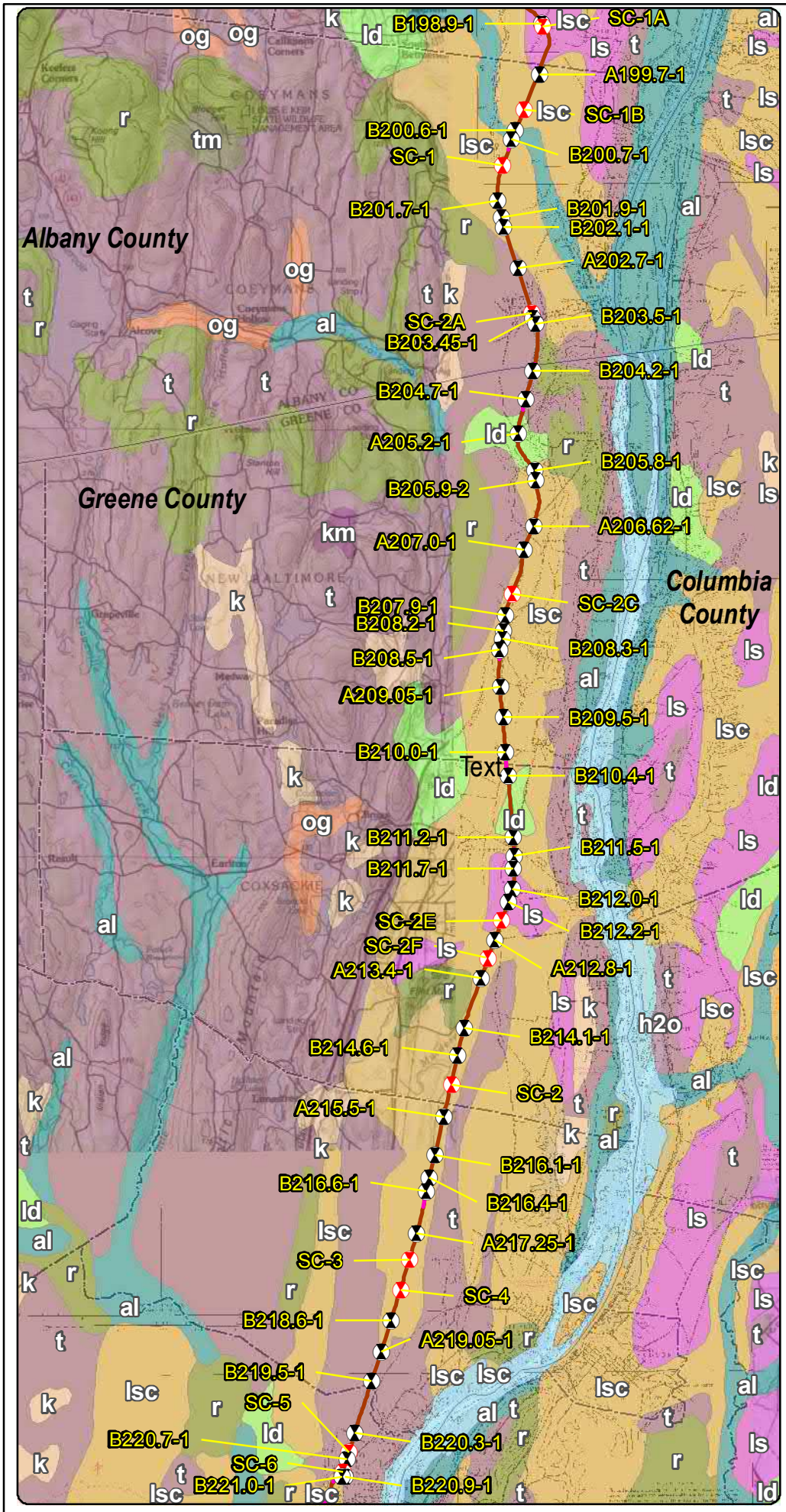
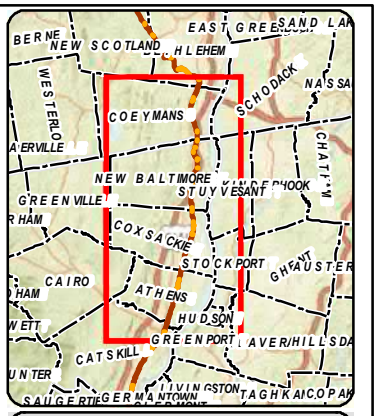




LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- h2o - Water
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- r - Bedrock
- t - Till
- tm - Till moraine

1 0.5 0 1 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

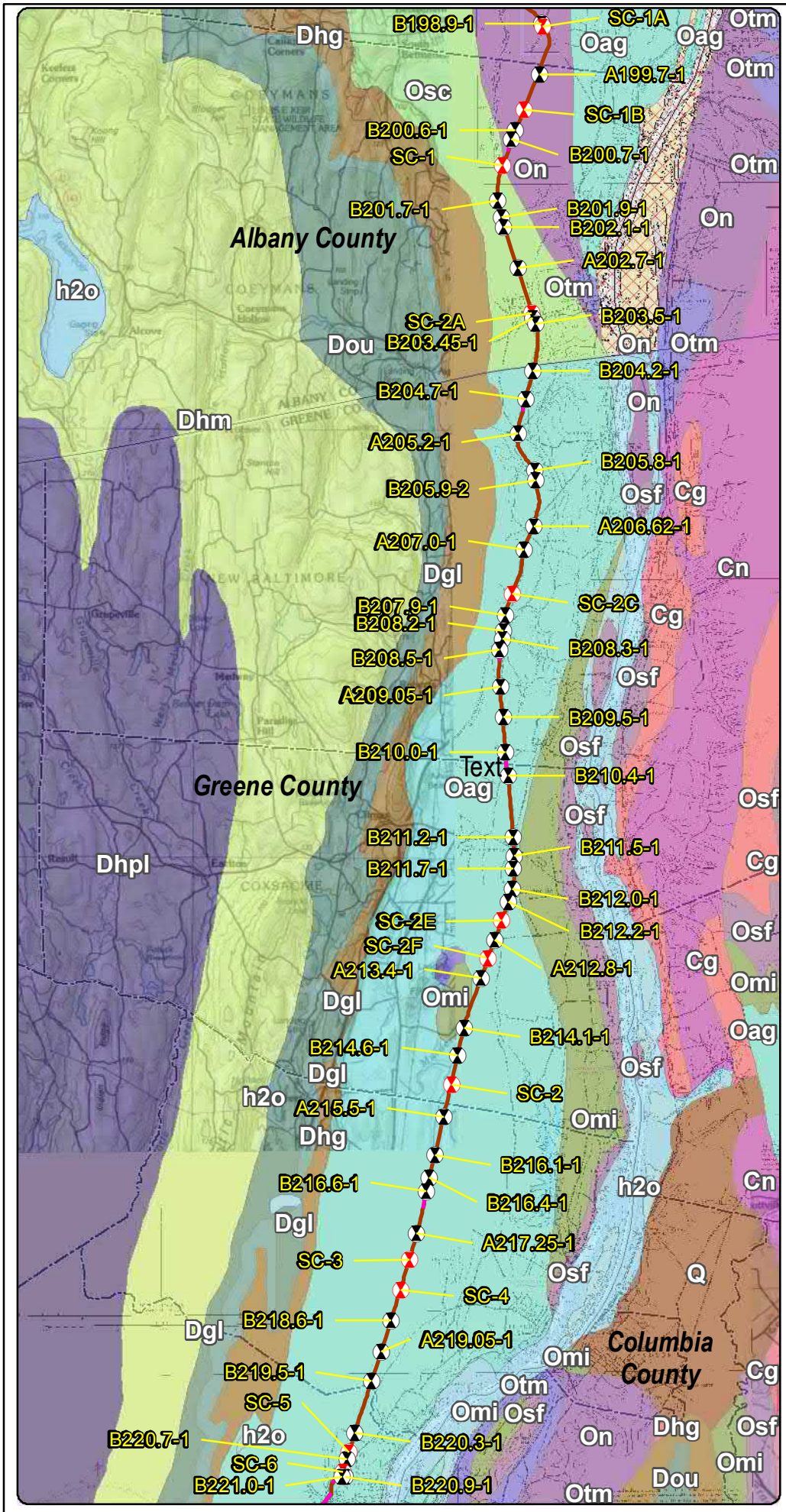
Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

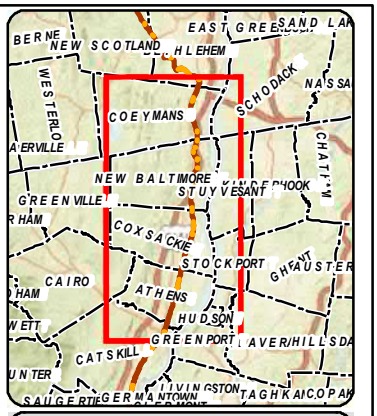
Prepared on 5/3/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

Y:\Projects\CHPE\IRoute\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Selkirk_to_Catskill_Boring_Locations_Surficial_May_2021_Report.mxd





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cg - Germantown Formation
- Cn - Nassau Formation
- Dgl - Glenerie Formation
- Dhg - Port Ewen Formation
- Dhm - Undiff Lower Hamilton Group
- Dhpl - Plattekill Formation
- Dou - Onondaga Limestone
- No Label
- Oag - Austin Glen Form (graywacke, shale)
- Omi - Mount Merino Formation
- On - Normanskill Shale
- Osc - Schenectady Formation
- Osf - Stuyvesant Falls Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- h2o - Water

* Schenectady Formation includes: graywacke, sandstone, siltstone, shale

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Selkirk to Catskill Figure 4-10

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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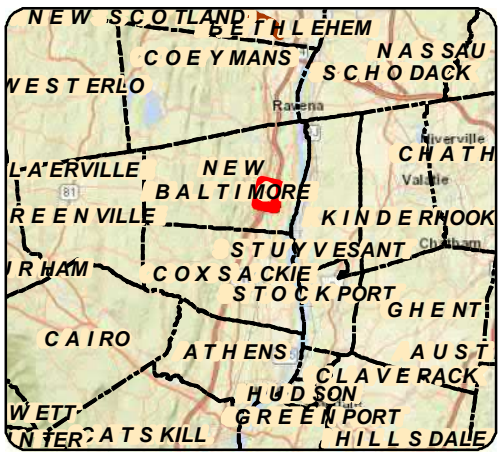
207.5
207.6
SC-2C
207.7
207.8
207.9
B207.9-1
208.1
NEW BALTIMORE
208.2
B208.2-1
208.3
B208.3-1
208.4
B208.5-1
208.6
208.7
Flat Bush Rd
US-9W
State Route 9W
Kreimer Rd
Conrail
Taylor Rd
Hawley Ln W
Gov Thomas E Dewey Thruway
New York State Thruway
Thruway
0
1,000
Feet



LEGEND

- Certified Milepost - Tenths
- Certified Milepost
- Preferred Alternative Milepost - Tenths
- Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership: TOWN NAME

Road Name: Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Selkirk to Catskill

Figure A-10

Sheet 8 of 18

Prepared by: AECOM 5/19/2021

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

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TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B207.9-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 2

GROUNDWATER DATA			
FIRST ENCOUNTERED 13.5 '			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	4.0 '
d	FROM	4.0 '	TO	40.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	02/13/2013
DATE COMPLETED	02/13/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	4 5 7 9		***BLACK SILTY M/C SAND (FILL)***		
	S-2	6 7 3 6		4.0		
5	S-3	4 2 3 4		***LIGHT BROWN CLAY, TR SILT, TR M/C SAND, TR GRAVEL***		
	S-4	10 11 12 10		8.0		
10	S-5	9 9 8 9			33.7	
15	S-6	6 5 5			40.7	
20	S-7	10 12 10			37.8	
				LIGHT BROWN CLAY, TR SILT		
25	S-8	7 7 7			33.6	
30	S-9	8 7 8				
35	S-10	7 7 8				

DRN.	JPB
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B207.9-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	2 OF 2

DEPTH		A	B	C	DESCRIPTION	Wn	REMARKS
					LIGHT BROWN CLAY, TR SILT		
40		S-11	8 5 6		40.0		
					END OF BORING AT 40'		
45							
50							
55							
60							
65							
70							
75							

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

S.W.COLE ENGINEERING, INC.

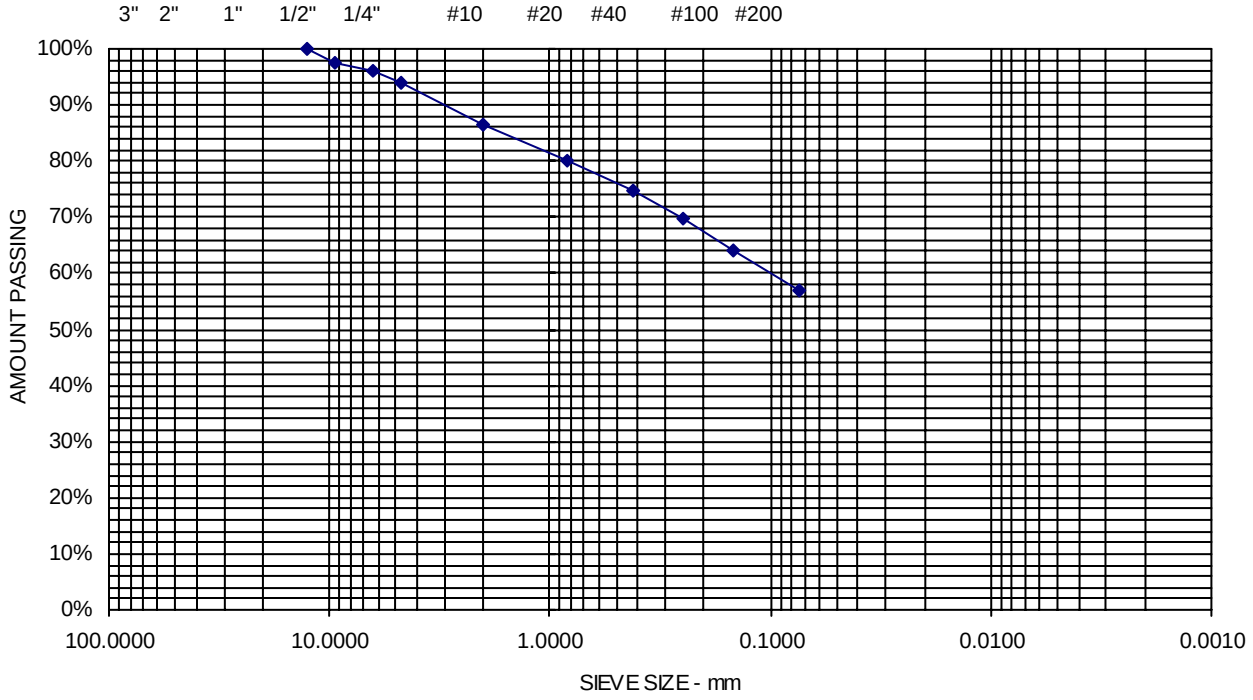
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10802S
Exploration	**B207.9-1**	Date Received	2/15/2013
Material Source	**5-10 FEET**	Date Completed	2/20/2013
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**97**	
6.3 mm	**1/4"**	**96**	
4.75 mm	**No. 4**	**94**	5.9% Gravel
2.00 mm	**No. 10**	**86**	
850 um	**No. 20**	**80**	
425 um	**No. 40**	**75**	37.1% Sand
250 um	**No. 60**	**70**	
150 um	**No. 100**	**64**	
75 um	**No. 200**	**56.9**	56.9% Fines

GRAY SAND AND SILT SOME GRAVEL (ML)



Comments: MOISTURE CONTENT = 24.7%

Sheet

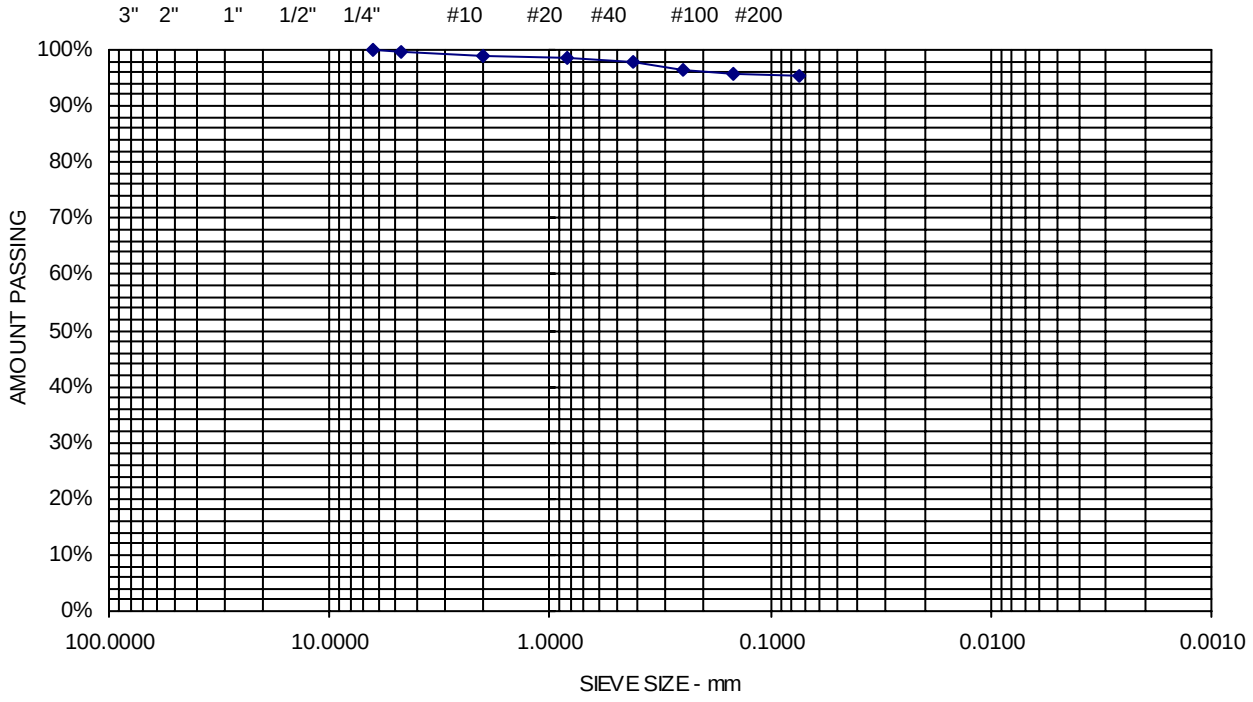
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10803S
Exploration	**B207.9-1**	Date Received	2/15/2013
Material Source	**15-30 FEET**	Date Completed	2/20/2013
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0.5% Gravel
2.00 mm	**No. 10**	**99**	
850 um	**No. 20**	**99**	
425 um	**No. 40**	**98**	4.1% Sand
250 um	**No. 60**	**96**	
150 um	**No. 100**	**96**	
75 um	**No. 200**	**95.5**	95.5% Fines

BROWN SILTY CLAY TRACE SAND AND GRAVEL (CL)



Comments: MOISTURE CONTENT = 33.2%

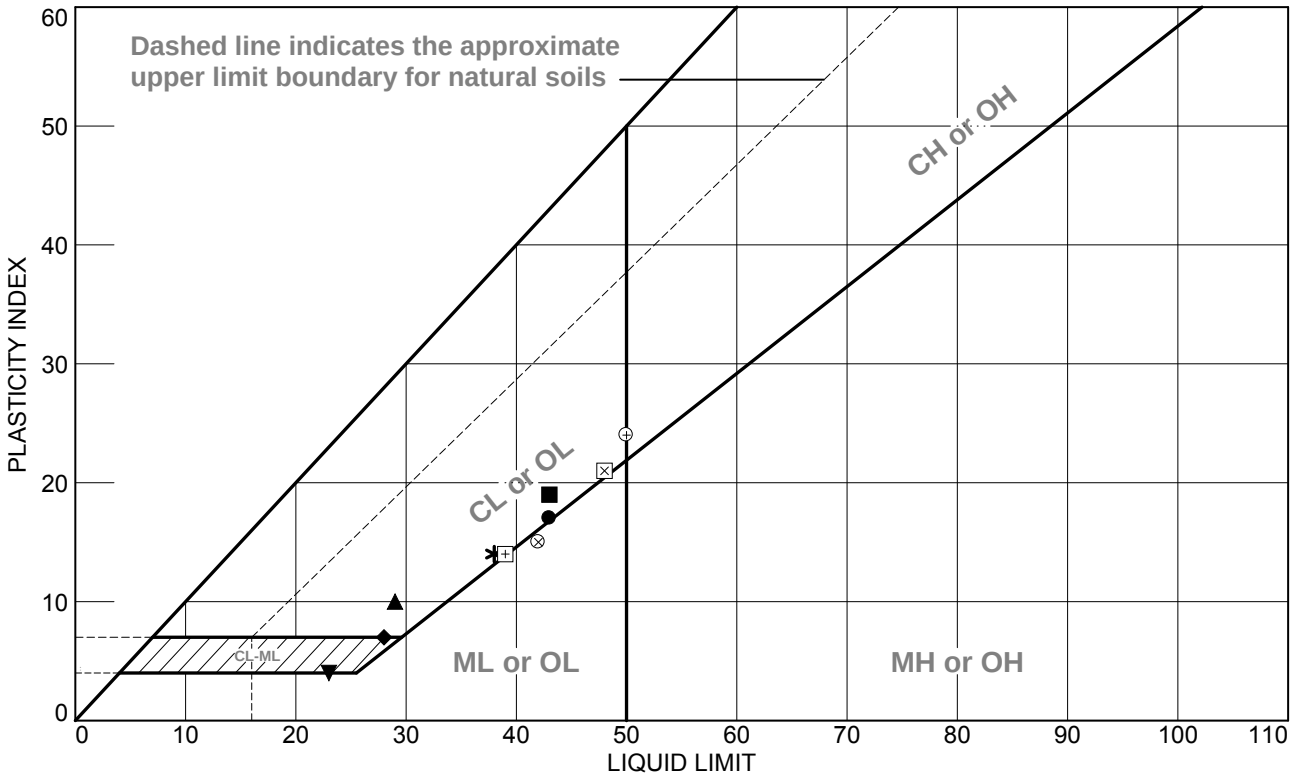
Sheet

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-2	2.0-4.0														
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	31.0	93.5	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	22.3	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	33.1	91.3	-	-
A207.0-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	23.7	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	31.5	-	-	-
B207.9-1	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	33.7	-	-	-
	S-6	13.5-15.0	ML	-	-	-	-	42	27	15	0.9	-	40.7	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	37.8	-	-	-
	S-8	23.5-25.0	-	16.3		9.6	74.1	-	-	-	-	2.77	33.6	-	-	-
B208.2-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	35.0	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

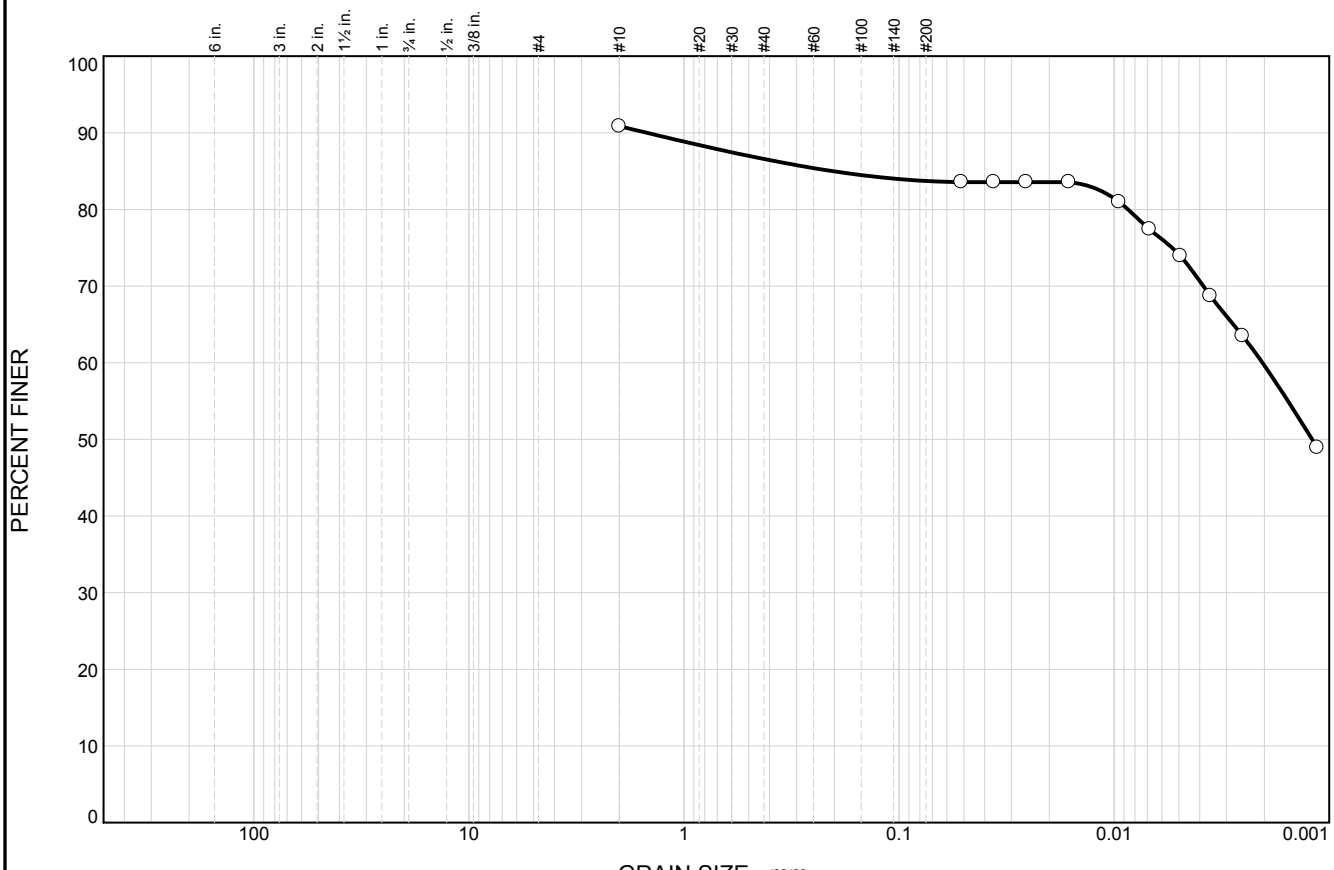
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B201.9-1	S-7	18.5-20.0 FT	27.5	26	43	17	CL
■	B202.1-1	S-7	18.5-20.0 FT	43.9	24	43	19	CL
▲	B203.45-1	S-6	13.5-15.0 FT	30.0	19	29	10	CL
◆	B203.5-1	S-2	2.0-4.0 FT	13.7	21	28	7	CL-ML
▼	B203.5-1	S-6	13.5-15.0 FT	16.7	19	23	4	CL-ML
✳	B204.2-1	S-4 & S-5	6.0-10.0 FT	22.9	24	38	14	CL
⊕	B204.7-1	S-3, S-4, & S-5	4.0-10.0 FT	30.5	26	50	24	CL/CH
⊞	B204.7-1	S-8	23.5-25.0 FT	24.3	25	39	14	CL
⊗	B207.9-1	S-6	13.5-15.0 FT	40.7	27	42	15	ML

