1						Hand Auger 0' to 0.5', co	ncrete sidev	valk		-							
F														orown cm S	AND, some	e Gravel, lit	tle .			
-			1			0.0 - 6.0		Hand		Auger			cobbles 3.0' to 6.0', o	em SAND, s	some m-f G	ravel, occas	sional .			
_	**************************************		1										large pieces	of brick.						
<b>-</b> 5	****		1														_			
-	1 D Z		1										****	00127						
	* 4		$\int_{\mathbf{S}}$	1		6.0 - 8.0	17	5	5	3	12		Light brown medium den		), some Sili	t, trace c-f C	iravel,			
			Ĭ			0.0 0.0	1,							` ′						
	<b>★</b>		$ _{S}$	2		8.0 - 10.0	4	3	9	14	11		Grayish brov Silt, medium	wn, m-f SA n dense (SM	ND, little m	n-f Gravel, l	ittle			
<b>-</b> 10	<b>*</b> ∆ □					0.0 - 10.0	-	3		14	11		,	`	,		_			
			<sub>S</sub>	3		10.0 - 12.0	8	12	13	15	10		Reddish Bro Silt, medium	own, m-f SA	ND, some	c-f Gravel,	little			
	40			3		10.0 - 12.0	0	12	13	13	10		Siit, iliculuii	i delise (Sivi	1)					
	<b> </b>												-Rig chatters -Wash is bro	s with Rolle	rbit (37/8-i	nch)				
	****		1										- vv asii is DfC	7W11			•			
	<b>*</b> ∆		1														•			
<del>-</del> 15	* 4		]_			150 170	_						Reddish Bro		AVEL, son	ne c-f Sand,	trace			
5 <b>-</b>	- 67v −		S	4		15.0 - 17.0	7	3	1	1	1		Silt, loose (C	jP)						
	* -5		1										-Rig chatter -Wash is bro	with Roller	bit		•			
														<u> </u>						
																	-			
<del>-</del> 20			1										Grayish brown c-f SAND, little m-f Gravel, little							
; <b> </b> -			S	5		20.0 - 22.0	8	4	4	9	5		Clayey Silt (	(SM)						
			1										-Rig chatter				-			
<b>[</b>			1										-Wash is gra	ıyısh-brown						
	, ,,,		-	-	_		-					Bori	ing No.	PE-25	Shee	t 1 c	of 2			

			<u></u> P	ars	son	s								BORING NUMBER: PE-25
			_		cke		off	R	∩R	INI	C I	$\mathbf{O}$	G	SHEET NUMBER: 2 of 2
		100 YEAR			ide		Inc.			contir	nued)	_0	9	
	DDO IE		_				line Exte							PROJECT NUMBER:
	LOCAT					_	mic Exu	71181011						CONTRACTOR: Jersey Boring & Drilling
	CLIENT			1111		411								DRILLER: G. Marney
	CLILIN	1.1VI	IA				45.5			<b>/D</b> I	<b>(2:</b> )			INSPECTOR: R. Jeremic
	et)	90	£ (;	L	<u> </u>	SAI	MPLE			(Blows	· ·	REC.		
	DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft) CORING (Min./ft)				eet)	0/6	6/12	12/18	18/24	(in.)	FIE	ELD CLASSIFICATION AND REMARKS
	DEPT	RAP	NG (I	lш	NUMBER	SYMBOL	DEPTH (feet)			CORING				
	_	U	CAS	TYPE	≥ N	SYM	DEP	RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.	
	_			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)
	-			ł										-Smooth drilling
	_			l										-Smooth drilling -Wash is gray
	- 30			S	7		30.0 - 30.5	100/6				5		- 
	-	Ì		3	′		30.0 - 30.3	100/0	-	-	_	3		Silver and gold c-f SAND, some Silt, very dense, decomposed Schist (SM)
	_			l										Roller bit refusal and begin coring at 33.5'.
	-			-									33.5	
	<b>–</b> 35													_
	_			ł										-
	-													
	-			l										-
	<del>-</del> 40			ł										_
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	<del>-</del> 45													_
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8/21/06	— 50 -													
1.GLB	-			ŀ										-
AINLI~	_			ł										-
3PJ M	- 55													_
BORING LOG NO_7NE.GPJ MAINLI~1.GLB 8/21/06	-			-										-
OG NO	-			1										-
ING LC	-													- -
BOR														

	È≣	Pars	ons				BORING	NUM	IBER:	PE-25	5		
		📕 Brind	kerho	off		CORING LOG	SHEET	NUME	BER:_	1	c	of	4
		Quad	de &			CORING LOG							
-	10 YEA	Doug	glas, I	nc.			PROJEC	T NU	MBEF	₹:			
PROJ	JECT:	No 7 Su	bway	line I	Extens	sion	LOCATION	ON: <b>3</b>	0th St	. & 11	th A	ve (SF	E)
		l: Manha	ttan				COORD.		13,65			-	3
CLIE							STN. NC		_		OFFS	ET:	
		TOR: Jer		oring	5 & D	rilling	SURFAC		EV.:1	15.1 f	eet		
		G. Marno	•				DATUM:						
		R: R. Jei			1 .111		OTA DT 1		<b>=</b> /2.2	/0.2 T		11 00	
		METHOL Acker A				ng with double core barrel	START [						
KIG I	TPE.	Acker A	ו ווע	ruck	VIOU	nteu	FINISH [			MATER		3:00	рш
COB		RREL DA	ΤΛ.		NOT	TC.		Gr		wa i ⊑n Water	Cas		Hole
+		KKEL DA	IA:		NOT	E5:				Depth	De	pth	Depth
TYPE							Date	7:30 am		(ft)	(f		(ft)
		E: 2.5"					7/29/03			18.0	34		137.2
O.D.:	5"						7/30/03	7:15		16.1	34		150.0
I.D.:		175 40 74					7/31/03	7:30	am	16.0	34	.0	150.0
CASI		IZE: 4" (4	.5")			Τ				510	001171		
	RATE (ft/min)	O.€	(د	(9)		DESCRIPTION AND REMARK	S	(D		DIS	CONTI	NUITY	DATA
DEPTH (feet)	<u>₩</u>	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	(%)	(Lithology, Structure, Weatherin	g,	WEATHERING	王	g)			<del></del>
<del>_</del>	₩	RUI	ÆR	ÆR	RQD (%)	Continuity, Strength, Color, Grain S	size)	里	STRENGTH	ANGLE (deg)		_	DEPTH (feet)
FPT	1 5	RE D D	00	ő	RQ	* - Denotes discontinuity along folia	ation	₩	F	3.E	Ļ	Ja	표
	CORING	OA	RE	뀚		MB - Denotes mechanical brea	k	ૅ	0)	AN			DEF
	S					Ded to ded COHET 6-1:-to-	1 5904 -	I/II	R4				
T						Dark gray to dark green SCHIST, foliated 60°, slightly weathered to unweathered, so	ound, wide	1/11	K4				
<del>-</del> 35		C-1				fracture spacing, strong, fine to medium a -Occasional Garnets present (1/8" to 3/8"	grained			*50	1.5	2.0	35.2
-		33.5 - 38.3	58	100	95	throughout the run	,			0-30	1.5	2.0	35.9
-						-Weak, friable along schistosity				*50	1.5	2.0	36.2
-						Dark gray to green SCHIST, foliated 45to	700	II	R2/R4	*60	1.5	1.0	38
-						slightly weathered, sound to moderate fra		11	K2/K4	40 <sub>MB</sub> *45	1.5	1.0	38.3
<del>-</del> 40						spacing, strong, fine to coarse grained -Light gray Granite xenoliths at 39.4' to 3	6 6' and						39.3_
-						43.2'				*55 <sub>MB</sub> *60	1.5 1.5	1.0	40.5
-						-Close fracture spacing 43.4' to 44.0', fria -Breaks easily along schistosity	bie			60	1.5	4.0	41.2
-		C-2 38.3 - 48.0	116	100	87	-Possible slickensides at 44.0'	0!! 40 2/0!!)			15	1.5	2.0	42.5
F		30.3 - 48.0				-Abundant garnets throughout the run (1/	ο ω <i>3/8")</i>			*60 <sub>MB</sub> 40	1.5	2.0	43.2
<del>-</del> 45										*75 *45 <sub>MB</sub>	0.5	2.0	44 _
-										*45 <sub>MB</sub>	1.5	4.0	44.4 45.4
<u></u>										0	1.5	2.0	46
- 170 -										*60	1.5	4.0	47.2
80 M						Dark gray SCHIST, foliated, slightly wea sound, moderate to wide fracture spacing		II	R4	35 <sub>MB</sub> *50	1.5	4.0	48 48.6
ਲ ∑ – 50						coarse grained	,			55	1.5	4.0	49
						-Close fracture from 48.6' to 49.4' -Abundant garnets (1/16" to 3/8") through	nout the run			*50 *55	1.5 1.5	4.0	49.3 <sup>-</sup> 49.4
M						-Foliation dip angle: 48.0' to 49.8' - 50' to 55°				- <sub>MB</sub>	-	-	50.7
		C-3				49.8' to 58.3' - wavy 7\mathcal{S} to 90°							
Z -		48.0 - 58.3	124	100	96	-Foliation is ptygmatically folded in place amplitudes up to 1/2"	es with fold			5 <sub>MB</sub>	-	-	53
Z						-Light green platy mineral on fracture sur	faces at			$\begin{bmatrix} 0 \\ 0_{\mathrm{MB}} \end{bmatrix}$	1.5	1.0	53.3 - 53.6
<u>55</u> − 55						48.6', 49', 49.4', and 54.9'				$50_{MR}$	-	-	54.9
N -										0-10 25	1.5 1.5	1.0 1.0	55.4 55.5
55-										$30_{\mathrm{MB}}$	-	-	56.8
oi <b>l</b> -										I		1	] .

PE-25

Boring No.

Sheet 1

of **4** 

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	IT: M	ITA				INSPEC	INSPECTOR: R. Jeremic							
	(ft/min)					DESCRIPTION AND DEMARKS			DISC	CONTI	NUITY	DATA		
DEPTH (feet)	CORING RATE (#/r	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	ANGLE (deg)	٦L	Ja	DEPTH (feet)		
- 60 -						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'	I/II	R4	30 <sub>MB</sub> *70	1.0	4.0	58.3 - 58.7 - - 61.6 -		
[		C-4	120	100	100	-Schistosity dip 60-90, crenulated with 1/4" amplitude				-	-	_		
- 65		58.3 - 68.3	120	100	100	-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	,		$0-20_{\rm MB}$ $25_{\rm MB}$	-	-	63.2 – 64.5 –		
-									70 <sub>MB</sub> 45	1.5	2.0	64.8 65.9		
[									50	1.5	4.0	67.4		
-						Dark gray SCHIST, foliated 50 to 60° (crenulated), slightly weathered, sound, moderate fracture spacing	JI II	R4	40 <sub>MB</sub>	-	-	68.3		
- 70 -						strong, fine grained -Close fracture spacing from 74.3' to 74.5' -Numerous Garnets (1/8" to 3/8") present throughou			30 *75	1.5 1.5	2.0 4.0	69.4 69.5 -		
-		C-5 68.3 - 77.3	108	100	97	the run -Soft Chlorite/light green talc on fractures at 69.5', 71.4', 74.3', 74.5', and 75.9'			*55 *60 <sub>MB</sub> 10-55 <sub>ME</sub> *60	1.5 - 1.5	4.0 - 4.0	71.4 - 71.6 72.4 - 73.1		
- 75 -									*60 *60 50 *55	1.5 1.5 1.5 1.5	4.0 2.0 1.0 4.0	74.3 74.5 74.9 75.9		
-						Dark gray SCHIST, wavy foliated, unweathered, sound, wide fracture spacing, strong, fine to coarse	I	R4	0-10 <sub>MB</sub> *50	1.5	1.0	76.9 <sup>-</sup> 77.3 <sub>-</sub>		
- - 80 -						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			30 <sub>MB</sub>	1.5	2.0	78.4 _ - 80.3 _		
		C-6 77.3 - 87.2	119	100	100	-Chlorite/talc on fracture surface at 81'			*65 45 <sub>MB</sub>	1.5	4.0	81 82.2		
- N N		77.3 - 67.2							$0-10_{MB}$	-	-	83.1		
- 85 -									*60 <sub>MB</sub> 40 <sub>MB</sub>	- -	-	84.3 85		
85 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	I I	R4 R6	10 <sub>MB</sub> 20	1.5	2.0	87.2 87.8		
90						T grained  89.8' to 90.8' - Gray QUARTZ, unweathered, sound extremely strong, very coarse grained	I	R6	$     \begin{bmatrix}       0_{\text{MB}} \\       0_{\text{MB}} \\       75     \end{bmatrix} $	- - 1.5	- - 1.0	88.8 - 89.2_ 90.2		
- -						90.8' to 91.4' - Healed breccia-Quartz xenoliths with black Biotite/Amphibole matrix - Mica seam dipping 75 at 90.2'	I	R4	*30 40 <sub>MB</sub>	1.5	4.0	91.2 92		
<u>-</u>		C-8	96	100	100	91.4' to 97.2' - Gray SCHIST, wavy foliated,  Boring No.			20	1.5	1.0	92.2 -		
				PE-2	25	Shee	t <u>2</u>	of	4					

DR	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

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

CLIEN	IT: M	ITA				INSPECTOR: R. Jeremic								
	(ft/min)									DISC	CONTI	NUITY	DATA	
DEPTH (feet)	CORING RATE (ft/n	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering, Continuity, Strength, Color, Grain Si:  * - Denotes discontinuity along foliati MB - Denotes mechanical break	ze)	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)	
-		89.2 - 97.2				unweathered, sound, strong, wide fracture s f-m grained, foliation dip 50-60	spacing,			*55	1.5	1.0	93.2 _	
- 95 -	95									50	1.5	1.0	94.9	
-  -  -						Dark gray SCHIST, wavy foliated (crenula places), unweathered, sound, wide fracture strong, fine to coarse grained, foliation dip -Fine to medium grained below 101.5' -Scattered Garnet crystals to 1/4"	spacing,	I	R4	$40_{ m MB}$	-	-	97.2	
- 100 -		G 0				" thick			20 <sub>MB</sub>	-	-	100.3		
		C-9 97.2 - 107.2	120	100	100	to 104.3'			35 <sub>MB</sub> 25 <sub>MB</sub>	-	-	101.5 - 102.2		
-									0-10	4.0	2.0	103.4 _		
- 105 -	105													
_										*55	1.5	4.0	106.2	
- - - 110						Dark gray SCHIST, wavy foliated, unweath sound, wide fracture spacing, strong, fine to grained, foliation dip 60-75 -Fine to coarse grained below 116.8' -Scattered Garnets crystals up to 1/4" -All MB cross cut foliation -Quartz vein (1.5" thick) congruent to folia	o medium	I	R4	20 <sub>MB</sub> 0-20 <sub>MB</sub> *75 35 <sub>MB</sub>	1.5	2.0	107.2 107.9 - 109.5_ 110.4 _	
- - -		C-10 107.2 - 117.2	120	100	100	117.4' to 118.3'				$0_{ m MB}$	-	-	112.1	
- 115 -														
GLB 8/21/06						Dark-gray SCHISTOSE GNEISS, unweath foliated 50° to 75°, sound, wide fracture spa strong, fine to coarse grained EXCEPT: Slightly weathered, sound, mod	cing,	Ι	R4	$\frac{0_{\mathrm{MB}}}{30_{\mathrm{MB}}}$	-	-	117.1 117.2 -	
- 120	fracture spacing from 125.0' to 127.3' -Quartz veins congruent to foliation @ 120.7', 121.8' to 123.6' -Clay coated joint walls @ 126.5'		fracture spacing from 125.0' to 127.3' -Quartz veins congruent to foliation @ 119 120.7', 121.8' to 123.6'				0 <sub>MB</sub> 30	1.5	1.0	120.1 120.8				
			-Chlorite coatings on some fracture surface	es			30	1.5	1.0	122.2				
120 - 120 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 - 125 -								II	R4	*55 *50 *55 *55	1.0 1.0 1.5 1.5	4.0 1.0 4.0 2.0	123.7 - 124.1_ 125 125.6 -	
						127.3' to 128.6' - Dark gray SCHIST, foliat	 ted 55	II	R4	45 50 <sub>MB</sub>	1.5	4.0	126.5 <u>-</u> 127.3 <u>-</u>	
Z <b></b> _					1	slightly weathered, strong, sound, wide frag	g No.	PE-2	<u> </u>	Shee	t 3	of	4	

DD	Parsons Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

)G

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

DESCRIPTION AND REMARKS (Ulthodgy, Structure, Weathering, Conformity, Structure, Weathering, Color, Grain Size)   Fig. 1
130
130.9   93   128.6 in 130.9 - Light gray speckled pink Grantitic GNFISS, mostly Quartz, sound, very strong, m-f grained (190.5 to.)   1.5   1.0   129.2   1.0   129.2   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0
130.9   16   100   100
132.2
132.2 -   115   100   86   132.2 \tag{2.1 \text{Light gray, speckled Granitic}} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
Strong, fine to coarse grained   -1 tupper contact of \$\$chist with Gneiss, schistosity is   -1 to   -2" wide band of Gneiss dipping 60 at 139.2',   -2" wide band of Gneiss dipping 60 at 139.2',   -1 to   -2" wide band of Gneiss dipping 60 at 139.2',   -1 to   -2" wide band of Gneiss dipping 60 at 139.2',   -1 to   -1 to   -2" wide band of Gneiss dipping 60 at 139.2',   -1 to
- 150    Very closely fractured 140.4' to 141.6'   30   1.5   2.0   142.7'   Rehealed joint @ 142.2' (Schist) (incipient)   45-60   1.5   2.0   145.7   146.7'   1.5   1.5   1.0   143   145.6   1.5   1.0   145.9   145.9   1.5   1.5   1.0   145.9   1.5   1.0   145.9   1.5   1.0   145.9   1.5   1.0   147.4   144.9' to 145.3'   146.0' to 147.3' - Light gray to pink Granitic   PEGMATITE, sound, very strong, coarse grained   1-Loss of rock wall contact (mechanical) @ 147.7 & 149'   1-Re-drilled (drilling marks) at 149.0'   1-Re-drilled (drilling marks) at 149.0'   1-Re-drilled (drilling marks) at 149.0'   1-Re-drilled (drilling marks) at 149.2', all   with thin clay coatings   1.5   1.0   147.4   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   149.1   14
PEGMATITE, sound, very strong, coarse grained   1-Loss of rock wall contact (mechanical) @ 147.7 &   55   1.5   1.0   148.6   149'     -Re-drilled (drilling marks) at 149.0'     -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   E.O.B. at 151.1'.   E.O.B. at 151.1'.   151.1
Boring No. PE-25 Sheet 4 of 4

- 1														BORING	NUMBE	R: PE-27	3				
			D	/[/	D)	Ti	TERS.		BC	ORIN	١G	LC	OG	SHEET	NUMBER	:1_	of	2			
1			Ш		777		THIPL							PROJEC	T NUMB	ER:	19499B				
ſ							n Express	(THE	) Proje	ect				LOCATION			th St, NV	V			
1	LOCAT CLIEN					, N	lew York							corner COORD.: N: 699,757.3 E: 629,565.0							
-						v E	Boring & I	)   Drilling	J					SURFACE ELEV.: 318.5 feet							
ŀ	DRILLE								•						Horizont			Plane			
							i/M. Tekin										atum-200				
1							tary Wash				. Uam	<b></b>		START DATE: 4/15/08 TIME: 7:00 am FINISH DATE: 4/18/08 TIME: 11:00 am							
ł	KIG I I	PE.			sing		ck-mount Split Spoon			Piston	Gra		Core Barrel	THUGHE		NDWATER		oo um			
1	Type/Symbol HW S ■ U □ P □ G □ C □														0.100	Water	Casing	Hole			
1	I.D. 4" 1.375" 2.938" 2.938" 1.875"														Time	Depth (ft)	Depth (ft)	Depth (ft)			
O.D. 4.5" 2" 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")																				
	SAMPLE SOIL (Blows/6 in.)																				
	CORING														FIELD CLASSIFICATION AND REMARKS						
/11/08	DEPT	RAPH	NG (B		NUMBER	SYMBOL	DEPTH (feet)			TILLD GL	LAGGII ICA I	ION AND I	LIVIAINO								
ERSHIP EPE LAND (FINAL) 11-07-08.GLB 11/11/08	_	ð	CASI	TYPE	NON	SYM		RUN (in.)													
)7-08.		***************************************		G	1		0.0 - 0.5 0.5 - 6.0							Hand augere	d from 0.0'	to 6 0'					
<u>1</u>	-	<b>₩</b> .,				$\mathbb{N}$								0-0.5': Aspha	alt		60 1.				
FINA	-	***************************************		1		W								0.5-6.0': Bro Silt, brick &				ce –			
AND	-			1		I X												-			
	-	***		+														-			
SHP	- 5	\$ <b>*</b> 4		┨														_			
	_	□Δ·		-s	2		6.0 - 8.0	7	7	5	2	12		_							
PAR	_	*************************************		-  <sup>™</sup>				·	,		_			Brown, c-f S concrete. (FI		(+) m-f Gra	ivel, trace Si	lt, -			
ͳ	-	₩ ₩ 		- <sub>s</sub>	3		8.0 - 10.0	3	5	5	4	6						_			
PARTNERSHIP BORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTN	-	****		-										Brown, c-f S	SAND, little	m-t Gravel,	trace Silt. (F	ILL)			
ES 4-3	<del>-</del> 10	<del>4.K.</del> .C.		-s	4		10.0 - 12.0	2	4	29	71	5		Dlook on de-	hita a f CD	AVEI ~~	a a f Cand 4				
CKAG	-			+										Black and w Silt with mic		AVEL, SOM	e c-1 Sana, t	14CC -			
L PAC	_	9 O C		4														_			
PE AL	_	0.00																_			
00 E	_																				
INAL)	4.5																				
DR (F	<del>-</del> 15			$\int S$	5		15.0 - 17.0	2	2	6	3	8		Brown, SILT	Γ, some f Sa	nd, trace c-f	Gravel. (MI	L)			
ING G	-			1														-			
BOR	-			1														-			
SHIF																		-			
ZTNE!	-			+														-			
Ā		0.0.												na No	PF-273	Shee	1 0	of 2			

	ECT: .TION:	Tra	ns- h <i>A</i>	Hu	dso	on Express 30th St, N		E) Proj	(cor	<b>VG</b> ntinued	<b>LO</b>	BORING NUMBER: PE-273  SHEET NUMBER: 2 of 2  PROJECT NUMBER: 19499B  CONTRACTOR: Jersey Boring & Drilling  DRILLER: J. Kurzynowski  INSPECTOR: R. Sidorski/M. Tekin
	၅				SAI	MPLE		SOIL	. (Blows/	6 in.)		
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
EPT!	RAPH	NG (B	l	BER	30L	DEPTH (feet)			CORING	;		FIELD CLASSIFICATION AND NEIVANAS
-	g	CASI	TYPE	NOM	SYMBOL		RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
-			S	6		20.0 - 22.0	1	WOH	WOH	20	4	Red & gray, c-f SAND, some c-f Gravel, trace (+) Silt. (SP)
D (FINAL) 11-07-08:GLB 11/11/0			S	7		25.0 - 27.0	24	9	11	15	11	Red brown, c-f SAND, some m-f Gravel, trace Silt. (SP)
THE PARTNERSHIP EPE LAN			S	8		30.0 - 32.0	2	1	1	2	18	Dark gray, CLAY & SILT, trace f Sand with marine shells. (CL)
PE ALL PACKAGES 4-30-08:GPJ			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'.
PARTNERSHIP BORING GDR (FINAL) 00 EPE ALL PACKAGES 4:30-08 GPJ THE PARTNERSHIP EPE LAND (FINAL) 11-07-08:GLB 11/11/08  0 1 2 4 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7			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)  Roller-bit to 41.5' depth and start rock coring.
PARTNE -												Boring No. PE-273 Sheet 2 of 2