TRC Engineers, Inc.
Mt. Laurel, NJ

Client: TRANSMISSION DEVELOPERS INC.
Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

Project No.: 195651 **Figure** 4

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○					4.3	2.9	9.6	74.1

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2034	0.0020	0.0012					

Material Description	USCS	AASHTO
○ BROWN CLAY, TR SILT, TR F/M/C SAND, TR F/ GRAVEL		

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B207.9-1 **Depth:** 23.5-25.0 FT **Sample Number:** S-8

Remarks:
○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 89

Tested By: TBT 02/26/13 **Checked By:** JPB 03/12/13

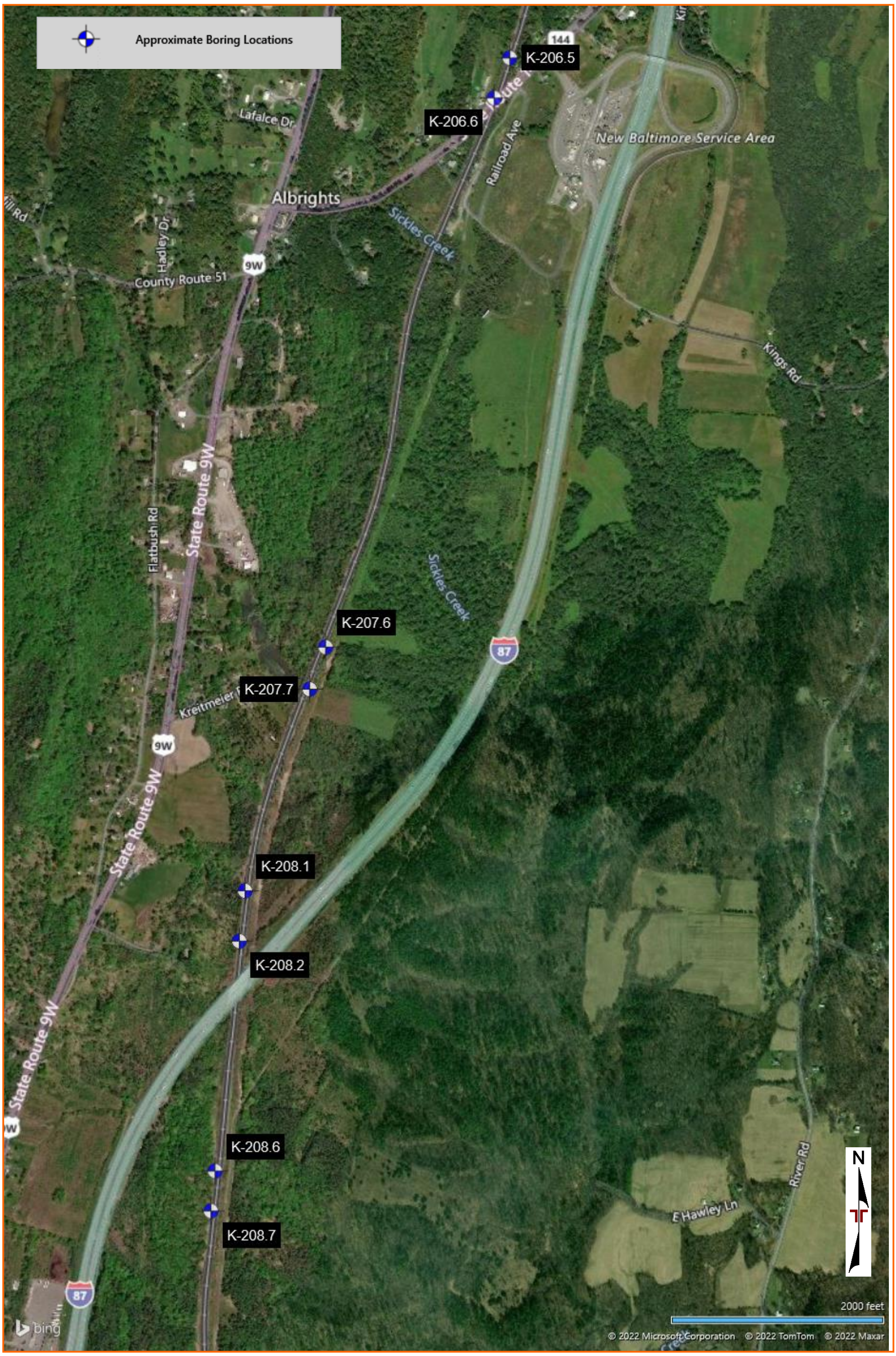


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-208.1

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.4091° Longitude: -73.8182°

Surface Elev.: 159.1 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - SILT AND CLAY, organics noted, brown, medium stiff	16	WOH-3-4-5 N=7			
2.0	157	**LEAN CLAY (CL)**, gray, soft to very stiff	10	6-6-6-7 N=12			
5			15	7-7-8-8 N=15			
			18	7-8-8-10 N=16			
			18	12-10-10-8 N=20			
10			23	4-4-5-6 N=9	35.1		
15			26	3-3-5-5 N=8			
20			17	2-3-4-5 N=7			
25		grades gray	24	3" Split Spoon With Ring Samplers	35.6	39-22-17	94

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: LC/MO
Hammer Efficiency Summary:
Energy Transfer Ratio: 86.9% +/-2.2%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-10-2022 | Boring Completed: 03-14-2022

Drill Rig: Mobile B-57 | Driller: S. Kahn

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-208.1

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.4091° Longitude: -73.8182°

Surface Elev.: 159.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), gray, soft to very stiff *(continued)*								
		30						
				24	WOH-1-2-2 N=3			
		35						
				24	3" Split Spoon With Ring Samplers	29.5	36-24-12	92
		40						
				24	1-2-3-3 N=5			
		45						
				24	2-3-4-8 N=7			
				24	7-11-9-7 N=20			
Sand and rock fragments from 48' to 50'								
50.0	109	50						
Boring Terminated at 50 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: LC/MO
Hammer Efficiency Summary:
Energy Transfer Ratio: 86.9% +/-2.2%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-10-2022 | Boring Completed: 03-14-2022

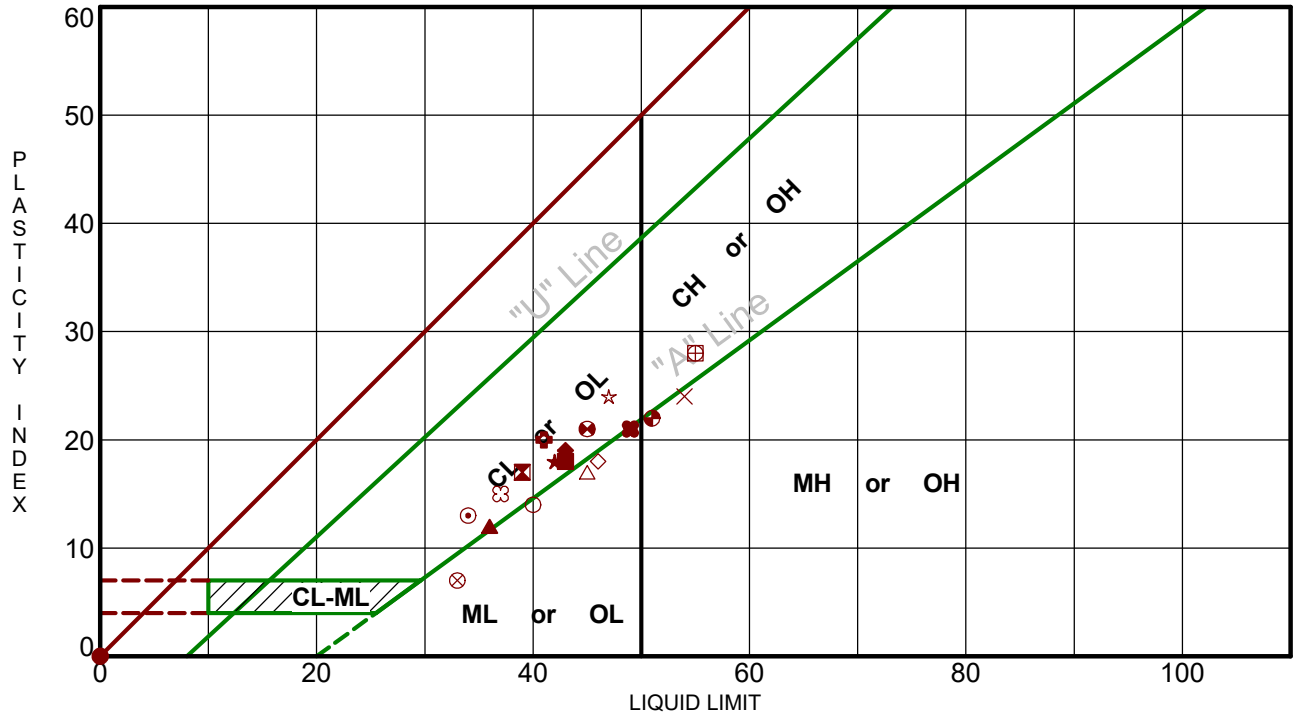
Drill Rig: Mobile B-57 | Driller: S. Kahn

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-207.7	25 - 25.8	NP	NP	NP	21.3	SM	SILTY SAND with GRAVEL
⊠	K-208.1	25 - 27	39	22	17	93.7	CL	LEAN CLAY
▲	K-208.1	35 - 37	36	24	12	91.9	CL	LEAN CLAY
★	K-208.2	15 - 17	42	24	18	83.9	CL	LEAN CLAY with SAND
⊙	K-208.2	25 - 27	34	21	13	89.4	CL	LEAN CLAY
✿	K-208.2	35 - 37	41	21	20	97.6	CL	LEAN CLAY
○	K-208.6	13 - 14.5	40	26	14	73.8	ML	SILT with SAND
△	K-208.7	8 - 10	45	28	17	43.8	SM	SILTY SAND with GRAVEL
⊗	K-208.7	18 - 20	33	26	7	92.8	ML	SILT
⊕	K-210.1	15 - 17	55	27	28	62.6	CH	SANDY FAT CLAY
□	K-210.1	38 - 40	55	27	28	65.8	CH	SANDY FAT CLAY
✖	K-210.2	20 - 22	45	24	21	29.0	SC	CLAYEY SAND
◕	K-210.2	30 - 32	51	29	22	73.8	MH	ELASTIC SILT with SAND
☆	K-211.2	10 - 12	47	23	24	69.7	CL	SANDY LEAN CLAY
✿	K-211.2	19 - 21	37	22	15	88.7	CL	LEAN CLAY
■	K-211.3	10 - 12	43	25	18	59.3	CL	SANDY LEAN CLAY with GRAVEL
◆	K-211.3	20 - 22	43	24	19	95.4	CL	LEAN CLAY
◇	K-211.4	10 - 12	46	28	18	65.1	ML	SANDY SILT
×	K-211.4	28 - 30	54	30	24	84.2	MH	ELASTIC SILT with SAND
✖	K-211.6	6 - 8	49	28	21	68.0	ML	SANDY SILT

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

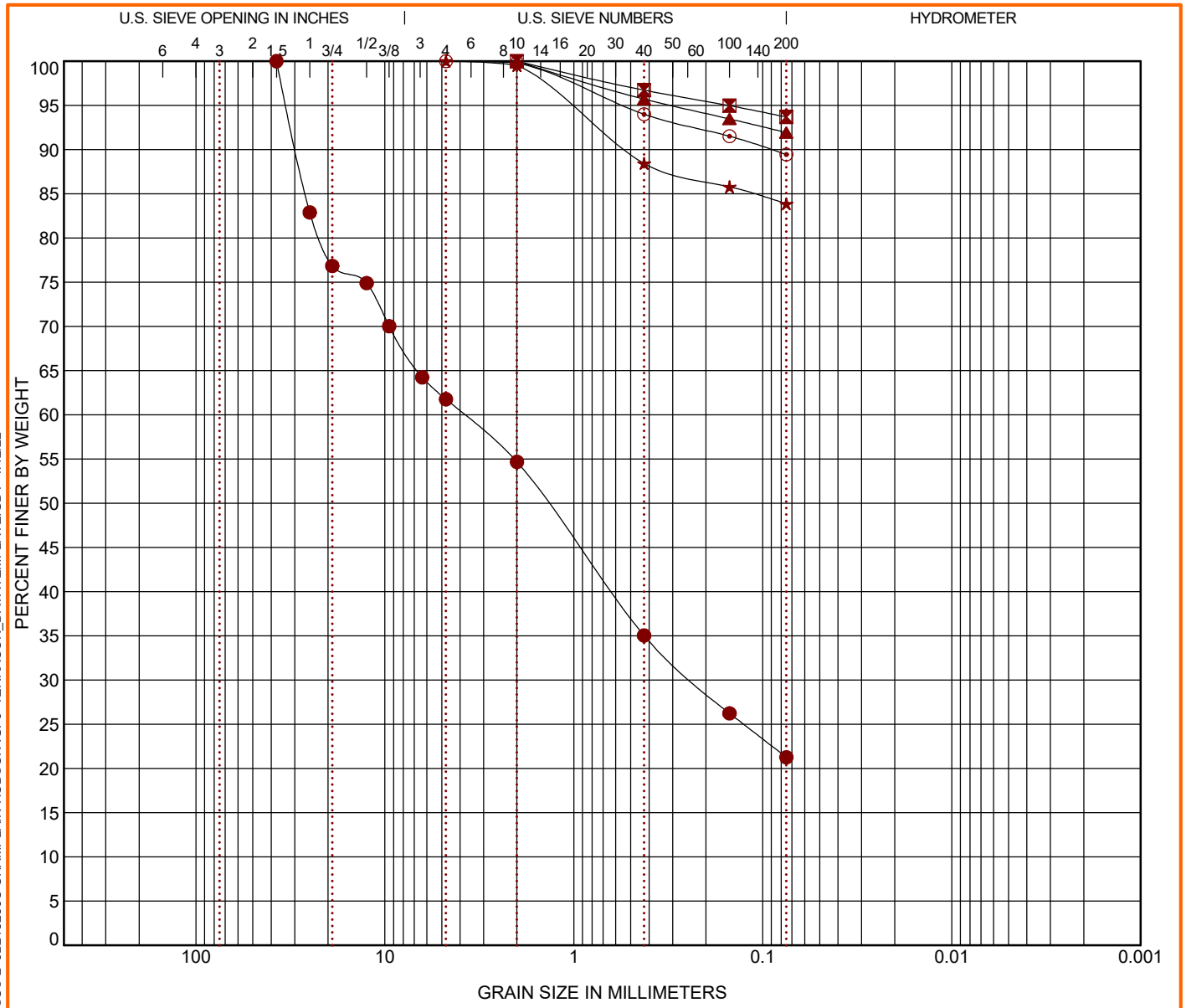
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/13/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	K-207.7	25 - 25.8	SILTY SAND with GRAVEL (SM)	4.2	NP	NP	NP		
⊠	K-208.1	25 - 27	LEAN CLAY (CL)	35.6	39	22	17		
▲	K-208.1	35 - 37	LEAN CLAY (CL)	29.5	36	24	12		
★	K-208.2	15 - 17	LEAN CLAY with SAND (CL)	33.4	42	24	18		
⊙	K-208.2	25 - 27	LEAN CLAY (CL)	35.3	34	21	13		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-207.7	25 - 25.8	37.5	3.832	0.234		0.0	38.2	40.5		21.3	
⊠	K-208.1	25 - 27	2				0.0	0.0	6.3		93.7	
▲	K-208.1	35 - 37	2				0.0	0.0	8.1		91.9	
★	K-208.2	15 - 17	4.75				0.0	0.0	16.1		83.9	
⊙	K-208.2	25 - 27	4.75				0.0	0.0	10.6		89.4	

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

Kiewit

MEMORANDUM

DATE: November 11, 2022

TO: Todd Kilduff; Kilduff Underground Engineering, Inc. MKH

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp.
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data – Segment 10 – Package 6 – HDD Crossing 99A
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 99A is STA 60503+00 (42.40639° N, 73.81914° W)

The geotechnical data at this HDD crossing is attached. The available data is taken from the previous investigation by TRC and the recent investigation by Terracon, referenced below.

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 177.6-228.2, dated March 15, 2013.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Package 6, Selkirk to Catskill, Rev-1, dated June 28, 2022.

Contact us if you have questions or require additional information.

HDD 99A
Borings K-208.2, B208.2-1,
B208.3-1, B208.5-1, K-208.6, K-208.7
Segment 10 - Design Package 6

CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	B210.0-1	1293021.1	676353.2	109.9
	B210.4-1	1291223.1	676583.0	120.5
	B211.2-1	1286509.8	676960.2	132.6
	B211.5-1	1285068.8	677013.1	140.7
	B211.7-1	1284088.5	676965.4	141.5
	B212.0-1	1282469.0	676857.5	138.9
	B212.2-1	1281498.0	676590.5	130.8
	B214.6-1	1269721.4	672670.9	124.9
	B216.1-1	1262073.1	670916.0	127.0
	B216.4-1	1260344.1	670520.5	128.3
	B216.6-1	1259315.9	670290.2	129.8
	B219.5-1	1244816.4	666093.7	130.4
AECOM**	SC-1A	1348656.7	679220.0	176.4
	SC-2A	1326692.2	678361.5	178.9
	SC-2C	1305133.1	676877.4	160.6

Notes:
- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.

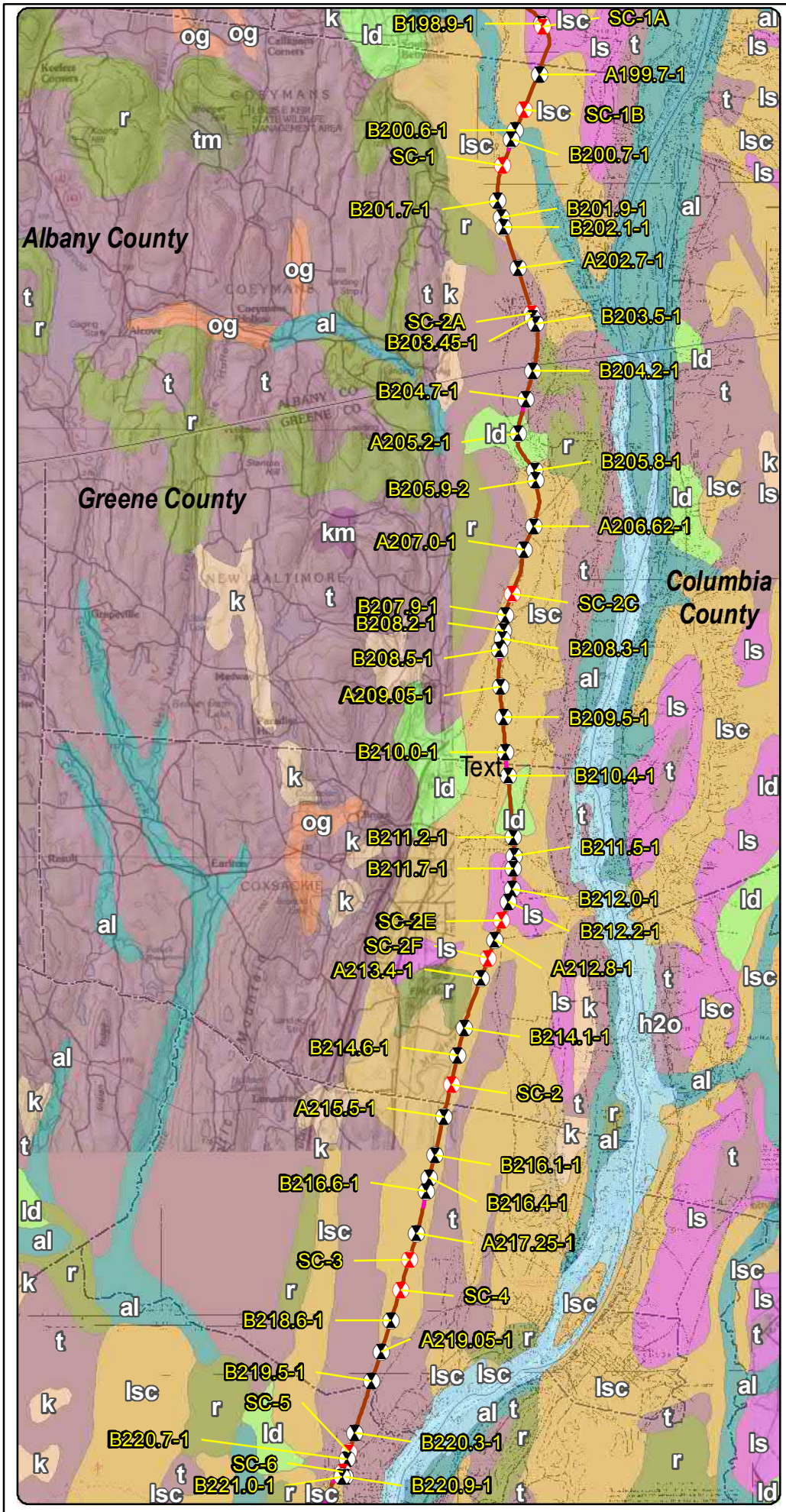
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

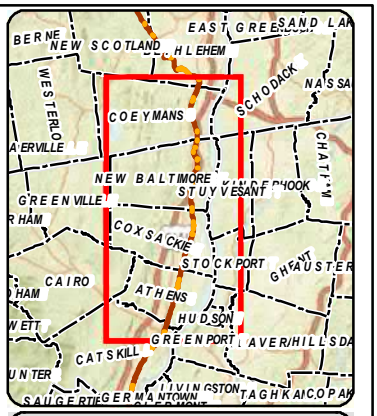
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:

AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- h2o - Water
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- r - Bedrock
- t - Till
- tm - Till moraine

1 0.5 0 1 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

Prepared on 5/3/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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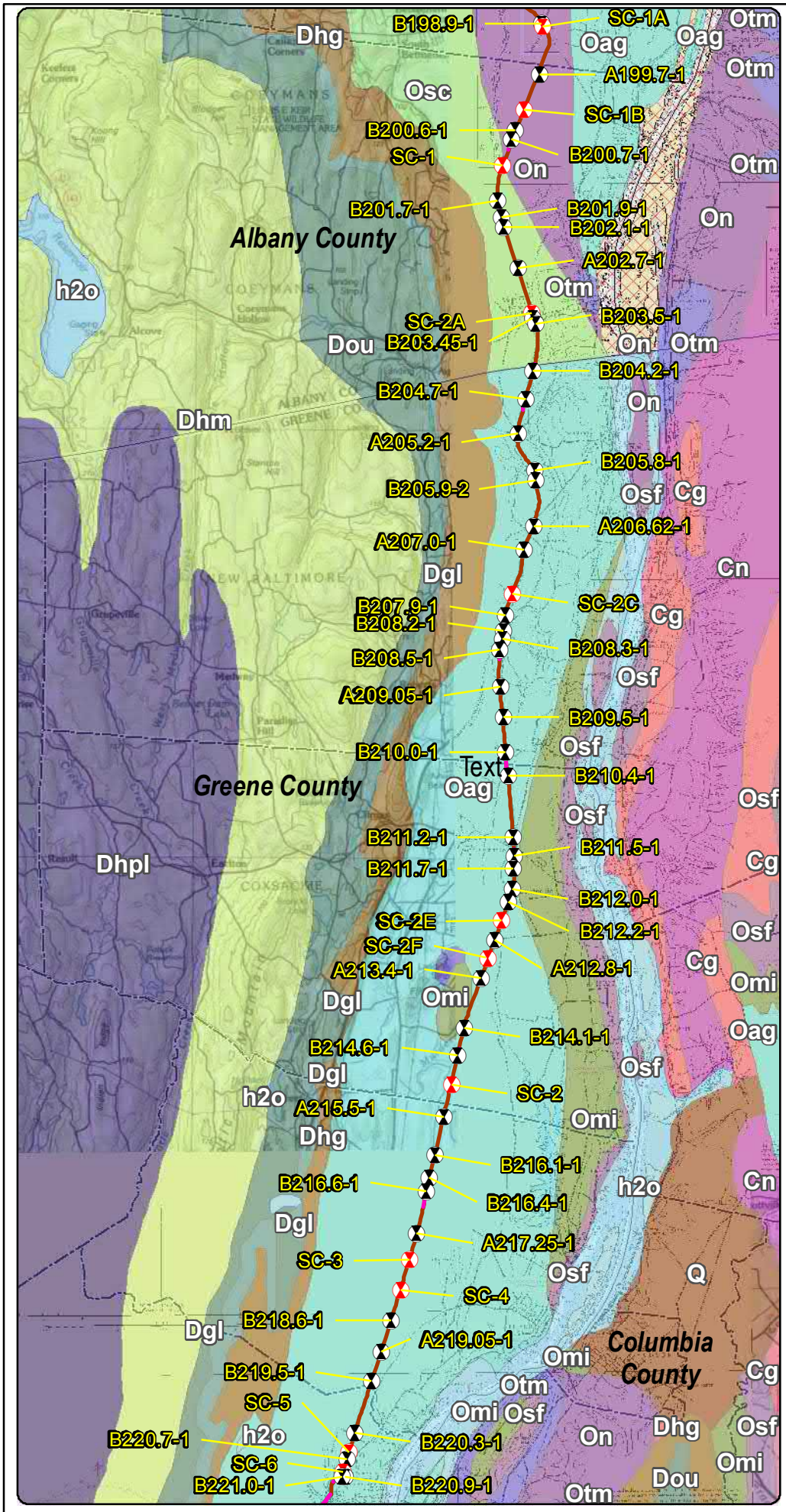

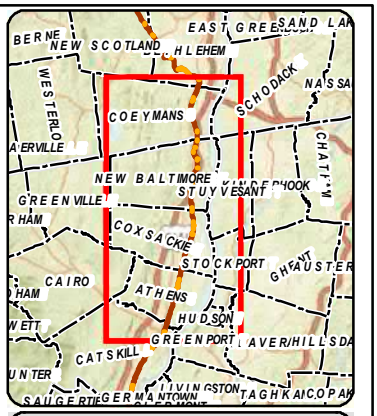

LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cg - Germantown Formation
- Cn - Nassau Formation
- Dgl - Glenerie Formation
- Dhg - Port Ewen Formation
- Dhm - Undiff Lower Hamilton Group
- Dhpl - Plattekill Formation
- Dou - Onondaga Limestone
- No Label
- Oag - Austin Glen Form (graywacke, shale)
- Omi - Mount Merino Formation
- On - Normanskill Shale
- Osc - Schenectady Formation
- Osf - Stuyvesant Falls Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- h2o - Water

* Schenectady Formation includes: graywacke, sandstone, siltstone, shale

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Selkirk to Catskill Figure 4-10

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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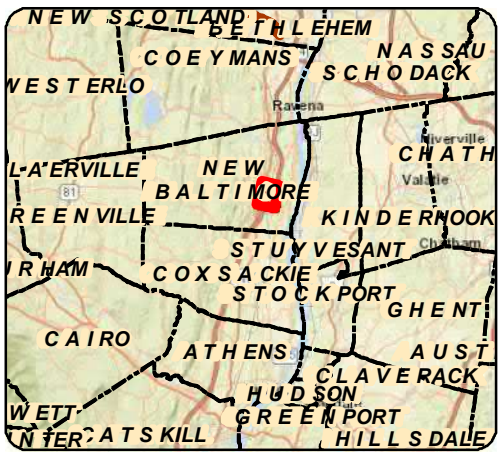
207.5
207.6
SC-2C
207.7
207.8
207.9
B207.9-1
208.1
NEW BALTIMORE
208.2
B208.2-1
208.3
B208.3-1
208.4
B208.5-1
208.6
208.7
Flat Bush Rd
US-9W
State Route 9W
Kreimer Rd
Conrail
Taylor Rd
Hawley Ln W
Gov Thomas E Dewey Thruway
New York State Thruway
Thruway
0
1,000
Feet



LEGEND

- Certified Milepost - Tenths
- Certified Milepost
- Preferred Alternative Milepost - Tenths
- Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership: TOWN NAME

Road Name: Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Selkirk to Catskill

Figure A-10

Sheet 8 of 18

Prepared by: AECOM 5/19/2021

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

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TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B208.2-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED 13.5 '			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	4.0 '
d	FROM	4.0 '	TO	25.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	02/12/2013
DATE COMPLETED	02/12/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	6 6 7 9		***BLACK ROCK FRAGMENTS, SM SILT, TR TO SM SAND (FILL)***		
	S-2	5 7 9 4		4.0		
5	S-3	7 5 3 4		***BLACK SILTY M/C SAND (FILL)*** 6.0		
	S-4	7 9 8 10			35.0	
10	S-5	8 7 5 6				
15	S-6	7 6 5		***LIGHT BROWN CLAY, TR TO SM SILT, TR ROCK FRAGMENTS***	39.2	
20	S-7	11 17 14			43.3	
25	S-8	7 6 5		25.0		
				END OF BORING AT 25'		
30						
35						

DRN.	JPB
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B208.3-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED DRY			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	4.0 '
d	FROM	4.0 '	TO	25.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	02/13/2013
DATE COMPLETED	02/13/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	4 13 7 8		***BLACK AND BROWN CLAY, SM F/M SAND. SM ROCK FRAGMENTS (FILL)*** 2.0		
	S-2	9 7 6 7		***BLACK ROCK FRAGMENTS, SM SILT (FILL)***		
5	S-3	9 7 9 8		6.0		
	S-4	8 9 10 9		***BROWN CLAY, TR TO SM F/M SAND*** 8.0		
10	S-5	7 9 10 8			29.9	
15	S-6	4 6 5		***GRAY-BROWN CLAY***		
20	S-7	6 4 5			30.2	
25	S-8	4 5 4		25.0	31.0	
				END OF BORING AT 25'		
30						
35						

DRN.	JPB
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B208.5-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED DRY			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	4.0 '
d	FROM	4.0 '	TO	30.0 '
c_2	FROM	30.0 '	TO	35.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	02/06/2013
DATE COMPLETED	02/07/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	1 2 3 5		***BROWN CLAYEY SILT*** 2.0		
	S-2	4 9 10 10			31.7	
5	S-3	6 11 12 12				
	S-4	12 15 17 15			35.9	
10	S-5	13 14 15 14		***BROWN CLAY, TR SILT***		
15	S-6	5 4 5			35.7	
				18.5		
20	S-7	6 4 5			33.0	
	S-8	50/0.1		***GRAY SILT, SM CLAY*** 23.5		
25	S-9	50/0		***GRAY GRAVEL-SIZED ROCK FRAGMENTS, TR SILT, TR F/ SAND (DECOMPOSED ROCK)***		
30				30.0		
35	R-1	REC =100% RQD =62%		***DARK GRAY, MODERATELY WEATHERED, MEDIUM HARD GRAYWACKE, CLOSE TO MODERATELY CLOSE, 45 TO 90 DEGREE FRACTURES*** 35.0		SEVERELY WEATHERED, BROKEN ROCK SEAM AT 31-33 FT

END OF BORING AT 35'

DRN.	JPB
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

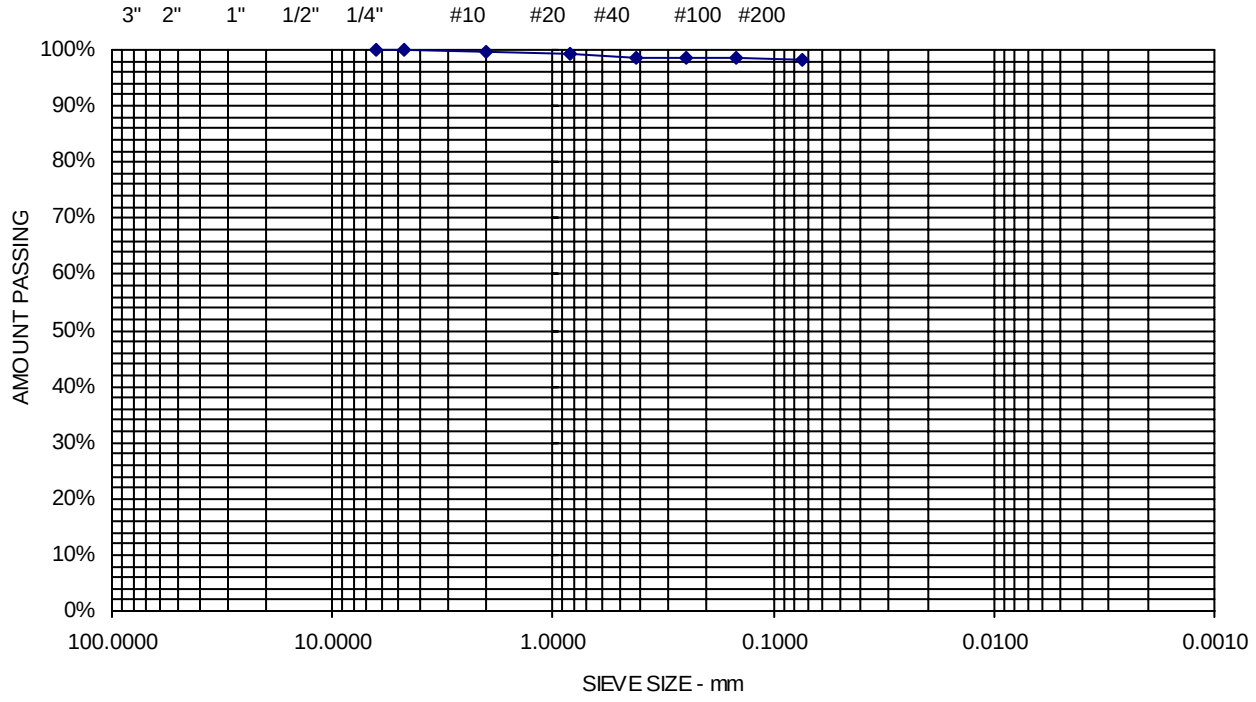
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10842S
		Date Received	3/1/2013
		Date Completed	3/6/2013
Material Source	**B208.2-1, 0.0' - 10.0'**	Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**99**	
850 um	**No. 20**	**99**	
425 um	**No. 40**	**99**	2% Sand
250 um	**No. 60**	**99**	
150 um	**No. 100**	**99**	
75 um	**No. 200**	**98.0**	98% Fines

BROWN SILTY CLAY TRACE SAND (CL)



Comments: MOISTURE CONTENT = 33.8%

Sheet

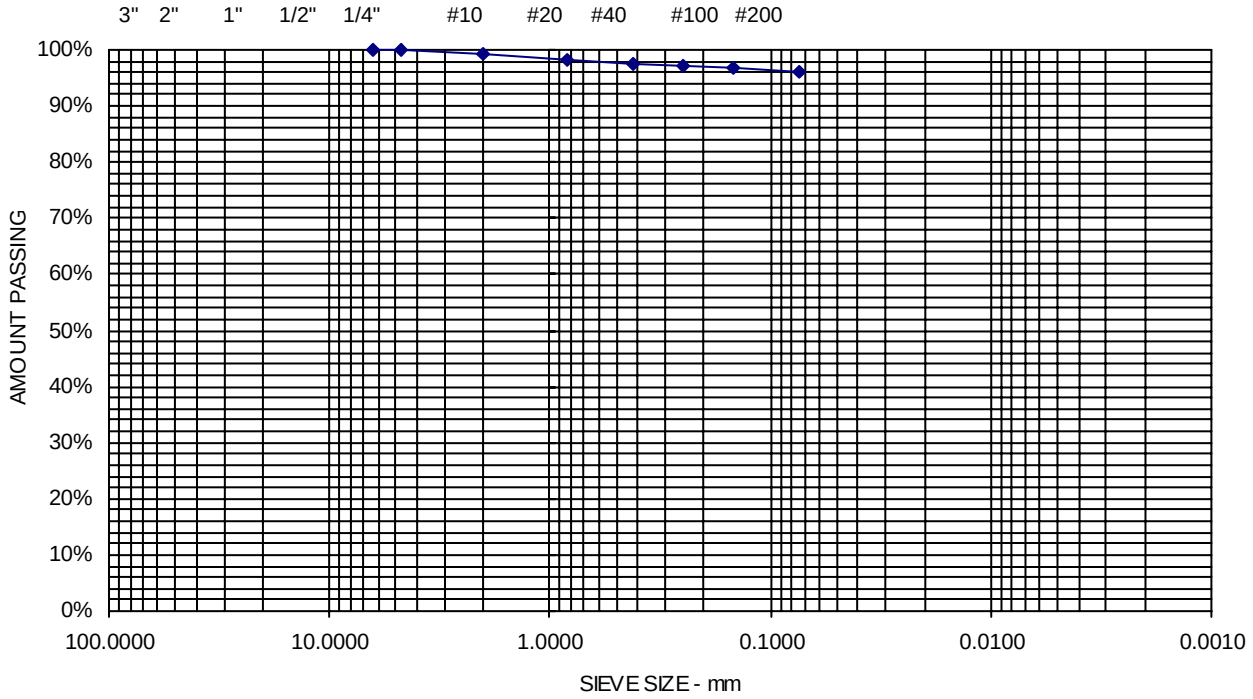
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10804S
Exploration	**B208.2-1**	Date Received	2/15/2013
Material Source	**10-25 FEET**	Date Completed	2/20/2013
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**99**	
850 um	**No. 20**	**98**	
425 um	**No. 40**	**98**	3.9% Sand
250 um	**No. 60**	**97**	
150 um	**No. 100**	**97**	
75 um	**No. 200**	**96.1**	96.1% Fines

BROWN CLAY AND SILT TRACE SAND (ML)



Comments: MOISTURE CONTENT = 33.9%

Sheet

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

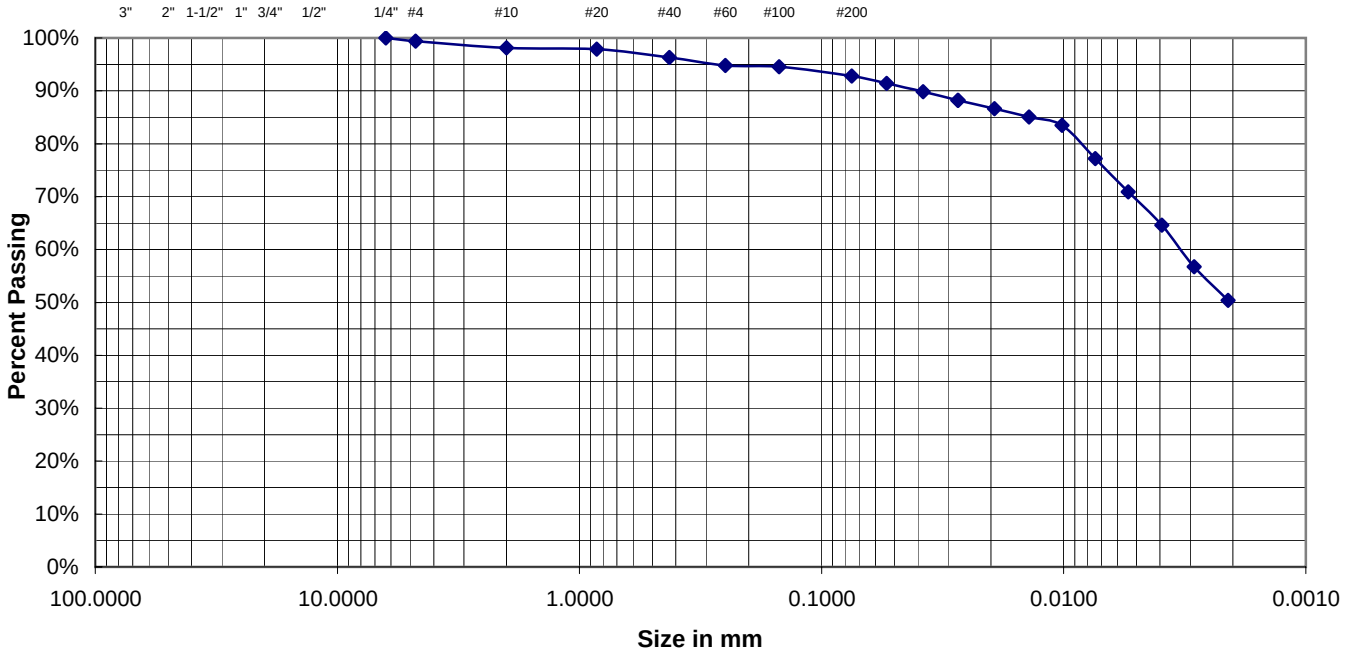
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10805S
Material Type	BROWN SILTY CLAY SOME SAND TRACE GRAVEL (CL)	Date Received	2/15/2013
Material Source	5.0'-10.0'	Date Completed	2/21/2013
Exploration	B-208.3-1	Tested By	MJS

Sieve Analysis

Sieve Size	Standard Designation (mm)	Amount Passing (%)
3"	75	**100**
2"	50	**100**
1-1/2"	37.5	**100**
1"	25	**100**
3/4"	19	**100**
1/2"	12.5	**100**
1/4"	6.3	**100**
No. 4	4.75	**99**
No. 10	2	**98**
No. 20	0.85	**98**
No. 40	0.425	**96**
No. 60	0.25	**95**
No. 100	0.15	**95**
No. 200	0.075	**92.8**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.054	91.4
0.038	89.8
0.027	88.2
0.019	86.7
0.014	85.1
0.010	83.5
0.007	77.2
0.005	70.9
0.004	64.6
0.003	56.7
0.002	50.4



Particle Distribution	
Gravel, retained on #4	0.6%
Sand, passing #4 and retained on #200	6.6%
Fines, 0.074 to 0.005	23.5%
Clay Fraction, <0.005	69.3%

Comments: MOISTURE CONTENT = 28.3%

Chad B. Michaud

Reviewed By

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

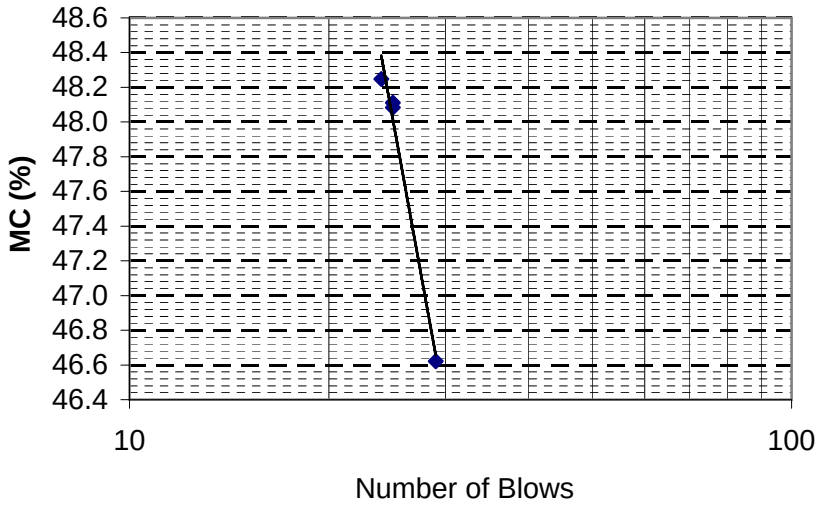
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10805S
Soil Description	BR SILTY CLAY SOME SAND TRACE GRAVEL (CL)	Date Received	2/15/2013
Soil Source	B-208.3-1, 5.0'-10.0'	Date Completed	2/20/2013
		Tested By	JJR

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
4%	48	25	23

LIQUID LIMIT CURVE



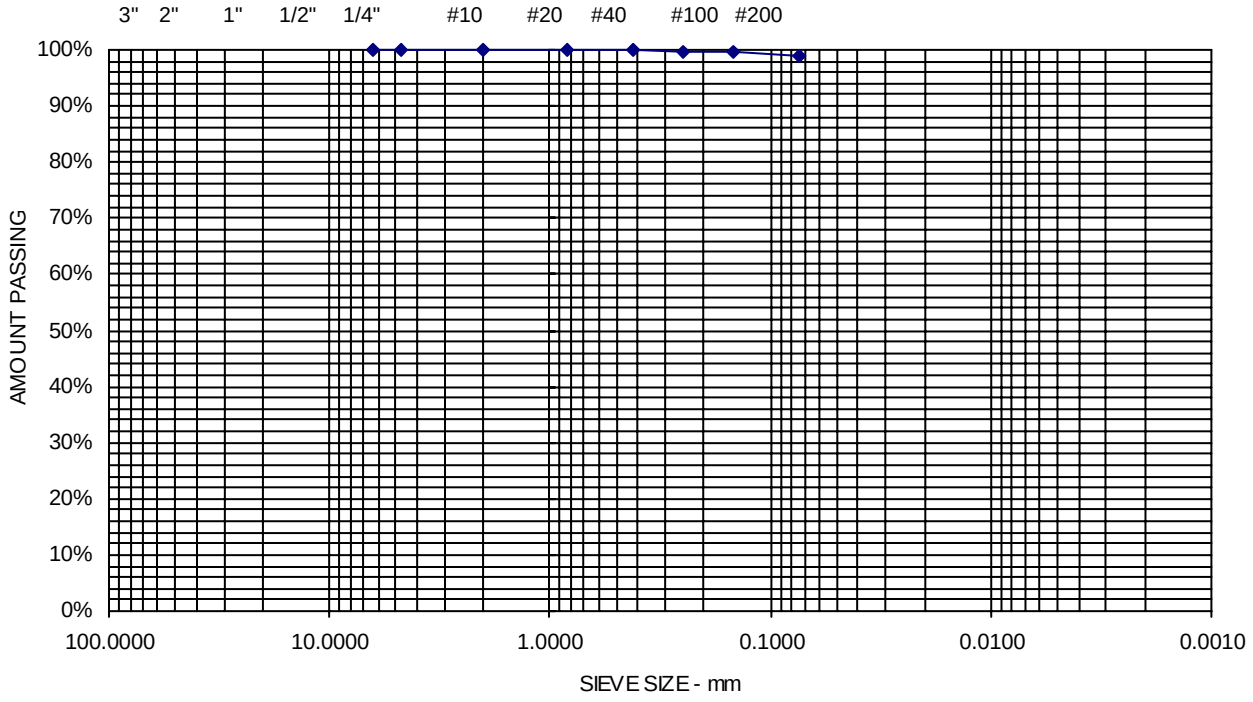
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10806S
Exploration	**B208.3-1**	Date Received	2/15/2013
Material Source	**15-25 FEET**	Date Completed	2/20/2013
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	1.1% Sand
250 um	**No. 60**	**100**	
150 um	**No. 100**	**100**	
75 um	**No. 200**	**98.9**	98.9% Fines

BROWN SILTY CLAY TRACE SAND (CL)



Comments: MOISTURE CONTENT = 34.0%

Sheet

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

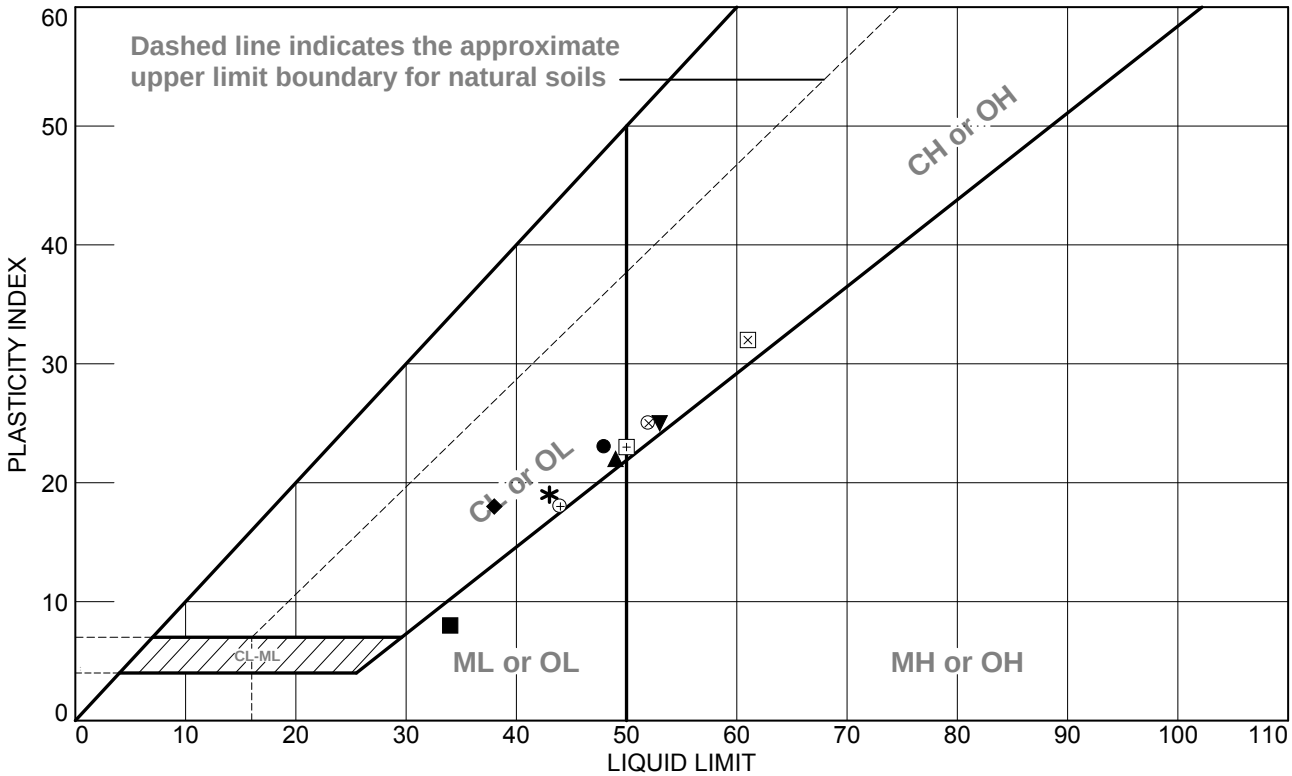
SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-2	2.0-4.0														
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	31.0	93.5	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	22.3	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	33.1	91.3	-	-
A207.0-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	23.7	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	31.5	-	-	-
B207.9-1	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	33.7	-	-	-
	S-6	13.5-15.0	ML	-	-	-	-	42	27	15	0.9	-	40.7	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	37.8	-	-	-
	S-8	23.5-25.0	-	16.3		9.6	74.1	-	-	-	-	2.77	33.6	-	-	-
B208.2-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	35.0	-	-	-