								BORING	NUM	BER:	PE-27	3		
			DVIDALVI		ПI		CORING LOG	SHEET	NUMB	ER:	1	0	of	9
		Ы	MAAKIIN		21/1		CORING LOG		<b>.</b>					
		т. т.	II	. E	(T	PITE	Ductors	PROJEC					NIXX/	
			rans-Hudson New York, No			THE)	Project	LOCATION		Ith A orner		Jth St	i, NW	
			ransit	ew 10	K			COORD.				E: 629	9,565.	0
			R: Jersey B	oring o	& Dr	illing	,	SURFAC	E ELI	EV.:3	18.5 fee	et		
			Kurzynowski					DATUM:						Plane
			R. Sidorski/								YCT o			
			THOD: Rota					START [ FINISH [						
RIC	GIYP	<b>E</b> : <b>C</b> I	VIE-/5, 1 ruc	:K-mot	inted	ı, Au	tomatic Safety Hammer	TINIOTE			OWATER			aiii
ارر	DE B	۸DDI	EL DATA:			OTE	:e.		Gr	TOUNL	Water	Cas		Hole
-			Barrel, solid inne	er harrel				Date	Tim		Depth (ft)	Dep (ft	oth	Depth (ft)
	ORE SI			ci barrer	WILLI	WII CIIII	<u> </u>	Date	11111		(11)	(11	.)	(11)
	D.: 3"		110											
	).: 1.87													
_			: 4" (4.5")											
		n/ft)		_				•			DIS	CONTI	NUITY	DATA
	eet)	CORING RATE (min/ft)	õ€	RECOVERY (in)	RECOVERY (%)				WEATHERING	돈	=			ı.
	DEPTH (feet)	ATE	N N H	ĒŘ	ĒŘ	RQD (%)	DESCRIPTION AND REMARKS	3	吊	STRENGTH	ANGLE (deg)			DEPTH (feet)
	<u>E</u> PTI	G R	E RI	8	000	RQI	DESCRIPTION / NEW WAY		Y Y	H	J.E	누	Б	Ŧ
80	D	RIN	CORE RUN NO. AND DEPTH (ft)	Ä.	REC				WE	S	ANG			
RSHIP EPE (FINAL) 10-24-08.GLB 10/24/08		ö	04				C 1, 41 5 45 9l. Dodl. grave CCHICT, f. a gr	aina af	П	R3/R4	1 *70	2.0	2.0	41.5
GLB -							C-1: 41.5-45.8': Dark gray SCHIST; f-c gr biotite, quartz, muscovite, feldspar, and sp	arse	111	K3/K4	1 70	2.0	2.0	41.3
24-08							garnet; close to moderate fracture spacing, extremely close at 42.3-42.4'; slightly wea	thered;			30 30	2.0 2.0	2.0 2.0	42.3 42.4
.010							medium strong to strong; distinct wavy an	d oge iron			*60 *80	2.0	2.0	42.8
INAL I			C-1	61	100	70	crenulated schistosity dips 50-80 deg; orar staining on some fracture surfaces; no rocl contact at horizontal fracture at 44.1'; 1/2-	wall			*50	1.5 2.0	1.0 1.0	43.4 43.6
) BE		4	41.5 - 46.6				quartz-feldspar pegmatites; parallel to sch				$\begin{bmatrix} 0 \\ 5 \end{bmatrix}$	1.0 2.0	6.0	44.1 44.6
≝  4	15						43.6', 44.4', and 44.6'.				*70	1.5	1.0	44.8
ZERS							45.8-46.3': Medium gray GRANITE; med of mostly quartz, with some muscovite and	um grains	I	R4	15 10	3.0 3.0	2.0 2.0	45.4 45.6
ARTI							feldspar; moderate fracture spacing; unwe	athered;			*70	1.5	1.0	46.3
뿔							strong; upper contact is parallel to foliation C-2: Dark gray SCHIST, with interlayered	n in schist. medium	I/II	R4	*70	1.5	1.0	47
<u> </u>							to light gray to light red GRANITE; altern and granite bands are 1/4" to 8" thick; sch	ating schist			"	1.5	1.0	.,
-080							grains of biotite, quartz, muscovite, feldsp	ar, and						-
24-30							sparse garnet; granite has f-m grains of qu feldspar, and muscovite, with hematite at	53.8-54.3'						-
AGE							and 55.7-56.1'; moderate to wide fracture except close at 55.6-56.1'; unweathered to							
ğ - 5	50						weathered; strong; schist has distinct plan schistosity dipping 50-70 deg; schist-gran	ar			25	3.0	1.0	49.7_
ALL							are intact and parallel to schistosity; pure	QUARTZ						
			C-2 46.6 - 56.1	114	100	95	at 55.5-55.6'; pink PEGMATITE at 51.0-5	1.1'.			*70	2.0	1.0	51.2
00		5	1010 0011											-
NIH)														
GDR											*50	1.5	1.0	53.3
RING													1.0	55.5
P C											*50	1.0	1.0	54.6
5 - 일 :	55										30	1.0	6.0	54.8
PARTNERSHIP CORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNE											30 *50	3.0 2.0	1.0 1.0	55.5 55.6
Ā							C-3: 56.1-61.0': Light red to light gray GR		I DE 6	R4				
							Bor	ng No.	PE-2	73	Shee	t 1	of	9

THE PARTNERS IP C	ORING LOG
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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

┝		( <del>L</del>						1		DIS	CONT	NUITY	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	٦	вL	DEPTH (feet)
TNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	- 60	5	C-3 56.1 - 66.0	119	100	97	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.  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'.	П	R4	20 25 0 20 *50 60 40	1.0 1.5 MB 2.0 1.5 1.0 MB	6.0 1.0 MB 2.0 6.0 MB	56 56.1 - 59.4 60 - 61.3 62 - 63.4 64.4
PARTNERSHIP CORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	- 65	5	C-4 66.0 - 76.0	118	98	86	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.	П	R4	*60 60 *60 5 20 35 80 90 85 *70 *70 *60	1.5 1.0 MB 2.0 2.0 2.0 2.0 1.5 1.5 1.5 0.5 1.0	1.0 1.0 MB 1.0 1.0 1.0 4.0 4.0 4.0 4.0 1.0	65 65.6 66.5 66.8 67.3
PARTN	- 75									90 60	3.0 3.0	2.0 1.0	74.3 74.35

Boring No. \_\_\_PE-273\_\_\_ Sheet \_\_2 \_\_ of \_\_9\_\_

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

	in/ft)								DIS	CONTI	NUITY I	DATA
DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	٦	Jа	DEPTH (feet)
-						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.	П	R4	10 20 80 *60	3.0 3.0 1.5	2.0 2.0 1.0	74.4 75.3 76 - - 78.4 - 79.3
- 80 	5	C-5 76.0 - 86.1	121	100	100				*50 *50 20 *50	1.5 MB 3.0 1.0	2.0 MB 1.0 1.0	80.5 80.8 - 81.6 _ 82.2 -
- 85 -						C-6: Medium to dark gray SCHIST; f-m grains of	I	R4	*50 *50 *70	1.5 2.0 2.0	1.0 2.0 1.0	84.5 85.3 85.7
-						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			30 *60	2.0	1.0	86.9 - - 88.6 _
90 	5	C-6 86.1 - 96.1	120	100	100	schistosity; core sides are slightly bulging at 92.0-93.5'.			*50 10	3.0	1.0	90.2
_						Rating No.	DE 2		*60	1.5	2.0	93.6

Boring No. \_\_\_PE-273\_\_\_ Sheet \_\_3\_\_ of \_\_9\_\_

CORING LOG (continued)
------------------------

BORING NUMBER: PE-273
SHEET NUMBER: 4 of 9

CONTRACTOR: Jersey Boring & Drilling

PROJECT NUMBER: 19499B

PROJECT: Trans-Hudson Express (THE) Project

LOCATION: 11th Ave at 30th St, NW corner DRILLER: J. Kurzynowski

CLIENT: NJ Transit INSPECTOR: R. Sidorski/M. Tekin

Į													
		n/ft)		(	(					DIS	CONTI	NUITY I	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	Jr	вL	DEPTH (feet)
	– 95 -									15 20	MB 3.0	MB 1.0	95.1 95.6
10-24-08.GLB 10/24/08	-						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	30	MB 3.0	MB	96.1 - 98.1
INERSHIP EPE (FINAL)	100 	5	C-7 96.1 - 105.8	116	100	95				40 *60 10	MB 1.0 1.0	MB 1.0 6.0	99.7 100.2 100.9
PARTNERSHIP CORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	- - - 105									*60 0 *60	1.5 2.0 1.5	1.0 1.0 1.0	103.6 _ 104.7 105.1
AL) 00 EPE ALL PACKAG	<del>-</del>						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	*50 40 *60 *60	2.0 2.0 1.0 2.0	1.0 1.0 1.0	105.4 105.8 - 107.2 107.7 -
SHIP CORING GDR (FIN,	- 110 	5	C-8 105.8 - 115.4	115	100	93				*70 *70 *70 35 *50	2.0 1.5 2.0 2.0 1.5	1.0 1.0 1.0 1.0 1.0	108.6 _ 109.2
PARTNEF	-									0	2.0	1.0	112.1

Boring No. \_\_PE-273\_\_ Sheet \_\_4\_ of \_\_9\_

CORING LOG (continued)
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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

ŀ		n/ft)	1				<b>_</b>			DIS	CONTI	NUITY	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	٦	вL	DEPTH (feet)
F										*50 *60	1.0 1.5	1.0 1.0	112.2 - 112.8
ŀ	- 115									10 *40	3.0 1.5	1.0 1.0	114.1 114.2
4/08							C-9: 115.4-121.3' and 124.0-125.4': Medium to dark gray SCHIST; fm grains of quartz, biotite,	I	R4	30	3.0	1.0	115.4
B 10/2							muscovite, feldspar, calcite, and sparse garnet; close to moderate fracture spacing, except two very close			40 30	2.0	1.0	116.1 116.6
)-24-08.GL							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			0 *70	MB 1.5	MB 1.0	117 117.3
NAL) 10							124.9-125.35'; core sides bulging at 119.5-120.4'.			5	3.0	1.0	118.4
00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	- 120	5	C-9	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;						_
INERS			115.4 - 125.4	120	100	71	near-vertical inclusion of dark gray schist at 122.5-123.0'.			*60	1.5	1.0	120.5
THE PAR										*70 *80	1.5 1.0	1.0	121.1 121.3
08.GPJ										90 50	2.0 1.5	1.0	122.5 122.55
ES 4-30-										*65	1.0	1.0	122.7
ACKAG	- 125												_
ALL P,							C-10: 125.4-132.4': Black and white pinstriped SCHIST; f-m grains of biotite, amphibole (?), quartz,	П	R4	40	2.0	1.0	125.4
0 EPE							feldspar, and calcite; close to moderate fracture spacing; slightly weathered; strong; distinct planar			10 50	MB 2.0	MB 1.0	126.1 126.5
AL)							schistosity and wavy banding dip 70-90 deg; planar			30	3.0	1.0	120.3
DR (FIN							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			20	3.0	2.0	127.5
DRING G							clay on 80 deg foliation fracture at 128.4'; calcite on most fracture surfaces.			*80 5	1.5 3.0	4.0 2.0	128.4 128.6 -
SHIP CC	- 130		C 10				132.4-135.7': Light gray GRANITE; m grains of feldspar, quartz, muscovite, and sparse garnet; close to moderate fracture spacing, except extremely close			30	3.0	2.0	129.7_
PARTNERSHIP CORING GDR (FINAL)		5	C-10 125.4 - 135.7	124	100	81	at 135.0-135.6' (may be mechanical); unweathered; very strong; calcite on some fracture surfaces inclusion of dark gray schist at 133.1-133.4'.			30 10	3.0 3.0	1.0 1.0	130.3 130.7 _

Boring No. \_\_PE-273\_\_ Sheet \_\_5\_ of \_\_9\_

CORING LOG (continued)
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BORING NUMBER: **PE-273**SHEET NUMBER: **6** of **9** 

CONTRACTOR: Jersey Boring & Drilling

PROJECT NUMBER: 19499B

PROJECT: Trans-Hudson Express (THE) Project

LOCATION: 11th Ave at 30th St, NW corner DRILLER: J. Kurzynowski

CLIENT: NJ Transit INSPECTOR: R. Sidorski/M. Tekin

	n/ft)		_						DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	Jr	ы	DEPTH (feet)
-							I	R5	*80 10 5 *90 50 80 60 40	1.5 3.0 2.0 2.0 2.0 1.5 1.0 2.0	4.0 1.0 2.0 2.0 2.0 2.0 1.0 1.0	131.2 131.3 - 131.4 131.6 131.8 - 132 133.1 _ 133.9
0-24-08.GLB 10/24/08						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	I/II	R5	40 20 30 60 90 10 50	2.0 2.0 2.0 3.0 3.0 2.0 2.0	1.0 1.0 1.0 1.0 1.0 1.0 1.0	133.9 134.4 134.8 135.1 135.3 135.5 – 135.7 135.8
ERSHIP EPE (FINAL) 11						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'.			30 10 5	1.5 1.5 2.0	1.0 1.0 1.0	137.2 137.6 138.3
00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	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'.	I/II	R4	10 5 10 15 50 0	1.5 1.5 1.5 2.0 MB 1.0	1.0 1.0 1.0 1.0 MB 6.0	139.5 139.6 139.7 139.9 140.5
L PACKAGES 4-30-									*50 *40	1.0 MB	1.0 MB	142.4
T 145									*50 *50	1.5 MB	1.0 MB	144.6 <u> </u>
-IINAL) (						C-12: Medium to dark gray SCHIST; f-m grains of quartz, biotite, feldspar, muscovite, calcite, and	I	R4	*50	1.0	1.0	145.7 _
PARTNERSHIP CORING GDR (FINAL)  1						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			55 *50	1.5	1.0	146.4
RSHIP COI						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.			*50 *60	1.0 1.5	1.0	147.8 -
BARTIN — 150									*40	1.0	1.0	149.8

Boring No. \_\_PE-273\_\_ Sheet \_\_6\_\_ of \_\_9\_\_

CORING LOG (continued)
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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

f		in/ft)		<u></u>	(9)			(D		DIS	CONTI	NUITY	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	٦Ļ	ьU	DEPTH (feet)
			C-12 145.6 - 155.6	120	100	94				*50 *50 *50 *50	1.5 1.5 1.5 1.0	1.0 1.0 1.0 1.0	150.1 150.3 150.5 150.7
١										*60	1.0	1.0	152.3
24/08										0	3.0	1.0	152.9
3LB 10,	•									*60	1.0	1.0	154
INAL) 10-24-08.0	- 155						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	I	R4	*50 45 15	1.5 2.0 2.0	1.0 1.0 1.0	155.1 155.2 155.6
ERSHIP EPE (F							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			30	2.0	1.0	157.5
J THE PARTN	- 160						granitic intrusions, 1" thick and near-vertical, at 160.0', 161.3', and 162.1'; 1/2" of adjacent schist is enriched in biotite.			*70	1.0	1.0	159.1
-08.GP		٠	C-13 155.6 - 165.6	120	100	97				*50	1.5	1.0	160.6
ES 4-30		5								*60	1.5	1.0	161.4
PACKAG													_
PE ALL										*50	1.0	1.0	163.3
L) 00 E										*50	1.0	1.0	164.2
PARTNERSHIP CORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	- 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'.	п	R3/R4	*50 *50 *50 *60 *50 *60 15 *50 *70	1.0 1.0 1.5 1.0 1.0 1.0 3.0 1.0	1.0 1.0 1.0 1.0 1.0 MB 1.0 4.0	165.4 165.45- 165.6 166.4 167 167.05 167.5 - 167.9 168.2
2							Roring No.	DF_2		Shoo	1.0	1.0	100.2

Boring No. \_\_\_**PE-273**\_\_\_ Sheet \_\_**7**\_\_ of \_\_**9**\_\_

CORING LOG	CORING LOG (continued)
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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

	n/ft)		_	_					DIS	CONTI	NUITY I	DATA
DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	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 *60 *50 30 15 10 15 *60 20 *40 *50 80 10 0	1.5 1.5 1.0 2.0 3.0 1.0 3.0 2.0 3.0 1.5 1.5 2.0 1.5 3.0 3.0	1.0 4.0 1.0 2.0 1.0 6.0 1.0 2.0 2.0 2.0 4.0 1.0 4.0 1.0 MB	169.1 169.3 169.5—170.05 170.2 170.8 – 171 171.5 171.6 172 172.8 – 172.9 173 173.1 – 173.4 174.6
- - - - - - - - 180		C-15 175.6 - 185.3	116	100	89	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'.  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.  183.4-185.3': Medium gray, pure QUARTZ; close to moderate fracture spacing; unweathered; very strong; few small (<0.1") inclusions of white feldspar.	п	R4	*50 *50 *50 *40 *50 20 *50 *30 *60 25 90 40 80 *70 60 15	1.5 1.0 1.5 2.0 1.5 3.0 1.5 1.0 1.0 3.0 2.0 3.0 2.0 3.0 2.0 3.0 2.0 3.0	1.0 1.0 1.0 1.0 2.0 1.0 1.0 2.0 4.0 1.0 4.0 2.0	175.2 175.3 175.35 175.5 175.6 175.7 176.8 177.9 178.3 178.6 178.9 179.2 179.8 180 180.3 180.9
105							I	R5	20 20	1.5	1.0	- 183.8 - 184.6
- 185 - -						C-16: 185.3-185.5': Medium gray QUARTZ, as above.  185.5-188.0': Light gray GRANITE; f-c grains of feldspar, quartz, and muscovite; close to moderate fracture spacing; slightly weathered; strong; coarse  Boring No.	PE-2	R4	10 40 *40 80 30 90 70	1.5 3.0 3.0 2.0 1.5 3.0 3.0	1.0 1.0 2.0 1.0 1.0 2.0 1.0	185.1 185.3 185.6 - 185.9 186 186.5 186.9

Boring No. PE-273 Sheet 8 of 9

CORING LOG (continued)
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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

		n/ft)								DIS	CONTI	NUITY I	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	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 *50	1.5 1.0	1.0 1.0	188 188.7 _
80	<del>-</del> 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			*45 50	3.0	1.0	189 189.8—
GLB 10/24/C	-						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			*60	1.0	2.0	191.7 _
.) 10-24-08.0	-						192.3-192.9'; schistosity is contorted around granite contacts.			*60	1.0	1.0	192.4
EPE (FINAL	-									*50 *50 *50	1.0 1.0 1.0	1.0 1.0 1.0	193.5 194.2 194.6
TNERSHIP	— 195 -						End of Boring at 195.2'			30 40 40	$\begin{bmatrix} 3.0 \\ 3.0 \\ 2.0 \end{bmatrix}$	1.0 1.0 1.0	194.7 195 195.2
PJ THE PAF	_												-
S 4-30-08.G	-												- -
- PACKAGE	- 200												_
L) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	_												_
DR (FINAL)	_												_
CORING G	-												-
PARTNERSHIP CORING GDR (FINA	– 205 -												<del>-</del>
Α							Roring No.	DF_2		Shoc	t 0	of	0

Boring No. \_\_\_PE-273\_\_\_ Sheet \_\_9\_\_ of \_\_9\_\_

- 1														BORING	NUMBE	≺: PE-27	4	
		E	P		0)7		VERS		BC	DRIN	NG	LC	OG	SHEET	NUMBER		of	2
			ЦΖ		177	Ш								PROJEC	T NUMB	ER:	19499B	
Ī							n Express Iew York	(THE)	) Proje	ect				LOCATION	ON: 11th corne		th St, NE	
١	CLIEN					, -	iew Tork								: N: 699,	717.1 I	E: <b>629,64</b> 1	1.9
						_	Boring & I	Orilling	3						E ELEV.			
١	DRILLE						кi								Horizont		State atum-200	Plane
ŀ	INSPE						tary Wash	. Dian	and C	oring							IME: 10:	
١							ick-mount				v Ham	mer			DATE: 4/2		IME: 11:	
İ					sing	_	Split Spoon			Piston	Gra		Core Barrel		GROU	NDWATER	DATA	
١	Type/S	ymbo	ı	Н	IW		S	U [		PΩ	G		С			Water	Casing	Hole Depth
١	I.D.			4	4"		1.375"	2.93	8"	2.938"			1.875"	Date	Time	Depth (ft)	Depth (ft)	(ft)
١	O.D.			4	.5"		2"	3"		3"			3"	4/22/08	7:00 am	19.5	35.0	115.1
	Length				0"		24"	24"	'	24"			120"	4/24/08	7:00 am	19.0	35.0	166.1
	Hamme		-		lbs.		140 lbs.		rill Rod S				WJ					
	Hamme	er Fal	II	2	4"		. 30"	I	.D. (O.E	).)	2	.25" (	2.625")					
١		(1)			;	SAI	MPLE		SOII	_ (Blows/6	6 in.)							
١	(feet)	l lo	vs/ft)	Г			_	0/6	6/12	12/18	18/24	REC						
80	DEPTH (feet)	GRAPHIC LOG	(Blov		띪	٦	(feet)			CORING		(in.	)	FIELD CL	_ASSIFICAT	ION AND F	REMARKS	
ERSHIP EPE LAND (FINAL) 11-07-08.GLB 11/11/08	DE	GR/	CASING (Blows/ft)	TYPE	NUMBER	SYMBC	DEPTH (feet)	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQI %						
-08.GI		*A. · 5		Ť			0.0 - 6.0	()	()		()	,,,		Hand-augere	ed from 0.0'	to 6.0'.		
11-07-	-			┨										0-0.5': Concr 0.5-6.0': Bro	rete		Gravel little	Silt
NAL)	-	****		+										occasional b	lack pebble.	(FILL)	Graver, min	-
E)	_			4														=
E LA	=	*		1														_
P EP	E	1 D. 7																
RSHI	<del>-</del> 5	***		1														
	-	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		S	1		6.0 - 8.0	3	3	4	4	3		Black brown	, c-f SAND.	little m-f G	ravel, little (	-)
PARTNERSHIP BORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTN	-	*\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		+										organic silt.			,	=
3PJ T	-	M. 12		-s	2		8.0 - 10.0	7	9	14	12	4		Black brown	. c-f SAND	little m-f G	ravel little (	-) -
0-08.0	-	***		+										organic silt,				-
\$ 4-3	<del>-</del> 10	***		$\rfloor_{\rm s}$	3		10.0 - 12.0	9	13	16	17	4						_
<b>4AGE</b>	_	*****					10.0 12.0	,	13		1/			Dark brown, with brick fr			vel, little Silt	t, _
PAC	_	ዞ ⊔ .ቪ													5 - 2 - 4	,		
⊒ ALL		***	_															
0 EPE	-	100x 1		1														=
AL) C	=			1														-
/ EIN	<del>-</del> 15			-s	4		15.0 - 17.0	3	3	3	3	6		Croy bearing	o CCANID	and Cilt +	aa (+) f	$\dashv$
3 GDF	_			+										Gray brown, Gravel, mica			ce (+) m-1	-
JRINC	-			1														_
IIP BC	_																	
ERSH																		]
ARTN	=			1														
۵		1. 1.1 · [ ]										I	 Dani	na No	PF-274	Sheet	1 0	of 2

PROJ	ECT: TION:	Tra	ns– h <i>A</i>	Hu	ds	on Expres 30th St, N	s (THE	C) Proj	(cor	<b>NG</b> ntinued	LO )	G	BORING NUMBER: PE-274 SHEET NUMBER: 2 of 2 PROJECT NUMBER: 19499B  CONTRACTOR: Jersey Boring & Drilling  DRILLER: J. Kurzynowski  INSPECTOR: M. Tekin
<b>₽</b>	90	<u> </u>			SAI	MPLE		SOIL	. (Blows/	'6 in.)			
DEPTH (feet)	IIC LC	lows/fi				et)	0/6	6/12	12/18	18/24	REC. (in.)		FIELD CLASSIFICATION AND REMARKS
DEPT	GRAPHIC LOG	CASING (Blows/ft)	<u> </u>	NUMBER	BOL	DEPTH (feet)			CORING				
		CAS	TYPE		SYN		RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %		
SHIP EPE LAND (FINAL) 11-07-08:GLB 1/1/1/08			S	6		20.0 - 22.0 25.0 - 27.0 30.0 - 32.0	14	10	6	8	6		Gray, c-f SAND, some (+) m-f Gravel, some Silt, micaceous. (SM)  Gray brown, c-f SAND, some (+) c-f Gravel, trace (+) Silt, wet. (SP)
GES 4-30-08.GPJ THE PARTNERS			S	8		35.0 - 35.3	100/4"				4	35.9'	Gray, SILT & CLAY, trace (+) f Sand. (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  0	* * * *												Note: Start rock coring at 35.9' depth.