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	39.2	-	-	-
	S-7	18.5-20.0	CL	-	-	-	-	48	27	21	0.8	-	43.3	-	-	-
B208.3-1	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	29.9	97.1	-	-
	S-7	18.5-20.0	CL	-	-	-	-	48	25	23	0.2	-	30.2	-	-	-
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	31.0	-	-	-
B208.5-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	31.7	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	35.9	88.3	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	35.7	-	-	-
	S-7	18.5-20.0	ML	-	-	-	-	34	26	8	0.9	-	33.0	-	-	-
	R-1	33.5-34.2	-	-	-	-	-	-	-	-	-	-	-	167.0	486	-
A209.05-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	22.9	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B208.3-1	S-7	18.5-20.0 FT	30.2	25	48	23	CL
■	B208.5-1	S-7	18.5-20.0 FT	33.0	26	34	8	ML
▲	B209.5-1	S-6	13.5-15.0 FT	30.9	27	49	22	CL
◆	B210.0-1	S-2	2.0-4.0 FT	20.8	20	38	18	CL
▼	B210.0-1	S-5	8.0-10.0 FT	33.7	28	53	25	CH
✱	B210.4-1	S-7	18.5-20.0 FT	30.0	24	43	19	CL
⊕	B211.2-1	S-2	2.0-4.0 FT		26	44	18	CL
⊞	B211.2-1	S-6 & S-7	13.5-20.0 FT	47.5	27	50	23	CH
⊗	B211.5-1	S-5	8.0-10.0 FT	35.9	27	52	25	CH
⊠	B211.5-1	S-8 & S-9	23.5-30.0 FT	52.1	29	61	32	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

Client: TRANSMISSION DEVELOPERS INC.
Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

Project No.: 195651 **Figure** 5

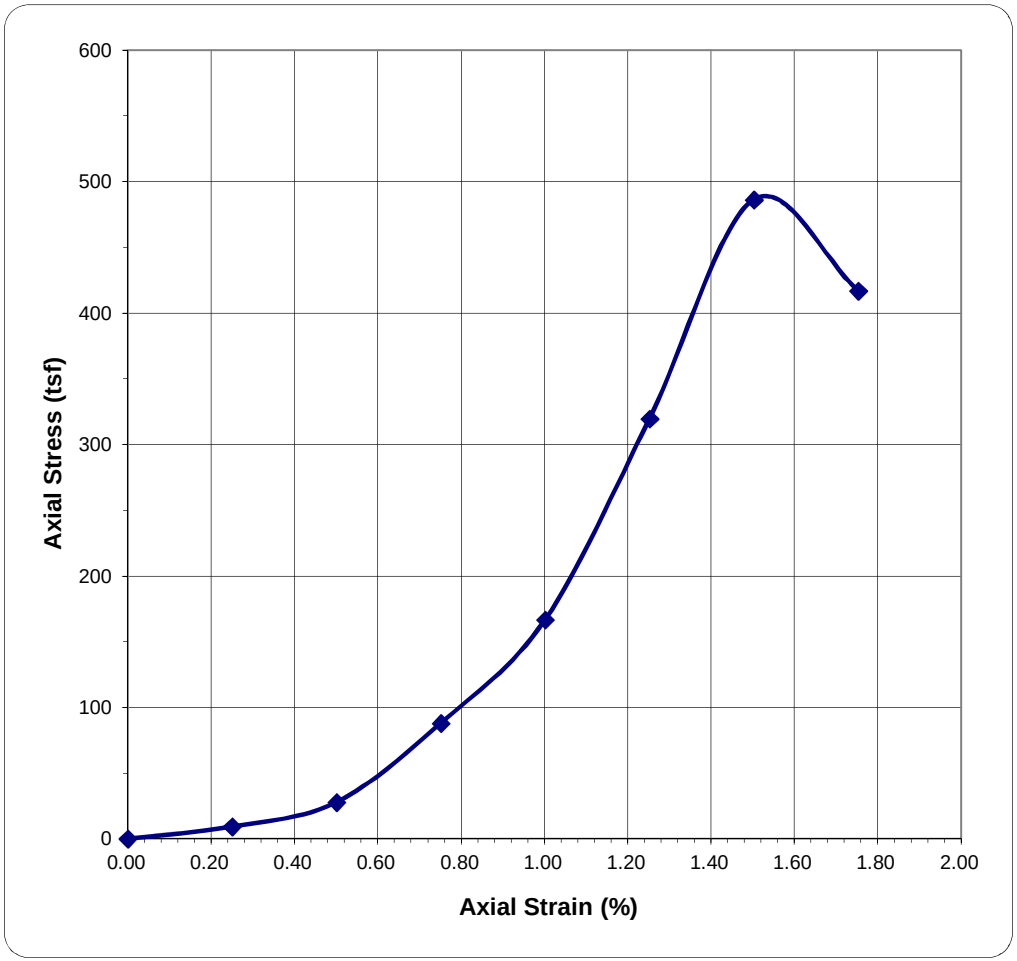
TRC Engineers, Inc.
Soil Mechanics Laboratory

Unconfined Compression Strength Test of Rock Core

Project Name:	TDI				
Project No.:	195651	**Average Sample Diameter (in.):**	1.990	**Sample Description:**	
Boring No.:	B208.5-1	**Cross Sectional Area (sq. in.)**	3.110		DARK GRAY GRAYWACKE
Sample No:	R-1	**Average Sample Height (in.):**	3.992		
Depth (ft):	33.5-34.2	**Sample Mass-Dry (g):**	544.33		
Elevation (ft):		**Unit Weight (PCF)**	167.0		

Test Data

Strain Dial (in.)	Load (lb)	Strain (%)	Stress (tsf)
0.000	0	0.00	0
0.010	400	0.25	9
0.020	1200	0.50	28
0.030	3800	0.75	88
0.040	7200	1.00	167
0.050	13800	1.25	319
0.060	21000	1.50	486
0.070	18000	1.75	417



Failure Conditions:

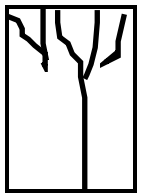


FIGURE: 150

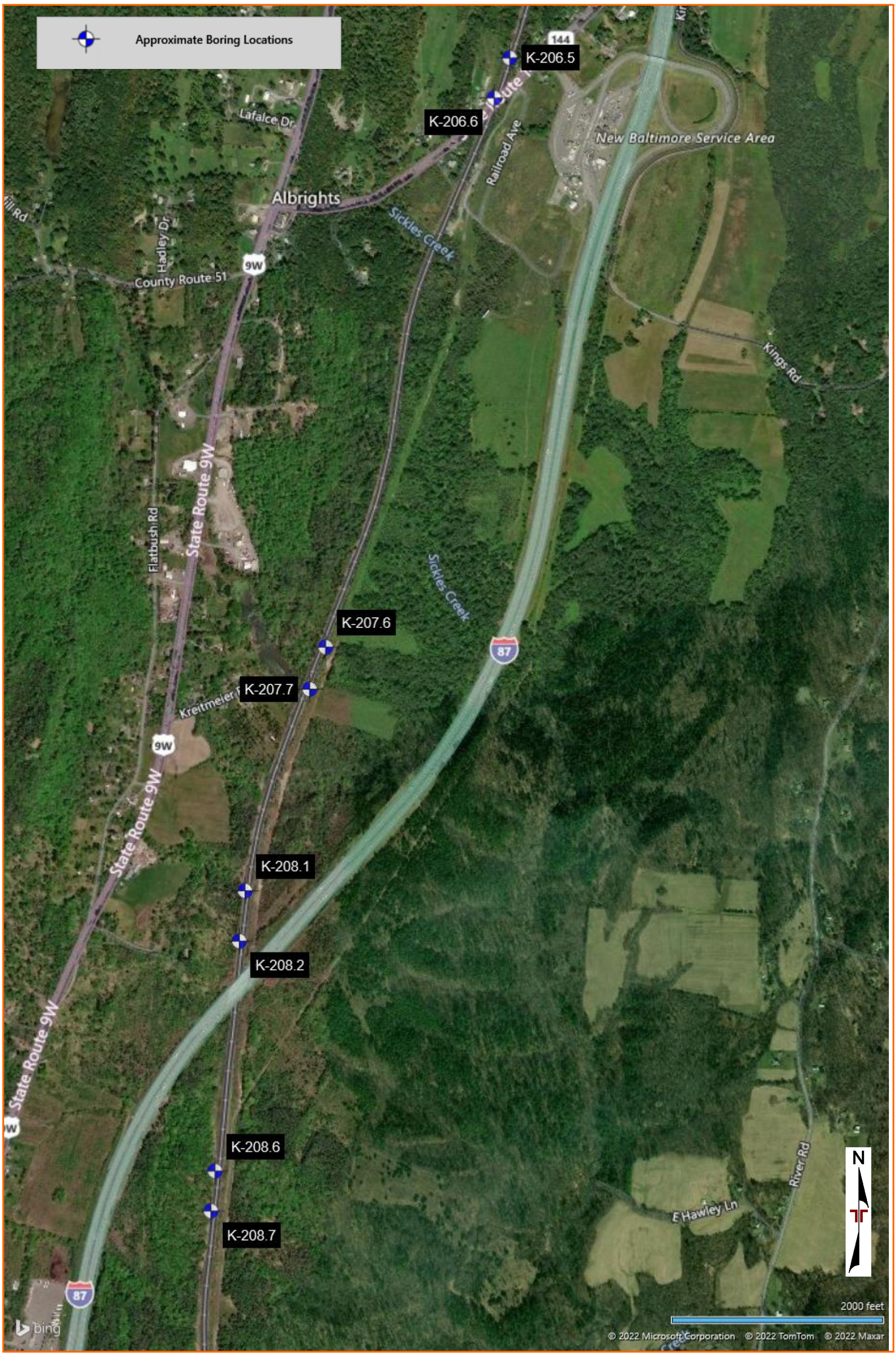


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-208.2

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.4064° Longitude: -73.8185°

Surface Elev.: 153.0 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
2.0	151	**FILL - SILTY AND CLAY**, mottled brown and gray, very soft
23.0	130	**LEAN CLAY WITH SAND (CL)**, brown and gray, soft to stiff
		LEAN CLAY (CL), gray, very soft to soft

Sample	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
	20	1-1-1-1 N=2			
	19	1-3-3-5 N=6			
	19	2-4-4-6 N=8			
	24	3-5-7-7 N=12			
	24	2-3-4-6 N=7	35.1		
	24	7-7-7-4 N=14			
	24	2-3-3-4 N=6	33.4	42-24-18	84
	24	1-2-2-3 N=4			
	24	WOH-WOH-1-1 N=1			
	24	WOH-1-2-3 3"Split Spoon With Ring Sampler	35.3	34-21-13	89

Depth (Ft.): 5, 10, 15, 20, 25

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: SL
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-10-2022 | Boring Completed: 03-11-2022

Drill Rig: CME 750x | Driller: S. Morey

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-208.2

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.4064° Longitude: -73.8185°

Surface Elev.: 153.0 (Ft.)

DEPTH | ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), gray, very soft to soft *(continued)*								
	30			24	WOH-WOH-WOH-2			
				24	WOH-WOH-2-2 N=2			
	35			24	WOH-WOH-2-3 3"Split Spoon With RIng Sampler	43.9	41-21-20	98
	40			24	WOH-WOH-WOH-WOH			
	45			24	WOH-WOH-WOH-WOH			
	50			24	WOH-WOH-WOH-WOH	39.3		
52.0	101							
Boring Terminated at 52 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: SL
Hammer Efficiency Summary:

Energy Transfer Ratio: 91.3% +/-2.7%

Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-10-2022 | Boring Completed: 03-11-2022

Drill Rig: CME 750x | Driller: S. Morey

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-208.6

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.4013° Longitude: -73.8191°

Surface Elev.: 149.5 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - LEAN CLAY WITH GRAVEL, brown, medium dense	12	5-12-3-4 N=15			
				9-50/1"			
3.0	146.5	**FILL - CORED THROUGH BOULDER**					
8.0	141.5	**FILL - SILTY SAND WITH GRAVEL**, cored through dense fill from 8 to 13 feet, brown					
13.0	136.5	**FILL - SILT WITH SAND**, brown, medium dense	16	3-9-7-50/0" N=16	31.2	40-26-14	74
14.5	135	**FILL - LEAN CLAY WITH GRAVEL**, dense fill with cobbles					
				REC= 100% RQD = 86%			
23.8	126	**GRAYWACKE**, slightly weathered, close to moderate fractured, good RQD, gray, Bottom 15" of core was competent bedrock. REC and RQD numbers based on recovered rock.					
25.0	124.5	**GRAYWACKE**, slightly weathered, close to wide fractured, good RQD, gray		REC= 100% RQD = 70%			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by LC
Hammer Efficiency Summary:
Energy Transfer Ratio: 89.1% +/- 4.4%
Hammer Efficiency Correction (CE): 1.49

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-11-2022
Boring Completed: 03-14-2022
Drill Rig: Mobile B-57
Driller: L. Spicher
Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-208.6

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.4013° Longitude: -73.8191°

Surface Elev.: 149.5 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS
		GRAYWACKE, slightly weathered, close to wide fractured, good RQD, gray *(continued)*	
30.0	119.5	**GRAYWACKE**, slightly weathered, close to wide fratcured, excellent RQD, gray	REC= 100% RQD = 97%
35.0	114.5	**GRAYWACKE**, slightly weathered, close to wide fractured, excellent RQD, gray	REC= 95% RQD = 90%
40.0	109.5	**GRAYWACKE**, slightly weathered, close to wide fractured, good RQD, gray	REC= 100% RQD = 78%
45.0	104.5	**GRAYWACKE**, slightly weathered, close to wide fractured, excellent RQD, gray	REC= 100% RQD = 92%
50.0	99.5	***Boring Terminated at 50 Feet***	

GRAPHIC LOG | DEPTH (Ft.) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE | RECOVERY (In.) | FIELD TEST RESULTS | WATER CONTENT (%) | ATTERBERG LIMITS LL-PL-PI | PERCENT FINES

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by LC
Hammer Efficiency Summary:
Energy Transfer Ratio: 89.1% +/- 4.4%
Hammer Efficiency Correction (CE): 1.49

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-11-2022 | Boring Completed: 03-14-2022

Drill Rig: Mobile B-57 | Driller: L. Spicher

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-208.7

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.4000° Longitude: -73.8192°

Surface Elev.: 147.6 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - SILT AND CLAY WITH GRAVEL, shale fragments and organics noted, black and brown, medium stiff to very stiff			6	8-3-3-3 N=6			
					12	5-4-4-4 N=8			
			5		12	2-3-5-7 N=8			
					24	4-8-10-12 N=18			
8.0	139.5	**FILL - SILTY SAND WITH GRAVEL**, brown, loose			24	3-4-4-5 N=8	26.6	45-28-17	44
10.0	137.5	**SILT (ML)**, brown, stiff	10		18	7-7-8-10 N=15			
					16	2-5-5-8 N=10			
			15						
					24	5-5-4-4 N=9	32.4	33-26-7	93
			20						
23.5	124				6	7-50/2"			
25.0	122.5	**WEATHERED ROCK**, gray, very dense	25						
		GRAYWACKE, moderately weathered, close to moderate fractured, fair RQD, gray				REC = 73% RQD = 72%			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by LC
Hammer Efficiency Summary:
Energy Transfer Ratio: 89.1% +/- 4.4%
Hammer Efficiency Correction (CE): 1.49

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-09-2022 | Boring Completed: 03-10-2022

Drill Rig: Mobile B-57 | Driller: L. Spicher

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-208.7

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.4000° Longitude: -73.8192°

Surface Elev.: 147.6 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		GRAYWACKE, moderately weathered, close to moderate fractured, fair RQD, gray *(continued)*								
30.0	117.5	**GRAYWACKE**, moderately weathered, close to moderate fractured, poor RQD, gray	30				REC = 58% RQD = 46%			
35.0	112.5	***Boring Terminated at 35 Feet***	35							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by LC
Hammer Efficiency Summary:
Energy Transfer Ratio: 89.1% +/- 4.4%
Hammer Efficiency Correction (CE): 1.49

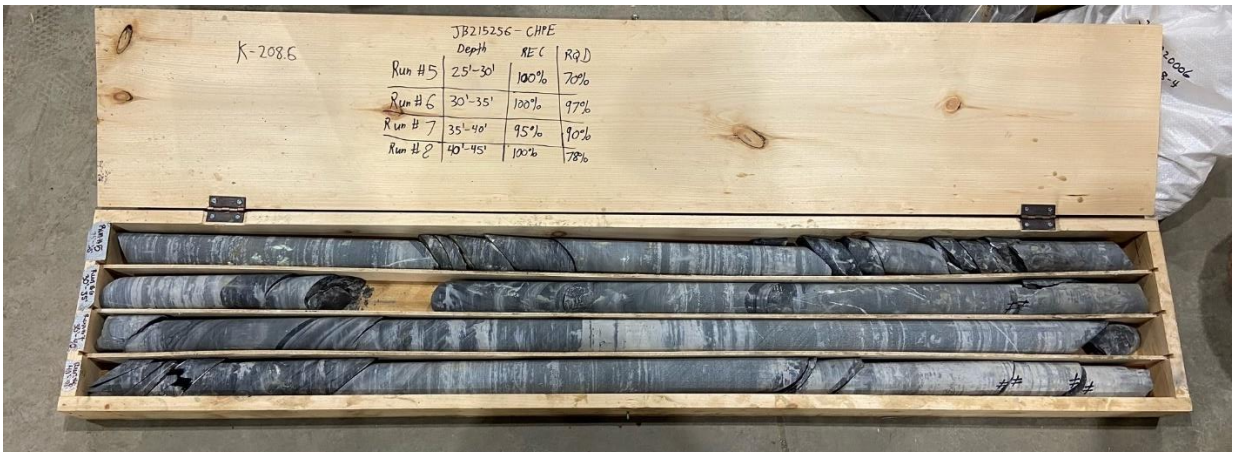
WATER LEVEL OBSERVATIONS

While drilling

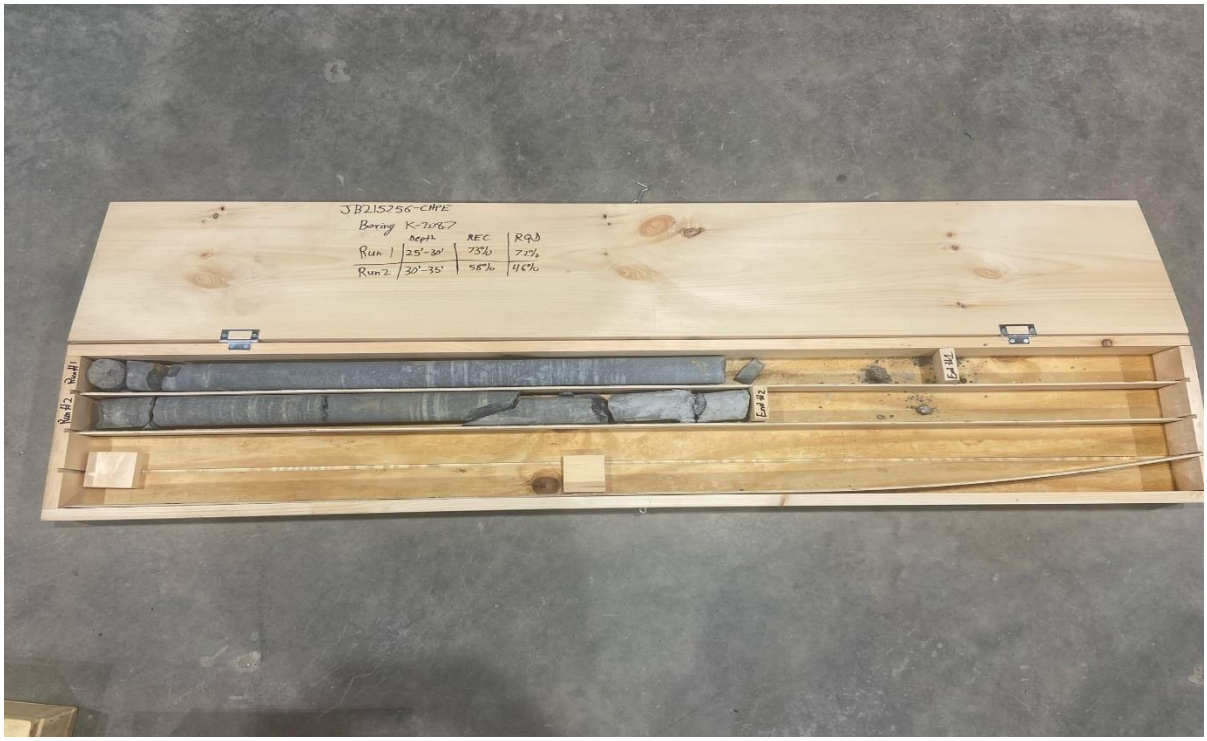
Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-09-2022
Boring Completed: 03-10-2022
Drill Rig: Mobile B-57
Driller: L. Spicher
Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22



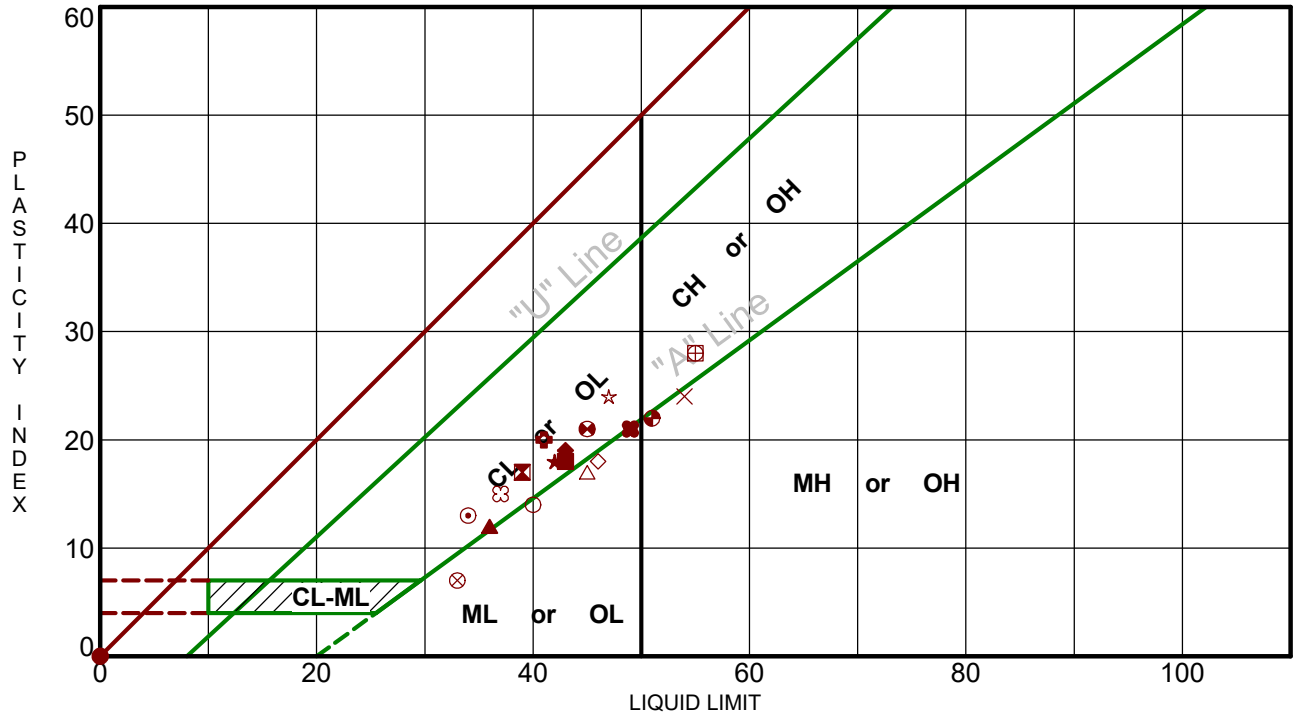
Rock Core – Boring K-208.6



Rock Core – Boring K-208.7

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-207.7	25 - 25.8	NP	NP	NP	21.3	SM	SILTY SAND with GRAVEL
⊠	K-208.1	25 - 27	39	22	17	93.7	CL	LEAN CLAY
▲	K-208.1	35 - 37	36	24	12	91.9	CL	LEAN CLAY
★	K-208.2	15 - 17	42	24	18	83.9	CL	LEAN CLAY with SAND
⊙	K-208.2	25 - 27	34	21	13	89.4	CL	LEAN CLAY
✿	K-208.2	35 - 37	41	21	20	97.6	CL	LEAN CLAY
○	K-208.6	13 - 14.5	40	26	14	73.8	ML	SILT with SAND
△	K-208.7	8 - 10	45	28	17	43.8	SM	SILTY SAND with GRAVEL
⊗	K-208.7	18 - 20	33	26	7	92.8	ML	SILT
⊕	K-210.1	15 - 17	55	27	28	62.6	CH	SANDY FAT CLAY
□	K-210.1	38 - 40	55	27	28	65.8	CH	SANDY FAT CLAY
✖	K-210.2	20 - 22	45	24	21	29.0	SC	CLAYEY SAND
◕	K-210.2	30 - 32	51	29	22	73.8	MH	ELASTIC SILT with SAND
☆	K-211.2	10 - 12	47	23	24	69.7	CL	SANDY LEAN CLAY
✿	K-211.2	19 - 21	37	22	15	88.7	CL	LEAN CLAY
■	K-211.3	10 - 12	43	25	18	59.3	CL	SANDY LEAN CLAY with GRAVEL
◆	K-211.3	20 - 22	43	24	19	95.4	CL	LEAN CLAY
◇	K-211.4	10 - 12	46	28	18	65.1	ML	SANDY SILT
×	K-211.4	28 - 30	54	30	24	84.2	MH	ELASTIC SILT with SAND
✖	K-211.6	6 - 8	49	28	21	68.0	ML	SANDY SILT