							BORING	NUM	IBER:	PE-27	4		
ITH	E	PARTN	TEXX	T	TD)	CORING LOG	SHEET I	NUME	BER: _	1	0	of	9
				211			PROJEC	T NU	MBEF	R: 194	99B		
PROJE	CT: T	rans-Hudson	Expre	ess (	THE)	Project	LOCATION	ON: 1	1th Av	ve at 30	Oth St	t, NE	
		New York, No	ew Ŷor	·k `		ū		c	orner				•
CLIENT							COORD		-			9,641.	.9
		R: Jersey B		& Di	rilling	5	SURFAC						DI
		Kurzynowsk	i				DATUM:			NJ YCT d		tate -200 -	Plane
		M. Tekin	W.	ah.	Diam	and Coving	START I						
		THOD: Rota ME-75, Truc				tomatic Safety Hammer	FINISH [						
								G		WATER			
CORE E	BARR	EL DATA:		1	NOTE	S:				Water Depth	Cas Dep		Hole Depth
TYPE: I	Double !	Barrel, solid inne	er barrel	with	wirelin	e	Date	Tim		(ft)	(ft		(ft)
CORE S	SIZE:	NQ					4/22/08	7:00	am	19.5	35	6.0	115.1
O.D.: 3	3"						4/24/08	7:00	am	19.0	35	5.0	166.1
I.D.: 1.8	375"			$\top$									
CASING		4" (4.5")											
	(min/ft)			(6				<b></b>		DIS	CONTI	NUITY	DATA
DEPTH (feet)	E	õ£	RECOVERY (in)	RECOVERY (%)	<u></u>			WEATHERING	l E				<del>-</del>
<u>±</u>	ATE	l SE	ĒŖ	ΈR	RQD (%)	DESCRIPTION AND REMARKS	3	岸	STRENGTH	jep)			(fee
I H	9	DE PE	8	30	RQI			ΙΨ	R	빌	누	Б	l E
	CORING RATE	CORE RUN NO. AND DEPTH (ft)	REC	REC				WE	S)	ANGLE (deg)			DEPTH (feet)
RSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	8	O∢								ì			
, EB.						C-1, 35.9-37.6' and 38.5-40.7': Light gray gray PEGMATITE; medium to coarse gra	to medium ins of	П	R3	*45	2.0	2.0	36.1
0.80 -						quartz, white feldspar, muscovite, and biod to moderate fracture spacing; slightly wear	ite; close			70 *20	3.0 1.5	2.0	36.5 36.7
10-24						medium strong; irregular seams of mica the orange iron-staining above 37.6'; schist incompany	roughout;			*60	1.5	1.0	37
(] <u>-</u>						orange iron-staining above 37.6'; schist inc 36.8-37.0'.	clusion at			20 *40	3.0 2.0	2.0 2.0	37.2 37.5
Ē						37.6-38.5' and 40.7-43.5': Dark gray to br	own			*70 *50	2.0 1.5	4.0 2.0	37.8 38.4
		C-1				SCHIST; fine to medium grains of biotite, quartz, feldspar, and scattered garnets, up	to 1/8"			*5	2.0	1.0	38.7
분 - 40		35.9 - 43.4	90	100	59	across; very close to moderate fracture spa except extremely close at 43.1-43.5'; slight	cing,			*40	1.5	1.0	39.5
	4					weathered, except moderately weathered a	t			15	2.0	1.0	40
PAR.						41.8-42.5'; medium strong, except weak a 41.8-42.5'; distinct wavy to laminated sch				*60	MB	MB	40.7
뽄						dips 50-75 degrees; orange iron staining a	t			15	1.5	1.0	41
G <b>F</b>						41.8-43.0', with thin (<0.1") coatings of somica and gray clay on fracture surfaces.	ntened	III	R2	*50 *60	1.0 1.0	4.0 4.0	41.8
.80-08								II	R3	*60	1.5	4.0	42.2
S 4-3										*70 30	2.0 2.0	2.0	42.5 42.55
AGE		G 2				C-2: 43.5-44.4': Tan to light gray PEGMA coarse grains of quartz, white feldspar, and		П	R3	*75	1.5	4.0	42.6
ACK ACK		C-2 43.5 - 45.3	21	100	57	muscovite, with gray schist inclusions; clo	se fracture			5 *60	3.0 2.0	2.0 1.0	42.9 43.2
ੂ ⊢ 45	4					spacing; slightly weathered; medium stron iron staining throughout, with healed hairly		_	<b></b>	*60 *60	1.5 2.0	1.0 2.0	43.5 <b>–</b> 43.8
EPE.						fractures.		II	R3/R4	80	1.5	2.0	43.9
8						44.4-45.2': Dark gray SCHIST; fine to coa of biotite, muscovite, quartz, feldspar, scat	tered			50 85	2.0 3.0	2.0	44.3
ZE_						garnets, up to 1/8" across; close fracture spatially weathered; medium strong; distinct	pacing;			*60	1.5	1.0	44.7
자 <u>구</u>						crenulated schistosity dips 60-75 degrees.	,			85 30	3.0 3.0	1.0 1.0	45 45.1
6 L						C-3: Dark gray to medium gray SCHIST; coarse grains of muscovite, biotite, quartz,				45 50	3.0 3.0	1.0 1.0	45.2 45.8
X X						and scattered garnets, up to 1/8" across; cl	ose to			*60	1.5	1.0	45.9
<u> </u>						moderate fracture spacing; slightly weather medium strong to strong; distinct crenulate	ed			30 30	2.0 3.0	2.0	47.2 47.9
RSH H						schistosity dips 50-80 degrees; medium gr PEGMATITE; with muscovite seams, at 4	ay to tan			*50	1.5	2.0	48.3
PARTNERSHIP CORING GDR (FINAL) 00 EPE ALL PACKAGES 4:30-08:GPJ THE PARTNE CORING GDR (FINAL) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		C-3 45.2 - 55.1	118	99	91	no rock wall contact, with increased weath	ering at			10 10	1.0 3.0	6.0	48.4 48.5
PAF	5	.0.2 33.1				fractures at 48.7' and 48.8'; clay and softer	ned mica			40	2.0	2.0	48.6
						Bor	ing No.	PE-2	74	Shee	t 1	of	9

CORING LOG (continued)

BORING NUMBER: PE-274
SHEET NUMBER: 2 of 9

CONTRACTOR: Jersey Boring & Drilling

PROJECT NUMBER: 19499B

PROJECT: Trans-Hudson Express (THE) Project

LOCATION: 11th Ave at 30th St, NE corner DRILLER: J. Kurzynowski

CLIENT: NJ Transit INSPECTOR: M. Tekin

Ì	_	nin/ft)		(-	(9)		<b>L</b>	(1)		DIS	CONTI	NUITY I	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	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 30 *60 *60 *50 50 *60	MB 1.0 1.5 1.5 1.0 2.0 1.5	MB 6.0 4.0 2.0 3.0 4.0 4.0	48.7 48.8 49.3 49.7 50.1 51.3 51.8
GLB 10/24/08	- 55						C-4: Dark gray SCHIST; fine to coarse grains of	I/II	R4	*60 *60	2.0 1.5 2.0	1.0 2.0 1.0	53.8 - 54.6_ 55.1
JAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	-						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';			*70 10 30	2.0 1.0 3.0	1.0 6.0 1.0	55.4 55.5 - 56.6 _
ERSHIP EPE (F	-						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			15 *40 *60	2.0 1.0 1.5	2.0 2.0 1.0	57.8 - 58.2 58.8 -
PJ THE PARTN	- 60	5	C-4 55.1 - 65.1	120	100	97	mafic minerals and adjacent yellow metallic mineral (gold?).			*60 *60	2.0	1.0	59.7 <u></u> 60.2
4-30-08.G	-									*50	1.5	2.0	61.3
ALL PACKAGES	-									*55 20 *50 0	1.0 3.0 1.0 2.0	2.0 1.0 4.0 1.0	62.2 62.3 62.6 63.1
G GDR (FINAL) 00 EPE	- 65 -						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;	I/II	R4	*50 0 20 20 *60	1.0 3.0 2.0 1.0 2.0	4.0 2.0 1.0 6.0 1.0	64.7— 65.1 65.5 65.6 -
PARTNERSHIP CORING GDR (FIN	-						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'.			15 20 30	3.0 3.0 3.0	1.0 2.0 1.0	67.3 67.9 68.4
PARI	-						Roring No.	DF_2		Shee			

Boring No. \_\_\_PE-274\_\_\_ Sheet \_\_2 \_\_ of \_\_9\_\_

THE PARTHERSHIP CORING LOG	(continued)
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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

	(H)					<b>_</b>			DIS	CONTI	NUITY I	DATA
DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	٦Ļ	БГ	DEPTH (feet)
<del>-</del> 70	4	C-5 65.1 - 75.5	120	96	90				*60 *60	1.5 1.5	4.0 4.0	69.7 <b>—</b> 69.8
-									*50	1.5	2.0	70.8 -
-									40 40	3.0 3.0	1.0 2.0	71.6 71.7
-									*60	1.5	2.0	73.1
- 75 -						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	I/II	R4	*60 *60	1.0 1.0	2.0 2.0	74.6 75.1
- - -						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'.			*60 *60	1.5	1.0	- 78 - 79 -
<b>–</b> 80									50	2.0	1.0	79.7
-	4	C-6 75.5 - 85.5	120	100	100				60 50 30	MB MB 3.0	MB MB 2.0	80.5 80.7 - 81
- - - 85									*50	2.0	1.0	83.5
-						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	I	R4	*60 40 50	2.0 2.0 3.0	2.0 1.0	85.5 85.9 -
						60-75 degrees; thin (<0.1") calcite coatings on	DF_2		Shoo	t 3		

Boring No. \_\_PE-274\_\_ Sheet \_\_3\_\_ of \_\_9\_\_

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

ł		in/ft)			(					DIS	CONTI	NUITY	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	Jr	ьl	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
GLB 10/24/08	-									*60	1.5	1.0	91.8 -
INAL) 10-24-08	-									*60	2.0	1.0	93.8 -
P EPE (F	– 95						C-8: 95.5-99.1': Dark gray SCHIST; fine to medium	I	R4 R4	*60 *70 *70	2.0 1.5 2.0	1.0 2.0 1.0	94.8— 95.1 95.15
HE PARTNERSHI	-						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 OUARTZ at 98.8-99.0'.			10 *60 *80	1.0 2.0 2.0	6.0 2.0 1.0	95.2 - 95.5 96.1 _
8.GPJ T	-						99.1-104.7': Medium gray to light gray GRANITE; fine to medium grains of feldspar, quartz, and muscovite; wide fracture spacing; unweathered,			*60	1.5	2.0	98.4
ACKAGES 4-30-0	- 100	4	C-8 95.5 - 104.7	110	100	96	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.	I/II	R5	*60	1.5	1.0	99.1 —
AL) 00 EPE ALL PA	-									0	1.0 1.0	6.0 6.0	101.6 101.9
NG GDR (FINA	-									15	MB	MB	103.9
PARTNERSHIP CORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	- 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
ď.	_						Poring No.	DF_2		Shoo	+ 1	of	0

Boring No. \_\_\_**PE-274**\_\_\_ Sheet \_\_**4**\_\_ of \_\_**9**\_\_

CORING LOG (continued)	
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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

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-		in/ft		<u></u>	(9)			(D		DIS	CONTI	NUITY	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	٦	вЪ	DEPTH (feet)
80/	– 110	4	C-9 104.7 - 111.5	81	100	100	pure QUARTZ at 107.0-107.5', 108.1-108.4', and 110.9-111.5'; 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'.			40 0 *80 20	3.0 MB 1.0 MB	2.0 MB 4.0 MB	107 
10/24										0	3.0	2.0	110.3
.GLB							C-10: 111.5-112.9': Medium gray QUARTZ, with	I	R4	20 *50	3.0	1.0	110.9
EPE (FINAL) 10-24-08.		4	C-10 111.5 - 115.5	48	100	100	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.		IC4	*50 *60	3.0	1.0	112.9
SHIP	- 115						induites have aim ( on ) careful comings.			*50	1.5	1.0	114.7_
TNER	- 115						C. 11. Dayle away COLUCT: Fine to madisum agains of	I/II	R4	*60	1.5	1.0	115.5
4L) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08							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.	1/11	K4	30	MB	MB	117 -
ACK													
ALLF	- 120		C-11	117	100	100							_
0 EPE		4	115.5 - 125.3	117	100	100				20	2.0	1.0	120.6
INAL) 0													
SDR (F										85	2.0	2.0	122
PARTNERSHIP CORING GDR (FIN.	-												-
P COF													
RSHI	405									*60	1.5	1.0	124.6
RTNE	- 125 -						C-12: Dark gay to black SCHIST; fine to medium	I	R4	20	3.0	1.0	125.3
4							g., e,e 314111						1

Boring No. <u>PE-274</u> Sheet <u>5</u> of <u>9</u>

PARTITION CORING LOG	(continued)
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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

ł		in/ft)		<u> </u>	(						DIS	CONTI	NUITY	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS		WEATHERING	STRENGTH	ANGLE (deg)	٦	вL	DEPTH (feet)
10/24/08							grains of biotite, muscovite, quartz, feldspar, and sparse garnets, up to 1/8" across; wide fracture spacing; unweathered; strong; faint, wavy schistos dips 60-90 degrees; pure QUARTZ, with vertical contacts at 125.3-126.0'; light gray GRANITE, wi near-vertical muscovite seams, with vertical contact along schistosity at 126.5-129.0'.	sity			*60	1.5	1.0	126.5
JAL) 00 EPE ALL PACKAGES 4-30-08.GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	- 130	5	C-12 125.3 - 135.3	120	100	100					45	3.0	1.0	130.2
PART	- 135										*80	2.0	2.0	134.6_
8.GPJ THE							C-13: Dark gray SCHIST; fine to medium grains biotite, muscovite, quartz, feldspar, and sparse medium grained garnet; close to moderate fracture	re	I/II	R4	0 30	2.0 3.0	1.0 1.0	135.3 135.6 _
CKAGES 4-30-0							spacing; unweathered to slightly weathered; strong indistinct schistosity dips 60-90 degrees; contorted 1/2" band of quartz-feldspar at 142.4-142.6', parato schistosity; no rock wall contact and orange iro staining at low-angle fracture at 136.6'; thin (<0.1)	ed illel on			20 10	1.0	6.0	136.6 _ 137.5 _
PE ALL PA							calcite coating on foliation fracture at 142.8'; softened mica on smooth foliation fracture at 143.	.9'.			40	MB	МВ	138.9
	- 140	4	C-13 135.3 - 145.4	121	100	93					30	3.0	1.0	139.9
PARTNERSHIP CORING GDR (FIN		4									*50	2.0	1.0	141
CORINC	•													_
3SHIP (											*60 40	2.0 3.0	1.0 1.0	142.8 <b>-</b> 143.1
PARTNEF											*50 *70	1.5 1.0	2.0 4.0	143.7 <b>-</b> 143.9
							Paring No		DF 2'		Shoc			

Boring No. \_\_\_**PE-274**\_\_\_ Sheet \_\_**6**\_\_ of \_\_**9**\_\_

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

	(min/ft)		Ē	(9		•	(D		DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (m	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	Jr	ьl	DEPTH (feet)
<del></del> 145									*60 60	1.0 1.0	1.0 2.0	144.2_ 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 40 *70 *60	1.5 2.0 2.0 1.0	1.0 1.0 1.0 4.0	145.3 145.4 145.8 146.1
- - - 150	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.  C-15: 146.9-147.8': Dark gray SCHIST; as above, except extremely close fracture spacing throughout;	П	R2/R3	*60 10 80 0 *50 75 15 10 *60 20	1.0 3.0 1.5 1.5 1.0 1.5 2.0 3.0 1.0 2.0	4.0 2.0 2.0 3.0 2.0 2.0 2.0 2.0 2.0 2.0	146.2 146.3 146.4 146.5 146.55 146.6 146.65 146.7 146.8 147.6
- - 150 - - - - 155 - -	4	C-16 150.4 - 156.1	68	100	100	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.	П	R4	75 15 *60 10 *70 15 20 *60 *70 *65 *65	2.0 2.0 1.5 2.0 2.0 2.0 3.0 1.5 2.0 MB 1.5	2.0 2.0 1.0 2.0 4.0 2.0 2.0 4.0 4.0 MB 1.0 2.0	147.65 147.68 147.7 147.72 148.1 148.15 149.9 150.1 151.4 151.7 153
- - -						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'.  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	II I/II	R4	30 *60 20 45 *50 *60 *50	3.0 1.5 3.0 2.0 1.5 1.5 1.0	1.0 1.0 2.0 2.0 4.0 1.0 2.0	156.1 156.8 157.4 157.6 157.65 157.8 158.2
160  -	4	C-17 156.1 - 166.1	120	100	91	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.  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.			*30 40 30 *50 20	1.5 1.5 2.0 1.5 2.0	1.0 1.0 1.0 1.0 1.0	158.2 158.7 159 160 160.3 160.7

Boring No. PE-274 Sheet 7 of 9

THE	PARTNERSHIP	CORING LOG
	PARTINERSHIP	CORING LOG

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

L													
		(min/ft)		(						DIS	CONTI	NUITY	DATA
	DEPTH (feet)	CORING RATE (m	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	ANGLE (deg)	٦Ļ	вL	DEPTH (feet)
-	- 165							I	R4	0 *50	2.0 1.5	1.0 2.0	164.2 164.7
0/24/08	-						C-18: 166.1-170.8': Dark gray SCHIST; as above; near vertical healed hairline fractures have orange, weathered calcite fillings.	I	R4	*50 *50 50 *60	1.5 2.0 2.0 1.5	1.0 1.0 2.0 4.0	165.3 165.9 166.1 166.8 -
-) 10-24-08.GLB 1	-						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			*60 *70	1.0	2.0	167.2 - 168.2
ERSHIP EPE (FINAL	– 170 -	4	C-18 166.1 - 175.4	112	100	89	and banding dip 60-70 degrees; very dense.  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	I	R5	20 *70 *70	MB 1.5 1.5	MB 1.0 1.0	169.8 <del>-</del> 170.6 170.8 -
GPJ THE PARTNE	-						weathered; strong; wavy schistosity dips 70-80 degrees; calcite coatings on most fracture surfaces; pure, medium gray QÜARTZ at 174.2-175.0', with yellow metallic flakes (pyrite?) on fracture surface at 174.9'.	I/II	R4	*70	2.0	2.0	- 172.7 _
CKAGES 4-30-08.	- 175						C-19, Dark gray SCHIST; fine to coarse grains of	П	R4	*50 *40 5 *70	2.0 1.5 3.0 2.0	1.0 1.0 1.0 1.0	174.1 174.3 174.9 175.2
PARTNERSHIP CORING GDR (FINAL) 00 EPE ALL PACKAGES 4-30-08 GPJ THE PARTNERSHIP EPE (FINAL) 10-24-08 GLB 10/24/08	-	6	C-19 175.4 - 179.1	44	100	23	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")	iii	R2/R3	*70 20 *50 *70 *80 30 *70 *70 *70	1.0 4.0 4.0 1.0 0.5 3.0 1.0 1.5 1.0	1.0 1.0 4.0 2.0 4.0 4.0 4.0 4.0	175.3 - 175.4 - 176.3 - 176.8 - 177.1 177.5 177.6 - 177.7 177.9
PARTNERSHIP CORING GL	- 180 -	5					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	П	R3/R4	*60 *70 50 *70 *70 *70 30 *70 0	1.0 1.5 2.0 1.0 1.0 2.0 1.0 3.0	4.0 4.0 2.0 4.0 4.0 3.0 4.0 2.0	178 178.3 178.6 179 179.05 179.1 - 179.9 180.5

Boring No. \_\_\_**PE-274**\_\_\_ Sheet \_\_**8**\_\_ of \_\_**9**\_\_

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

	n/ft)								DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS	WEATHERING	STRENGTH	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 15 20	1.0 1.5 MB	2.0 2.0 MB	180.7 181 182.8 -
PARINERSHIP CORING GDR (FINAL) 00 EPE ALL PACKAGES 4:30-08.GP) THE PARINERSHIP EPE (FINAL) 10-24-08.GLB 10/24/08	5	C-21 185.7 - 195.8	121	100	94	C-21: 185.7-186.4': Dark gray SCHIST, as above.  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'.  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.  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.	п	R3/R4 R5	0 *70 *70 *60 *60 *50 10 *50	2.0 1.0 2.0 1.0 1.0 1.0 1.0 MB 1.0	3.0 4.0 4.0 2.0 1.0 4.0 1.0 MB 1.0	184.3 185 185.1 185.5 - 185.8 185.9 - 186.4 186.7 188.1
G GDR (FINAL) 00 EPE ALL PACKAGES 4-35						End of Boring at 195.8'			45 0 5 0 10 80 15	3.0 1.5 1.5 2.0 2.0 3.0 2.0	1.0 3.0 3.0 1.0 1.0 1.0 1.0	194.8—194.9—195.4—195.5—195.8————————————————————————————————————
- 200						Boring No.	PE-	274	Shee	et 9	of	9

Boring No. PE-274 Sheet 9 of 9

		T	ne (	ริล	tev	wa	v							BORING	NUMBE	R:SEG-3	3-1T		
	Ti	ran	s-F	lu Par	ds rtn	on	, ship	B	ORI	NG	10	G		SHEET	NUMBER	:1	of	3	
А	.≡CO.	M	PAR BRIN	SON	IS ERHO	FF	STV 100							PROJEC	T NUMB	ER:4016	6879		
	_						udson Ya			•				LOCATION	ON: 30th	St., 11th	Ave., Ne	w York	
CLIEN						llt	h Ave., N	ew Yo	rk, NY	-				COORD	NY N· 1.915	5.821 2 F	: 14.802	907 7	
CONTI														COORD. N: 1,915,821.2 E: 14,802,907.7 STN. NO.: OFFSET:					
							e, George	Rayn	ond					SURFAC	E ELEV.	:306.5 fe	eet		
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							tary Was								DATE: 8/2				
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	e/Symbol HW S U						Pitcher	Gra		Core Barrel	GROUNDWATER DATA  Water Casing Ho								
Type/S	Symb	ool				$\dashv$	S			P 🛚	G		C			Depth	Depth	Depth	
I.D.					4" 1.375" 2.938" " " 2.155"		Date	Time	(ft)	(ft)	(ft)								
O.D.					5"		2"	3"		"	"		2.98"	8/26/2015	7:15:00 AM	10.9	65	70	
Length					5		24"	30'		"	"		60"						
Hamm					lb lb		140 lbs		rill Rod S			NV		<b>_</b>					
Hamm	er Fa	all	<u> </u>	30	" in.		30 in.	ı	.D. (O.E	).)	2	2.25" (2	625")						
<u> </u>	ပ္ခ					SA	MPLE		SOIL	_(Blows/	'6 in.)		_						
DEPTH (feet)	GRAPHIC LOG	9	CASING (Blows/ft)				et)	0/6	6/12	12/18	18/24	REC (in.)			COLLICAT				
EPT	SAPH.	9	1G (B)		3ER	3 S	H (fe			CORING	}			ELD CLAS	SSIFICAT	ION ANI	J KEWAR	KNS	
Δ	GF		CASIN	TYPE	NUMBER	SYMBOL	DEPTH (feet)	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQE	Depth Elev.						
-	***	<b>4.</b>		G	1	1	0.0 - 6.0							Excavated to Mud at 3' to	op 6' soil to c 4'.	lear utilities	S.		
_																			
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-	*****	1	_																
<del>-</del> 5	*.0	₫	4															-	
-	Ø.	<del> </del>	4	C	1	'	(0.00	_	1	1	,	0		C. L. Daulaka			NID 4		
-	* -		_	S	1		6.0 - 8.0	2	1	1	1	8		S-1: Dark br medium to fi					
_	<sup>4</sup> O□			C	2		0.0 10.0		0	1.4	_	24		G 2 D	, ~	CAND	1.		
_			_	S	2		8.0 - 10.0	2	8	14	5	24		S-2: Brown of fine Gravel,					
<del>-</del> 10	<b>₽</b> Δ′	<u>-</u>		C	2		100 120	_			4	10		C 2. D	4 6	CAND		4-	
_	<b>₩</b>	<u> </u>		S	3		10.0 - 12.0	5	6	6	4	10		S-3: Brown in fine Gravel,					
_		44 	4																
_	***																		
_	***	4 <sup>7</sup>	_																
<del>-</del> 15	₽ □ .	7		~				_										_	
-	* -	ı. } 4¥——		S	4		15.0 - 17.0	5	3	2	2	0		S-4: No Rec	overy. — — — — —				
_		_																	
_																			
_		_	_																
- 20		-		C	_		20.0. 22.0			_				0.5.0	. ~	CAND "	u1 1º	_	
-		_	4	S	5		20.0 - 22.0	6	3	5	8	9		S-5: Brown of fine Gravel,				to	
-		_	_											,	,		-		
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### **BORING LOG**

**BORING NUMBER: SEG-3-1T** 

SHEET NUMBER: 2 of \_\_\_

AECOM PARSONS STV 100

(continued)

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymond

INSPECTOR: Juan Zapata Jr.

PROJECT NUMBER: 4016879

PROJECT:	<b>AMTRAK</b>	Hudson	Vards
I INCOLOT.	LATAT T TAY ATA	Hudson	1 ai us

LOCATION: 30th St., 11th Ave., New York, NY

CLIENT: AMTRAK

	<sub>0</sub>				S	AMPLE		SOIL	_(Blows	'6 in.)		
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	CHIS AND			et)	0/6	6/12	12/18	18/24	REC. (in.)	
EPTH	NAPH.	שני שני			SER 5	STMBOL DEPTH (feet)		•	CORING	}		FIELD CLASSIFICATION AND REMARKS
	9.9	1 0 A C		7	NUMBER	DEPTH (1	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	Depth Elev.
_			- 1	S	6	25.0 - 27.0		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).
- 45 - 45 50 55 55			$\dashv$									

# BORING LOG (continued)

BORING NUMBER: SEG-3-1T

SHEET NUMBER: 3 of

AECOM PARSONS STV 100

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymon

INSPECTOR: Juan Zapata Jr.

PROJECT NUMBER: 4016879

PROJECT: AMTRAK Hudson Yards
LOCATION: 30th St., 11th Ave., New York, NY

CLIENT: AMTRAK

OLILI				_								mior Editoria sum Empura sir
	O			5	SAN	MPLE		SOIL	. (Blows/	'6 in.)		•
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				et)	0/6	0/6 6/12		18/24	REC. (in.)	FIFE D OF A CONFICATION AND DEMARKS
EPTF	ЗАРН	IG (Bl	l	3ER	30L	DEPTH (feet)			CORING	}		FIELD CLASSIFICATION AND REMARKS
	95	CASI	TYPE	NUMBER	SYMBOL	DEPT	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).
-			l									
-												
<del>-</del> 65			S	14		65.0 - 67.0	WOR	WOR	WOR	WOR	18	S-14: Same as above.
-												
-												
- 70				1.5		<b>7</b> 0.0 <b>72</b> .0	WOD	MOH	MOH	2	0	0.15 N. D
-			S	15		70.0 - 72.0	WOR	WOH	WOH	2	0	S-15: No Recovery.
-												
-			l									
75 -			S	16		75.0 - 77.0	WOR	WOH	WOH	1	20	S-16: Gray Silty CLAY, frequent marine material, very soft, wet (CL).
-												
-												
<del>-</del> 80			S	17		80.0 - 81.3	40	35	50/4"	-	0	S-17: No Recovery.
-												
_												End of soil at 83' bgs.
- 85												Start rock coring at 83' bgs.
-												
<del>-</del>												
-			-									
— 90 -												,
-			-									
- 80 - 80 85 90 												
			ı									

### **BORING NUMBER: SEG-3-1T** The Gateway Trans-Hudson SHEET NUMBER: 1 **CORING LOG Partnership** A=COM PARSONS STV 100 PROJECT NUMBER: 4016879 PROJECT: AMTRAK Hudson Yards LOCATION: LOCATION: 30 St., 11 Ave., New York, NY COORD. CLIENT: AMTRAK STN. NO.: OFFSET: CONTRACTOR: ADT DRILLER: Dominick Pepe, George Raymond SURFACE ELEV .: INSPECTOR: Juan Zapata Jr. DATUM: DRILLING METHOD: MUD ROTARY START DATE: 8/24/15 TIME: 1:00 pm RIG TYPE: CME-75 (truck mounted), Automatic Hammer FINISH DATE: 8/26/15 TIME: 2:30 pm **GROUNDWATER DATA** Water Casing **CORE BARREL DATA:** NOTES: Depth Depth Depth TYPE: Double Tube Swivel Date Time (ft) (ft) CORE SIZE: NO O.D.: 2.98" I.D.: 1.875" CASING SIZE: 3" (3.5") **DISCONTINUITY DATA** CORING RATE (ft/min % **DESCRIPTION AND REMARKS** RECOVERY (in) CORE RUN NO. AND DEPTH (ft) WEATHERING DEPTH (feet) STRENGTH (Lithology, Structure, Weathering, DEPTH (feet) RECOVERY 8 ANGLE (deg) Continuity, Strength, Color, Grain Size) ROD 느 a \* - Denotes discontinuity along foliation MB - Denotes mechanical break C-1: Gray Garnet-Mica SCHIST, coarse to fine grains II R3 $0_{\text{MB}}$ 83 \*60<sub>MB</sub> 1 of quartz, feldspar, biotite, muscovite and garnet, 83.4 \*60<sub>MB</sub> slightly weathered, medium strong, close to moderate 1 84.1 85 fracture spacing, schistosity dips 55° to 65°, recovery loss assumed at 85.1'-85.7', granitic band at \*60<sub>MB</sub> 3 84.3 C-1 1 53 88 68 83.0 - 88.0 $10_{MB}$ 85 $80_{MB}^{\cdot}$ 84.1'-84.3'. 6 85.05 $10_{\mathrm{MB}}^{\mathrm{MB}}$ 85.1 6 2 2 1 2 1 85.7 1 $10_{MB}$ 1.5 \*65<sub>MB</sub> 86.65 C-2: Gray SCHIST, medium to fine grains of quartz, $\Pi$ R3 15<sub>MB</sub> \*55<sub>MB</sub> 86.95 feldspar, biotite, muscovite and garnet, slightly 1 87.7 weathered, medium strong, close to moderate fracture $20_{MB}$ - 90 88 spacing, granitic bands at 88.7'-88.9', and 89.2' to 3 C-2 60 100 87 1.5 \*60<sub>MB</sub> 88.3 88.0 - 93.0 89.3', schistosity dips 60° to 65°. CANARSIE-LIB.GLB - COPY.GLB 10/25/15 \*60<sub>MB</sub> 1 89.5 15<sub>MB</sub> 1.5 1.5 1 90.4 91.5 \*60<sub>MB</sub> 1 1 \*65<sub>MB</sub> 92.7 1 C-3: Gray gneissic SCHIST, medium to fine grains of П R3 93 $10_{MB}$ quartz, feldspar, biotite, muscovite and sparse garnet, slightly weathered, medium strong, moderate to wide 95 fracture spacing except very close fracture spacing at C-3 93 100 60 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 93.0 - 98.0 $60_{MB}$ 1.5 2 96.3 $10_{\mathrm{MB}}$ 2 96.45 2 2 2 1 $10_{MB}$ 97.8 C-4: Gray SCHIST, medium to fine grains of quartz, П R3 1.5 98 $15_{MB}$ feldspar, biotite, muscovite and sparse garnet, slightly 98.6 **HUDSON YARD ROCK.GPJ** \*70<sub>MB</sub> weathered, medium strong, close to moderate fracture 100 C-4spacing except extremely close to very close fracture spacing at 102.15' to 102.3', schistosity dips 65° to 98.0 -60 100 95 $10_{\mathrm{MB}}$ 2 2 1.5 100.35 103.0 1.5 101 $*70_{MB}$ \*70<sub>MB</sub> 1 101.7 102.15 \*65<sub>MB</sub> 1 \*70<sub>MB</sub> 102.2 C-5: Gray SCHIST, medium to fine grains of quartz, $\Pi$ R3/R4 1 1 $10_{\mathrm{MB}}$ 2 1 102.3 feldspar, biotite, muscovite and sparse garnet, slightly 3 2 weathered, medium strong to strong, close to $10_{\mathrm{MB}}$ 103 CORING LOG C-5 105 \*60<sub>MB</sub> 1 104.4moderate 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.

103.0 -

108.0

58

85

97

 $30_{MB}$ 

 $10_{MB}$ 

 $80_{MB}$ 

3

3

2

1

2

105.55

106.3

106.4

AECOM PARSONS STV 100

## **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.

	CLILINI.	7 1111	114.111					INSI LO			Zuput	. 01.		
		min)					DECORURTION AND DEMARKS				DISC	CONTI	VUITY	DATA
	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 S  * - Denotes discontinuity along folia  MB - Denotes mechanical break	WEATHERING	STRENGTH	ANGLE (deg)	٦Ļ	Ja	DEPTH (feet)	
	-		C-6 108.0 - 109.9	23	100	100	C-6: Gray gneissic SCHIST, medium to fine quartz, feldspar, biotite, muscovite and spars slightly weathered, strong, moderate fracture schistosity dips 65° to 70°. End of boring at 109.9' bgs.	e grains of rse garnet, e spacing,	II	R4	*60 <sub>MB</sub> 85 <sub>MB</sub> 65 <sub>MB</sub>	1 3 3	2 2 1	106.6 107 - 107.6
	<del></del>						schistosity dips 65° to 70°. End of boring at 109.9' bgs.				*60 <sub>MB</sub> *60 <sub>MB</sub> 40 <sub>MB</sub>	3 3 3	2 2	108 — 109.9 _ - - - -
	- - - 120 -													- - - - -
10/25/15	- - 125 - -													- - - -
PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15	- - 130 - -													- - - -
ON YARD ROCK.GPJ CANA	- - 135 - -													- - - - -
PB CORING LOG HUDSC	- 140 													- - - -

		Th	e G	atev	wa	v							BORING	NUMBE	R:SEG-	3-2T	
	Tra	ans	e Ga s-Hi Pa	uds	on	ship	BO	ORI	NG	LC	)G		SHEET	NUMBER	R:1	of	3
A	N≡CON	И	PARSO	NS KERHO	OFF	STV <sub>2</sub> 100		<i>-</i> . \		_~			PROJEC	T NUMP	BER:4016	5879	
						ludson Ya								ON: 30th		Ave., Ne	w York,
LOCA CLIEN					11t	th Ave., N	ew Yo	rk, NY	7				COORD	NY N: 1.91	5.957.9 F	: 14,802,	845.3
CONT					'								STN. NC	).:	C	FFSET:	J.
						e, George	Rayn	ond					SURFAC DATUM:		∴307.3 fe	eet	
INSPE DRILL					_	ita Jr. otary Was	h						_		10/15 T	TME: 11:0	00 am
RIG T			CM	E-7	<b>'5 (</b>	truck mo	unted)							DATE: <b>8</b> /1	15/15 T	IME: 10:	
	<b>.</b> !	.		sing	J	Split Spoon			Pitcher	Gra	-	Core Barrel		GROU	NDWATER Water		Hole
Type/S	symbo	) I		IW 4"		S 1.375"	U [		P 🛚	G [		C = 2.155"	Doto	Time	Depth	Casing Depth	Depth
O.D.		-		4.5"		2"	2.938		"	"		2.133	Date	Time	(ft)	(ft)	(ft)
Length	1	-		60		24"	30'		"	"		60"					
Hamm		:. [	140	lb lb	os	140 lbs		rill Rod S	Size		NV	V					
Hamm	er Fa	II	30	)" in.		30 in.	ı	.D. (O.E	D.)	2	.25" (2	.625")					
	<u>ල</u>				SA	MPLE		SOIL	_ (Blows/	6 in.)							
(feet)	C LO	ws/ft)				t)	0/6	6/12	12/18	18/24	REC (in.)						
DEPTH (feet)	GRAPHIC LOG	3 (Blo		유	7	l (feei		<u> </u>	CORING	3	FII		ELD CLAS	SSIFICAT	ION ANI	O REMAR	RKS
	GR4	CASING (Blows/ft)	TYPE	NUMBER	SYMBOL	DEPTH (feet)	RUN (in.)	REC.	REC.	L>4" (in.)	RQD %	Depth Elev.					
	***		G		\ /	0.0 - 5.0	(111.)	(111.)	/0	(111.)	/0	LICV.	Excavated to	p 5' soil to	clear utilities	S.	
	₩				$  \rangle /$												
<u> </u>					$ $												
-	****		+														
<del>-</del> 5	* P		- <sub>s</sub>	1		5.0 - 7.0	3	3	3	4	8		S-1: Brown a	and red brov	vn coarse to	fine SAND	-
<u> </u>	**		$\dashv$										some medium (SM)-Fill.	n to fine Gr	avel, some S	Silt, loose, m	noist
	۵۵			2		7.0 - 9.0	7	7	4	4	3		S-2: Same as	s above.			
-			- <sub>S</sub>	3		9.0 - 11.0	2	11	3	4	0		S-3: No Reco	over.			
<del>-</del> 10	***		$\dashv^{\mathfrak{s}}$	3		7.U - 11.U		11	3	4			5-5. INU KEC	overy.			_
<u> </u>	*		$\dashv$														
Ĺ	***																
			_]														
<del>-</del> 15			- <sub>S</sub>	4		15.0 - 17.0	3	7	4	4	1		S-4: Dark br	own coarse	to fine SAN	ID little Silt	_
}			$\dashv$	7		13.0 - 17.0		,	-	•	1		trace fine Gr				,
}			$\dashv$														
_																	
- 20			_	_		20.0. 22.0	_	0	10	6			C 5. No D	ON JOSEPH J			_
-			-S	5		20.0 - 22.0	5	8	10	6	0		S-5: No Reco		tip.		
-			+														
- 10 - 15 - 20 - 20																	



### **BORING LOG**

BORING NUMBER: SEG-3-2T

SHEET NUMBER: 2 of \_\_\_

AECOM PARSONS STV 100

(continued)

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymond

PROJECT NUMBER: 4016879

INSPECTOR: Juan Zapata Jr.

PROJECT: AMTRAK Hudson Yards LOCATION: 30th St., 11th Ave., New York, NY

CLIENT: AMTRAK

U				SA	MPLE		SOIL	(Blows/	6 in.)		
OT OI	(tJ/swc				et)	0/6	6/12	12/18	18/24	REC. (in.)	
	NG (BK		BFR .	30 J	TH (fee			CORING	;		FIELD CLASSIFICATION AND REMARKS
9	CASI	TYPF		SYME	DEPT	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	Depth Elev.
		S			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).
		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).
		  S	9		35.0 - 37.0	21	8	9	18	3	S-9: Same as above.
		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).
		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).
		_ _ _ _	12	2	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).
		S	13	3	55.0 - 57.0	WOR	WOH	WOH	3	24	S-13: Gray fine SAND, some Clayey Silt, frequent marine material, very soft, wet (SM).
	GRAPHIC LOG	GRAPHIC LOG		S 11	S 11 S 11 S 12 SAWBOL	S 6 25.0 - 27.0  S 7 27.0 - 29.0  S 8 30.0 - 32.0  S 9 35.0 - 37.0  S 10 40.0 - 42.0  S 11 45.0 - 47.0	S 7 27.0 - 29.0 12  S 8 8 30.0 - 32.0 6  S 9 40.0 - 42.0 6  S 11 45.0 - 47.0 WOH	S   10   40.0 - 42.0   6   7   7   7   7   7   7   7   7   7	S   10   45.0 - 47.0   WOH   WOH   WOH	S   S   S   S   S   S   S   S   S   S	S   10   40.0 - 42.0   6   7   8   8   21   50.0 - 52.0   WOR   WOH   WOH   23   WOH   WOH   WOH   23   35.0 - 32.0   WOR   WOH   WOH   WOH   23   WOH   WOH   WOH   23   WOH   WOH   WOH   23   WOH   WOH   WOH   WOH   23   WOH   WOH   WOH   WOH   23   WOH

The Gateway Trans-Hudson Partnership
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PROJECT: AMTRAK Hudson Yards

# BORING LOG (continued)

BORING	NUMBER: SEG-3-2T

PROJECT NUMBER: 4016879

SHEET NUMBER: 3 of \_\_\_

AECOM PARSONS STV 100

LOCATION: 30th St., 11th Ave., New York, NY

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymond

CLIEN	T: A	MTR	Aŀ	K								INSPECTOR: Juan Zapata Jr.
	Ō			,	SAI	MPLE		SOIL	. (Blows/	6 in.)		
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
)EPT	RAPH	NG (B	ļ.,,	BER	BOL	DEPTH (feet)		(	CORING	;		FIELD CLASSIFICATION AND REMARKS
	Ö	CASII	TYPE		SYMI	DEP <sup>-</sup>	RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.
-			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												_
-			$\ $									
-												
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- 70 -												-
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<del>-</del> 75			$\ $									-
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- 80												_
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### **BORING NUMBER: SEG-3-2T** The Gateway Trans-Hudson Partnership SHEET NUMBER: 1 **CORING LOG** AECOM PARSONS STV 2100 PROJECT NUMBER: 4016879 PROJECT: AMTRAK Hudson Yards LOCATION: LOCATION: 30 St., 11 Ave., New York, NY COORD. CLIENT: AMTRAK STN. NO.: OFFSET: CONTRACTOR: ADT DRILLER: Dominick Pepe, George Raymond SURFACE ELEV .: INSPECTOR: Juan Zapata Jr. DATUM: DRILLING METHOD: MUD ROTARY START DATE: 8/10/15 TIME: 11:00 am RIG TYPE: CME-75 (truck mounted), Automatic Hammer TIME: 10:30 am FINISH DATE: 8/15/15 **GROUNDWATER DATA** Water Casing **CORE BARREL DATA:** NOTES: Depth Depth Depth TYPE: Double Tube Swivel Date Time (ft) (ft) CORE SIZE: NO O.D.: 2.98" I.D.: 1.875" CASING SIZE: 3" (3.5") **DISCONTINUITY DATA** CORING RATE (ft/min % **DESCRIPTION AND REMARKS** RECOVERY (in) CORE RUN NO. AND DEPTH (ft) WEATHERING DEPTH (feet) STRENGTH (Lithology, Structure, Weathering, DEPTH (feet) RECOVERY 8 ANGLE (deg) Continuity, Strength, Color, Grain Size) ROD 느 a \* - Denotes discontinuity along foliation MB - Denotes mechanical break C-1: Gray Garnet-Mica SCHIST, coarse to fine grains II/III R3 63 $0_{MB}$ C-1 2 4 2 6 63.5 20 83 46 of quartz, feldspar, biotite, muscovite, garnet and $55_{MB}$ 63.0 - 65.0 $0_{\rm MB} \\ *80_{\rm MB}$ chlorite, slightly to moderately weathered, medium 10 63.95 65 strong, very close to close fracture spacing, schistosity dips 65° to 75°, recovery loss assumed at 1.5 64.3 П/Ш R3 3 $50_{MB}$ 64.6 10<sub>MB</sub> 64.7'-65.7 1 64.7 C-2: Gray Garnet-Mica SCHIST, coarse to fine grains $20_{\mathrm{MB}}^{\mathrm{MB}}$ 1 65.3 6 6 6 3 3 2 2 2 2 2 2 1 1 C-2 65.0 - 70.0 93 52 \*70<sub>MB</sub> of quartz, feldspar, biotite, muscovite, garnet and 65.6 1 chlorite, slightly to moderately weathered from 65' to $30_{MB}$ 65.85 $10_{MB}$ 66.9', slightly weathered from 66.9' to 70', medium 1.5 66.9 1.5 1.5 3 3 strong, very close to moderate fracture spacing, \*85<sub>MB</sub> 67.1 schistosity dips 70° to 85°, recovery loss assumed at $50_{MB}$ - 70 67.3 П R3 65'-65.3'. $30_{MB}$ 68.25 CANARSIE-LIB.GLB - COPY.GLB 10/25/15 $30_{MB}$ C-3: Gray Garnet-Mica SCHIST, coarse to fine grains 68.5 of quartz, feldspar, biotite, muscovite, garnet and \*80<sub>MB</sub> 13 68.55 C-3 chlorite, slightly weathered, medium strong, very $10_{MB}$ 68.75 60 100 93 70.0 - 75.0 \*80<sub>MB</sub> close to moderate fracture spacing, schistosity dips 1 68.9 $50_{MB}$ 3 75°, quartz band at 73.8' to 74.6'. 69.1 $10_{MB}$ 69.7 69.8 $20_{MB}$ 3 75 \*85<sub>MB</sub> C-4: Gray SCHIST, medium to fine grains of quartz, II R4 1 69.9 45<sub>MB</sub> \*75<sub>MB</sub> feldspar, biotite, muscovite and garnet, slightly 3 1 2 2 2 1 2 1 70 weathered, strong, moderate to wide fracture spacing 1.5 70.1 3 except close fracture spacing at 75' to 75.4', $10_{MB}$ 70.6 C-4 100 88 60 $10_{\mathrm{MB}}$ 1.5 schistosity dips 75° to 85°. 71.25 75.0 - 80.0 \*75<sub>MB</sub> 1 72 1.5 72.15 $10_{\mathrm{MB}}$ **HUDSON YARD ROCK.GPJ** $25_{MB} \\$ 3 73.15 80 $\overline{20}_{MB}$ 73.5 74 C-5: Gray SCHIST, medium to fine grains of quartz, II/I1.5 1 $15_{MB}$ feldspar, biotite, muscovite and garnet, slightly $20_{MB}^{\cdot}$ 74.1 1 1 weathered to fresh, strong, wide fracture spacing 75 75.4 $20^{-1}_{\mathrm{MB}}$ 3 1 2 2 1 except close fracture spacing at 84.4' to 85', C-5 \*85<sub>MB</sub> 60 100 100 1 80.0 - 85.0 schistosity dips 70° to 85°. $30_{MB}$ 3 77.6 78.5 $15_{\mathrm{MB}}$

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°

CORING LOG

85

C-6

58

100

100

R4

I

25<sub>MB</sub> 15<sub>MB</sub>

 $10_{MB}$ 

3

1

1

80

84.4

85



### **CORING LOG**

(continued)

BORING NUMBER: SEG-3-2T
SHEET NUMBER: 2 of 2

PROJECT NUMBER: 4016879

PROJECT: AMTRAK Hudson Yards

AECOM PARSONS BRINCKERHOFF STV

LOCATION: 30th St., 11th Ave., New York, NY

CLIENT: AMTRAK

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymond

INSPECTOR: Juan Zapata Jr.

I CLIENT	. / \$171	I IW XIX					INOI LO	1 O1 (. )	o uun	Zapat	01.		
	nin)									DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARK: (Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folia  MB - Denotes mechanical brea	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Jа	DEPTH (feet)
-													-
<del>- 90</del>						End of boring at 89.8' bgs.				40 <sub>MB</sub>	3	2	89.8
-													
+													-
- - 95													
-													-
-													-
-													-
<del>-</del> 100													
-													-
+													-
_ _ 105													_
1/25/15													-
GLB 10													
- COPY													-
- 110													
RSIE-L													-
CANA													
원 - 115													_
PB CORING LOG HUDSON YARD ROCK.GPJ. CANARSIE-LIB.GLB - COPY.GLB 10/25/15													-
Y NOSON Y													
되는 원 <b>는 120</b>													
SING LC													
PB COF				L									
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		The	Ga	itev	va	v							BORING	NUMBE	R:SEG-	3-3T					
	Tra	The ans	-Hu Pa	rtn	on er	ı' ship	BO	OR	ING	LC	)G		SHEET	NUMBER	:1_	of	3				
A	ECO/	M B	RINCK	NS ERHO	FF	STV 100							PROJEC	CT NUMB	ER:4016	6879					
PROJE	ECT: A	AM'	ΤR	AK	H	ludson Ya	rds							ON: 30th			w York				
					1t	th Ave., No	ew Yo	rk, N	Y				00000	NY	, 022.2 E	14003	025.0				
CLIEN <sup>*</sup>													STN. NO	. N: 1,915		L: 14,802, DFFSET:	927.9				
					'en	e, George	Ravn	nond					_	) CE ELEV.							
INSPE							, itti jii	10114					DATUM:								
						tary Was								DATE: <b>8</b> /1							
RIG TY	/PE:	(				truck mo							FINISH I	DATE: 8/2		IME: 12:0	)0 pm				
L		.  -		sing		Split Spoon			Pitcher	Gra	-	Core Barrel		GROUN	NDWATER		Liele				
	Type/Symbol HW I.D. 4"			$\dashv$	S	U		P 🛚	G		c⊟	_		Water Depth	Casing Depth	Hole Depth					
	4" 1 0. 4.5" gth 68		1.375"	2.938	8"	"	"		2.155"	Date	Time	(ft)	(ft)	(ft)							
O.D.	ngth 68					2"	3"		"	"		2.98"	8/24/2015	7:10:00 AM	8.5	68	93				
Length		L				24"	30'		"	"		60"									
1					s	140 lbs		rill Rod			NW 2 25 II (2 (										
Hamm	er Fa	Fall 30" in.				30 in.	I.D. (O.D.) 2.25" (2.6				.625")										
	_ (1)			5	SAI	MPLE		SOI	L (Blows/	Blows/6 in.)											
(feet	CLO	ws/ft)				t)	0/6	6/12	12/18	18/24	REC (in.)										
PTH	DEPTH (feet) GRAPHIC LOG			띪	7	H (fee			CORING	}	(111.)	<b>-</b> FII	ELD CLAS	SSIFICAT	ION ANI	D REMAF	RKS				
	GR	CASING (Blows/ft)	TYPE	NUMBER	SYMB	DEPTH (feet)	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD	Depth Elev.									
	* * * * * * * * * * * * * * * * * * *		G		0,	0.0 - 6.0	(111.)	(111.)	70	(111.)	70	Liev.	Excavated to	op 6' soil to c	lear utilities	S.					
-			1		$\mathbb{N}$								Mud from 0	' to 6'.							
	***		1		V																
	1 - <del>*</del> - 1		1		$ \Lambda $																
	***		1																		
<del>-</del> 5	*4		1		۱ ۱												-				
	* 4		S	1		6.0 - 8.0	5	3	3	3	10		S-1: Black c fine Gravel,			me medium	to				
<u> </u>	₩ ₩ □		_	2		0.0 10.0	_	_			10					1.					
i ] –			S	2		8.0 - 10.0	7	5	3	2	10		S-2: Black c fine Gravel,	oarse to fine loose, moist	SAND, soi (Fill).	me meaium	to				
10	**		$\frac{1}{s}$	3		10.0 - 12.0	3	3	3	1	7		S-3: Black c	oarse to fine	SAND sor	me medium	to .				
<u></u>	***		ľ	5		10.0 12.0					,		fine Gravel,								
<u>-</u>			┨																		
<u> </u>	***************************************		1																		
<u> </u>	<b>₩</b> Δ		1																		
<u>-</u> 15	* -4		s	4		15.0 - 17.0	1	WOH	1	1	16		S-4: Black C			Sand, trace fi	ine				
	±67∀		1										Gravel, very	soit, wet (M	L)-F1ll.						
	* -																				
	# <sub>4</sub> =																				
20	1 . 1		1																		
	*		S	5		20.0 - 22.0	4	4	4	4	0	L	S-5: No Rec	overy. — — — — —							
5  -			1																		

### **BORING LOG** (continued)

BORING NUMBER: SEG-3-3T

SHEET NUMBER: 2 of \_\_\_

AECOM PARSONS STV 100

PROJECT NUMBER: 4016879 CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymond

INSPECTOR: Juan Zapata Jr.

PROJECT: AMTRAK Hudson Yards

LOCATION: 30th St., 11th Ave., New York, NY

CLIENT: AMTRAK

	O.				SAN	MPLE		SOIL	. (Blows/	6 in.)					
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	]	ELD OLAGOIFICATION AND DEMARKO		
EP TH	SAPHI	JG (Bk		3ER	30L	DEPTH (feet)			CORING	;			ELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYME	DEPT	RUN (in.)	UN REC. REC. L>4" RQD De n.) (in.) % (in.) % Ele		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				0		25.0. 27.0	WOII	WOII	WOII	WOII	21		C O. Corre Est CLAY according to making material		
-			S	8		35.0 - 37.0	WOH	WOH	WOH	WOH	21		S-8: Gray Fat CLAY, occasional marine material, very soft, wet (CH).		
-															
-															
<del>-</del> 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).		
<u> </u>  -															
50 50			C	11		50.0 52.0	1	1	WOII	WOII	24		C 11. Como co obeyo		
;  - !			3	11		50.0 - 52.0	1	1	WOH	WOH	24	'	S-11: Same as above.		
<b> </b>  -															
- 45 - 50 - 55 - 55															
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).		
- -															
<u> </u>															
<u> </u>															

### **BORING LOG**

BORING NUMBER: SEG-3-3T

PROJECT NUMBER: 4016879

SHEET NUMBER: 3 of

AECOM PARSONS STV

PROJECT: AMTRAK Hudson Yards

(continued)

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymont

INSPECTOR: Juan Zapata Jr.

LOCATION: 30th St., 11th Ave., New York, NY	

CLIENT: AMTRAK

	CLIEN	II: AN	ЛТК	AK									INSPECTOR: Juan Zapata Jr.
		g				SAI	MPLE		SOIL	. (Blows/	6 in.)		
	DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	FIELD OF ACCILICATION AND DEMARKS
	EPTF	SAPH	NG (BI		BER	30L	DEPTH (feet)			CORING	;		FIELD CLASSIFICATION AND REMARKS
		G	CASII	TYPE	NUMBER	SYME	DEPT	RUN REC. REC. L>4" RQD Deptl (in.) (in.) % (in.) % Elev.		RQD %	Depth Elev.		
	-				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 -												
9/16	-												-
LB 2/29	<del>-</del> -												
COPY.G	<del>-</del> 80												-
3.GLB - 1	-												
RSIE-LIE	_												-
CANA	- 85												_
OIL.GP.	=												-
LOGS S	-												
ORING	- 90												_
SEG 3 B	- 90												
EST BOREING SEG 3 BORING LOGS SOIL. GPJ CANARSIE-LIB.GLB - COPY.GLB 2/29/16	_												-
ST BOR	_												
ш		1	I	1 1		1		1	1	I		1	1

### **BORING NUMBER: SEG-3-3T** The Gateway Trans-Hudson Partnership SHEET NUMBER: 1 **CORING LOG** AECOM PARSONS BRINCKERHOFF STV 100 PROJECT NUMBER: 4016879 PROJECT: AMTRAK Hudson Yards LOCATION: LOCATION: 30 St., 11 Ave., New York, NY COORD. CLIENT: AMTRAK STN. NO.: OFFSET: CONTRACTOR: ADT DRILLER: Dominick Pepe, George Raymond SURFACE ELEV .: INSPECTOR: Juan Zapata Jr. DATUM: DRILLING METHOD: MUD ROTARY START DATE: 8/19/15 TIME: 2:00 pm RIG TYPE: CME-75 (truck mounted), Automatic Hammer FINISH DATE: 8/24/15 TIME: 12:00 pm **GROUNDWATER DATA** Water Casing **CORE BARREL DATA:** NOTES: Depth Depth Depth TYPE: Double Tube Swivel Date Time (ft) (ft) CORE SIZE: NO O.D.: 2.98" I.D.: 1.875" CASING SIZE: 3" (3.5") **DISCONTINUITY DATA** CORING RATE (ft/min % **DESCRIPTION AND REMARKS** RECOVERY (in) CORE RUN NO. AND DEPTH (ft) WEATHERING DEPTH (feet) STRENGTH (Lithology, Structure, Weathering, RECOVERY DEPTH (feet) 8 ANGLE (deg) Continuity, Strength, Color, Grain Size) ROD 느 a \* - Denotes discontinuity along foliation MB - Denotes mechanical break C-1: Gray Garnet-Mica SCHIST, coarse to fine grains II $\overline{10}_{MB}$ 68 R3 \*80<sub>MB</sub> of quartz, feldspar, biotite, muscovite and garnet, 1.5 3 68.7 slightly weathered, medium strong, extremely close to \*75<sub>MB</sub> 2 1.5 69.6 - 70 moderate fracture spacing, schistosity dips 70° to 80°, C-1 58 97 72 \*80<sub>MB</sub> 1.5 2 70.3 pyrite on multiple fractures, recovery loss assumed at 68.0 - 73.0 \*75<sub>MB</sub> 1.5 1 71.3 \*80<sub>MB</sub> 1 1 72.2 \*80<sub>MB</sub> 2 6 72.55 C-2: Gray Garnet-Mica SCHIST, coarse to fine grains П R3 $10_{\rm MB}$ 72.65 of quartz, feldspar, biotite, muscovite and garnet, 72.7 72.8-6 $85_{MB}$ 1 slightly weathered, medium strong, moderate fracture - 75 $10_{MB}$ 1 C-2 spacing except very close to close fracture spacing at 57 95 92 73.25 75.2 1 6 $15_{MB}$ 73.0 - 78.0 77.8' to 78', schistosity dips 70° to 80°. CANARSIE-LIB.GLB - COPY.GLB 10/25/15 $30_{MB}$ 1.5 \*75<sub>MB</sub> 77.15 1 1 $40_{\rm MB}$ 3 2 77.8 C-3: 78' to 81.35': Gray Garnet-Mica SCHIST, coarse П R4 $20_{MB}$ 78 to fine grains of quartz, feldspar, biotite, muscovite and garnet, slightly weathered, strong, wide fracture 80 C-3 spacing schistosity dips 70° to 80°; 100 100 60 \$1.35' to 83'. Light gray-green Muscovite GRANITE, coarse to fine grains of quartz, feldspar, muscovite, epidote (?) and garnet, slightly weathered, strong, 78.0 - 83.0 $60_{MB}$ 1.5 2 81.35 close to moderate fracture spacing, high-angle healed $75_{MB}$ 3 82.4 fractures. $10_{\mathrm{MB}}$ П R3/R4 2 83 C-4: 83' to 85': Light gray-green Muscovite GRANITE, coarse to fine grains of quartz, feldspar, $70_{MB}$ 85 muscovite, epidote (?) and garnet, slightly weathered, 2 84.6 C-4 \*70<sub>MB</sub> 60 100 82 strong, close to moderate fracture spacing; 1 85 83.0 - 88.0 85' to 88': Gray Garnet-Mica SCHIST, coarse to fine $10_{MB}$ 3 2 2 2 85.96 grains of quartz, feldspar, biotite, muscovite and 1.5 $45_{MB}$ 86.05 garnet, slightly weathered, medium strong to strong, $50_{MB}$ 1.5 86.4 very close to moderate fracture spacing, schistosity $\Pi$ R3/R4 $20_{MB}$ 3 1 88 dips 60° to 75° C-5: Gray Garnet-Mica SCHIST, coarse to fine grains $60_{MB}$ 89 1.5 1 of quartz, feldspar, biotite, muscovite and garnet, $40_{MB}$ 89.45 90 3 1 C-5 slightly weathered, medium strong to strong, very 60 100 75 \*75<sub>MB</sub> 2 89.55 88.0 - 93.0

close to moderate fracture spacing, schistosity dips

65° to 75°.