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

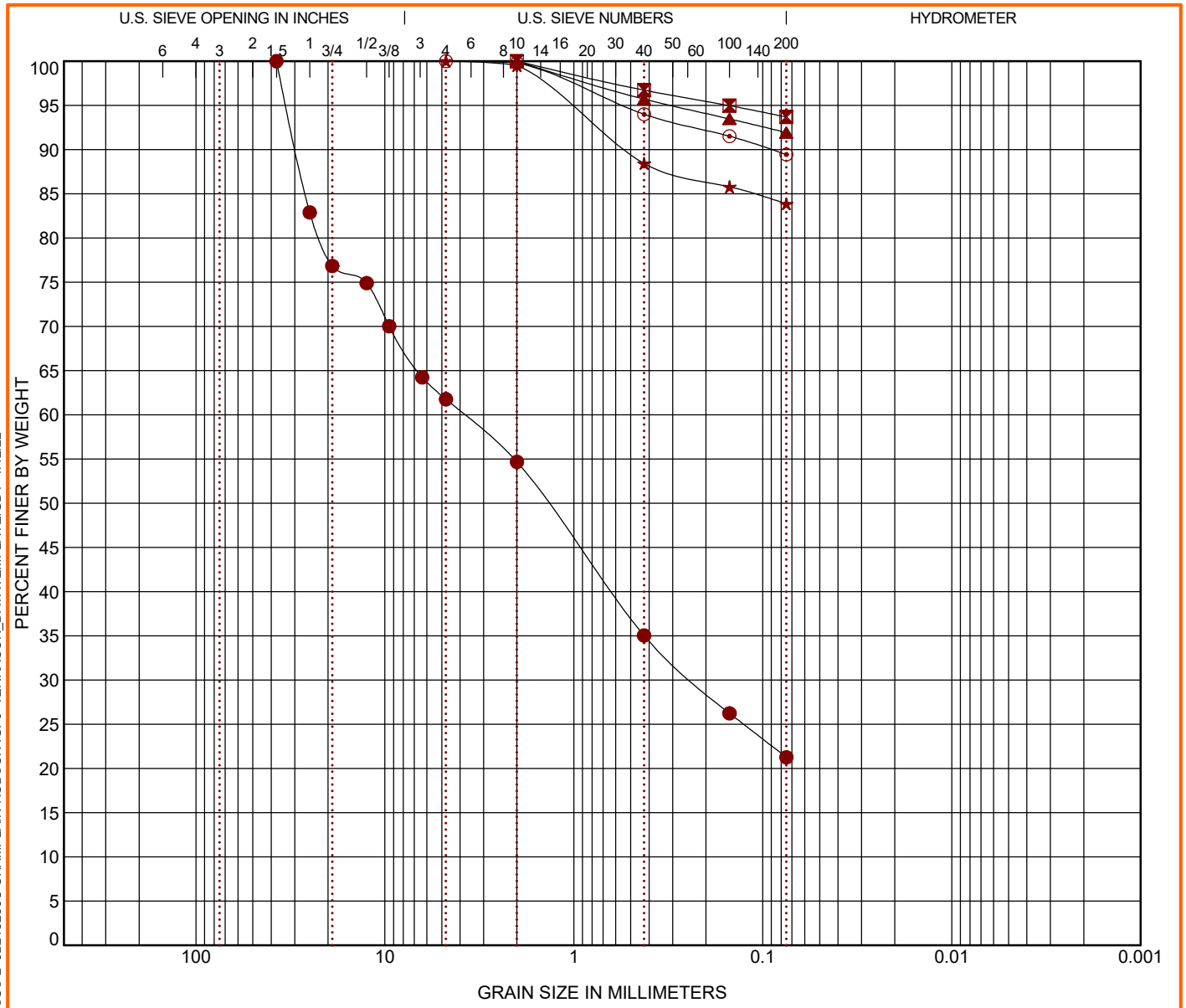
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/13/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	K-207.7	25 - 25.8	SILTY SAND with GRAVEL (SM)	4.2	NP	NP	NP		
⊠	K-208.1	25 - 27	LEAN CLAY (CL)	35.6	39	22	17		
▲	K-208.1	35 - 37	LEAN CLAY (CL)	29.5	36	24	12		
★	K-208.2	15 - 17	LEAN CLAY with SAND (CL)	33.4	42	24	18		
⊙	K-208.2	25 - 27	LEAN CLAY (CL)	35.3	34	21	13		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-207.7	25 - 25.8	37.5	3.832	0.234		0.0	38.2	40.5		21.3	
⊠	K-208.1	25 - 27	2				0.0	0.0	6.3		93.7	
▲	K-208.1	35 - 37	2				0.0	0.0	8.1		91.9	
★	K-208.2	15 - 17	4.75				0.0	0.0	16.1		83.9	
⊙	K-208.2	25 - 27	4.75				0.0	0.0	10.6		89.4	

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

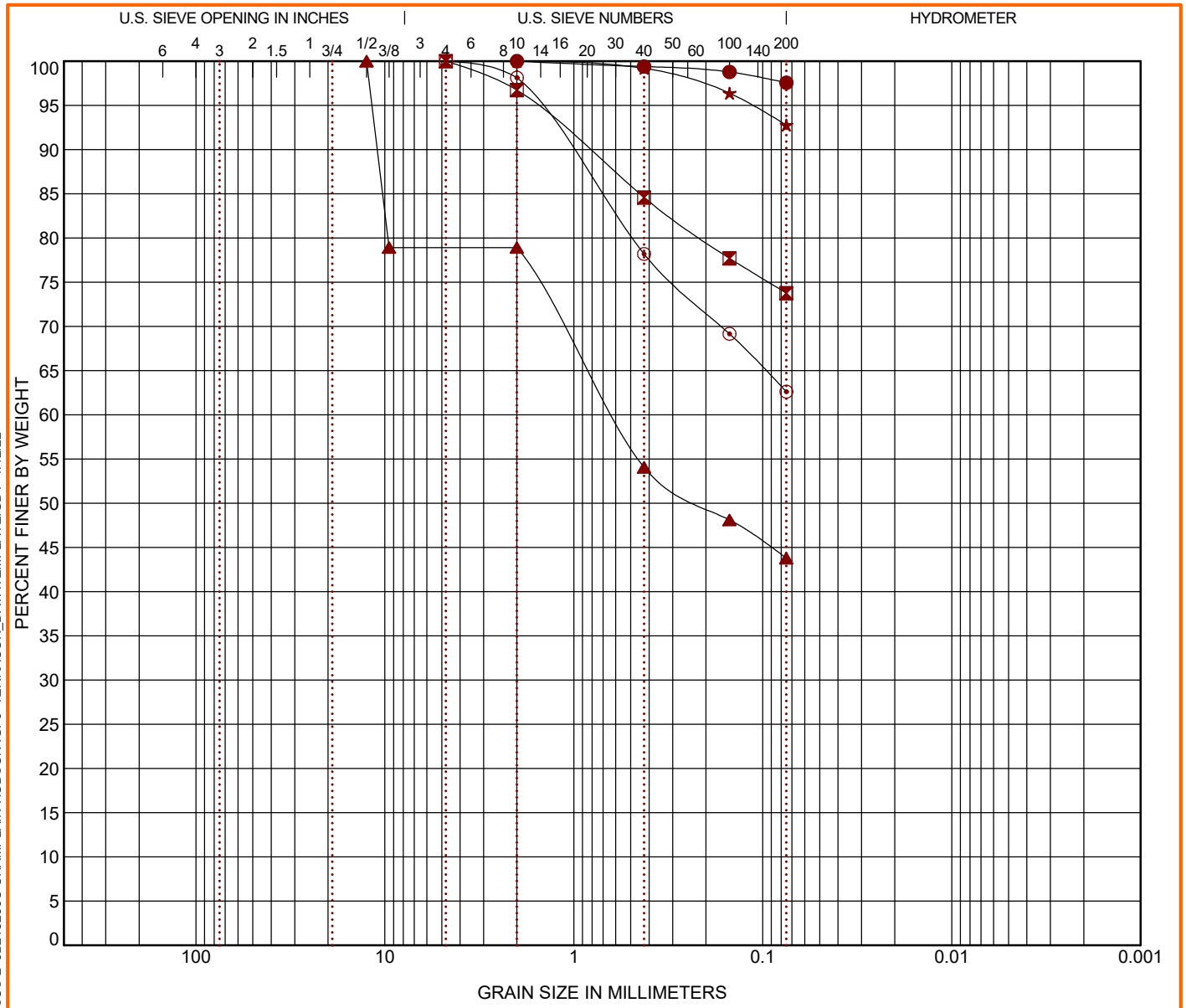
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	K-208.2	35 - 37	LEAN CLAY (CL)	43.9	41	21	20		
⊠	K-208.6	13 - 14.5	SILT with SAND (ML)	31.2	40	26	14		
▲	K-208.7	8 - 10	SILTY SAND with GRAVEL (SM)	26.6	45	28	17		
★	K-208.7	18 - 20	SILT (ML)	32.4	33	26	7		
⊙	K-210.1	15 - 17	SANDY FAT CLAY (CH)	34.5	55	27	28		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-208.2	35 - 37	2				0.0	0.0	2.4		97.6	
⊠	K-208.6	13 - 14.5	4.75				0.0	0.0	26.2		73.8	
▲	K-208.7	8 - 10	12.5	0.616			0.0	21.1	35.1		43.8	
★	K-208.7	18 - 20	2				0.0	0.0	7.2		92.8	
⊙	K-210.1	15 - 17	4.75				0.0	0.0	37.4		62.6	

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

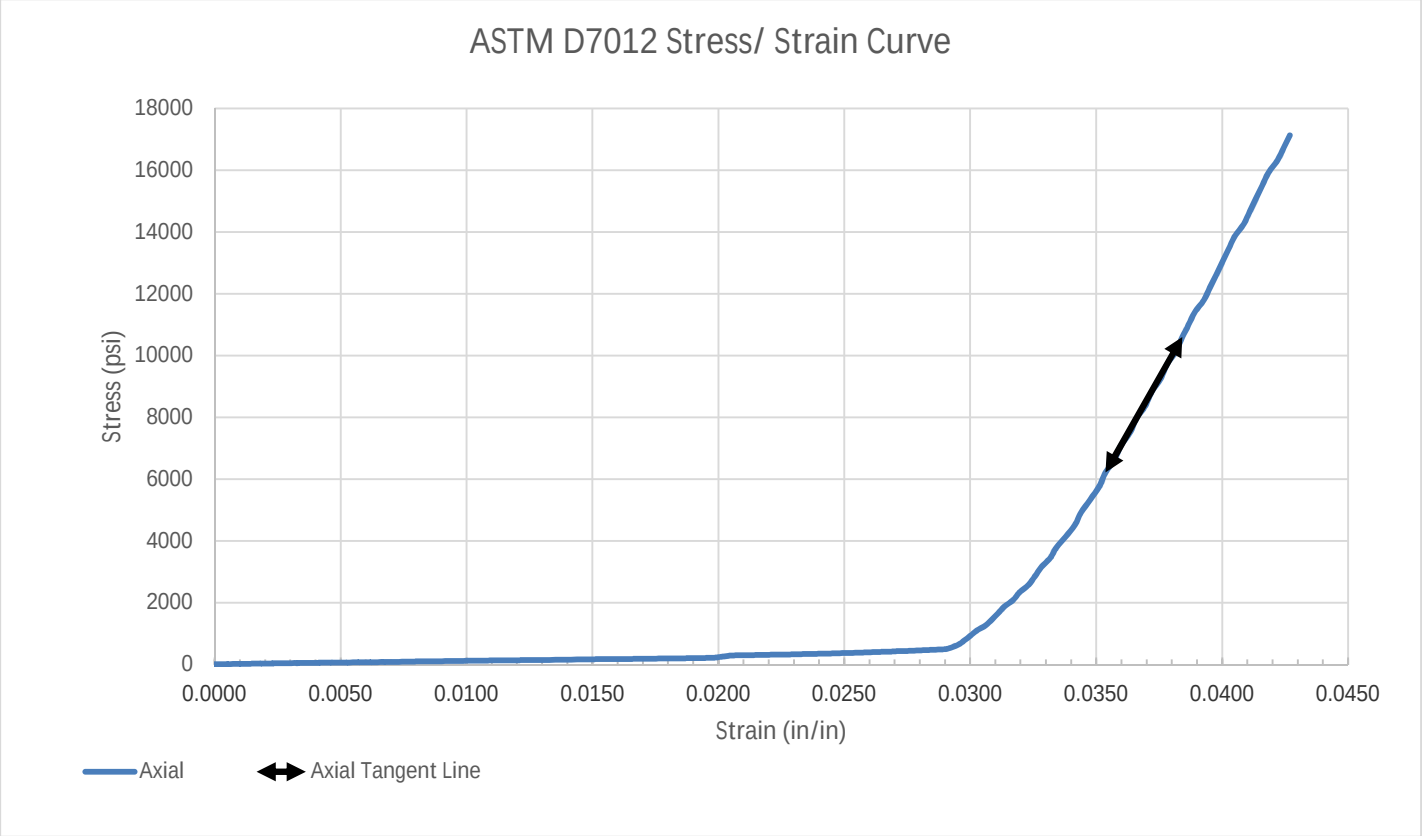
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

Rock Core D7012 Method C

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256



SAMPLE LOCATION			
Site:	Kiewit Engineering Corp.		
Description:	Graywacke		
Boring:	K-208.6	Depth (feet):	45-50

SPECIMEN INFORMATION			
Sample No.:		Mass (g):	563.37
Length (in.):	4.12	Diameter (in.):	1.98
L/D Ratio:	2.081	Density (pcf):	169.182

TEST RESULTS	
Failure Load (lbs):	52739
Failure Strain (in/in):	0.047
Unconfined Compressive Strength (psi):	17,128
Elastic Modulus, E, (ksi):	1437
Time of Failure (min):	03:34
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	0.39%

Rock Core D7012 Method C

Client	Project
Kiewit Engineering Corp	Champlain-Hudson Power Express Project
	Project No. JD215256

Equipment:	TICCS ID:
Calipers	W-44049
Scale	B-71466
Dial Indicator	C-70608
Compression (spherically seated)	C-48999

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below:

Notes:

Per ASTM D4543, this specimen has not met the requirements for perpendicularity, by exceeding 0.250º.
Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches.
Per ASTM D4543, this specimen has not met the requirements for parallelism, by exceeding 0.25º.

According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256

Splitting Tensile Strength of Intact Rock Core Specimens, ASTM D3967

Boring	K-208.6	**Material Description**	Graywacke
Sample No	Sandstone	**Equipment Used**	Tinius Olsen (120,000lbs)
Depth (ft)	45-50	**TICCS ID/Serial No.**	C-48999, 118285
Lab No	6031	**Calibration Date**	11/2/2021

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	0.64	0.6	0.61	0.63	0.64
Length (in)	1.98	1.97	1.98	1.98	1.98
Length Diameter Ratio	3.09	3.28	3.25	3.14	3.09
Rate of Loading	0.0198	0.0198	0.0198	0.0198	0.0198
Moisture Condition	0.96%	0.96%	0.96%	0.96%	0.96%
Maximum Applied Load (lbf)	5247	4563	4258	5448	4563
Splitting Tensile Strength (psi)	2637.3	2458.9	2245.5	2781.8	2293.5

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	0.57	0.59	0.62	0.58	0.61
Length (in)	1.98	1.98	1.98	1.98	1.99
Length Diameter Ratio	3.47	3.36	3.19	3.41	3.26
Rate of Loading	0.0198	0.0198	0.0198	0.0198	0.0198
Moisture Condition	0.96%	0.96%	0.96%	0.96%	0.96%
Maximum Applied Load (lbf)	3293	5057	5816	4040	5092
Splitting Tensile Strength (psi)	1858.5	2757.2	3017.6	2240.7	2671.8

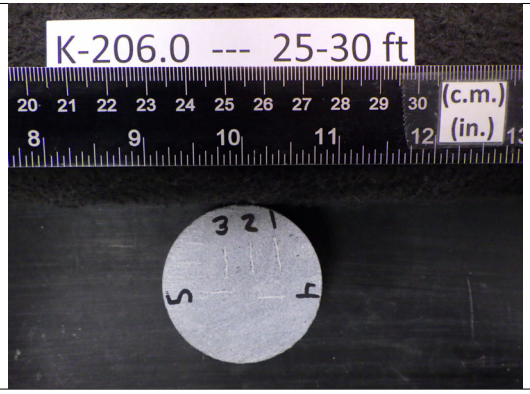
Client:	Terracon Consultants, Inc.		
Project:	Champlain-Hudson Power Express		
Location:		Project No:	GTX-315284
Boring ID: K-206.0	Sample Type: cylinder	Tested By:	tlm
Sample ID: ---	Test Date: 04/29/22	Checked By:	smd
Depth : 25-30 ft	Test Id: 664266		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
K-206.0	---	25-30 ft	1	1.0	1.4	1.20	
			2	1.5	1.8	1.65	
			3	1.0	0.8	0.90	
			4	2.1	1.1	1.60	
			5	0.7	1.6	1.15	
			Average CAIs			1.3	
			Average CAI *			1.77	
					CERCHAR Abrasiveness Index Classification	**Medium abrasiveness**	

Notes

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardess 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel
* CAI = (0.99 * CAIs) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface
Comments:

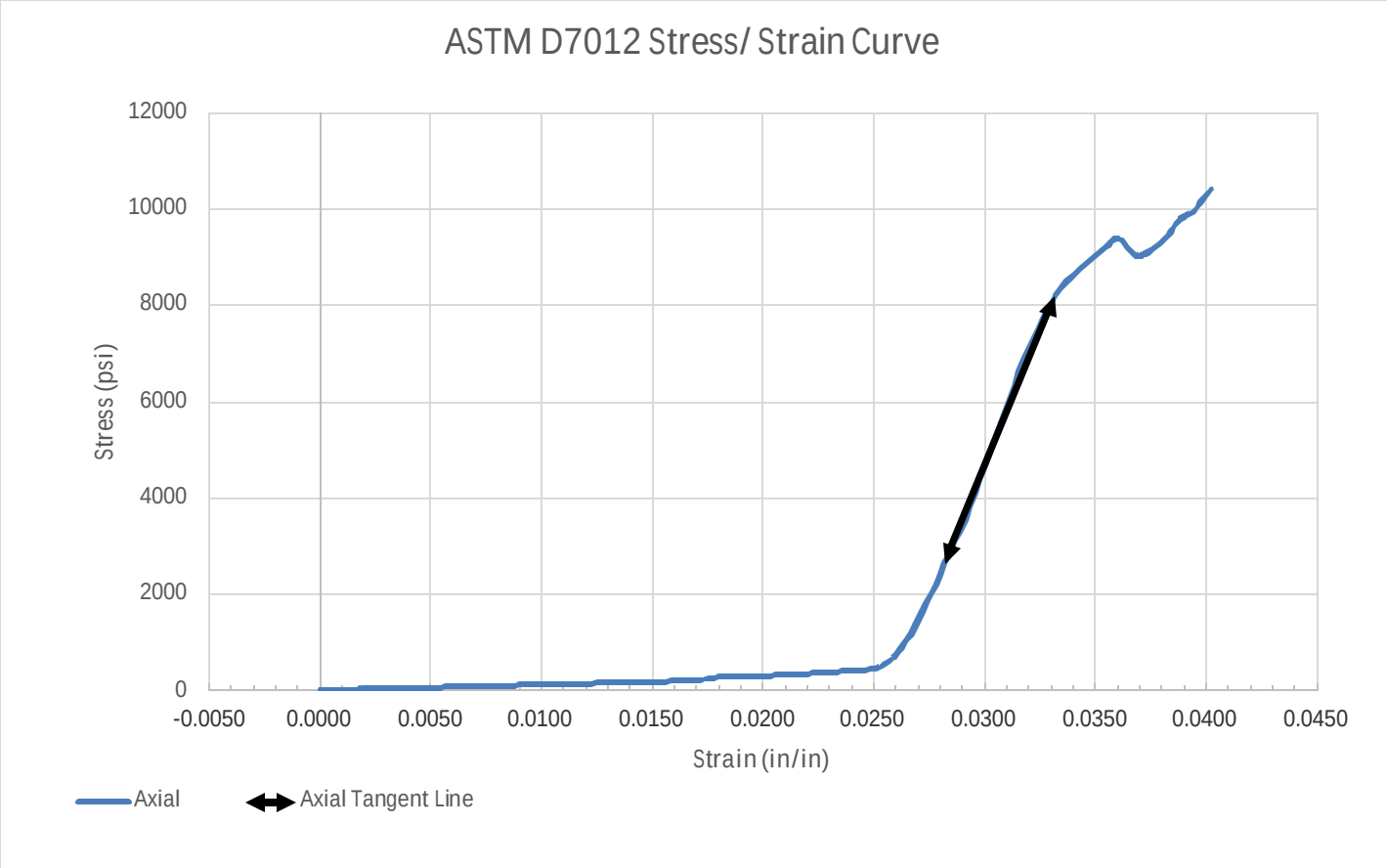


Rock Core D7012 Method C

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256



SAMPLE LOCATION

Site:	Kiewit Engineering Power Express		
Description:	Graywacke		
Boring:	K-208.7	Depth (feet):	25-30

SPECIMEN INFORMATION

Sample No.:		Mass (g):	589.32
Length (in.):	4.35	Diameter (in.):	1.98
L/D Ratio:	2.197	Density (pcf):	167.617

TEST RESULTS

Failure Load (lbs):	32057
Failure Strain (in/in):	0.043
Unconfined Compressive Strength (psi):	10,411
Elastic Modulus, E, (ksi):	1115
Time of Failure (min):	03:29
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	0.67%

Rock Core D7012 Method C

Client	Project
Kiewit Engineering Corp	Champlain-Hudson Power Express Project
	Project No. JD215256

Equipment:	TICCS ID:
Calipers	W-44049
Scale	B-71466
Dial Indicator	C-70608
Compression (spherically seated)	C-48999

Samples were prepared and tested in accordance with ASTM D4543 and D7012. Deviations, if any, are noted below:

Notes:

Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches.
Per ASTM D4543, this specimen has not met the requirements for parallelism, by exceeding 0.25º.

According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256

Boring	K-208.7	Material Description	Graywacke
Sample No		Equipment Used	Tinius Olsen (120,000lbs)
Depth (ft)	25-30	TICCS ID/Serial No.	C-48999, 118285
Lab No	2976	Calibration Date	11/2/2021

Splitting Tensile Strength of Intact Rock Core Specimens, ASTM D3967

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	1.98	1.98	1.97	1.98	1.97
Length (in)	0.53	0.65	0.53	0.63	0.66
Length Diameter Ratio	0.27	0.33	0.27	0.32	0.34
Rate of Loading	0.0053	0.0065	0.0053	0.0063	0.0066
Moisture Condition	0.47%	0.47%	0.47%	0.47%	0.47%
Maximum Applied Load (lbf)	3672	4798	3586	4770	3994
Splitting Tensile Strength (psi)	2228.8	2374.6	2187.6	2435.6	1956.6

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	1.97	1.97	1.98	1.97	1.97
Length (in)	0.67	0.68	0.57	0.66	0.65
Length Diameter Ratio	0.34	0.35	0.29	0.34	0.33
Rate of Loading	0.0067	0.0068	0.0057	0.0066	0.0065
Moisture Condition	0.47%	0.47%	0.47%	0.47%	0.47%
Maximum Applied Load (lbf)	5224	4293	3913	5232	5540
Splitting Tensile Strength (psi)	2520.9	2041.2	2208.4	2563.1	2755.7

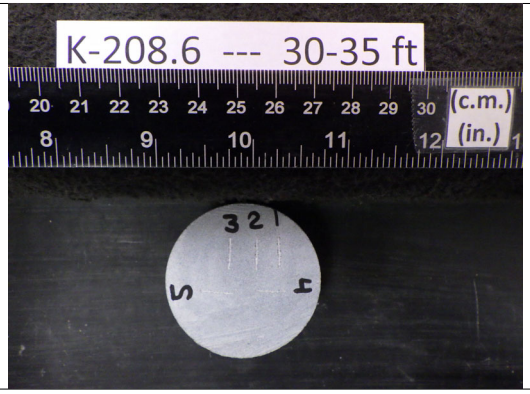
Client:	Terracon Consultants, Inc.		
Project:	Champlain-Hudson Power Express		
Location:		Project No:	GTX-315284
Boring ID: K-208.6	Sample Type: cylinder	Tested By:	tlm
Sample ID: ---	Test Date: 04/29/22	Checked By:	smd
Depth : 30-35 ft	Test Id: 664264		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
K-208.6	---	30-35 ft	1	1.4	1.3	1.35	
			2	1.6	1.5	1.55	
			3	1.9	1.5	1.70	
			4	1.0	1.3	1.15	
			5	1.2	1.9	1.55	
			Average CAIs			1.46	
			Average CAI *			1.93	
					CERCHAR Abrasiveness Index Classification	**Medium abrasiveness**	

Notes

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardess 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel
* CAI = (0.99 * CAIs) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface
Comments:



Kiewit

MEMORANDUM

DATE: November 11, 2022

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 101 – Revision 1
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 101 is STA 60534+00 (42.39799° N, 73.81996° W).

The geotechnical data at this HDD crossing is attached. The available data is taken from the previous investigation by TRC and the recent investigation by Terracon, referenced below.

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 177.6-228.2, dated March 15, 2013.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Additional HDD Borings – Phase 3, Fort Ann to Coxsackie, NY, dated November 3, 2022.

Contact us if you have questions or require additional information.

HDD 101
Borings A209.05-1 KB-208.8, KB-208.9
Segment 10 - Design Package 6

CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	B210.0-1	1293021.1	676353.2	109.9
	B210.4-1	1291223.1	676583.0	120.5
	B211.2-1	1286509.8	676960.2	132.6
	B211.5-1	1285068.8	677013.1	140.7
	B211.7-1	1284088.5	676965.4	141.5
	B212.0-1	1282469.0	676857.5	138.9
	B212.2-1	1281498.0	676590.5	130.8
	B214.6-1	1269721.4	672670.9	124.9
	B216.1-1	1262073.1	670916.0	127.0
	B216.4-1	1260344.1	670520.5	128.3
	B216.6-1	1259315.9	670290.2	129.8
	B219.5-1	1244816.4	666093.7	130.4
AECOM**	SC-1A	1348656.7	679220.0	176.4
	SC-2A	1326692.2	678361.5	178.9
	SC-2C	1305133.1	676877.4	160.6

Notes:
- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.