CORING LOG HUDSON YARD ROCK.GPJ

\*70<sub>MB</sub>

\*65<sub>MB</sub>

\*65<sub>MB</sub>

90.1

90.6

91

1

### **CORING LOG**

(continued)

BORING NUMBER: SEG-3-3T													
SHEET NII IMBED:	2	of	2										

PROJECT NUMBER: 4016879

PROJECT: AMTRAK Hudson Yards

AECOM PARSONS STV 100

LOCATION: 30th St., 11th Ave., New York, NY

CLIENT: AMTRAK

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymon

INSPECTOR: Juan Zapata Jr.

	CLILINI.	7 81 7 1						INOI LO	. 0	<i>-</i>	Zuput	011		
Ī		min)					DECORPTION AND DEMARK	0			DIS	CONTI	NUITY	DATA
	DEPTH (feet)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARK: (Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folia MB - Denotes mechanical brea	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦٢	Ja	DEPTH (feet)
-	- 95						End of boring at 93' bgs.				*70 <sub>MB</sub> 30 <sub>MB</sub>	1 3	1 1	91.6 93 - - -
-	- 100 -													- - - -
-	- 105 -													- - - -
	- 110 -													- - - -
PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15	- 115													- - - - -
HUDSON YARD ROCK.G	- 120													- - - -
PB CORING LOG	- 125 ·								EC 3					-

		The	G	ato:	A/O								BORING	NUMBE	R:SEG-3	3-4T				
	Tra	ans-	Hu	ıds	on	y ship	R	)BI	NG	10	)C			NUMBER			2			
,	A=COA	A BA	RSO	NS ERHO	FF	STV y 100	ים		140				PROJEC	CT NUMB	ER:4016	<b>6879</b>				
						udson Ya							LOCATION	ON: 30th	St., 11th	Ave., Ne	w York			
	ATION: NT: <b>AN</b>				l1t	h Ave., N	ew Yo	rk, NY					NY COORD. N: 1,916,164.6 E: 14,802,800.5							
	RACT												STN. NO.: OFFSET:							
						e, George	Rayn	nond						CE ELEV.	:308.6 fe	eet				
	ECTOF				_	ita Jr. otary Was	L						DATUM:	: DATE: <b>8</b> /1	2/15 T	'IN/E: 11.	00 am			
	YPE:					truck mo		. Auto	matic ]	Hamm	er			DATE: 8/1		IME: <b>11.</b>				
				sing		Split Spoon			Pitcher	Gra		Core Barrel			NDWATER		•			
Гуре/	Symbo	ol 🗌	Н	IW		S	U[		PΩ	G	X	С			Water Depth	Casing Depth	Hole Depth			
.D. 4" 1.375"					1.375"	2.93	8"	"			2.155"	Date	Time	(ft)	(ft)	(ft)				
D.D.	4.5" 3"					3"	3"		"			2.98"	8/17/2015	9:00:00 AM	11.5	35	35			
_engtl			3	35		24"	30'		"			60"		10:00:00 AN		35	35			
	ner Wt	-		0 lb		140 lbs	1	rill Rod S			NV		8/19/2015	7:00:00 AM	9.3	35	35			
lamn	ner Fa	11		30"		30 in.		I.D. (O.E		-	.25" (2	.625")	<u> </u>							
t	၂ ဗွ	_	L		SAI	MPLE		SOIL	(Blows/	6 in.)		╛								
(fee	C CC	ws/ft	l			<del>C</del>	0/6	6/12	12/18	18/24	REC (in.)									
DEPTH (feet)	GRAPHIC LOG	(Blo	l	æ	٦	eej)			CORING	<u> </u>	()	┫ FII	FIELD CLASSIFICATION AND REM							
DE	GRA	CASING (Blows/ft)	TYPE	MBE	SYMBOL	DEPTH (feet)	RUN	REC.	REC.	L>4"	RQD	Depth								
	-2 -2	δ	_		ς		(in.)	(in.)	% %	(in.)	%	Elev.	П	<i>(</i> 1	1					
			G	1	1	0.0 - 6.0							Excavated to	op 6' soil to c	lear utilities	S.				
	***************************************		1		V															
			ł		)															
	\ <del>\</del>		┨																	
5			┨		$/ \setminus$												-			
	* D Z		s	1		6.0 - 8.0	9	9	8	5	16		S-1: Brown,							
			1										SAND, and dense, moist		arse to fine	Gravel, med	lium			
	***************************************		S	2		8.0 - 10.0	5	8	11	8	10		S-2: Same as	s above.						
10	**		]														_			
10	<b>₩</b>		S	3		10.0 - 12.0	3	2	1	3	1		S-3: Brown a Silt, very loo	and green co	arse to fine P)-Fill	SAND, trac	ce			
	***		-											.,	,					
	者員		-																	
	***		-																	
15	k n M		$\frac{1}{s}$	4		15.0 - 17.0	1	1	1	2	15		S-4: Brown	medium to fi	ne SAND	trace Silt v	erv			
	* 04					15.0 - 17.0		1	1	_	13		loose, moist	(SP)-Fill.	ne or nad,	auce one, v	C1 y			
	* 5		$\mathbf{I}$																	
	<b>₽</b> 4		1																	
00			1																	
20			S	5		20.0 - 22.0	1	1	1	2	17		S-5: Gray Fa	t CLAY, so	ne fine San	d, trace fine	;			
												Gravel, very soft wet (CH)								
			1																	
			-																	
			1																	

# **BORING LOG**

BORING NUMBER: SEG-3-4T

SHEET NUMBER: 2 of \_\_\_

AECOM PARSONS
BRINCKERHOFF STV 100

(continued)

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymont

INSPECTOR: Juan Zapata Jr.

PROJECT NUMBER: 4016879

PROJECT: AMTRAK Hudson	Yards	

LOCATION: 30th St., 11th Ave., New York, NY

CLIENT: AMTRAK

$\perp$															
		g			,	SAI	MPLE		SOIL	(Blows/	6 in.)				
	l (feet	IC LO	ows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	]	TI D OLAGOIFICATION AND DEMARKS	
	DEPTH (feet)	GRAPHIC LOG	IG (Bk		3ER	3OL	н (fее		(	CORING	<b>;</b>			ELD CLASSIFICATION AND REMARKS	
	Δ	GF	CASING (Blows/ft)	TYPE	NUMBER	SYME	DEPTH (feet)	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	Depth Elev.		
				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).	
$\mathbf{l}$														-	
ļ														- -	
$\vdash$	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).	
ŀ															
F														End of soil at 35' bgs. Start rock coring at 35' bgs.	
Ŀ	35													_	
-	33													-	
ŀ														-	
-														-	
<u> </u>	40													_	
_														-	
2/21/16														-	
PY.GLB	45													_	
- R - CO														-	
ELIB.GI														- -	
ANARSI	50													-	
GPJ C	50													-	
SS SOIL														-	
NG LOC														- -	
3 BORI	55													-	
2 SEG															
PB BORINGS 2 SEG 3 BORING LOGS SOIL GPJ CANARSIE-LIB.GLB - COPY.GLB 2/2/1/16															
PB BC															

#### **BORING NUMBER: SEG-3-4T** The Gateway Trans-Hudson Partnership SHEET NUMBER: 1 **CORING LOG** AECOM PARSONS BRINCKERHOFF STV 100 PROJECT NUMBER: 4016879 PROJECT: AMTRAK Hudson Yards LOCATION: LOCATION: 30 St., 11 Ave., New York, NY COORD. CLIENT: AMTRAK STN. NO.: OFFSET: CONTRACTOR: ADT DRILLER: Dominick Pepe, George Raymond SURFACE ELEV .: INSPECTOR: Juan Zapata Jr. DATUM: DRILLING METHOD: MUD ROTARY START DATE: 8/13/15 TIME: 11:00 am RIG TYPE: CME-75 (truck mounted), Automatic Hammer FINISH DATE: 8/19/15 TIME: 2:00 pm **GROUNDWATER DATA** Water Casing **CORE BARREL DATA:** NOTES: Depth Depth Depth TYPE: Double Tube Swivel Date Time (ft) (ft) CORE SIZE: NO O.D.: 2.98" I.D.: 1.875" CASING SIZE: 3" (3.5") **DISCONTINUITY DATA** CORING RATE (ft/min **DESCRIPTION AND REMARKS** RECOVERY (in) % CORE RUN NO. AND DEPTH (ft) WEATHERING DEPTH (feet) STRENGTH (Lithology, Structure, Weathering, DEPTH (feet) RECOVERY 8 ANGLE (deg) Continuity, Strength, Color, Grain Size) RQD a 늑 \* - Denotes discontinuity along foliation MB - Denotes mechanical break II 35.25 C-1: Gray SCHIST, coarse to fine grains of quartz, R4 $0_{MB}$ feldspar, biotite, muscovite and sparse garnet, slightly \*65<sub>MB</sub> 36.3 2 1 2 weathered, medium strong, very close to moderate \*65<sub>MB</sub> 36.7 C-1 fracture spacing, schistosity dips 60° to 65°, 57 100 91 \*60<sub>MB</sub> 35.3 - 40.0 37.5 occasional banding parallel to schistosity. \*65<sub>MB</sub> 1 38 \*60<sub>MB</sub> 38.9 40 \*60<sub>MB</sub> 39 C-2: Gray Garnet-Mica SCHIST, coarse to fine grains П R4 \*60<sub>MB</sub> 39.5 \*60<sub>MB</sub> of quartz, feldspar, biotite, muscovite and garnet, 39.9 slightly weathered, strong, close to moderate fracture spacing, schistosity dips 55° to 65°, occasional \*60<sub>MB</sub> 40 \*60<sub>MB</sub> C-2. 40.7 97 83 58 banding parallel to foliation. 40.0 - 45.0 \*60<sub>MB</sub> 41.5 \*60<sub>MB</sub> 1.5 41.85 \*65<sub>MB</sub> 42.8 $*55_{MB}$ 1 43.5 - 45 \*55<sub>MB</sub> C-3: Gray Garnet-Mica SCHIST, coarse to fine grains R4 44 $\Pi$ \*55<sub>MB</sub> 44.2 1 of quartz, feldspar, biotite, muscovite and garnet, \*55<sub>MB</sub> slightly weathered, strong, very close to moderate 1.5 44.6 \*60<sub>MB</sub> 45 C-3 fracture spacing. 59 98 58 \*60<sub>MB</sub> 1.5 45.25 45.0 - 50.0 \*60<sub>MB</sub> 45.5 $*50_{MB}$ 46.7 \*55<sub>MB</sub> 47 \*60<sub>MB</sub> 50 47.35 C-4: Gray Garnet-Mica SCHIST, coarse to fine grains $\Pi$ R4 \*65<sub>MB</sub> 47.6 1 of quartz, feldspar, biotite, muscovite and garnet, \*65<sub>MB</sub> 1 47.8 slightly weathered, strong, close to moderate fracture \*65<sub>MB</sub> 47.9 1 6 2 1 C-4 spacing, schistosity dips 50° to 65°. \*65<sub>MB</sub> 59 100 92 1.5 47.95 50.0 - 54.9 $30_{MB}$ 48 $30_{MB}$ 1.5 48.9 35<sub>MB</sub> 3 49 50.8 \*65<sub>MB</sub> 1 1 - 55 C-5: 54.9' to 57.7': Gray Garnet-Mica SCHIST, I/IIR4 $20_{MB}$ 1.5 51.2 1 2 2 coarse to fine grains of quartz, feldspar, biotite, \*50<sub>MB</sub> 1.5 52.9 muscovite and garnet, slightly weathered, strong, $65_{MB}$ 3 53.2 C-5 close to moderate fracture spacing, schistosity dips $45_{MB}$ 54.3 59 98 68 2 1 54.9 - 59.9 55° to 60°: \*60<sub>MB</sub> 54.9 57.7' to 58.6': QUARTZ, fresh, strong, moderate 20<sub>MB</sub> \*55<sub>MB</sub> 1.5 55.2 fracture spacing; 2 1.5 55.5

58.6' to 59.9': Gray Garnet-Mica SCHIST, medium to

fine grains of quartz feldspar biotite muscovite and

CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB

60

 $35_{MB}$ 

1

56.5



# **CORING LOG**

(continued)

<b>BORING NUMBER</b>	:SEG-3-4	T	
SHEET NUMBER:	2	of	2

PROJECT NUMBER: 4016879

PROJECT: AMTRAK Hudson Yards

AECOM PARSONS STV 100

LOCATION: 30th St., 11th Ave., New York, NY

CLIENT: AMTRAK

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymond

INSPECTOR: Juan Zapata Jr.

									•			
et) (ff/min)									DISC	CONTI	VUITY	DATA
DEPTH (feet)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weathering Continuity, Strength, Color, Grain S  * - Denotes discontinuity along folia  MB - Denotes mechanical break	g, Bize) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦Ĺ	Ja	DEPTH (feet)
	C-6 59.9 - 64.9	60	100	93	garnet, slightly weathered, strong, very clos moderate fracture spacing, schistosity dips C-6: Gray Garnet-Mica SCHIST, coarse to of quartz, feldspar, biotite, muscovite and g slightly weathered, strong, close to moderate spacing, schistosity dips 55° to 60°, quartz 1 64.1' to 64.35'.	55° to 60°. fine grains arnet, e fracture	II	R4	40 <sub>MB</sub> *55 <sub>MB</sub> 60 <sub>MB</sub> 10 <sub>MB</sub> 30 <sub>MB</sub> 15 <sub>MB</sub>	1 1 3 1.5 1 1.5 1.5 1.5	2 1 2 1 2 2 1	56.7 57 57.5 58.1 58.9 59.05 59.9 60.4
- 65	C-7 64.9 - 69.9	59	98	88	C-7: Gray Garnet-Mica SCHIST, coarse to of quartz, feldspar, biotite, muscovite and g slightly weathered, strong, moderate to wide spacing except close fracture spacing at 69 schistosity dips 60° to 70°.	arnet, e fracture	II	R4	50 <sub>MB</sub> *60 <sub>MB</sub> 10 <sub>MB</sub> *55 <sub>MB</sub> 55 <sub>MB</sub> 30 <sub>MB</sub>	1.3 1 3 1 3 3	1 2 2 2 2 1	61.7 63.7 64.1 64.9 67.5
- 70	C-8 69.9 - 74.9	58	97	93	C-8: Gray Garnet-Mica SCHIST, coarse to of quartz, feldspar, biotite, muscovite and g slightly weathered, medium strong to strong close to moderate fracture spacing, schistos: 65°, muscovite grante bands at 70.9' to 71.73.55' to 73.75' with coarse to fine grains of feldspar, muscovite and garnet.	arnet, g, very ity dips 8', and	П	R3/R4	$^{*70_{MB}}_{10_{MB}}$ $^{10_{MB}}_{10_{MB}}$ $^{25_{MB}}_{*65_{MB}}$ $^{40_{MB}}_{40_{MB}}$ $^{40_{MB}}_{40_{MB}}$	1.5 1 1 3 1 3 1.5 1.5 1.5	2 6 6 2 2 1 1 1	69.5 69.8 70.1 70.2 70.7 71.5 72.1 72.6 73.2
- 75	C-9 74.9 - 79.9	55	92	60	C-9: Gray Garnet-Mica SCHIST, coarse to of quartz, feldspar, biotite, muscovite and g slightly weathered, medium strong, very clo moderate fracture spacing, schistosity dips (loss of recovery assumed at 74.9' to 75.35'.	arnet, ose to	II	R3	40 <sub>MB</sub> *65 <sub>MB</sub> *65 <sub>MB</sub> *65 <sub>MB</sub> 35 <sub>MB</sub> *65 <sub>MB</sub> 30 <sub>MB</sub> 30 <sub>MB</sub>	1 1 1 1 1 1 3 3	3 6 2 6 1 2 2	74.3 74.4 74.9 77 77.3 77.3 78.5
- 80					End of boring at 79.9' bgs.				35 <sub>MB</sub> 10 <sub>MB</sub> 30 <sub>MB</sub>	3 1.5 3	2 2 2	79.4 79.6 79.9
- 85												
- 90												
- 95												

		Tho	G	***									BORING	NUMBE	R: SEG-3	3-5T			
	Tra	The ans	Hu Pa	rtn	on er	ship	BO	ORI	NG	LC	)G		SHEET	NUMBEF	R: 1	of	2		
				alesc.		STV <sub>y</sub> 100							PROJECT NUMBER: 4016879						
						ludson Ya		.i. NIX	7				LOCATION		St., 11th	Ave., Ne	w York		
CLIEN					11	h Ave., N	ew Yo	rk, IN Y					COORD	NY COORD. N: 1,916,066.0 E: 14,802,889.8					
CONT													STN. NO.: OFFSET:						
						e, George	Raym	ond							.:306.6 fe	eet			
INSPE													DATUM:						
		1ETI	HO	D: ]	Ro	tary Was	sh 4 10	A 4 -	4• . 1	rr					28/15 T	TME: 2:00 TME: 2:00			
RIG T	TPE.			L-/; sing		truck mo Split Spoon			matic . Pitcher	Gra		Core Barrel	FINISH [		NDWATER		v pm		
Type/S	Symbo	,  -		W		S	U		PN	G		C		O NOO	Water	Casing	Hole		
I.D.	уннос	" ⊢		1"		1.375"	2.938		"			2.155"	Date	Time	Depth (ft)	Depth (ft)	Depth (ft)		
O.D.				.5"		3"	3"		"				Date	Tille	(11)	(11)	(11)		
Length	1			.5 35		24"	30"	,	"	1		2.98"							
Hamm				0 lb		140 lbs		rill Rod S			 N'								
Hamm		-		30"		30 in.	-	.D. (O.E				2.625")							
		.	T		SAI	MPLE			(Blows				•	l			<u> </u>		
(feet)	5 LOG	vs/ft)	H				0/6	6/12	12/18	18/24	REC								
									TION AND REMARKS										
DE	GR	SASIN	TYPE	NUMBER	SYMBOL	DEPTH	RUN (in.)	REC.	REC.	L>4" (in.)	RQI	Depth Elev.							
	* *		G		\ /	0.0 - 6.0	()	(111.)	70	(111.)	70	12.01.	Excavated to	op 6' soil to	clear utilities	S.			
	A		1		$\mathbb{N}$														
	** 4		1		V														
	**				$ \Lambda $														
- 5	1		1		$   \setminus  $												_		
,	0 7		1				_	_					a		a				
	* 4		S	1		6.0 - 8.0	2	6	4	4	7		S-1: Gray me fine Gravel,	edium to fin loose, moist	ie SAND, tra t-Fill.	ace medium	to		
	1 <del>*</del> 5		_			0.0 10.0	10	0			.					1			
	4 O□ ≯		S	2		8.0 - 10.0	10	8	9	14	1		S-2: Gray co moist-Fill.	arse to fine	GKAVEL, 1	meaium den	se,		
- 10	**		$\frac{1}{s}$	3		10.0 - 12.0	15	10	8	9	9		S-3: Gray Co	narce to fire	SAND and	l Silt some	-		
	***		+	ر		10.0 - 12.0	13	10	0	7	9		coarse to fin	e Gravel, m	edium dense	e, moist (SM	)-Fill.		
			┨																
	***		┨																
	***		┨																
- 15	***		$\frac{1}{8}$	4		15.0 - 17.0	1	2	5	2	6		S-4: Brown	medium to f	fine SAND.	loose, moist	- Fill.		
	- 1€2V- ,		1												,	,			
	* -		1																
	* 4		1																
00	k On Z		1																
- 20	₩ 6 4		s	5		20.0 - 22.0	WOH	1	1	1	1		S-5: Brown			little coarse	to		
	*		1										fine Gravel,	very loose,	wet-fill.				
	4																		

# The Gateway Trans-Hudson Partnership

### **BORING LOG**

BORING NUMBER: SEG-3-5T

PROJECT NUMBER: 4016879

SHEET NUMBER: 2

AECOM PARSONS STV 100

(continued)

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymond

INSPECTOR: Juan Zapata Jr.

PROJECT: AMTRAK Hudson Yards	
LOCATION: 30th St., 11th Ave., New York, N	Y

CLIENT: AMTRAK

	(1)			;	SAN	//PLE		SOIL	. (Blows/	6 in.)			
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)		
EPT	RAPH	NG (B)		BER	30L	DEPTH (feet)		-	CORING	ì		FIELD CLASSIFICATION AND	J KEIVIAKKS
	פֿ	CASII	TYPE	NUMBER	SYMBOL	DEP	RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	Depth Elev.	
- -			S	6		25.0 - 27.0	WOH	1	1	3	24	S-6: Dark gray Fat CLAY and Organ soft, wet (CH-OH).	nic CLAY, very
- - 30 -			S	7		30.0 - 32.0	1	1	WOH	1	24	S-7: Dark gray Fat CLAY and Organ occasional marine material, very soft	nic CLAY, t, wet (CH-OH).
- - - 35 - -			S	8		35.0 - 37.0	2	1	1	1	20	S-8: Dark gray Fat CLAY and Organoccasional marine material, very soft	nic CLAY, t, wet (CH-OH).
- - 40 - -			S	9		40.0 - 42.0	WOH	1	WOH	1	23	S-9: Brown medium to fine SAND, occasional marine material, very loos	and Clayey Silt, se, 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 GR coarse to fine Sand, little Silt, mediu (GM).	AVEL, and ım dense, wet
- - - 55 - -	. No		S	12		55.0 - 57.0	24	24	21	13	4	S-12: Dark brown medium to fine S. medium to fine Gravel, dense, wet (\$	AND, some SP).
-	-											End of soil at 58' bgs. Start rock coring at 58' bgs.	

	The Gateway Trans-Hudson							BORING NUMBER: SEG-3-5T							
1		Tra	ns-Hudso Partno	vay on ership		C	ORING LOG	SHEET NUMBER: 1 of 1							
	AEC	ОМ	PARSONS BRINCKERHOI			C	JKING LOG	PROJECT NUMBER: 4016879							
t	PROJEC	T: A	MTRAK	Hudso	n Ya	rds		LOCATI							
			30 St., 11	Ave., N	lew Y	York, N	NY								
	CLIENT:							COORD. STN. NO.: OFFSET:							
	CONTRACTOR: ADT DRILLER: Dominick Pepe, Georg					- D		STN. NO		Г\ / .	(	JEFSI	⊏1:		
			minick P : Juan Za			e Kaym	ond	DATUM:		EV.:					
			: Juan Za ETHOD:			ΛDV		START		. 8/28	/15 T	CIN/IE.	2.00	nm	
							utomatic Hammer	FINISH							
t				- 4011 111			224444				WATER			<b>P</b>	
1	CORE BA	٩RRI	EL DATA:	!		NOTE	ES:				Water	Cas		Hole	
- 1-			Tube Swivel					Date	Tim		Depth (ft)	Dep (ft		Depth (ft)	
- 1	CORE SI										()		,	()	
- ⊩	O.D.: 2.9											1			
- 1-	I.D.: 1.87											+			
- ⊩			E: 3" (3.5")												
t								<u> </u>			DIS	CONTI	NUITY	DATA	
1	et)	CORING RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)		DESCRIPTION AND REMARK (Lithology, Structure, Weathering)		NG						
1	DEPTH (feet)	\TE	NF	:RY	Y	RQD (%)	Continuity, Strength, Color, Grain	Size)	WEATHERING	STRENGTH	deg)			[eet]	
1	F	3 R	E R DE	OVE.	OVE	SQD	* - Denotes discontinuity along foli	ation	ΑTH	R. Fig.	LE (	٦	<sub>S</sub>	E	
1	DE	ž	AND AND	ZEC	SH	"	MB - Denotes mechanical brea	ık	WE	S	ANGLE (deg)			DEPTH (feet)	
L		CO		1			20	•••			4				
							C-1: Light gray to pink intermixed PEGMA Muscovite GRANITE, coarse to fine grain	ATITE and	II	R3/R4	$\frac{0_{\mathrm{MB}}}{10_{\mathrm{MB}}}$	3	1	58 58.35	
L	- 60						feldspar, muscovite and sparse biotite, slig	htly			10 <sub>MB</sub>	3	2	58.75	
	. 00		C-1 58.0 - 63.0	53	88	55	weathered, medium strong to strong, very omoderate fracture spacing except wide fracture.	close to cture			85 <sub>MB</sub> 10 <sub>MB</sub>	1 1.5	2 2	58.85 59	
L							spacing at 61' to 63 <sup>†</sup> .				10 <sub>MB</sub> 85 <sub>MB</sub>	1.5 1.5	$\begin{bmatrix} \frac{1}{2} \\ 2 \end{bmatrix}$	59.1 59.2	
											$60_{MB}$	1	6	59.4	
							C-2: Light gray to pink intermixed PEGMA Muscovite GRANITE, coarse to fine grain	ATITE and	II	R4	60 <sub>MB</sub> 55 <sub>MB</sub>	3 1.5	3 2	60.1 60.5	
L	- 65						feldspar, muscovite and sparse biotite, slig	htly			$\begin{array}{c} 25_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \end{array}$	3 1.5	2	61 63 -	
2	00		C-2 63.0 - 68.0	60	100	83	weathered, strong, close to moderate fractu	ire spacing.			15 <sub>MB</sub>	1.5	1	64.3	
)/25/1											$\begin{array}{c} 20_{\mathrm{MB}} \\ 10_{\mathrm{MB}} \end{array}$	1 1.5	1 2	64.5 65.6	
B 1											25 <sub>MB</sub> 85 <sub>MB</sub>	1.5 1.5	2 2	65.8 66	
PY.G							C-3: Light gray Muscovite GRANITE, coagrains of quartz, feldspar, biotite, muscovi		I/II	R4	$10_{\mathrm{MB}}$	1.5	1	66.9	
00	<del>-</del> 70		C-3				sparse biotite, fresh to slightly weathered, s				$10_{\rm MB} \\ 10_{\rm MB}$	1.5 1	1 1	68 69.6-	
GLB	70		68.0 - 72.7	56	100	88	close to moderate fracture spacing.				$0_{MD}$	1	1	70.2	
FLIB											10 <sub>MB</sub> 80 <sub>MB</sub>	1 1.5	1 2	70.7 71	
ARSI							C 4. Light grow Myssovits CD ANITE with		I/II	R4	$ \begin{array}{c} 20_{\mathrm{MB}} \\ 5_{\mathrm{MB}} \end{array} $	1 1	1 1	71.6 72.1	
CAN							C-4: Light gray Muscovite GRANITE with PEGMATITE lenses, coarse to fine grains	of quartz,	1/11	K4	$15_{\mathrm{MB}}$	1.5	1	72.6	
GPJ	75		C-4				feldspar, biotite, muscovite and sparse biot to slightly weathered, strong, very close to				$10_{\mathrm{MB}}$ $80_{\mathrm{MB}}$	1.5 1	2 2	73.2 73.4_	
SK.	– <b>7</b> 5		72.7 - 77.8	61	100	74	fracture spacing.	moderate			10 <sub>MB</sub>	1.5	2	73.45	
RD R	-										80 <sub>MB</sub> 15 <sub>MB</sub>	1 1.5	2	73.55 73.7	
Σ×	-										$80_{\mathrm{MB}}$ $10_{\mathrm{MB}}$	1 1.5	2 2	73.8 73.9	
DSO	-						C-5: Light gray Muscovite GRANITE with PEGMATITE lenses, coarse to fine grains		I	R4	$45_{MB}$	3	2	74.1	
밁			C-5				feldspar, biotite, muscovite and sparse biot				$80_{\mathrm{MB}} \\ 10_{\mathrm{MB}}$	1.5 1	2	74.4 74.9	
G LOX	- 80		77.8 - 82.4	55	100	100	strong, wide fracture spacing.				$\begin{array}{c} 10_{\mathrm{MB}} \\ 30_{\mathrm{MB}} \end{array}$	1 1.5	1 1	76.4 <sup>-</sup> 77.8	
PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15	-										- ~WB		-	,,,,	
PBC							End of boring at 82.4' bgs.				25мв	1.5	1	82.4	

Boring No. SEG-3-5T Sheet 1 of 1

,							y ship	В	ORI	NG	LC	G		SHEET	NUMBER	:1	of	2
			1171	2 1 1 5 7	Herric.		udson Ya	rds							ON: 30th			w Voul
							uuson xa h Ave., N		rk NV	7				LOCATION	NY NY	St., 11th	Ave., Ne	W YORK
CLIEN						111	11 11 100, 110	CW IU	I K9 1 1 I	-				COORD	N: 1,916	5,207.5 E	E: 14,802,	887.9
CONT														STN. NC			DFFSET:	
DRILL	ER:	Do	mir	nic	k P	ep	e, George	Raym	ond						CE ELEV.	:307.5 fc	eet	
INSPE						_								DATUM:				
							tary Was								DATE: 8/2		IME: 4:00	
RIG T	YPE:						truck mo								DATE: 8/2		IME: 12:0	oo pm
			-		sing		Split Spoon			Pitcher	Gra		Core Barrel		GROUN	NDWATER Water		Hole
Type/S	Symb	ool			W		S	U		P 🛚	G	<u> </u>	С	-		Depth	Casing Depth	Depth
I.D.					."		1.375"	2.938	3"	"			2.155"	Date	Time	(ft)	(ft)	(ft)
O.D.				4.	5"		3"	3"		"			2.98"	8/28/2015	7:10:00 AM	9.7	33	83
Lengtl				3	5		24"	30"		"			60"					
Hamm	ner W	۷t.		140	) lb		140 lbs	Dr	ill Rod S	Size		N	V					
Hamn	ner F	all		3	0"		30 in.		.D. (O.E	D.)	2	2.25" (2	2.625")					
	(D				,	SAI	MPLE		SOIL	_(Blows	'6 in.)							
(feet)	001		ws/ft)				t)	0/6	6/12	12/18	18/24	REC (in.)						
DEPTH (feet)	GRAPHIC LOG		3 (Blo		ER	7	ı (fee			CORING	}	()	┥ FII	ELD CLAS	SSIFICAT	ION ANI	D REMAF	RKS
DE	GR		CASING (Blows/ft)	YPE	NUMBER	SYMBOL	DEPTH (feet)	RUN	REC.	REC.	L>4" (in.)	RQE	Depth Elev.					
	*	4.	0	G		7	0.0 - 6.0	(in.)	(in.)	70	(111.)	70	Elev.	Excavated to Mud at arou	op 6' soil to c	lear utilitie	S.	
	40					$\mathbb{N}$								Mud at arou	nu Z.			
	*	4				IV												
	^ * * · *	١				l٨												
_	◊□	4																
- 5	<del>X</del> Δ					$/ \setminus$												
	801/ ·	4		S	1		6.0 - 8.0	4	5	2	2	13		S-1: Black co	oarse to fine	SAND, loc	ose, moist-Fi	11.
	<sup>4</sup> 0□	3		S	2		8.0 - 10.0	4	10	9	10	13		S-2: Brown				
	**													fine Sand, tra	ace Silt, med	lium dense,	moist (GW)	)-Fill.
- 10	1	Ä		S	3		10.0 - 12.0	6	6	10	9	22		S-3: Brown			trace fine G	ravel,
		_ 4⊈												medium den				*
	I	i [—	-															
	**																	
- 15				S	4		15.0 - 17.0	WOH	WOH	1	1	22		S-4: Gray Fa	t CLAY vei	v soft wet	(CH)	
				~	•		17.0				_				, , , , ,	, 2220, 1100	\J·	
				U	1		17.0 - 19.0					8		Shelby Tube				
							17.0 17.0							Showy Tube	•			
			-	S	5		19.0 - 21.0	WOR	WOH	WOH	WOH	17		S-5: Gray Cl	ayey SILT. v	ery soft. w	ret (ML).	
- 20														<i>, -</i>	,	, ·, ·.	· /·	

# The Gateway Trans-Hudson Partnership

## **BORING LOG**

BORING NUMBER: SEG-3-6T

SHEET NUMBER: 2 of \_\_\_

AECOM PARSONS STV 100

PROJECT: AMTRAK Hudson Yards

(continued)

CONTRACTOR: ADT

DRILLER: Dominick Pepe, George Raymond

INSPECTOR: Juan Zapata Jr.

PROJECT NUMBER: 4016879

LOCATION: 30th St.,	11th A	Ave., New	York, NY
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CLIENT: AMTRAK

Ţ													_	
		ŋ			(	SAI	MPLE		SOIL	(Blows/	6 in.)			
١	(feet	СГО	ows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	]	
	DEPTH (feet)	GRAPHIC LOG	IG (Bk		3ER	SOL	н (ее		(	CORING	<b>;</b>			ELD CLASSIFICATION AND REMARKS
	Ω	GF	CASING (Blows/ft)	TYPE	NUMBER	SYME	DEPTH (feet)	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	Depth Elev.	
Ì	-			S	6		25.0 - 27.0	WOH	WOH	WOH	WOH	24		S-6: Gray Fat CLAY, occasional marine material, very soft, wet (CH).
ŀ	-													-
ŀ														
ŀ	- 30			S	7		30.0 - 31.0	WOH	WOH	60/0	_	4		S-7: Gray Clayey SILT, very soft, wet (ML).
ł	-				,		30.0 31.0	,, 011	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	00/0		·		-
Ī														End of soil at 33' bgs. Start rock coring from 33' bgs.
ł														-
Ī	- 35 -	35												
ł	-													-
ļ														- -
ŀ	<del>-</del> 40													_
Ì														- -
2/21/16	-													-
GLB 2	- 45													_
- COP														-
LIB.GLE														
PB BORINGS 2 SEG 3 BORING LOGS SOIL.GPJ CANARSIE-LIB.GLB - COPY.GLB 2/21/16														-
PJ CAN	- 50 -													_
SOIL.G	-													- -
SPOT	-													-
30RING	- - 55													- -
SEG3E	-													-
VGS 2	-													-
B BORII	-													-
مة إ				1					l				I	

		-	0-4					BORING	NUM	IBER:	SEG-	3-6T		
		Trai	he Gatev	vay on		C(	ORING LOG	SHEET I	NUME	BER:_	1	c	of	2
				ership		C	JRING LOG							
			PARSONS BRINCKERHOI		0			PROJEC	T NU	MBE	R: 401	5879		
	PROJEC							LOCATION	ON:					
	LOCATIC CLIENT:			Ave., N	lew Y	ork, N	NY	COORD.						
	CONTRA							STN. NC			C	FFSI	ET.	
١	DRILLER			ene Ge	orge	Raym	and	SURFAC		FV·		) i Oi	- ' '	
	INSPECT					ixayiii	iona	DATUM:						
ı	DRILLING					ARY		START [	DATE	: 8/26/	/15 T	IME:	4:00	pm
	<b>RIG TYPI</b>	<b>E</b> : <b>C</b> ]	ME-75 (t	ruck m	ount	ed), Aı	ıtomatic Hammer	FINISH [						
									GR	ROUND	WATER	DATA		
	CORE BA	RRE	EL DATA:			NOTE	S:				Water Depth	Cas		Hole Depth
	TYPE: Do	uble [	Tube Swivel					Date	Tim		(ft)	(ft		(ft)
	CORE SI	ZE:	NQ											
	O.D.: 2.9	8"												
	I.D.: 1.875	5"												
	CASING	SIZE	E: 3" (3.5")											
I		min)						_			DIS	CONTI	NUITY	DATA
	et)	RATE (ft/min)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)		DESCRIPTION AND REMARK (Lithology, Structure, Weatherin		NG	E				
	ط ( <del>آ</del> و	ATE	NUN THE	ER)	ER.	(%)	Continuity, Strength, Color, Grain S	Size)	ËR	NG.	(deg			(feet
	DEPTH (feet)	GR	ZE F	000	ò	RQD	* - Denotes discontinuity along folional	ation	WEATHERING	STRENGTH	<u>ا</u>	7	٦a	F
	DE	CORING	COF	RE(	REO		MB - Denotes mechanical brea	k	WE	ν.	ANGLE (deg)			DEPTH (feet)
١		္ပ									,			
	_						C-1: 33' to 33.5' and 35' to 38': Gray SCHI to fine grains of quartz, feldspar, biotite, m	ST, coarse uscovite	II	R3/R4	Uvm	1	6	33.3
	- 35		C-1				and sparse garnet, slightly weathered, medi- very close to moderate fracture spacing, scl	um strong,			*50 <sub>MB</sub>	1 1.5	1 2	33.4
	-		33.0 - 38.0	56	93	78	dips 50° to 65°, recovery loss assumed at 3	3' to 33.3':			40 <sub>MB</sub> *60 <sub>MB</sub>	1.5	2 2 2 3 2 2 1	34.3
	_						33.5' to 35': Light gray, white and pink Mu GRANITE; gneissic towards the bottom, or	scovite parse to			*55 <sub>MB</sub>	1.5	$\frac{2}{2}$	35.3
	_						GRANITE; gneissic towards the bottom, of fine grains of quartz, feldspar, biotite and relightly weathered strong moderate fractures.	nuscovite,	T /TT	D 2 /D 5	*60 <sub>MB</sub>	1 1	$\begin{vmatrix} 3 \\ 2 \end{vmatrix}$	35.9
	_						slightly weathered, strong, moderate fractu C-2: 38' to 42.05': Gray SCHIST, coarse to	fine	I/II	R3/R5	*60 <sub>MB</sub>	1	2	37.3
	<del>-</del> 40		C-2				grains of quartz, feldspar, biotite and musc slightly weathered, medium strong, modera	te fracture			*60 <sub>MB</sub>	1	2	38.7_
15	-		38.0 - 43.0	60	100	98	spacing except extremely close fracture spa 38.7' to 38.75';	icing at			*60 <sub>MB</sub> *60 <sub>MB</sub>	1 1	2	38.75 39.6 -
10/25,	_						42.05' to 43': Gray QUARTZ, coarse to fit	ne grains			$20_{MB}$	3	1	40.7
J.B	_						of quartz, fresh, very strong, close fracture		***	D2	$30_{\mathrm{MB}}$ $30_{\mathrm{MB}}$	1.5 1	1 1	42.05 42.5 -
DPY.C	_						C-3: 43' to 43.95': Gray SCHIST, coarse to grains of quartz, feldspar, biotite and musc	ovite,	II	R3	$30_{\mathrm{MB}}^{\mathrm{MB}}$ $30_{\mathrm{MB}}$	1.5 1	1 6	43 43.1
Э- С	<del>-</del> 45		C-3				slightly weathered, medium strong, modera spacing except extremely close fracture spa	te fracture			30	1.5	2	43.15
B.GLI	_		43.0 - 48.0	58	97	97	to 43.15', schistosity dips 60°;	_			$\frac{40_{\mathrm{MB}}}{30_{\mathrm{MB}}}$	1 1	6	43.95 44 -
	_						43.95' to 48': Light gray-green to pink Mus GRANITE, medium to fine grains of quart	covite z, feldspar,			$25_{\mathrm{MB}}^{\mathrm{MB}}$	1.5	1	45.5
VARS	_						muscovite and sparse garnet, in some areas grained, fresh, strong, moderate to wide fra	coarse	T /TT	D.4				
CA	_						spacing, healed fractures dipping 55°.		I/II	R4	15 <sub>MB</sub>	1.5	1	48
K.GPU	<b>-</b> 50		C-4				C-4: 48' to 50': Light gray-green to pink M GRANITE, medium to fine grains of quart	luscovite z, feldspar,						
ROC	-		48.0 - 53.0	60	100	97	muscovite and sparse garnet, in some areas grained, fresh, strong, wide fracture spacin	coarse			10 <sub>MB</sub> *55 <sub>MB</sub>	1.5 1	2 2	50 50.1 -
4RD I	_						50' to 53': Gray SCHIST, coarse to fine gra	ins of			*65 <sub>MB</sub>	1.5	1	51.4 _
\ N N	_						quartz, feldspar, biotite and muscovite, slig weathered, strong, moderate fracture spacin				*60 <sub>MB</sub>	1	2	52.2
UDSC	_						extremely close fracture spacing at 50' to 5	0.1',	II	R3	30 <sub>MB</sub> *65 <sub>MB</sub>	1 1	6 2	53 53.1 -
ЭВ	- 55		0.5				schistosity dips 55° to 65°. C-5: Gray SCHIST, coarse to fine grains of	f quartz,			"55 <sub>MB</sub>	1	1	53.9
JO LC	_		C-5 53.0 - 58.0	59	98	67	feldspar, biotite and muscovite, slightly we medium strong, very close to moderate frac	athered,			20 <sub>MB</sub> *65 <sub>MB</sub>	2 1	2	54.45 54.8 _
PB CORING LOG HUDSON YARD ROCK GPJ CANARSIE-LIB.GLB - COPY.GLB 10/25/15	_						spacing, schistosity dips 55°, quartz-feldsp				85 <sub>MB</sub>	3	2	56.1
PB C							56.8' to 57.3'.				*65 <sub>MB</sub>	1.5	4	57.2

#### The Gateway Trans-Hudson Partnership

## **CORING LOG**

(continued)

BORING NUMBER: S	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.

	(ft/min)					<u> </u>			DIS	CONTI	NUITY	DATA
DEPTH (feet)	CORING RATE (#/r	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	ANGLE (deg)	٦	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	$\begin{array}{c} 10_{\rm MB} \\ 10_{\rm MB} \\ *65_{\rm MB} \\ 85_{\rm MB} \\ 30_{\rm MB} \\ 20_{\rm MB} \\ 75_{\rm MB} \\ *60_{\rm MB} \end{array}$	1.5 1.5 1.5 3 1 1 2 1.5	2 2 4 2 6 6 6 2 2	57.35 57.5 - 57.6 57.8 - 58 58.2 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°.	П	R2/R3	65 <sub>MB</sub> 30 <sub>MB</sub> 55 <sub>MB</sub> 65 <sub>MB</sub> 10 <sub>MB</sub> 10 <sub>MB</sub> 30 <sub>MB</sub> 40 <sub>MB</sub>	1.5 1.5 1.5 3 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,	II	R3/R4		1.5 1.5 3 2 1 15 1.5	2 2 2 1 6 2 1	65.75 - 66 - 67.8 - 68.1 - 68.4 - 70.8 - 72.5 -
- - 75 -		C-9 73.0 - 78.0	59	98	93	medium to fine grains of quartz, feldspar, muscovite and sparse garnet, slightly weathered, strong, close fracture spacing. 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	50 <sub>MB</sub>	3	1	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,	I/II	R4				-  - -
- - 85 - - - - - 90						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.						- - - -
- 90 -												- - -

													BORING	NUMBE	R: SEG 4	1-4T	
PA	RS	50	N	S			R/	ΛDI	NC		) <u>C</u>			NUMBER			3
BR	IN	CI		Ħ	?!	HOFF	<b>D</b> (	JKI _					PROJEC	CT NUMBI	ER:4016	6879	
						ds Phase I							LOCATI	ON: 30th	St., 12th	Ave., Ne	w York
LOCAT CLIEN					12t	h Ave., No	ew Yo	rk, NY	<b>7</b>				COORD	NY			
CONTE													STN. NO		C	FFSET:	
DRILLE						e								CE ELEV.:			
						nolly/Jua	n Zapa	nta					DATUM:				
DRILLI	NG N					tary Was								DATE: <b>3</b> /1		TME: 9:00	
RIG TY	PE:	(				truck mo							FINISH I	DATE: 3/2		IME: 10:0	00 am
			Ca	sing		Split Spoon			Pitcher	Gra		Core Barrel		GROUN	IDWATER		
Type/S	ymbo	ol 📙		IW		S	U [		P	G		c <u> </u>			Water Depth	Casing Depth	Hole Depth
I.D.			4	4"		1.375"	2.93	8	"			2.155"	Date	Time	(ft)	(ft)	(ft)
O.D.			4	.5"		2"	3		"			2.98"	3/23/2015	7:26:00 AM	11.1	35	93
Length			Ģ	94		24"	30		"			60"	4/7/2015	7:23:00 AM	8	94	133
Hamme	er Wi	t	14	0 lb		140 lbs	Dr	ill Rod S	Size		N	V					
Hamme	er Fa	II	. 3	30"		30 in.	ı	.D. (O.E	D.)	2	2.25" (2	.625")					
·	ဖွ				SA	MPLE		SOIL	. (Blows	/6 in.)							
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				et)	0/6	6/12	12/18	18/24	REC (in.)				ION! ^ \''		ארכ
EPTF	SAPH	IG (B)	١.	3ER	30	DEPTH (feet)			CORING	3		<b>-</b>	ELD GLAS	SSIFICAT	ION ANI	J KEMAI	KKS
Ω	G.	CASIN	TYPE	NUMBER	SYMBOL	DEPT	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQE	Depth Elev.					
			G	1	\	0.0 - 6.0	, ,	, ,				1	Hand augere 0-0.5': Asph	ed to 6'.			
					$\mathbb{N}$								0.5'-5.5': Bro	own SAND, s ccasional fab	some Silt, f	frequent bric	ek
			1		IV								fragments, of fragments (F	ccasional fab fill).	oric, occasio	onal wood	
-			1		lΛ								5.5'-6.0': Bri	ck fragments	(Fill).		
			1														
<del>-</del> 5					[ \												_
•			S	1		6.0 - 8.0	76	3	3	3	12			and gray SAl			
•			1										fragments, le	ents, occasion cose, moist (I	Fill).	ecasional W	oou
•			S	2		8.0 - 10.0	5	4	4	2	4			layer at first ( and black SA		Silt freque	nt
40			1										brick fragme	ents, occasion	nal wood fr	agments, loc	ose,
<del>-</del> 10			S	3		10.0 - 12.0	5	2	5	6	4		moist (Fill). S-3: Brown	fine GRAVE	L, and fine	to coarse S	and,
•			1										trace Silt, fre	equent brick toose, moist (I	fragments,	occasional v	vood
•													ingineno, i	, moist (1			
			1														
			1														
<del>-</del> 15			S	4		15.0 - 17.0	WOH	WOH	WOH	WOH	14		S-4: Brown	SILT, some S	Sand, very	soft, moist (	ML).
-																	
•			1														
_ 20																	
- 20			S	5		20.0 - 22.0	WOH	WOH	WOH	WOH	24		S-5: Gray an very soft, we	nd brown Silt et (CL).	y CLAY, tı	race fine Sar	nd,
			U	1		22.0 - 24.0							U-1: Shelby	tube.			
-																	
			S	6		24.0 - 26.0	WOH	WOH	WOH	WOH	20						

#### PARSONS BRINCKERHOFF **BORING LOG** (continued)

**BORING NUMBER: SEG 4-4T** 

PROJECT NUMBER: 4016879

SHEET NUMBER: 2 of

PROJECT: Hudson Yards Phase II

LOCATION: 30th St., 12th Ave., New York, NY

CLIENT: AMTRAK

CONTRACTOR: ADT

DRILLER: Dominick Pepe

INSPECTOR: Brian Connolly/Juan Zanata

													Zapata
	ဖွ			;	SAN	MPLE		SOIL	(Blows/	6 in.)			
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				eet)	0/6	6/12	12/18	18/24	REC. (in.)	FIF	ELD CLASSIFICATION AND REMARKS
DEPT	RAPF	NG (B	<b>.</b>	BER	30L	DEPTH (feet)		(	CORING	i		''-	LED GENEGII 10/111611/1145 NEIW, IIII.G
	<u>0</u>	CASII	TYPE	NUMBER	SYME	DEPT	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	Depth Elev.	
							, ,	, ,		,		5	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	5	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).

#### PARSONS BRINCKERHOFF **BORING LOG** (continued)

**BORING NUMBER: SEG 4-4T** 

SHEET NUMBER: 3 of

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
æ	၅			;	SAI	MPLE		SOIL	(Blows/	6 in.)		]
DEPTH (feet)	GRAPHIC LOG	(Blows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	
EPT	SAPH	G		3ER	30L	DEPTH (feet)		(	CORING	;		FIELD CLASSIFICATION AND REMARKS
	9	CASING	TYPE	NUMBER	SYMBOL	DEPT	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	Depth Elev.
			S	13		60.0 - 62.0	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 - - - - - 75 -			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).
			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'.