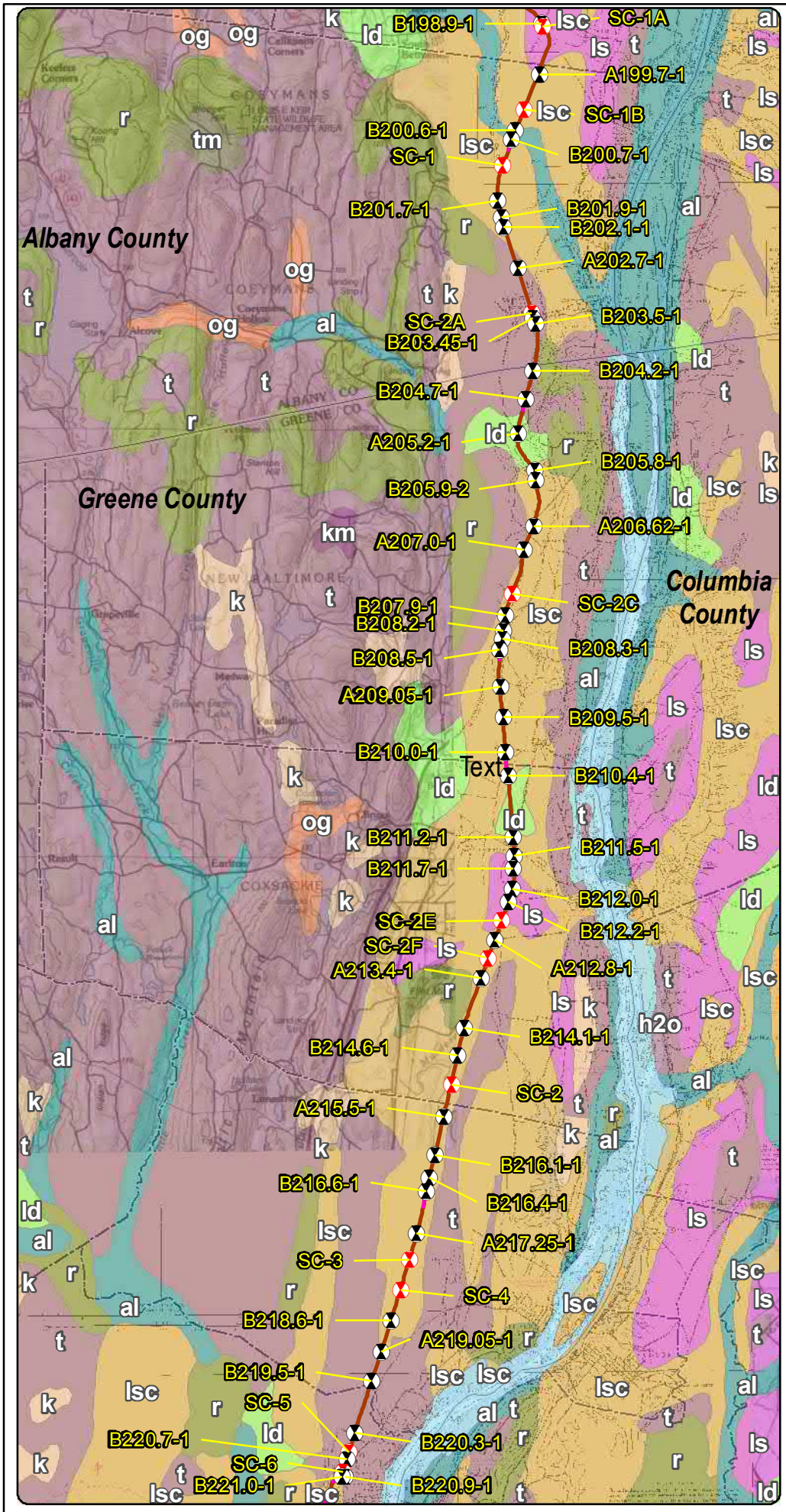
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

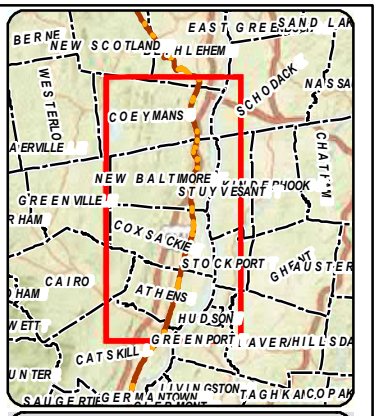
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:

AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- h2o - Water
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- r - Bedrock
- t - Till
- tm - Till moraine

1 0.5 0 1 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

Prepared on 5/3/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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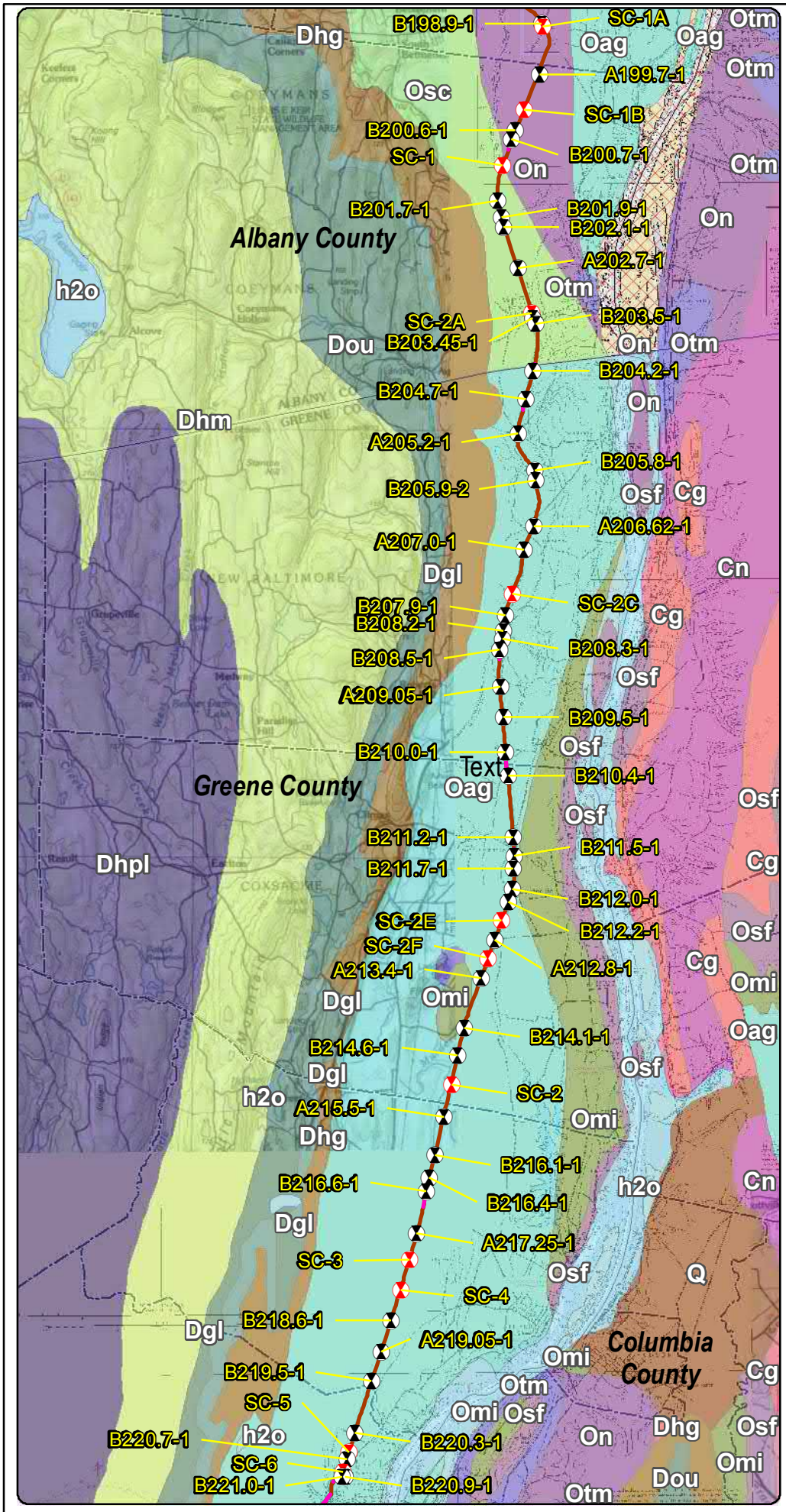

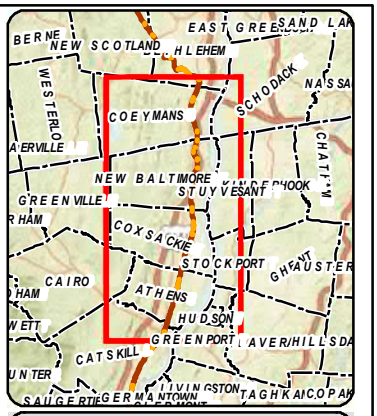

LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cg - Germantown Formation
- Cn - Nassau Formation
- Dgl - Glenerie Formation
- Dhg - Port Ewen Formation
- Dhm - Undiff Lower Hamilton Group
- Dhpl - Plattekill Formation
- Dou - Onondaga Limestone
- No Label
- Oag - Austin Glen Form (graywacke, shale)
- Omi - Mount Merino Formation
- On - Normanskill Shale
- Osc - Schenectady Formation
- Osf - Stuyvesant Falls Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- h2o - Water

* Schenectady Formation includes: graywacke, sandstone, siltstone, shale

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Selkirk to Catskill Figure 4-10

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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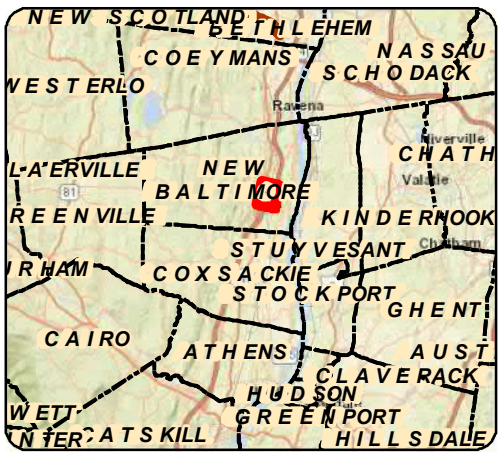
207.5
207.6
SC-2C
207.7
207.8
207.9
B207.9-1
208.1
NEW BALTIMORE
208.2
B208.2-1
208.3
B208.3-1
208.4
B208.5-1
208.6
208.7
Flat Bush Rd
US-9W
State Route 9W
Kreimer Rd
Conrail
Taylor Rd
Hawley Ln W
Gov Thomas E Dewey Thruway
New York State Thruway
Thruway
0
1,000
Feet



LEGEND

- Certified Milepost - Tenths
- Certified Milepost
- Preferred Alternative Milepost - Tenths
- Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership: TOWN NAME

Road Name: Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Selkirk to Catskill

Figure A-10

Sheet 8 of 18

Prepared by: AECOM 5/19/2021

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

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TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**A209.05-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED 4.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	4.0 '
d	FROM	4.0 '	TO	10.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	02/07/2013
DATE COMPLETED	02/07/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	12 8 7 6		***BLACK SILTY F/M/C SAND (FILL)*** 2.0		
	S-2	7 7 8 7		***LIGHT BROWN CLAY, TR TO SM GRAVEL, TR C/ SAND, TR SILT*** 4.0	22.9	
5	S-3	10 13 11 14			26.9	
	S-4	7 7 6 5		***LIGHT BROWN C/ SAND, SM F/C GRAVEL, TR SILT***	34.3	
10	S-5	7 8 8 5		10.0		
				END OF BORING AT 10'		
15						
20						
25						
30						
35						

DRN.	JPB
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	39.2	-	-	-
	S-7	18.5-20.0	CL	-	-	-	-	48	27	21	0.8	-	43.3	-	-	-
B208.3-1	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	29.9	97.1	-	-
	S-7	18.5-20.0	CL	-	-	-	-	48	25	23	0.2	-	30.2	-	-	-
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	31.0	-	-	-
B208.5-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	31.7	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	35.9	88.3	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	35.7	-	-	-
	S-7	18.5-20.0	ML	-	-	-	-	34	26	8	0.9	-	33.0	-	-	-
	R-1	33.5-34.2	-	-	-	-	-	-	-	-	-	-	-	167.0	486	-
A209.05-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	22.9	-	-	-

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Rock Core – Boring KB-205.8

Rock Core – Boring KB-208.8

Rock Core – Boring KB- 208.9

BORING LOG NO. KB-208.8

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.398099° Longitude: -73.819743°

Surface Elev.: 144.7212 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
		FILL - SILT, black
4.0	140.7	
		FAT CLAY WITH SAND (CH), varved silt and clay, brown with gray mottling, stiff to very stiff
15.0	129.7	
		ELASTIC SILT (MH), varved silt and clay, brown with gray mottling, medium stiff

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	2	3-2-2-1 N=4			
	2	1-2-3-5 N=5			
5	16	4-5-7-8 N=12	28.6	55-27-28	82
	24	8-9-11-11 N=20			
	24	4-5-8-11 N=13			
10	24	8-9-11-14 N=20			
15	18	2-3-5 N=8	34.1	51-44-7	94
20	18	2-3-3 N=6			
25	18	2-3-3 N=6			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0-12' - 2 1/4" HSA
12-50' - Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by J. Lamm
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/- 2.7%
Hammer Efficiency Correction (CE): 1.52
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-25-2022 | Boring Completed: 08-29-2022
Drill Rig: CME 750-X | Driller: C. Schindler
Project No.: JB215256G

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

BORING LOG NO. KB-208.8

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.398099° Longitude: -73.819743°

Surface Elev.: 144.7212 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		ELASTIC SILT (MH), varved silt and clay, brown with gray mottling, medium stiff *(continued)*								
30.0	114.7		30							
		LEAN CLAY (CL), varved silt and clay, brown with gray mottling, soft				18	1-2-2 N=4	37.9	40-22-18	96
35.0	109.7		35							
		LEAN CLAY (CL), varved silt and clay, gray, very soft				14	WH-WH-1 N=1			
40.0	104.7		40							
		CLAYEY GRAVEL WITH SAND (GC), occasional cobbles and boulders, shale fragments noted (GLACIAL TILL), brown, dense to very dense				12	4-16-31 N=47	9.8	27-19-8	20
			45			8	130-150/4 3"Split Spoon Bulk Sample			
						3	200/4" 3"Split Spoon Bulk Sample			
			50			8	37-100/4"			
			55			8	42-50/4"			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0-12' - 2 1/4" HSA
12-50' - Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by J. Lamm
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/- 2.7%
Hammer Efficiency Correction (CE): 1.52
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-25-2022	Boring Completed: 08-29-2022
Drill Rig: CME 750-X	Driller: C. Schindler
Project No.: JB215256G	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

BORING LOG NO. KB-208.8

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.398099° Longitude: -73.819743°

Surface Elev.: 144.7212 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
58.5	86.2	**CLAYEY GRAVEL WITH SAND (GC)**, occasional cobbles and boulders, shale fragments noted (GLACIAL TILL), brown, dense to very dense *(continued)*
61.0	83.7	**WEATHERED GRAYWACKE**, gray, tricone roller bit from 58.5' to 61.0'
66.0	78.7	**GRAYWACKE**, slightly weathered, very close to moderate fractured, excellent RQD, gray
		Boring Terminated at 66 Feet

GRAPHIC LOG | DEPTH (Ft.) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE | RECOVERY (In.) | FIELD TEST RESULTS | WATER CONTENT (%) | ATTERBERG LIMITS LL-PL-PI | PERCENT FINES

60

65

REC = 100%
RQD = 91%

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0-12' - 2 1/4" HSA
12-50' - Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by J. Lamm
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/- 2.7%
Hammer Efficiency Correction (CE): 1.52
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-25-2022	Boring Completed: 08-29-2022
Drill Rig: CME 750-X	Driller: C. Schindler
Project No.: JB215256G	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

BORING LOG NO. KB-208.9

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.396074° Longitude: -73.819533°

Surface Elev.: 146.5325 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
2.0	144.5	**BALLAST**, black
5.0	141.5	**FILL - LEAN CLAY (CL)**, organics noted, brown
15.0	131.5	**ELASTIC SILT (MH)**, varved silt and clay, brown and gray, medium stiff to very stiff
		FAT CLAY (CH), varved silt and clay, brown and gray, stiff

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	1	3-5-5-6 N=10			
	6	7-7-6-9 N=13			
5	12	5-2-2-3 N=4			
	11	5-4-7-5 N=11	31.1	55-31-24	93
	12	4-5-7-9 N=12			
10	14	8-9-11-12 N=20			
15	14	3-5-6 N=11	32.5	55-28-27	96
20	16	3-4-4 N=8			
25	18	3-4-5 N=9			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by J. Lamm
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/- 2.7%
Hammer Efficiency Correction (CE): 1.52
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-24-2022 | Boring Completed: 08-25-2022
Drill Rig: CME 750-X | Driller: C. Schindler
Project No.: JB215256G

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

BORING LOG NO. KB-208.9

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.396074° Longitude: -73.819533°

Surface Elev.: 146.5325 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FAT CLAY (CH), varved silt and clay, brown and gray, stiff *(continued)*								
30.0	116.5	**LEAN CLAY (CL)**, varved silt and clay, gray, very soft to soft	30			18	1-1-1 N=2	32.4	36-22-14	98
			35			18	WH-WH-WH			
			40			18	WH-WH-WH			
			45			18	WH-WH-WH	33.1	30-21-9	96
51.0	95.5	**SILTY SAND (SM)**, (GLACIAL TILL), gray, very dense	50			14	4-5-50/3" 3" Split Spoon With Ring Samplers			
		cored through boulder	55			3		9.8		31

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by J. Lamm
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/- 2.7%
Hammer Efficiency Correction (CE): 1.52
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-24-2022	Boring Completed: 08-25-2022
Drill Rig: CME 750-X	Driller: C. Schindler
Project No.: JB215256G	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

BORING LOG NO. KB-208.9

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.396074° Longitude: -73.819533°

Surface Elev.: 146.5325 (Ft.)

DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS		WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), (GLACIAL TILL), gray, very dense *(continued)*									
59.5	87										
60.5	86	**WEATHERED GRAYWACKE**, gray, **tricone roller bit from 59.5 ' to 60.5'**	60								
		GRAYWACKE, slightly weathered, close to moderate fractured, good RQD, gray					REC = 86% RQD = 81%				
65.5	81		65								
		Boring Terminated at 65.5 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by J. Lamm
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/- 2.7%
Hammer Efficiency Correction (CE): 1.52
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-24-2022	Boring Completed: 08-25-2022
Drill Rig: CME 750-X	Driller: C. Schindler
Project No.: JB215256G	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

Summary of Laboratory Results

BORING ID	Depth (Ft.)	Water Content (%)	Organic Content (%)
KB-200.8A	60-61.5	44.6	
KB-200.8A	85-86.5	32.4	
KB-200.8A	100-102	16.4	
KB-200.8A	120-122	30.5	
KB-205.8	2-4	33.3	
KB-205.8	10-12	7.9	
KB-205.8	20-22	42.1	
KB-205.8	35-37	15.3	
KB-208.8	4-6	28.6	
KB-208.8	15-16.5	34.1	
KB-208.8	30-31.5	37.9	
KB-208.8	40-41.5	9.8	
KB-208.9	6-8	31.1	
KB-208.9	15-16.5	32.5	
KB-208.9	30-31.5	32.4	
KB-208.9	45-46.5	33.1	
KB-208.9	55-55.3	9.8	

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

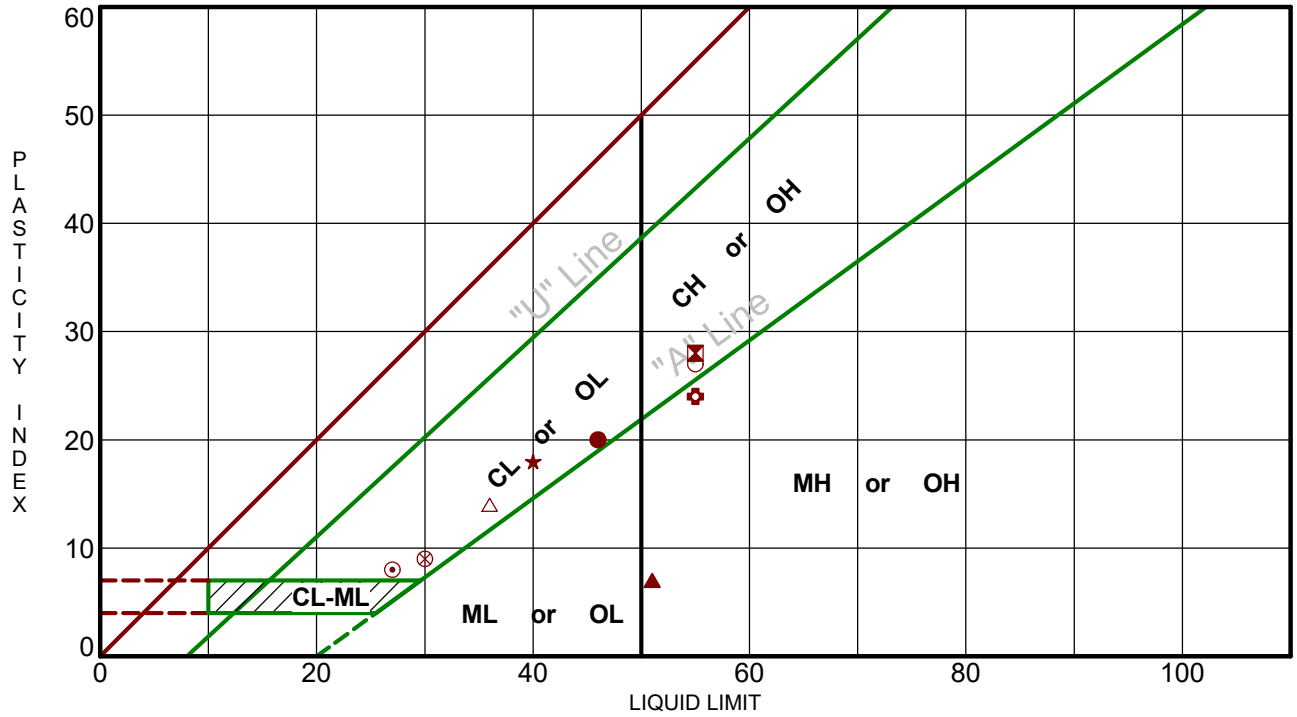
PROJECT NUMBER: JB215256G

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART LAB SUMMARY-PORTRAIT JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

ATTERBERG LIMITS RESULTS

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	KB-205.8	20 - 22	46	26	20	100.0	CL	LEAN CLAY
⊠	KB-208.8	4 - 6	55	27	28	82.0	CH	FAT CLAY with SAND
▲	KB-208.8	15 - 16.5	51	44	7	93.7	MH	ELASTIC SILT
★	KB-208.8	30 - 31.5	40	22	18	95.8	CL	LEAN CLAY
⊙	KB-208.8	40 - 41.5	27	19	8	19.9	GC	CLAYEY GRAVEL with SAND
✿	KB-208.9	6 - 8	55	31	24	92.6	MH	ELASTIC SILT
○	KB-208.9	15 - 16.5	55	28	27	96.0	CH	FAT CLAY
△	KB-208.9	30 - 31.5	36	22	14	97.6	CL	LEAN CLAY
⊗	KB-208.9	45 - 46.5	30	21	9	95.8	CL	LEAN CLAY

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

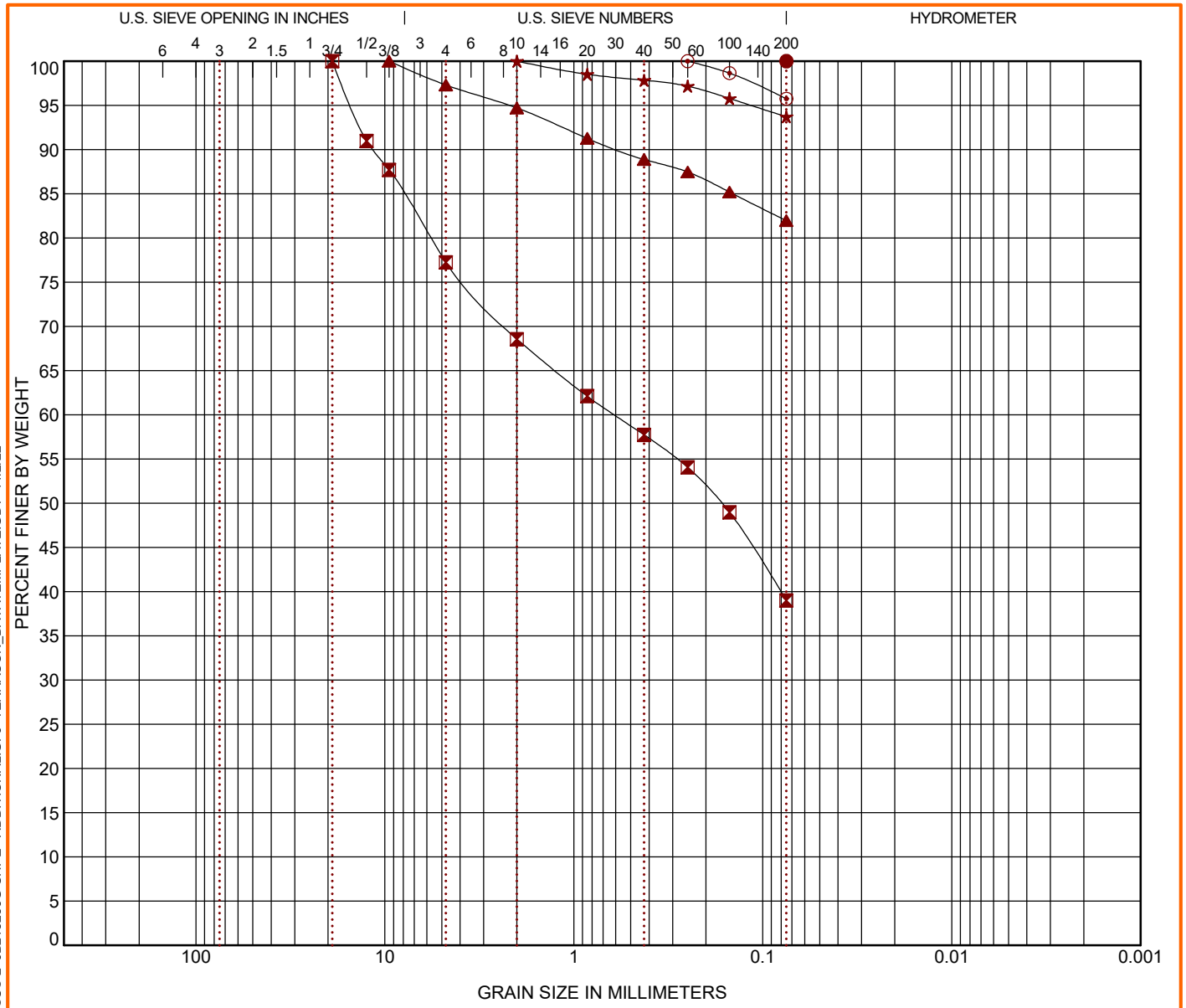
PROJECT NUMBER: JB215256G

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-205.8	20 - 22	LEAN CLAY (CL)	42.1	46	26	20		
⊠	KB-205.8	35 - 37	SILTY SAND (SM)	15.3					
▲	KB-208.8	4 - 6	FAT CLAY with SAND (CH)	28.6	55	27	28		
★	KB-208.8	15 - 16.5	ELASTIC SILT (MH)	34.1	51	44	7		
⊙	KB-208.8	30 - 31.5	LEAN CLAY (CL)	37.9	40	22	18		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-205.8	20 - 22	0.075				0.0	0.0	0.0		100.0	
⊠	KB-205.8	35 - 37	19	0.609			0.0	22.8	38.2		39.0	
▲	KB-208.8	4 - 6	9.5				0.0	2.7	15.3		82.0	
★	KB-208.8	15 - 16.5	2				0.0	0.0	6.3		93.7	
⊙	KB-208.8	30 - 31.5	0.25				0.0	0.0	4.2		95.8	

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

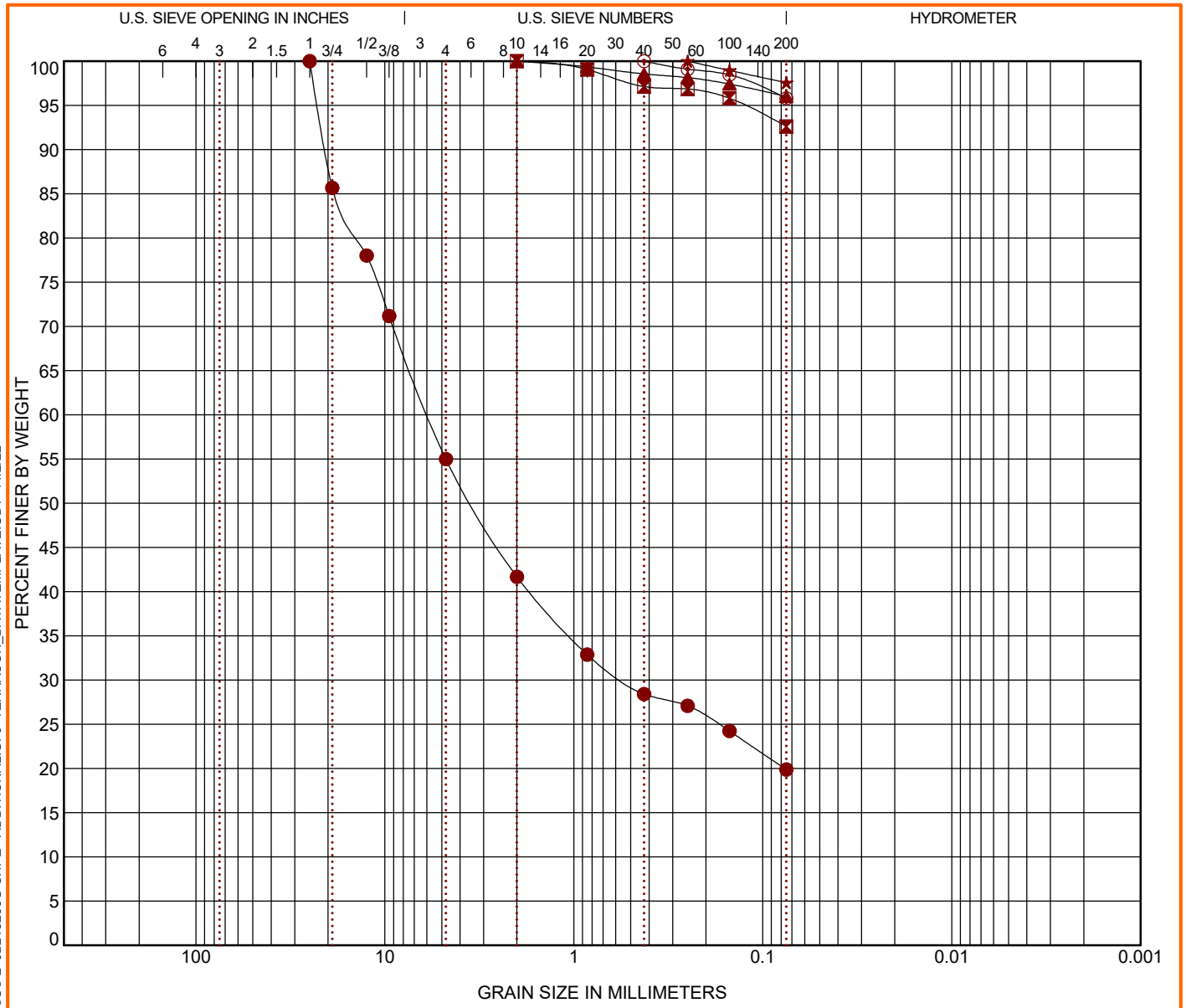
PROJECT NUMBER: JB215256G

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-208.8	40 - 41.5	CLAYEY GRAVEL with SAND (GC)	9.8	27	19	8		
⊠	KB-208.9	6 - 8	ELASTIC SILT (MH)	31.1	55	31	24		
▲	KB-208.9	15 - 16.5	FAT CLAY (CH)	32.5	55	28	27		
★	KB-208.9	30 - 31.5	LEAN CLAY (CL)	32.4	36	22	14		
⊙	KB-208.9	45 - 46.5	LEAN CLAY (CL)	33.1	30	21	9		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-208.8	40 - 41.5	25	5.888	0.544		0.0	45.0	35.1		19.9	
⊠	KB-208.9	6 - 8	2				0.0	0.0	7.4		92.6	
▲	KB-208.9	15 - 16.5	2				0.0	0.0	4.0		96.0	
★	KB-208.9	30 - 31.5	0.25				0.0	0.0	2.4		97.6	
⊙	KB-208.9	45 - 46.5	0.425				0.0	0.0	4.2		95.8	

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

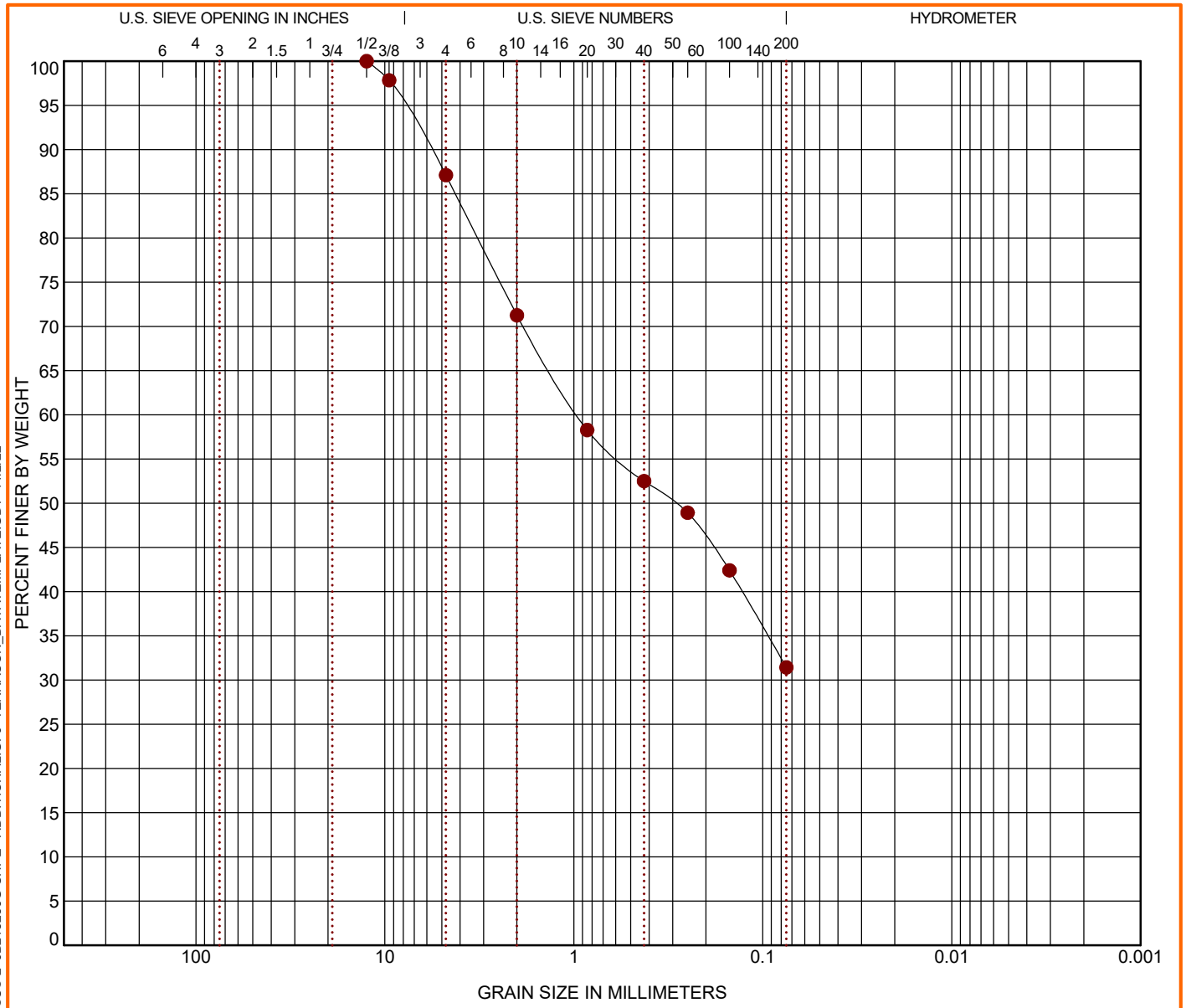
PROJECT NUMBER: JB215256G

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-208.9	55 - 55.3	SILTY SAND (SM)	9.8					

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-208.9	55 - 55.3	12.5	0.952			0.0	12.9	55.7		31.4	

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256G

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

Kiewit

MEMORANDUM

DATE: June 5, 2023

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 101A
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 101A is STA 60575+50 (42.3865°N, 73.8188°W).

The geotechnical data at this HDD crossing is attached. The available data is taken from the previous investigation by TRC and a recent investigation by Terracon, referenced below.

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 177.6-228.2, dated March 15, 2013.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express-Phase 4 HDD Borings – Package 6 and 7A – Rev 1, Schenectady to Selkirk, dated April 25, 2023.

Contact us if you have questions or require additional information.

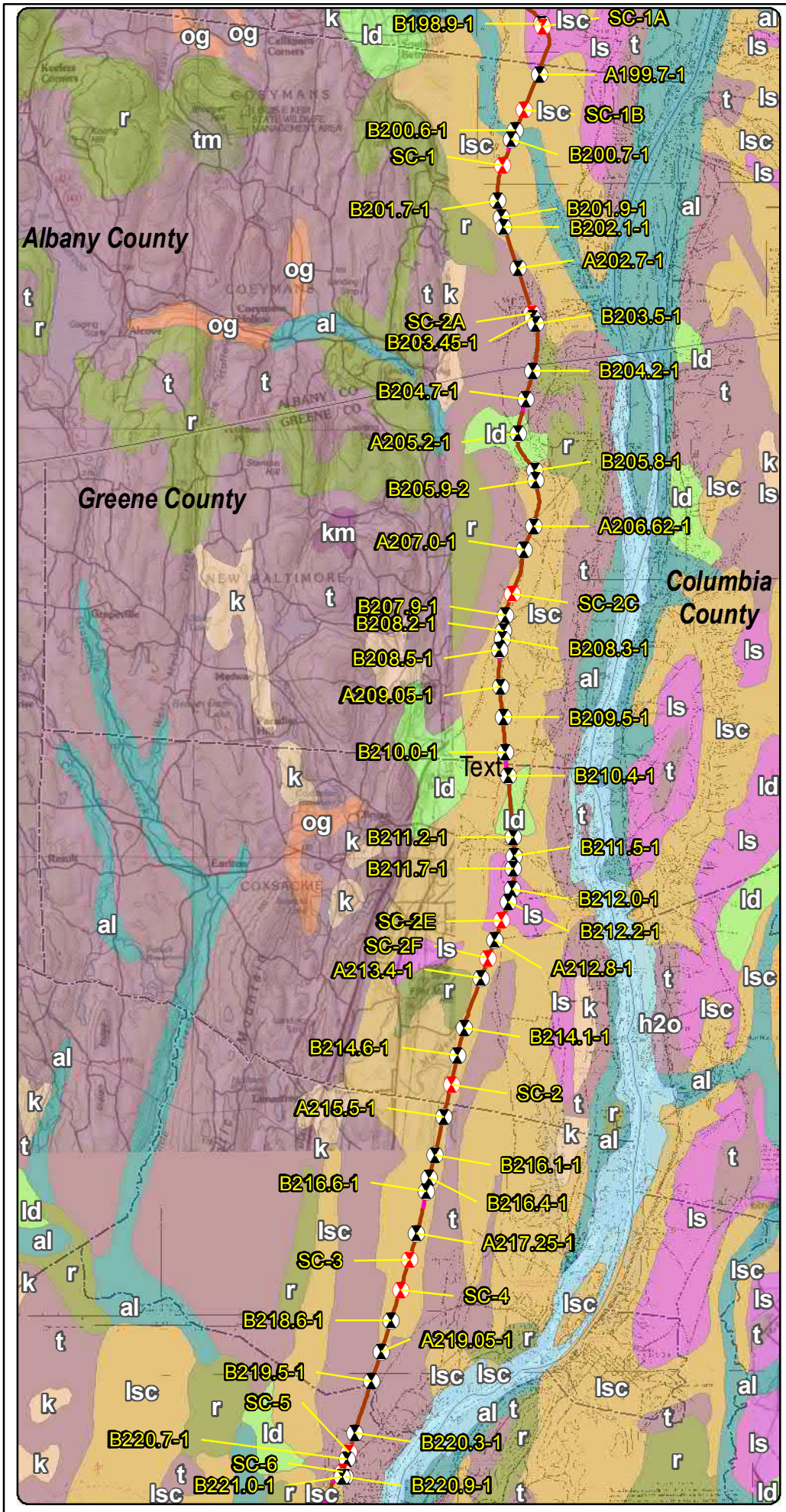
HDD 101A
Borings B-209.5, KB-209.7
Segment 10 - Design Package 6

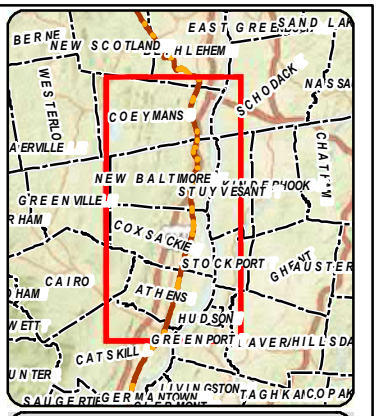
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	B209.5-1	1295695.1	676165.1	137.5
	B210.0-1	1293021.1	676353.2	109.9
	B210.4-1	1291223.1	676583.0	120.5
	B211.2-1	1286509.8	676960.2	132.6
	B211.5-1	1285068.8	677013.1	140.7
	B211.7-1	1284088.5	676965.4	141.5
	B212.0-1	1282469.0	676857.5	138.9
	B212.2-1	1281498.0	676590.5	130.8
	B214.6-1	1269721.4	672670.9	124.9
	B216.1-1	1262073.1	670916.0	127.0
	B216.4-1	1260344.1	670520.5	128.3
	B216.6-1	1259315.9	670290.2	129.8
	B219.5-1	1244816.4	666093.7	130.4
AECOM**	SC-1A	1348656.7	679220.0	176.4
	SC-2A	1326692.2	678361.5	178.9
	SC-2C	1305133.1	676877.4	160.6

Notes:
- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.
*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:
AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- h2o - Water
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- r - Bedrock
- t - Till
- tm - Till moraine

1 0.5 0 1 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

Prepared on 5/3/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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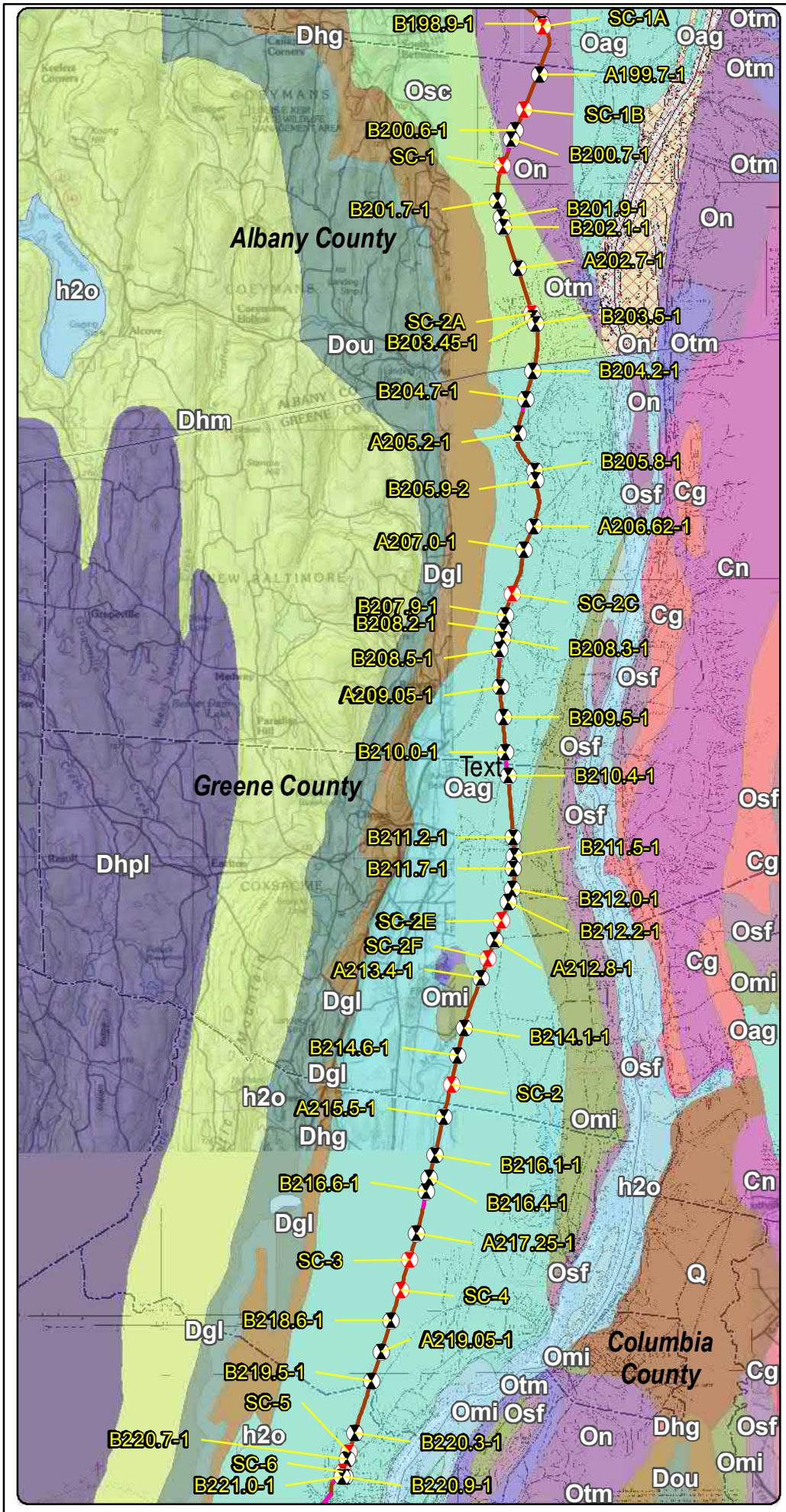

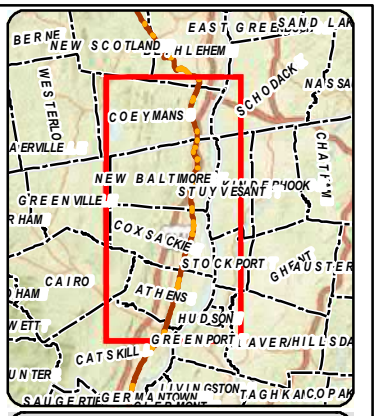

LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cg - Germantown Formation
- Cn - Nassau Formation
- Dgl - Glenerie Formation
- Dhg - Port Ewen Formation
- Dhm - Undiff Lower Hamilton Group
- Dhpl - Plattekill Formation
- Dou - Onondaga Limestone
- No Label
- Oag - Austin Glen Form (graywacke, shale)
- Omi - Mount Merino Formation
- On - Normanskill Shale
- Osc - Schenectady Formation
- Osf - Stuyvesant Falls Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- h2o - Water

* Schenectady Formation includes: graywacke, sandstone, siltstone, shale

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Selkirk to Catskill Figure 4-10

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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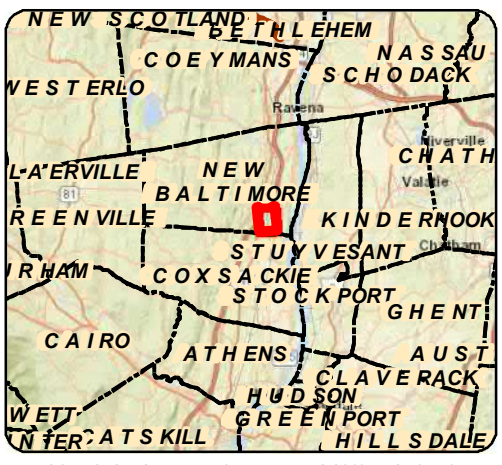
208.8
208.9
209
A209.05-1
209.1
209.2
209.3
209.4
209.5
B209.5-1
NEW BALTIMORE
209.6
209.7
209.8
209.9
B210.0-1
Gov Thomas E Dewey Thruway
New York State Thruway
0
1,000
Feet



LEGEND

- 111.8 Certified Milepost - Tenths
- 135 Certified Milepost
- 111.8 Preferred Alternative Milepost - Tenths
- 135 Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership: TOWN NAME

Road Name: Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Selkirk to Catskill

Figure A-10

Sheet 9 of 18

Prepared by: AECOM 5/19/2021

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

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TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B209.5**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED 4.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	4.0 '
d	FROM	4.0 '	TO	20.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	02/07/2013
DATE COMPLETED	02/07/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	10 10 9 7		***BLACK SILTY M/C SAND, SM ROCK FRAGMENTS (FILL)***		
	S-2	6 7 8 6		4.0		
5	S-3	9 7 10 11		***LIGHT BROWN SILTY F/M/C SAND, TR TO SM GRAVEL***		
	S-4	8 8 10 10		8.0	31.5	
10	S-5	4 5 7 6			33.2	
15	S-6	9 7 9		***OLIVE-BROWN CLAY***	30.9	
20	S-7	9 11 12		20.0		
				END OF BORING AT 20'		
25						
30						
35						