Г								BORING	NUM	IBER:	SEG 4	4-4T		
	PAF	25	ONS			CC		SHEET	NUME	BER:_	1	0	of	2
	BRI	NC	KEF	RHO	F		ORING LOG	PROJEC	T NU	MBEI	R: 401	6879		
F	PROJEC	T: H	udson Ya	rds Ph	ase I	I		LOCATION						
			0th St., 1				rk, NY							
	CLIENT:							COORD						
			DR: ADT					STN. NC		<b>-</b> \	(	DFFSE	ΞT:	
			minick P		/ <b>T</b>	7		SURFAC		EV.:				
			Brian Co				ta	DATUM: START I		2/10	/1 <i>5</i> 7	-IN AIT -	0.00	a <b></b>
							ıtomatic Hammer	FINISH [						
ŀ	10 111	<u> </u>	111L 75 (t	I dek iii	ount	(4), 110		I II VIOITE			WATER			, 4111
1	CORF BA	\RRF	EL DATA:			NOTE	·s·				Water	Cas		Hole
$\vdash$			Tube Swivel					Date	Time		Depth (ft)	Dep (ft		Depth (ft)
	CORE SI							Date			(11)	(,,	,	(11)
	O.D.: 2.9		- 1											
	.D.: 2.16													
-			E: 3" (3.5")											
F											DIS	CONTI	NUITY	DATA
	et)	(ft/min)	CORE RUN NO. AND DEPTH (ft)	(in)	(%)		DESCRIPTION AND REMARK		Ď	ı				
	(fee	빝	N N N	ïRΥ	₹	(%)	(Lithology, Structure, Weatherin Continuity, Strength, Color, Grain	ig, Size)	E E	1GT	deg)			eet)
	DEPTH (feet)	₽.	E RI	RECOVERY (in)	RECOVERY (%)	RQD	* - Denotes discontinuity along foli	ation	WEATHERING	STRENGTH	ANGLE (deg)	느	Ja	DEPTH (feet)
	DE	N N	SON ND	ÆÇ	EC.	L CC	MB - Denotes mechanical brea		WE/	ST	NGI			ĒPI
		CORING RATE		ш	"		IVID - Deflotes mechanical brea	ik			⋖			
Г							C-1: Gray SCHIST, medium to coarse grai	ned, fresh,						
Γ	0.5						medium strong to strong, very close to mode fracture spacing, foliation dips 25°-70°, room	ck tends to						
Г	- 95		C-1 93.0 - 98.0	56	93	80	break along foliation, quartz and feldspar by 96.6'-96.9'.	oand from						_
Γ			75.0 70.0											
Γ														
							C-2: Gray SCHIST, medium to coarse grain medium strong to strong, very close to wid	ned, fresh,						
L	- 100		C-2				spacing, foliation dips generally 70°, rock	tends to						_
	100		98.0 -	60	100	92	break along foliation, quartz and feldspar by 2" thick.	oands up to						
Г			103.0											
15														
5/13/							C-3: 103'-103.7' & 105.7'- 108.0': Light gr gray garnet-biotite-muscovite SCHIST, me	ay and						
GLB	105		C-3				grained, fresh, medium strong, close to mo	derate						
GLB.	105		103.0 -	59	98	92	fracture spacing except extremely close fra spacing at 106.1'-106.25'.	cture						
			108.0				103.7'-105.7': Light brown granitic GNEIS	SS, fresh,						
ARSIE							strong, moderate fracture spacing.							
CAN							C-4: Gray SCHIST, medium to coarse grain	ned, fresh,						
3PJ	4.40		C 4				medium strong to strong, close to wide frac spacing, foliation dips 65°-75°, rock tends							
Š.	- 110		C-4 108.0 -	60	100	97	along foliation.							-
SD R			113.0											
ΥA														
DSO							C-5: Gray SCHIST, medium to coarse grain	ned, fresh,						
롸			0.5				medium strong to strong, close to moderate spacing, foliation dips 60°-65°, rock tends							
3100	115		C-5 113.0 -	60	99	90	along foliation.							-
NING -			118.0											
PB CORING LOG HUDSON YARD ROCK.GPJ CANARSIE-LIB.GLB.GLB 5/13/15														

Boring No. SEG 4-4T Sheet 1 of 2

#### 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

										Zapat	a			
		nin)										CONTI	YTIUN	DATA
	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 S  * - Denotes discontinuity along folia  MB - Denotes mechanical breal	g, Size) ation	WEATHERING	STRENGTH	ANGLE (deg)	٦Ĺ	вГ	DEPTH (feet)
	- 120 -		C-6 118.0 - 123.0	60	100	85	C-6: Gray SCHIST, medium to coarse grain slightly weathered to fresh, medium strong, moderate fracture spacing except at 122.0-foliation dips 60°-65°, rock tends to break a foliation planes.	, close to 122.35',						-
	- - 125 -		C-7 123.0 - 128.0	60	100	86	C-7: Gray and light gray garnet-biotite-mus SCHIST, medium to coarse grained, fresh, strong, very close to moderate fractrue spac foliation dips 50°-65°, rock tends to break a foliation planes, 1-1/4' thick quartz band at	medium eing, along						- - -
	- - 130 -		C-8 128.0 - 133.0	60	100	97	C-8: Gray SCHIST, medium to coarse grain medium strong to strong, close to moderate spacing, foliation dips 45°-65°, rock tends talong foliation planes.	fractrue						- - -
	- - 135 -		C-9 133.0 - 138.0	60	100	72	C-9: Gray SCHIST, medium to coarse grain medium strong to strong, close to moderate spacing, foliation dips 45°-65°, rock tends along foliation planes, frequent quartz and bands and lenses up to 1" thick.	fractrue to break						- - -
CANARSIE-LIB.GLB.GLB 5/13/15			C-10 138.0 - 141.0	35	97	75	C-10: Dark to light gray garnet-biotite-muss SCHIST, medium to coarse grained, fresh, strong, very close to moderate fractrue space pegmatite band at 138.95'-139.75', foliation observed, dips 45°-65° (centered in places). End of coring at 141'.	medium eing,						_
ON YARD ROCK.GPJ CANARSIE	- - - 145 - -													- - - -
PB CORING LOG HUDSON YARD ROCK.GPJ	- 150 - -													- - -

ſ				<u> </u>	Parso	nns							BORING	NUMBE	R: <b>NW-5</b>	В	
				=		kerhoff	D/	<b>7</b> D			\ <u>^</u>			NUMBER			2
		_		=	Quac		R(	JK	ING	L	JĠ						
			100 YEARS	® [	Doug	las, Inc.	_						PROJEC	T NUMB	ER: <b>187</b> 6	625A	
ſ	PROJE												LOCATION	ON: Unde			
١	LOCAT			dso	n Ya	rds, New Y	York, I	NY					COOPD	betw not surv .		d 33th Si	., NYC
١	CONTR			: W	GI								STN. NC		•	FFSET:	
ł	DRILLE												_	E ELEV.			
	INSPEC												DATUM:				
١						otary Was		• \						DATE: 1/1			
ł	RIG IY	PE: I	JK :		(are	sel fueled 1 Split Spoon		-	Piston	Gra	ah.	Core Barrel	FINISH	DATE: 1/1	NDWATER		) pm
١	Type/Sy	vmho	,  -	Cas	siriy	S	U		P	G		Cole Ballel		GROOI	Water	Casing	Hole
	I.D.	yiiibc	" ├		;"	1.375"	U	Ш	ı	J G		2.16"	Date	Time	Depth (ft)	Depth (ft)	Depth (ft)
١	O.D.				5"	2"						2.98"	1/9/15	6:20 pm	5.6	10.0	10.0
	Length		-	٥.		24"				+		5'	1/19/15	10:15 am	6.0	44.0	58.2
	Hamme	er Wt	.	N	/A	140 lbs	Dı	ill Rod :	Size		1		1				
	Hamme		-		//A	30 in.		.D. (O.I	D.)		2" (2.	375")					
ļ				Τ	S	AMPLE			L (Blows/	6 in.)	-		_				
	set)	-0G	Œ	$\vdash$							REC	<u>-</u>					
	H (fe	일	slows			Set)	0/6	6/12	12/18	18/24	(in.	· I	ELD CLAS	SSIFICAT	ION AND	) REMAF	RKS
١	DEPTH (feet)	3RAPHIC LOG	NG (E	l	BER	구 (*			CORING	i							
		9	CASING (Blows/ft)	TYPE	NUMBER	DEPTH (feet)	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQI %	Depth Elev.					
Ī													Cleared for u	utilities with	by hand/vac	etron to 10' l	ogs.
	_																
	_			1													
5	_			-													
1/23/1	<b>-</b> 5			-		0.0 - 10.0											
GLB.	-			-													
OGS.	-			+													
CEL	-			┨													
O FEN	-			+													
YARI	<del>-</del> 10			1									No Recovery	<b>/</b> .			_
REET	-			S	1	10.0 - 12.0	41	41	50	40	0		-				
TH ST.	-			1_	_	10.0				_			S-2A: Gray S	Silty CLAY	at top 1", sti	iff, moist (C	L).
1481	-			S	2	12.0 - 14.0	10	16	9	7	3		S-2B: Gray to some fine gra	avel, little si	lt, medium o	dense, moist	ND,
Y.GPJ	- 15												(SM) at botto			on).	_
EWA)	- IO			$ ]_{\rm S} $	3	15.0 - 17.0	2	3	5	7	24		S-3 Gray CL 19': possible		oist (CL).		
V GAT	_				٦	13.0 - 17.0				,	24		-> . possioie				
NEW	-																
CALE	-			-													
HIC S	- 20			-									S-4 Brown to	n light orașie	sh brown SI	IT stiff m	nist –
<b>3RAP</b>	-			S	4	20.0 - 22.0	8	9	13	12	12		(ML).	o ngni grayis	ni oiowii Si	L1, SHII, III	Jist
0/M	-			+													,
RING	-			1													
PB BORING W/O GRAPHIC SCALE NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15	-			1													

MM	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

# **BORING LOG**

(continued)

BORING NUMBER: NW-5B

SHEET NUMBER: 2 of 2

PROJECT NUMBER: 187625A

INSPECTOR: Baris Imamoglu

PROJECT: Gateway, Phase II CONTRACTOR: WGI LOCATION: Hudson Yards, New York, NY DRILLER: C. Moreira CLIENT: TPC

L														
		9			,	SAN	MPLE		SOIL	. (Blows/	'6 in.)			
	DEPTH (feet)	GRAPHIC LOG	ows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	]	
	EPTH	SAPHI	IG (Bk		3ER	30L	н (fее			CORING	}	, ,		ELD CLASSIFICATION AND REMARKS
		99	CASING (Blows/ft)	TYPE	NUMBER	SYMBOL	DEPTH (feet)	RUN (in.)	REC. (in.)	REC.	L>4" (in.)	RQD %	Depth Elev.	
ļ				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).
ŀ														-
t														- -
F	30			C	(		20.0 21.2	42	70	100/2"		1.4		S-6 Brown to reddish brown, fine to coarse SAND,
Ł				S	6		30.0 - 31.3	43	78	100/3"	-	14		some(+) fine to coarse gravel, trace silt, some rock fragments; very dense, moist (SP).
$\downarrow$													End of B	Foring at 32.0'
ł	0.5		-											
F	35													
ł														-
2														_ _
1/23/1	40													-
GS.GLE														_
NCE LO														-
ARD FE	45													_
REET Y	.0													-
TH ST														
3PJ 148														-
EWAY.6	50													_
W GAT														-
ALE NE														-
HIC SC	55													- -
GRAP														_
NG W/C														- -
PB BORING W/O GRAPHIC SCALE NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15														-
									1	1				

SHEET NUMBER: 1 of 2		ÈĒ	Pars	sons				BORING	NUN	IBER:	NW-5	5B		
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)  PROJECT: Gateway, Phase II LOCATION: Under 11th Ave. overpass, betw. 30th and 33th St., NYC COORD. not surveyed STN. NO.: OFFSET: UNFSET: U16/15 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U16/16 UNFSET: U1		F	Brin	ckerho	ff	C	ADING LOG	SHEET	NUME	BER:_	1	c	of	2
Detail					ıc.		JKING LOG	PROJEC	CT NU	JMBEI	R:1 <b>87</b>	625A		
Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coording   Coordina   Coordina	PROJEC	CT: G	ateway, l	Phase I	Ι			LOCATI	ON: U	Inder	11th <i>A</i>	Ave. o	verpa	ass,
STN. NO.: OFFSET:   SURFACE ELEV.:   DRILLER: C. Moreira   SURFACE ELEV.:   DRATUM:   START DATE: 1/16/15   TIME: 7:00 am   RIG TYPE: DK 525 (diesel fueled track rig)   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   TIME: 11:10 am   START DATE: 1/19/15   START DATE: 1/19/15   START				ards, N	New Y	York, 1	NY		b	etw. 3	0th ai			
DRILLER: C. Moreira   INSPECTOR: Baris Imamoglu   DATUM:   START DATE: 1/16/15   TIME: 7:00 am   FINISH DATE: 1/19/15   TIME: 7:00 am   FINISH DATE: 1/19/15   TIME: 11:10 am   GROUNDWATER DATA   GROUNDWATER DATA   TYPE: Double Tube Swivel   Date   Time										survey				
DATUM:   DRILLING METHOD: Rotary Wash   RIG TYPE: DK 525 (diesel fueled track rig)   START DATE: 1/16/15   TIME: 7:00 am   FINISH DATE: 1/19/15   TIME: 11:10 am   TIME: 11:10											(	OFFS	ET:	
DRILLING METHOD: Rotary Wash RIG TYPE: DK 525 (diesel fueled track rig)										.EV.:				
RIG TYPE: DK 525 (diesel fueled track rig)						1.		-1		. 1/1/	/15 7	<b>□IN 4</b> □.	7.00	
CORE BARREL DATA:   NOTES:     Date       Water Depth (Pppth (Pppth)							ia)							
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g   38.2 - 43.2   00   100   close fracture spacing. Numerous 0°-30° joints,	_ 40		C-2				weathered, strong to very strong, close to n fracture spacing, except at 39.55' to 39.8':	noderate extremely						_
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 fresh to slightly weathered surfaces, slight FeOx coating; one 80° joint at 42.85' to 43.2', rough and undulating, heavy FeOx and silty fine to medium sand infill.  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.  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.	<u>g</u> –			60	100	100	close fracture spacing. Numerous 0°-30° jo	oints,						
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.  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.  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.	2 -						slightly weathered surfaces, slight FeOx co	ating: one						
With Sight PeOx coating, one of John at 42.53 to 43.2', rough and undulating, heavy FeOx and silty fine to medium sand infill.  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.  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.	<u> </u>						90° joint at 39.2' to 39.55', slightly rough a	nd planar		D				
fine to medium sand infill.  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.  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	<u> </u>						43.2', rough and undulating, heavy FeOx a	nd silty		R5/R4				
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 surface moderate 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	£ 							ssic						_
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joints, slightly rough and wavy to planar with fresh surfaces, one with silt coating. 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	<u></u>						moderate to very close fracture spacing. Fir	ve 0°-50°						
GALLEJ, the total 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	<u>-</u>  -						joints, slightly rough and wavy to planar w							
GRANITE with Quartz and Feldspar PEGMATITE bands and lenses, interlayered with SCHIST; fresh, very strong to strong, moderate to very close fracture	5.						C-4 Light gray, fine to coarse grained gneis	ssic	I/III	R5/R2				
$\begin{bmatrix} C-4 \\ 48 & 2 & 53 & 2 \end{bmatrix}$ 60   100   60   very strong to strong, moderate to very close fracture	<u></u> 50													_
VIE 140 / = 33 / 1   1 announce VCHIVI to alicabety to mandowately vycoathoused 1	<u> </u>		C-4 48.2 - 53.2	60	100	60	very strong to strong, moderate to very clos	se fracture						
spacing. SCHIST is slightly to moderately weathered, medium strong to weak. Prominent 70°-90° joint	N N		10.4 - 33.4				medium strong to weak. Prominent 70°-90	° joint						
between 48.7' and 49.95', smooth and undulating with moderately weathered surfaces. Extremely close	- (a)						between 48.7' and 49.95', smooth and undu	ulating						
fracture spacing between 48.6' and 48.7'. Four 0°-70° I/II R3/R5	5 2						fracture spacing between 48.6' and 48.7'. F	Four 0°-70°	I/II	R3/R5				
joints, smooth to slightly rough, planar to wavy with slightly to moderately weathered surfaces, few with	בן ס													
Signify to moderately weathered surfaces, rew with clays 55 3 2 58 3 48 79 64 clays said infill and FeOx coating.	<u>₹</u> 55			48	79	64	clayey sand infill and FeOx coating.							
53.2 - 58.2 46 79 04 C-5 53.2'-56': Dark gray to gray, fine to coarse grained schistose GNEISS; fresh, strong, moderate to			33.2 - 38.2				grained schistose GNEISS; fresh, strong, n	noderate to						
close fracture spacing except at 53.2' to 53.35': slightly weathered, medium strong, very close	<u> </u>						close fracture spacing except at 53.2' to 53.	.35': ose						
fracture spacing. One 60° foliation joint, smooth and	<u> </u>													

Boring No.

NW-5B

Sheet 1

of

	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

LOCATION: Hudson Yards, New York, NY

PROJECT: Gateway, Phase II

CLIENT: TPC

# CORING LOG (continued)

BORING NUMBER: NW-5B SHEET NUMBER: 2 of \_\_\_

PROJECT NUMBER: 187625A

CONTRACTOR: WGI DRILLER: C. Moreira

INSPECTOR: Baris Imamoglu

	CLILIVI.	110						INOI LO	1011.	Dairis		iogiu		
		n/ft)									DIS	CONTI	VUITY	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S	g, Size)	WEATHERING	STRENGTH	ANGLE (deg)	Jr	Ja	DEPTH (feet)
	60  						slightly undulating. Four 0°-30° cross joints to slightly rough, planar to wavy with fresh 56'-58.16': Light gray to light brown, Quart Feldspar PEGMATITE; fresh, very strong, fracture spacing. No joints. End of coring at 58.2' bgs.	s, smooth surfaces. z and moderate						- - -
	- 65 - - -													- - - -
2	- 70 - -													- - - -
148TH STREET YARD FENCE LOGS.GLB 1/23/15	- 75 - -													- - - -
	- 80 - -													- - - -
G (PB) NEW GATEWAY.G	- 85 - - -													- - - - -
55TH STREET CORING LOG (PB) NEW GATEWAY.GPJ	- 90 - -													- - - -

_			F	ars	ons							BORING				
			= (	Qua	ckerhoff de &	B	ORI	NG	LC	)G		SHEET	NUMBER	R:1_	of	2
		100 YEARS	? <sub>®</sub> [	Dou	glas, Inc.							PROJEC	T NUMB	ER: <b>187</b> 6	625A	
PROJE LOCAT					hase II ards, New	York, I	NY					LOCATION			ve. overj d 33th St	
CLIEN	T: TP	$\mathbf{C}$			,							COORD		veyed		
CONTR												STN. NC			FFSET:	
DRILLE					_							SURFAC		∴306.3 fe	eet	
INSPE					veda Rotary Was	. <b>.</b>						DATUM: START I		/23/14 T	INAE: 7.34	) nm
					esel fueled		rig)					FINISH				
				sing	Split Spoor			Piston	Gra	ab (	Core Barrel			NDWATER		
Type/S	ymbo	ol			S	U[		PΩ	G	<b>X</b>	С			Water	Casing	Hole
I.D.			3	3"	1.375"						2.16"	Date	Time	Depth (ft)	Depth (ft)	Depth (ft)
O.D.			3.	.5"	2"						2.98"	12/22/14	7:55 am	6.7	9.0	9.0
Length					24"						5'	12/22/14	7:00 pm	6.6	9.0	9.0
Hamme	er Wt	.	N	/A	140 lbs	Di	rill Rod S	Size		N						
Hamme	er Fa		N	I/A	30 in.		.D. (O.E	D.)		2" (2.3	75")					
	ŋ			S	AMPLE		SOIL	_ (Blows/	6 in.)							
(feet)	ОГО	ws/ft)	Г		t)	0/6	6/12	12/18	18/24	REC (in.)						
DEPTH (feet)	GRAPHIC LOG	3 (Blo		띪	JC H (feet			CORING	} }	(111.)	┥ FIE	ELD CLAS	SSIFICAT	ION ANI	O REMAP	RKS
	GR	CASING (Blows/ft)	TYPE	NUMBER	SYMBOL DEPTH (feet)	RUN	REC.	REC.	L>4"	RQD	Depth Elev.					
			╫			(in.)	(in.)	%	(in.)	%	Elev.					
_																
5			1													_
- -			-													
			-													•
<u>-</u>																
			+									S-1 Top 5": 0	Gray fine to	medium SA	ND, some s	silt.
10			-s	1	9.0 - 11.0	16	3	4	4	13		trace fine gra Bottom 8": R	iveľ, wet (SI	M).		
<u> </u>  -			+									interlayered	with gray fii	ne sand, son	ne(+) silt, tra	ice(-)
-			+									fine to media Note: Drove				
<u>-</u>			1										-			
			1									S-2 No recov	ery due to	coarse GRA	VEL lodged	in
<u> </u>			$\exists$	2	14.0 - 16.0	18	12	15	17	0		tip.				-
					160 100							S-3 Dark gra			(+) fine san	d,
			$\int S$	3	16.0 - 18.0	2	6	8	9	6		trace shell from PP up to 0.2:		L).		
						1.										
} - 20			$\int_{0}^{S}$	4	19.0 - 19.4	100/5"	-	-	-	2		S-4 Dark grashell fragmen			e fine sand,	trace
			1									Note: Rolled 3-inch casing	on it withou	ut advancem	ent, telesco	ped
)  -			-			l						19.4-20.5' B	oulder (2.75	mins/ft).		
> 9 - 9 -			-S	5	21.5 - 23.5	12	14	19	20	10		S-5 Brown f micaceous (S		some silt, de	ense, wet,	,
PB BORING WO GRAPHIC SCALE NEW GATEWAY GPJ 148TH STREET YARD FENCE LOGS.			+													
운 <b>[</b>			1													

AA	Parsons
	Brinckerhoff
	Quade &
100 YEARS ®	Douglas, Inc.

# BORING LOG (continued)

BORING NUMBER: WW-2 SHEET NUMBER: 2 of 2

PROJECT NUMBER: 187625A

PROJECT: Gateway, Phase II	CONTRACTOR: WGI
LOCATION: Hudson Yards, New York, NY	DRILLER: C. Moreira
CLIENT: TPC	INSPECTOR: L. Sepulveda

OLILITI	_											mon zovovu zvopu vedu
	G	_		5	SAN	MPLE		SOIL	. (Blows/	'6 in.)		
DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)				et)	0/6	6/12	12/18	18/24	REC. (in.)	FIELD CLASSIFICATION AND REMARKS
)EPT	RAPH	NG (BI		BER	BOL	DEPTH (feet)		(	CORING	}		FIELD CLASSIFICATION AND REWARKS
	Ŋ	CASI	TYPE	NUMBER	SYM	DEP.	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												_
-												-
-												
-												
												Boring No. WW-2 Sheet 2 of 2

I <b>≣</b>	È≣	Pars	sons				BORING	NUM	IBER	: WW-	2		
		_	ckerho	ff	C	ORING LOG	SHEET	NUME	BER:	1	c	of	2
=		_	glas, Ir	nc.			PROJEC	T NU	MBE	R: 187	625A		
	CT: G	ateway, I Hudson Y	Phase I	Ι	Vork 1	NV	LOCATION	ON: U	nder		ve. o		
CLIENT			ai us, 1	1011	1 U1 K, 1	<b>\1</b>	COORD						,1,10
		OR: WGI					STN. NC			•	OFFSI	ET:	
DRILLE	R: <b>C.</b>	Moreira					SURFAC	E EL	EV.:	306.3 f	eet		
INSPEC	TOR	: L. Sepul	veda				DATUM:						
DRILLIN	IG MI	ETHOD: I	Rotary	Was	h		START I	DATE	12/2	3/14 T	IME:	7:30	pm
<b>RIG TYF</b>	PE: D	K 525 (di	esel fu	eled t	track r	rig)	FINISH [	DATE:	12/2	6/14 T	IME:	10:3	0 am
								GR	OUNE	WATER	DATA	١	
CORE B	ARR	EL DATA:			NOTE	ES:				Water Depth	Cas Dep		Hole Depth
TYPE: I	ouble	Tube Swivel					Date	Tim	е	(ft)	(ft	t)	(ft)
CORE S	IZE:	NX					12/22/14	7:55 a	am	6.7	9.	.0	9.0
O.D.: 2	.98"						12/22/14	7:00 p	om	6.6	9.	.0	9.0
I.D.: 2.1	5"												
CASING	SIZI	Ξ: 3" (3.5")											
	/(#)									DIS	CONTI	NUITY	DATA
et)	RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)				S R					
DEPTH (feet)	1	NE	ΞRΥ	<u>}</u>	RQD (%)	DESCRIPTION AND REMARK		WEATHERING	STRENGTH	ANGLE (deg)			DEPTH (feet)
౼		E R	OVE	) SE	Q	(Lithology, Structure, Weatherir Continuity, Strength, Color, Grain	ng, Size)	F	R E	Щ	5	g	<del>E</del>
DEI	N	S O	Č H	Ŭ U	Œ	<i>3, 3 , 1</i>	,	WE/	ST	NGI			
	CORING	U∢	Ľ.	E				_		⋖			
						C-1 Gray and white, fine to coarse grained	SCHIST;	III	R4				
		C-1				moderately weathered, medium strong to s to moderate fracture spacing.	_						
		30.0 - 34.2	39	78	46	30'-30.2': coarse gravel sized rock fragmer	nts.						
						C-2 Gray and white, fine to coarse grained	SCHIST;	II	R4				
- 35						slightly weathered, strong, very close to me fracture spacing.	oderate						-
		C-2	59	98	80	fracture spacing.							
		34.2 - 39.2	39	90	80								
						C-3 Gray and white, fine to coarse grained	СПСТ.	I	R4				
<del>- 4</del> 0						fresh, strong, close to moderate fracture sp	acing.	'	N4				-
-		C-3											
		39.2 - 44.2	57	95	95								
- 45						C-4 Dark gray, medium to coarse grained fresh, strong, moderate to wide fracture sp		I	R4				_
. <del></del>						mesi, sitong, moderate to wide fractife sp	uv1115.						
		C-4 44.2 - 49.2	51	85	85								
		17.2 - 79.2											
- 50						C-5 Dark gray, medium to coarse grained	SCHIST;	I	R4				
50						fresh, strong, moderate fracture spacing.							
		C-5	56	93	93								
		49.2 - 54.2	-										'
						C-6 Dark gray, medium to coarse grained	SCHIST;	I/II	R4				
						<u> </u>				•			

Sheet

Boring No.



LOCATION: Hudson Yards, New York, NY

PROJECT: Gateway, Phase II

# **CORING LOG**

(continued)

BORING NUMBER: WW-2 SHEET NUMBER: 2 of 2

PROJECT NUMBER: 187625A

CONTRACTOR: WGI DRILLER: C. Moreira

CL	IENT:	TPC	•					INSPEC <sup>*</sup>	TOR:	L. Sep	oulved	la		
		in/ft)	-: (								DIS	CONTI	NUITY I	DATA
	DEPTH (feet)	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARK (Lithology, Structure, Weatherin Continuity, Strength, Color, Grain S	ig, Size)	WEATHERING	STRENGTH	ANGLE (deg)	٦Ļ	Р	DEPTH (feet)
-			C-6 54.2 - 59.2	56	93	80	fresh to slightly weathered, strong, close to fracture spacing.	moderate						1 1 1
- - 6 - -	60						End of coring at 59.2'.							- - -
- - 6 - -	55													-
068.GLB 1/23/15	0													-
H STREET YARD FENCEL	'5													
NEW GATEWAY.GPJ 148	30													-
55TH STREET CORING LOG (PB) NEW GATEWAY.GPJ 148TH STREET YARD FENCE LOGS.GLB 1/23/15	35													- - -

# MUESER, RUTLEDGE, JOHNSTON & DESIMONE WOODWARD—CLYDE CONSULTANTS, INC.

SHEET 1 or 4 SORING NO. WY-501 FILE NO. 4840

Mueser, Rutledge, Johnston & Debimone Woodward-Clyde Consultants, Inc.

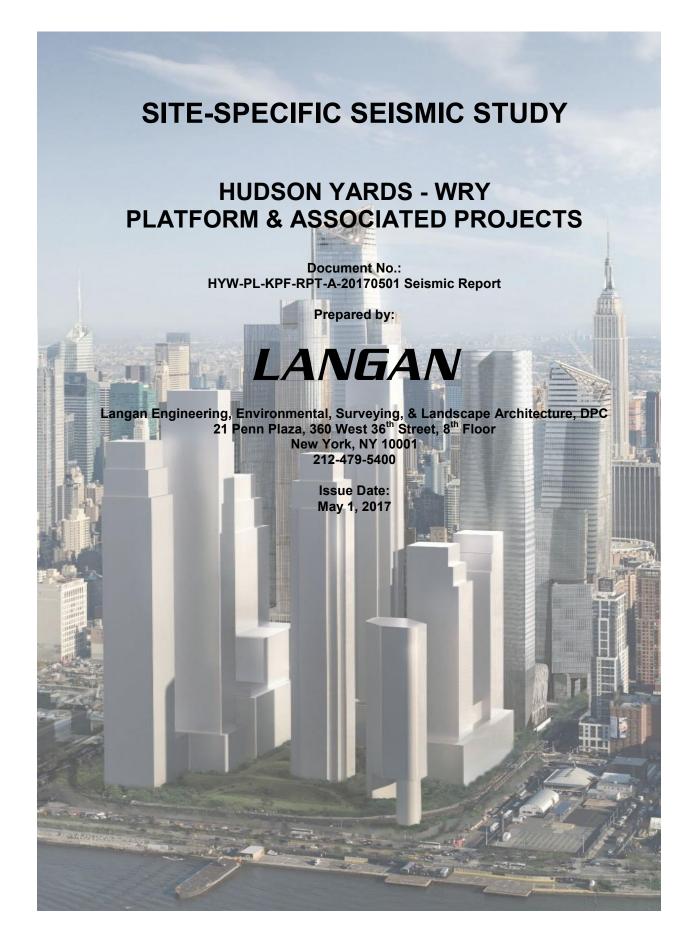
SHEET 3 4 4 BORING NO. NT-SOL

					W	00	PAWO		CONSULTAN	ITS, IN	C.		SOR	ING M	NY-1		_
-			- 51	DE NI	CHYAY	_	PG	T COMER NO	D 96416				ELEV.	NO	+ 5.2	-	ī
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0-1-1			3.	Sun					necess. F	. Gaus	hen,	7	. 5e.	īh.			1
Cylind I	-	5	w.	PPGW	0.010	١5.	D PT. D	12. 3.10	0.0 MORE 0.0	70 154.	O =7.	_					-
Dail Free						L L	ck Gel	206. Z° 0	D.				-G4	) <u>) }-</u> N	1/4:4-	74 TH	1
17.0	-6 10 -6 6:	(474)	JAY.	U-1			un mond,	1701 -					****		uble To	K .	1
711B 0U8				-ICPAN	44 D		4400	AULICE	OTHER ()		Je		*****		1010 11		ł
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i																	)
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11,05/80 Percly monny,	١Ę	24.	10	13.0	a - 3	_	soft,	gray silt	y clay, tra	co gvl	cley, orga		- 19-	-		•	
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7		-			ļ	4						١		]		-	
11/06/80 Banny, cool		1.	10	EE A	UB/4	⇉	84147				silty clay, some shells, vegetation	ı	 -65	١		i	
2	~~~	7		65.0 67.0	HE\ 54.	⇉	clsy,	trece f s	y organic e and, ahalls	10H		ĺ		qu .	43 1.0	1	1
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		<u>+</u>		73.0		7			-	lon	grey Lettess	ı	- 7		0.5		
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				THU	DWARD-CLYDE CONSULTANTS, IN BORING LOG	C.		ING NO. <u>17-501</u> NO. <u>4840</u>
DAILY PRODRESS	CASING		6 a led t		SAMIN E DESCRIPTION	258674	DIFTH	
PROBRISE	BLOWS	120		UR/12°	medium, dark gray organic silty	<u> </u>		**************************************
1					ciay, tr f send, shells (OH)		בַ ֡֡֞֝֞֡֡֡֡֡֡֡֡֡֡	gu = 0.75
1	ļ <u></u>	<b>-</b> -	- '			ŀ	F -	
						ļ	L.:	
		100	90.0	4 - 2	Medium, dark gray organic milty	1	F":	u = 40
Ī -	<u> </u>	ļ	97.0	2-1	cisy, as f word, f sand seams, lenses, tr shells, mics (OH)		├ -	qu =0,75
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#### 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<sub>R</sub>) 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<sub>R</sub> level event.
- 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<sub>R</sub>-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;
- Selecting and modifying appropriate bedrock acceleration time series;
- Estimating dynamic soil and bedrock properties for each zone;
- Determining the Site Class per the Building Code for each zone;
- 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 $_{\rm R}$ ) 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<sub>R</sub>) 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<sub>R</sub> spectrum is shown in Figure 3. Digitized MCE<sub>R</sub> values are listed in Table 1.

Table 1 – Bedrock Risk-Targeted Maximum Considered Earthquake (MCE<sub>R</sub>) Spectrum SA(g) for 5 Percent Damping

Structural	Site-Specific SA(g)
Period T (sec)	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<sub>R</sub> 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<sub>max</sub>);
- Shear modulus degradation curve with increased shear strains (i.e., G-γ curve); and
- Soil damping curve with increased shear strains (i.e., β-y 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<sub>R</sub> 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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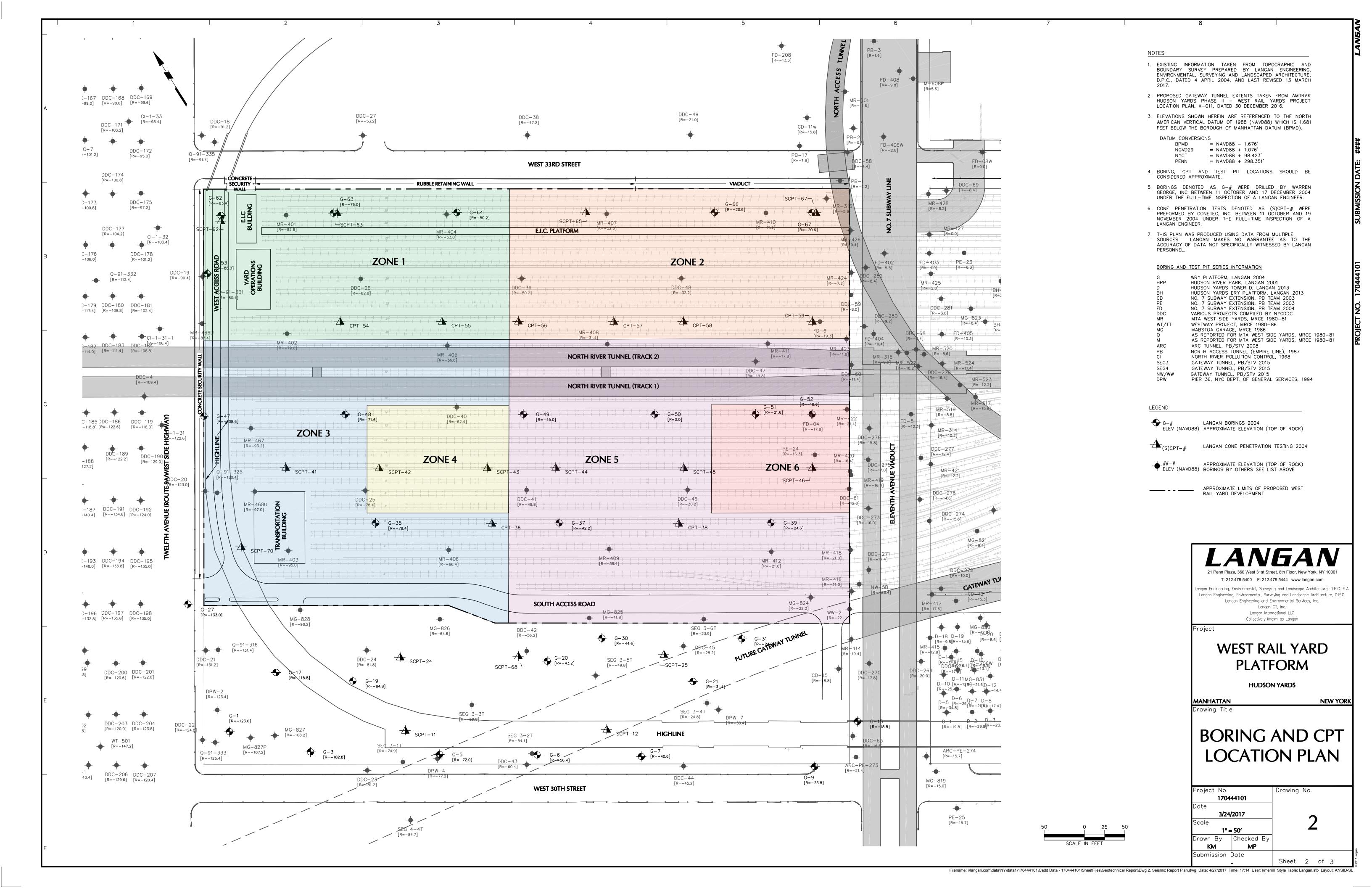


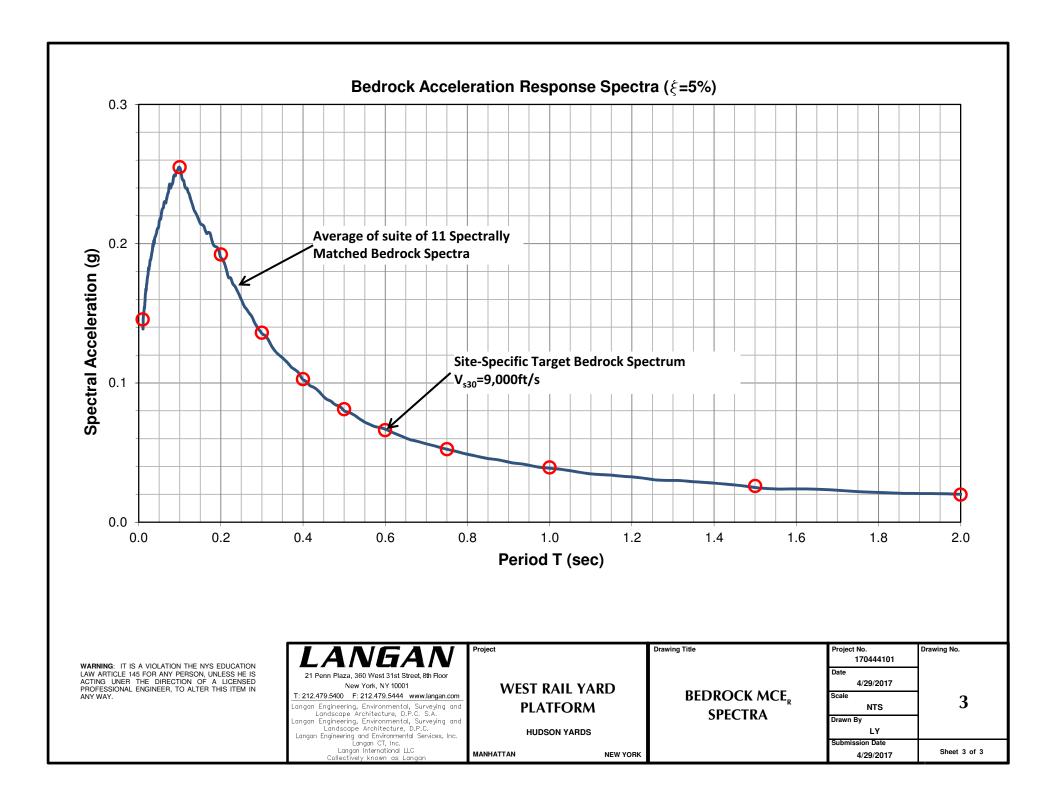
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# **FIGURES**









# 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			
			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  $MCE_{B}$ -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

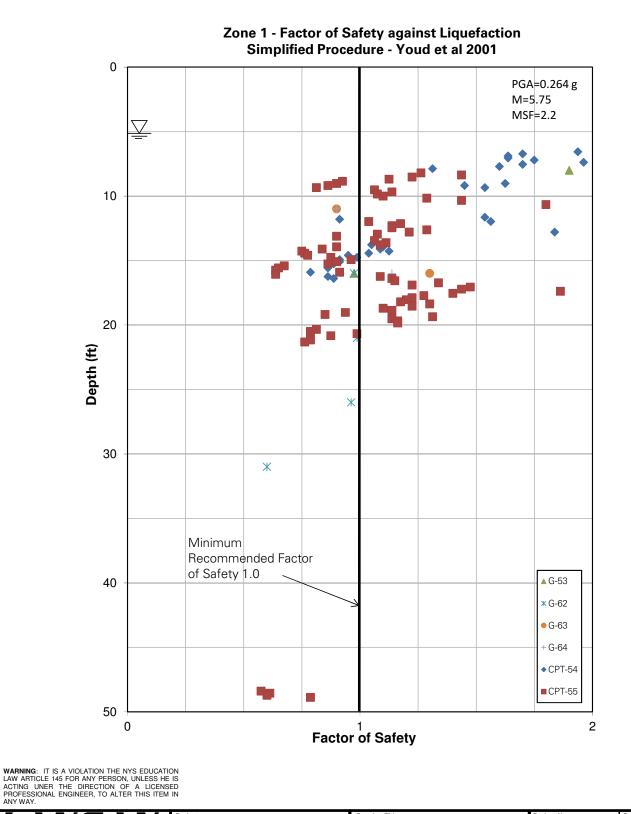


# 5 Seismic Design Category

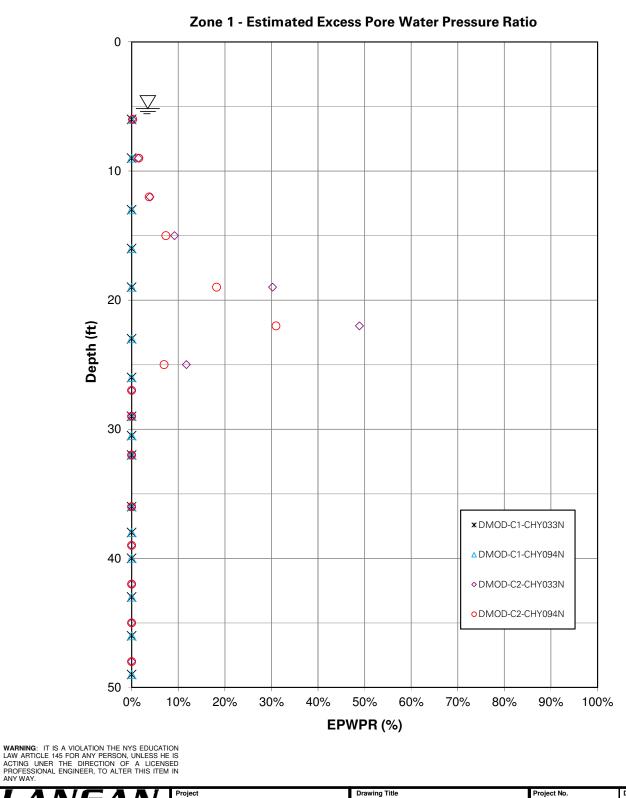
For Risk Category I, II and III, the recommended design spectral accelerations obtained from our site-specific analysis result in a Seismic Design Category C, regardless of the structure's fundamental period of vibration. The results of the site-specific seismic study are listed in Table A-4.

Table A-4 – Recommended Seismic Design Parameters – Site-Specific Seismic Study

Design Parameter	Design Value
Site Class	Е
Spectral Acceleration at short periods, S <sub>DS</sub>	0.359 g
Spectral Acceleration at 1-sec period, S <sub>D1</sub>	0.136 g
Site-Specific MCE <sub>R</sub> -level PGA	0.12 g
Risk Category	I, II and III
Seismic Design Category, SDC	С



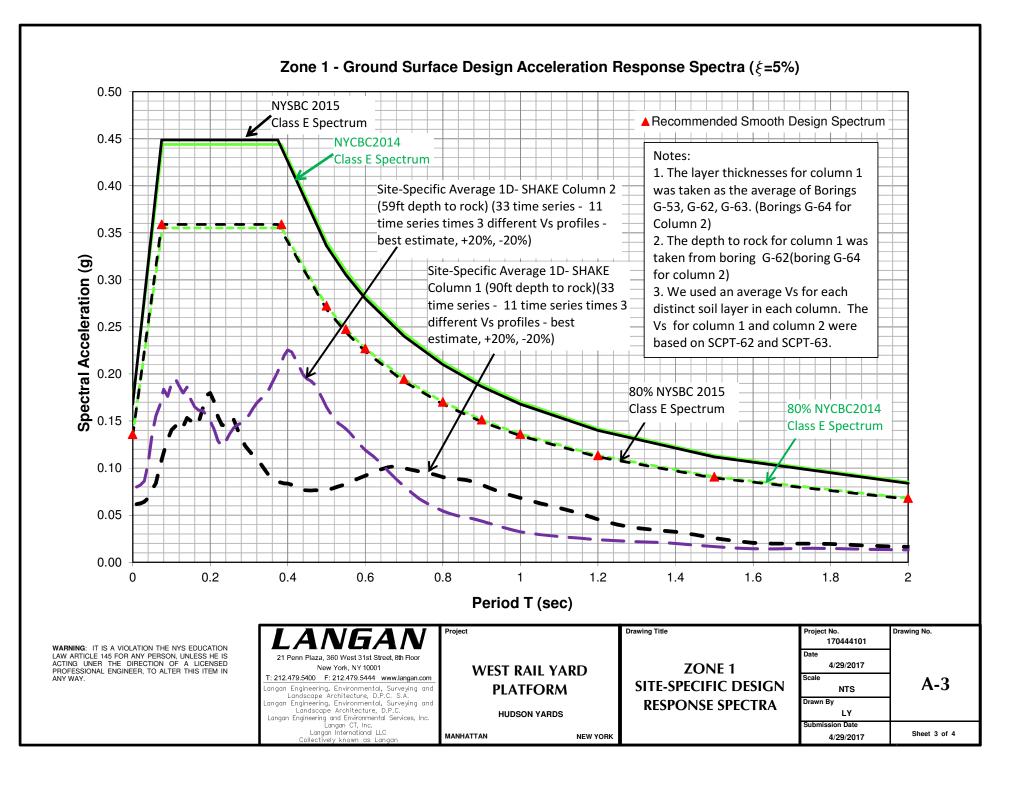
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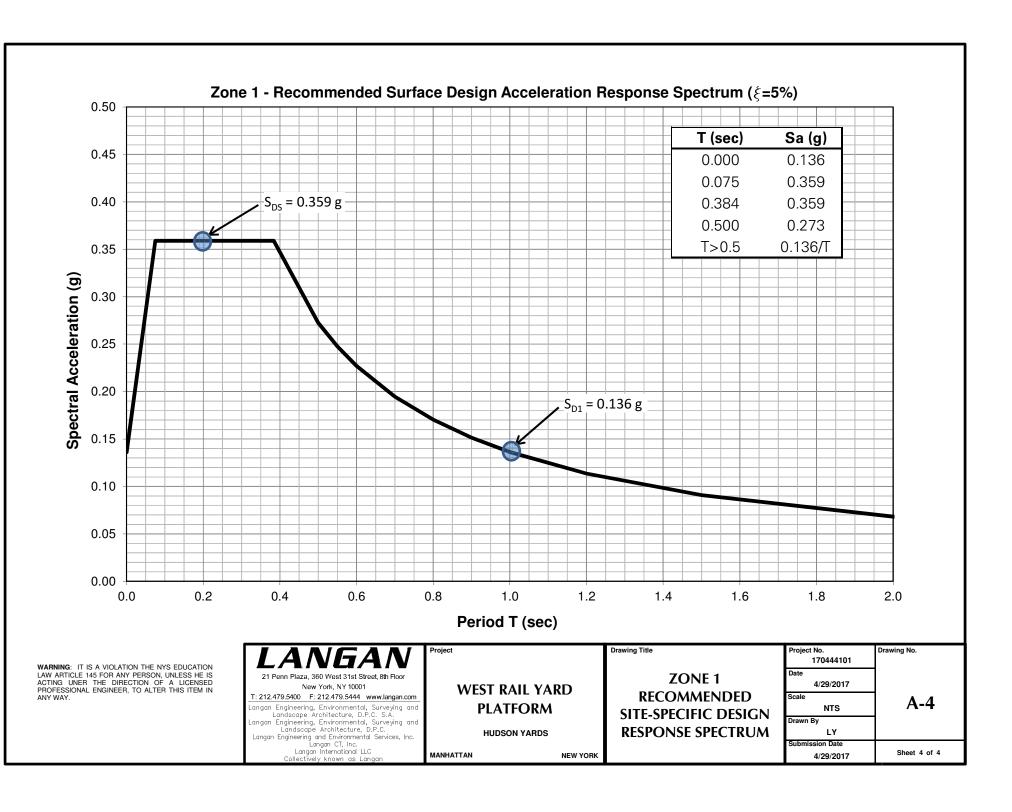


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# APPENDIX B ZONE 2 SITE-SPECIFIC SEISMIC STUDY



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 velocities (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 velocities (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

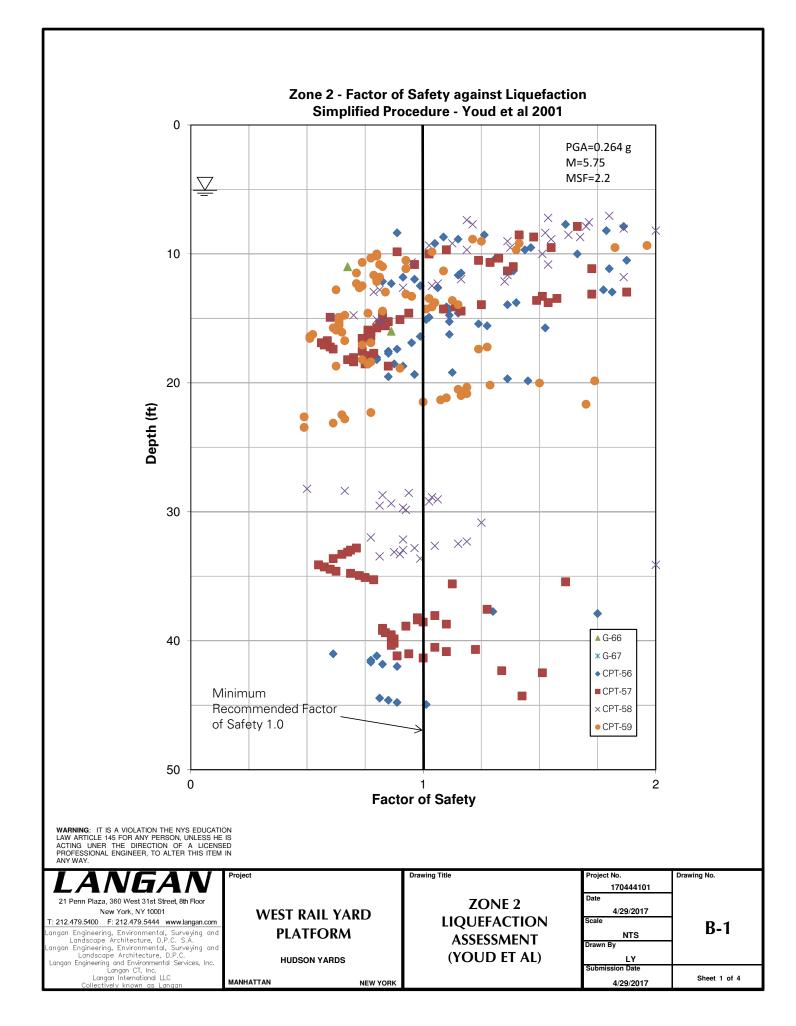


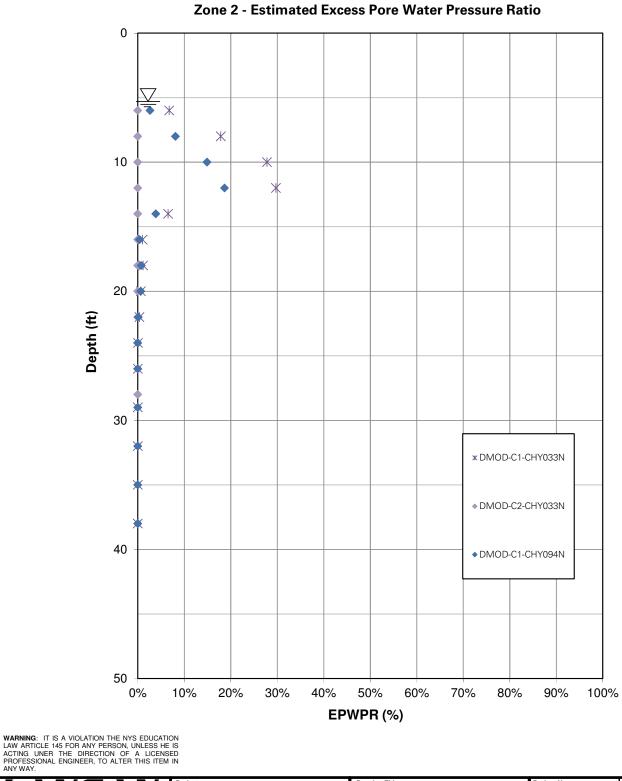
# 5 Seismic Design Category

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	Е
Spectral Acceleration at short periods, S <sub>DS</sub>	0.359 g
Spectral Acceleration at 1-sec period, S <sub>D1</sub>	0.136 g
Site-Specific MCE <sub>R</sub> -level PGA	0.153 g
Risk Category	I, II and III
Seismic Design Category, SDC	С





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