DRN.	JPB
CKD.	PWK

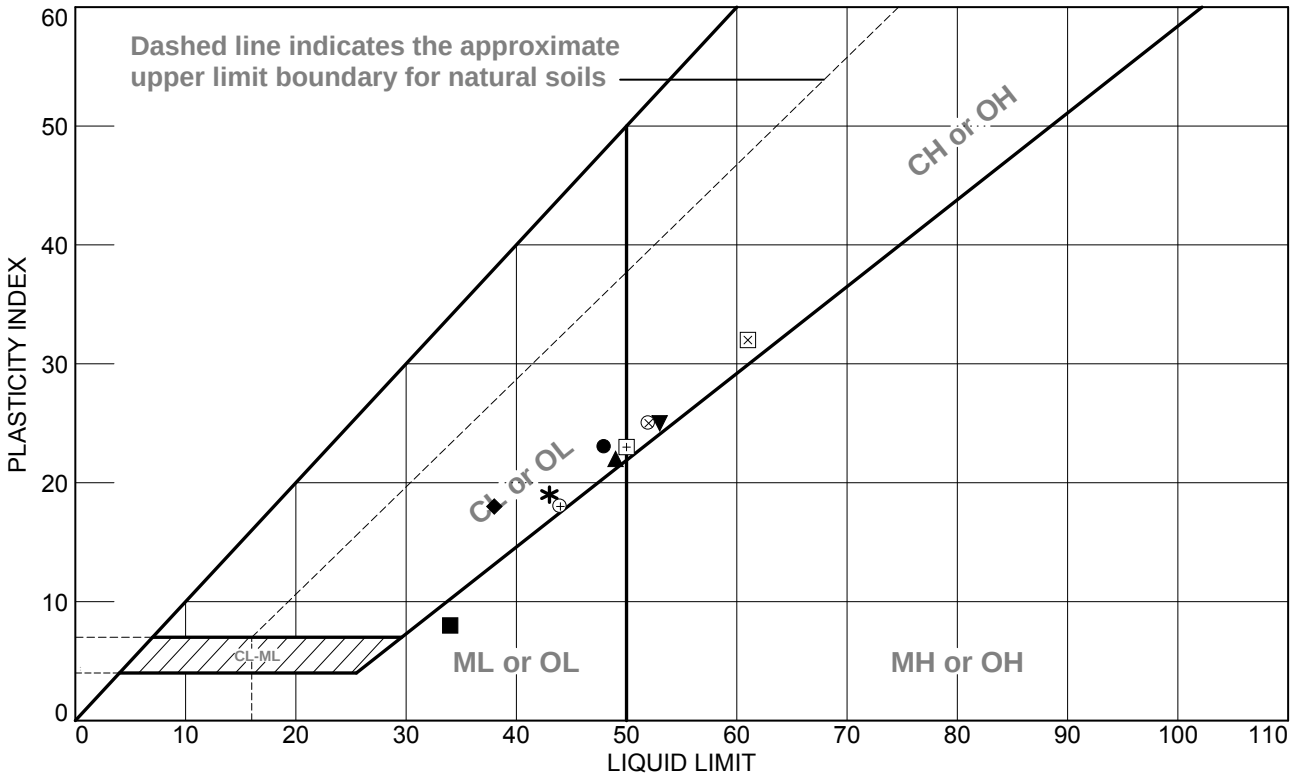
NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	26.9	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	34.3	-	-	-
B209.5-1	S-3	4.0-6.0	-	13.3	34.6	52.1		-	-	-	-	-	31.5	-	-	-
	S-4	6.0-8.0														
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	33.2	-	-	-
	S-6	13.5-20.0	CL	-	-	-	-	49	27	22	0.2	-	30.9	-	-	-
B210.0-1	S-2	2.0-4.0	CL	-	-	-		38	20	18	0.0	-	20.8	105.0	-	-
	S-4	6.0-8.0	-	-	-	-		-	-	-	-	-	24.8	-	-	-
	S-5	8.0-10.0	CH	0.0	3.0	2.2	94.8	53	28	25	0.2	2.83	33.7	-	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	29.5	96.3	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	29.1	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

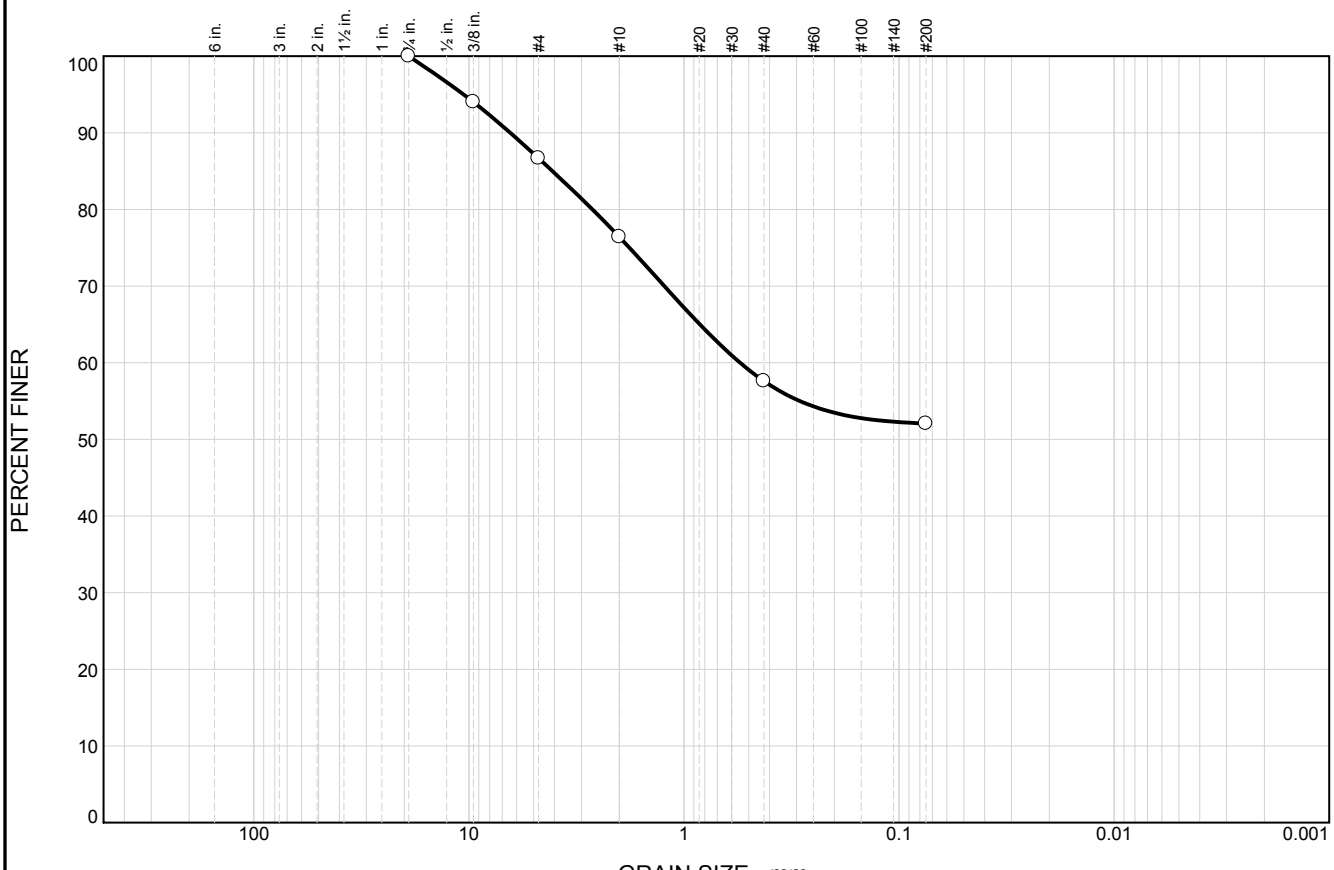
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B208.3-1	S-7	18.5-20.0 FT	30.2	25	48	23	CL
■	B208.5-1	S-7	18.5-20.0 FT	33.0	26	34	8	ML
▲	B209.5-1	S-6	13.5-15.0 FT	30.9	27	49	22	CL
◆	B210.0-1	S-2	2.0-4.0 FT	20.8	20	38	18	CL
▼	B210.0-1	S-5	8.0-10.0 FT	33.7	28	53	25	CH
✱	B210.4-1	S-7	18.5-20.0 FT	30.0	24	43	19	CL
⊕	B211.2-1	S-2	2.0-4.0 FT		26	44	18	CL
⊞	B211.2-1	S-6 & S-7	13.5-20.0 FT	47.5	27	50	23	CH
⊗	B211.5-1	S-5	8.0-10.0 FT	35.9	27	52	25	CH
⊠	B211.5-1	S-8 & S-9	23.5-30.0 FT	52.1	29	61	32	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

Client: TRANSMISSION DEVELOPERS INC.
Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

Project No.: 195651 **Figure** 5

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	13.3	10.3	18.8	5.5	52.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			4.0888	0.5484						

Material Description	USCS	AASHTO
○ BROWN M/C/F SANDY SILT, TR TO SM F/ GRAVEL		

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B209.5-1 **Depth:** 4.0-8.0 FT **Sample Number:** S-3 & S-4

Remarks:
○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 90

Tested By: BMH 02/21/13 **Checked By:** JPB 03/12/13

SITE LOCATION

Champlain-Hudson Power Express- Phase 4 HDD Borings – Package 6 and 7
Schenectady through Selkirk, NY
April 25, 2023 ■ Terracon Project No. JB215256J

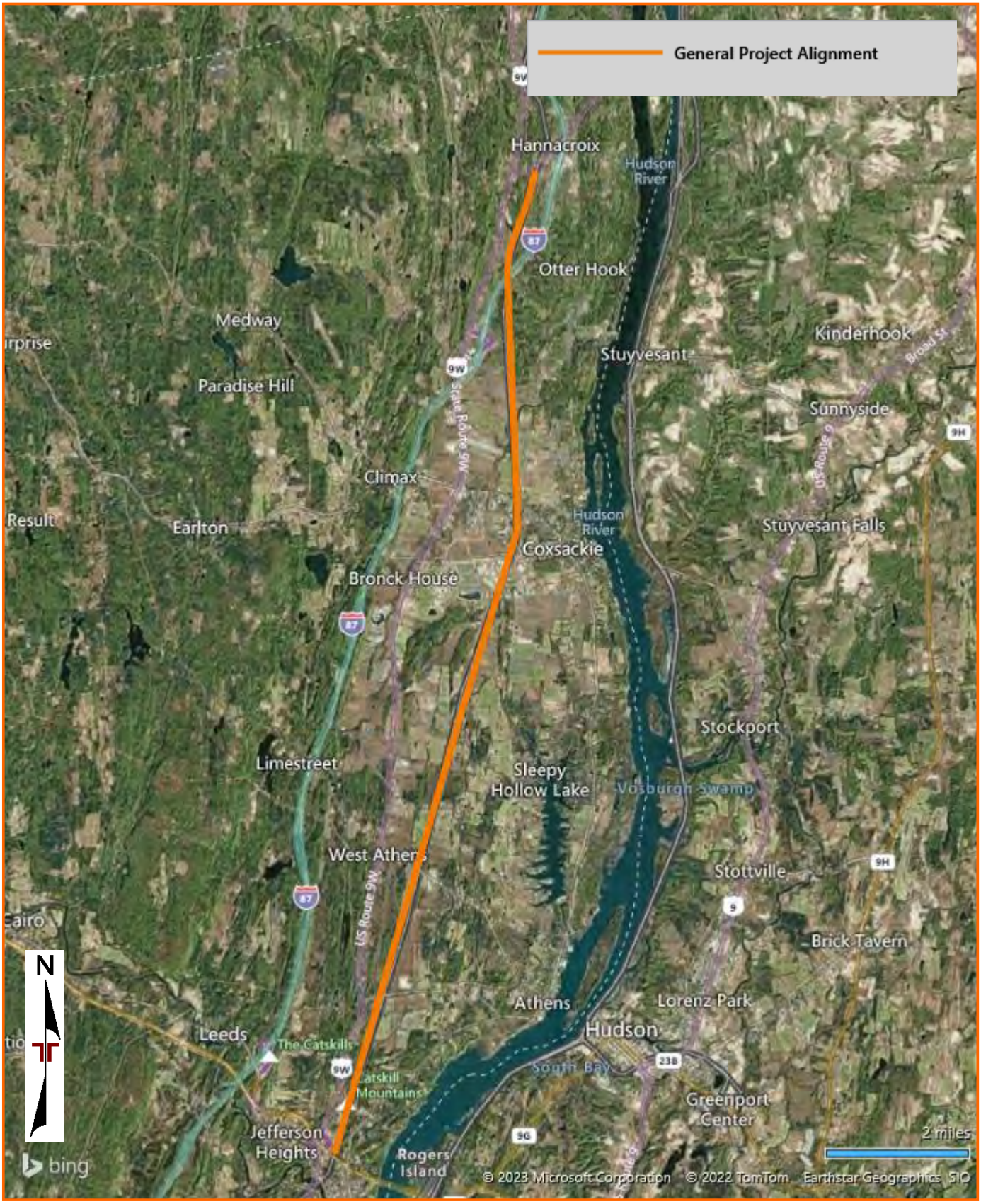


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Champlain-Hudson Power Express- Phase 4 HDD Borings – Package 6 and 7
Schenectady through Selkirk, NY
April 25, 2023 ■ Terracon Project No. JB215256J

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. KB-209.7

PROJECT: Phase 4 Borings

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3851° Longitude: -73.8188°

Surface Elev.: 121.17 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.1 **TOPSOIL**	121.1						
ELASTIC SILT (MH), varved silt and clay, brown, medium stiff to very stiff			12	WH-2-4-5 N=6			
			10	6-9-9-12 N=18			
		5	24	13-11-10-10 N=21	30.3	64-32-32	100
			14	7-8-8-11 N=16			
		10	16	2-4-5-8 N=9			
		15	22	2-3-4-6 N=7	38.8	64-32-32	100
grades with gray mottling		20	24	4-5-6-7 N=11			
25.0	96.2	25					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0-20' 4" Casing
20'-50' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Hammer Efficiency Summary:
Energy Transfer Ratio: 89.1% +/-4.4%
Hammer Efficiency Correction (CE): 1.49
Logged by DO
WH= Weight of hammer
WR= Weight of rod

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-01-2023 | Boring Completed: 03-16-2023
Drill Rig: Mobil B-57 | Driller: J. Swope
Project No.: JB215256J

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 4/21/23

BORING LOG NO. KB-209.7

PROJECT: Phase 4 Borings

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3851° Longitude: -73.8188°

Surface Elev.: 121.17 (Ft.)

DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FAT CLAY (CH), varved silt and clay, brown, medium stiff				24	3-3-4-5 N=7	38.8	54-25-29	100
			30			24	2-3-3-5 3" Split Spoon With Ring Samplers			
		grades gray	35			24	WH-WH-2-3 N=2			
40.0	81.2		40			24	WH-WH-2-3 N=2	38.8	45-25-20	100
		LEAN CLAY (CL), varved silt and clay, gray, very soft to soft								
			45			24	WR-WR-WH-WH			
			50							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0-20' 4" Casing
20'-50' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Hammer Efficiency Summary:
Energy Transfer Ratio: 89.1% +/-4.4%
Hammer Efficiency Correction (CE): 1.49
Logged by DO
WH= Weight of hammer
WR= Weight of rod

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-01-2023 | Boring Completed: 03-16-2023
Drill Rig: Mobil B-57 | Driller: J. Swope
Project No.: JB215256J

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 4/21/23

BORING LOG NO. KB-209.7

PROJECT: Phase 4 Borings

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3851° Longitude: -73.8188°

Surface Elev.: 121.17 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), varved silt and clay, gray, very soft to soft *(continued)*					24	WR-WR-WH-WH			
	52.0	69.2								
	Boring Terminated at 52 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0-20' 4" Casing
20'-50' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Hammer Efficiency Summary:
Energy Transfer Ratio: 89.1% +/-4.4%
Hammer Efficiency Correction (CE): 1.49
Logged by DO
WH= Weight of hammer
WR= Weight of rod

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-01-2023 | Boring Completed: 03-16-2023

Drill Rig: Mobil B-57 | Driller: J. Swope

Project No.: JB215256J

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 4/21/23

Summary of Laboratory Results

BORING ID	Depth (Ft.)	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Organic Content (%)
KB-206.8	4-6	29.4	50	26	24	
KB-206.8	15-17	32.9	40	23	17	
KB-206.8	35-37	11.0	17	13	4	
KB-207.0	4-6	23.7	42	30	12	
KB-207.1	4-6	15.1				
KB-209.7	4-6	30.3	64	32	32	2.8
KB-209.7	15-17	38.8	64	32	32	
KB-209.7	25-27	38.8	54	25	29	
KB-209.7	40-42	38.8	45	25	20	
KB-211.4B	4-6	32.8	58	32	26	
KB-211.4B	15-17	48.0	55	31	24	
KB-211.4B	40-42	36.7	63	32	31	
KB-214.4	4-6	33.7	65	33	32	
KB-214.4	15-17	37.6	57	29	28	
KB-214.4	30-32	49.7	45	30	15	
KB-219.4	6-8	11.8				
KB-220.9	4-6	31.0	50	27	23	
KB-220.9	20-22	39.6	47	26	21	
KB-220.9	45-47	33.6	42	27	15	

PROJECT: Phase 4 Borings

SITE: Champlain to Hudson HDD Crossings

Terracon
30 Corporate Cir Ste 201
Albany, NY

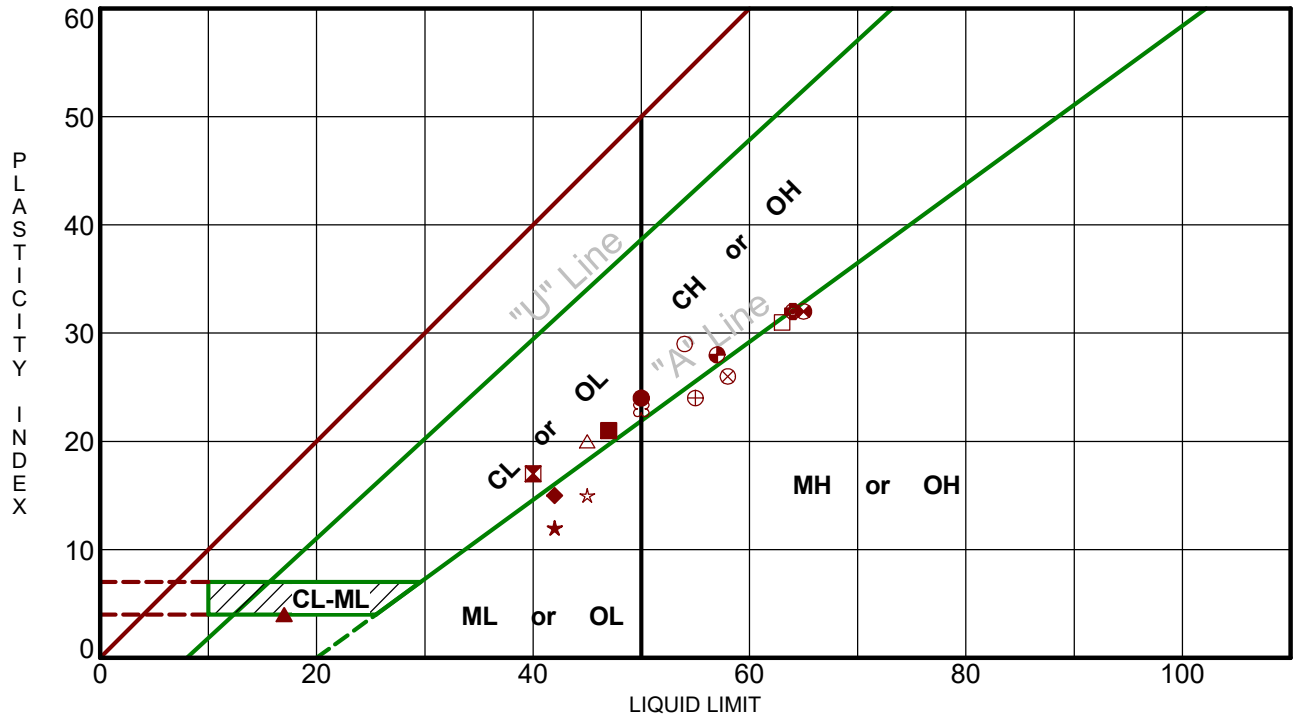
PROJECT NUMBER: JB215256J

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART LAB SUMMARY-PORTRAIT JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 4/14/23

ATTERBERG LIMITS RESULTS

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	KB-206.8	4 - 6	50	26	24	87.8	CH	FAT CLAY
⊠	KB-206.8	15 - 17	40	23	17	99.4	CL	LEAN CLAY
▲	KB-206.8	35 - 37	17	13	4	37.5	SC-SM	SILTY, CLAYEY SAND with GRAVEL
★	KB-207.0	4 - 6	42	30	12	86.9	ML	SILT
⊙	KB-209.7	4 - 6	64	32	32	100.0	MH	ELASTIC SILT
✿	KB-209.7	15 - 17	64	32	32	100.0	MH	ELASTIC SILT
○	KB-209.7	25 - 27	54	25	29	100.0	CH	FAT CLAY
△	KB-209.7	40 - 42	45	25	20	100.0	CL	LEAN CLAY
⊗	KB-211.4B	4 - 6	58	32	26	53.8	MH	SANDY ELASTIC SILT
⊕	KB-211.4B	15 - 17	55	31	24	82.0	MH	ELASTIC SILT with SAND
□	KB-211.4B	40 - 42	63	32	31	96.7	MH	ELASTIC SILT
⊗	KB-214.4	4 - 6	65	33	32	84.2	MH	ELASTIC SILT with SAND
◕	KB-214.4	15 - 17	57	29	28	94.7	CH	FAT CLAY
☆	KB-214.4	30 - 32	45	30	15	93.2	ML	SILT
⊗	KB-220.9	4 - 6	50	27	23	97.5	CH	FAT CLAY
■	KB-220.9	20 - 22	47	26	21	100.0	CL	LEAN CLAY
◆	KB-220.9	45 - 47	42	27	15	99.1	ML	SILT

PROJECT: Phase 4 Borings

SITE: Champlain to Hudson HDD Crossings

Terracon
30 Corporate Cir Ste 201
Albany, NY

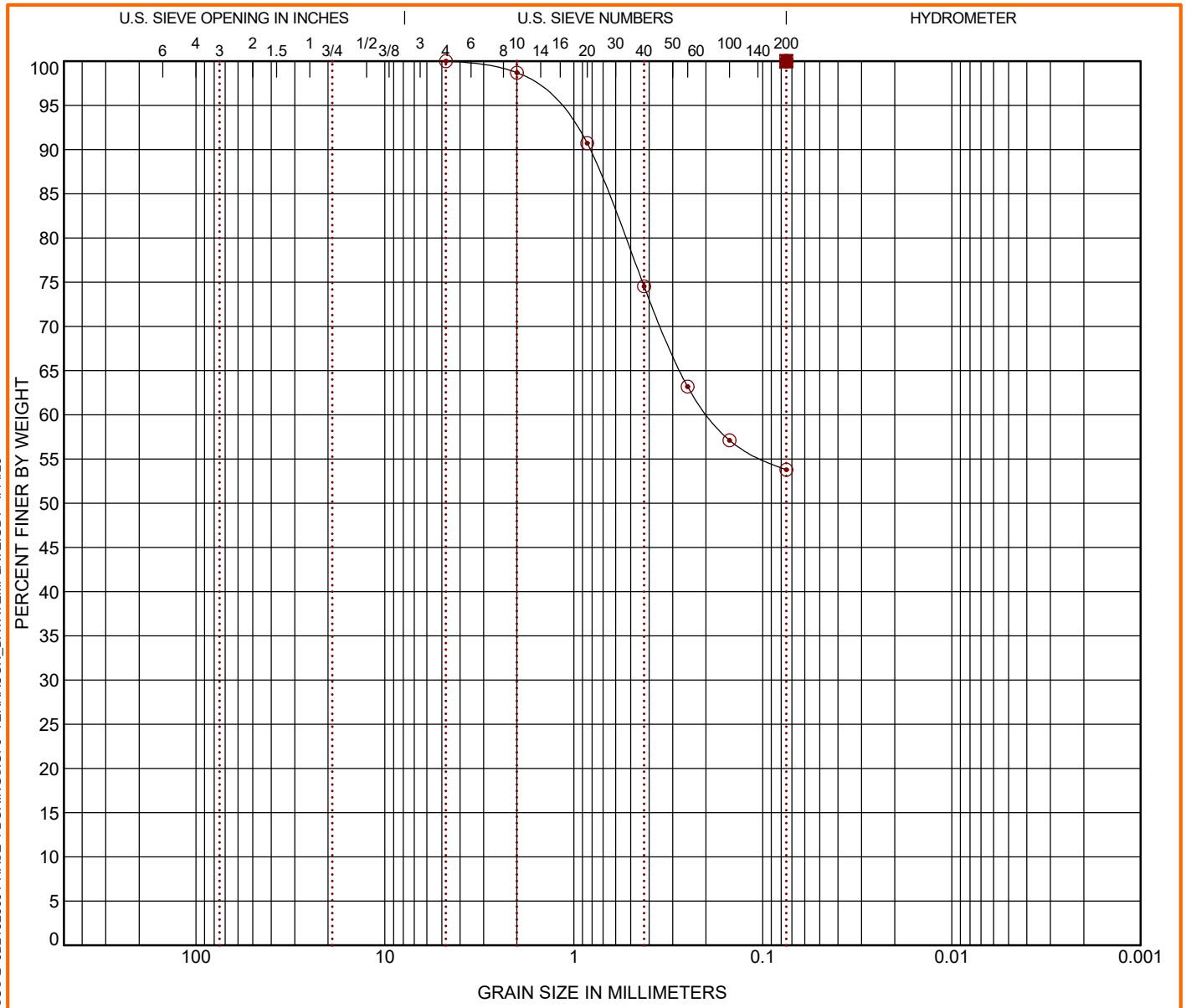
PROJECT NUMBER: JB215256J

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 4/14/23

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-209.7	4 - 6	ELASTIC SILT (MH)	30.3	64	32	32		
⊠	KB-209.7	15 - 17	ELASTIC SILT (MH)	38.8	64	32	32		
▲	KB-209.7	25 - 27	FAT CLAY (CH)	38.8	54	25	29		
★	KB-209.7	40 - 42	LEAN CLAY (CL)	38.8	45	25	20		
⊙	KB-211.4B	4 - 6	SANDY ELASTIC SILT (MH)	32.8	58	32	26		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-209.7	4 - 6	0.075				0.0	0.0	0.0		100.0	
⊠	KB-209.7	15 - 17	0.075				0.0	0.0	0.0		100.0	
▲	KB-209.7	25 - 27	0.075				0.0	0.0	0.0		100.0	
★	KB-209.7	40 - 42	0.075				0.0	0.0	0.0		100.0	
⊙	KB-211.4B	4 - 6	4.75	0.191			0.0	0.0	46.2		53.8	

PROJECT: Phase 4 Borings

SITE: Champlain to Hudson HDD Crossings

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256J

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 4/14/23

Kiewit

MEMORANDUM

DATE: November 11, 2022

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 102 – Revision 1
Champlain Hudson Power Express Project
Coxsackie, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located north of Coxsackie, New York. The approximate station for the start of HDD crossing number 102 is STA 60597+00 (42.38085° N, 73.81811° W).

The geotechnical data at this HDD crossing is attached. The available data is taken from the previous investigation by TRC and data from a recent investigation by Terracon, referenced below.

- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Package 6, Selkirk to Catskill, Rev-1, dated June 28, 2022.
- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 177.6-228.2, dated March 15, 2013.

Contact us if you have questions or require additional information.

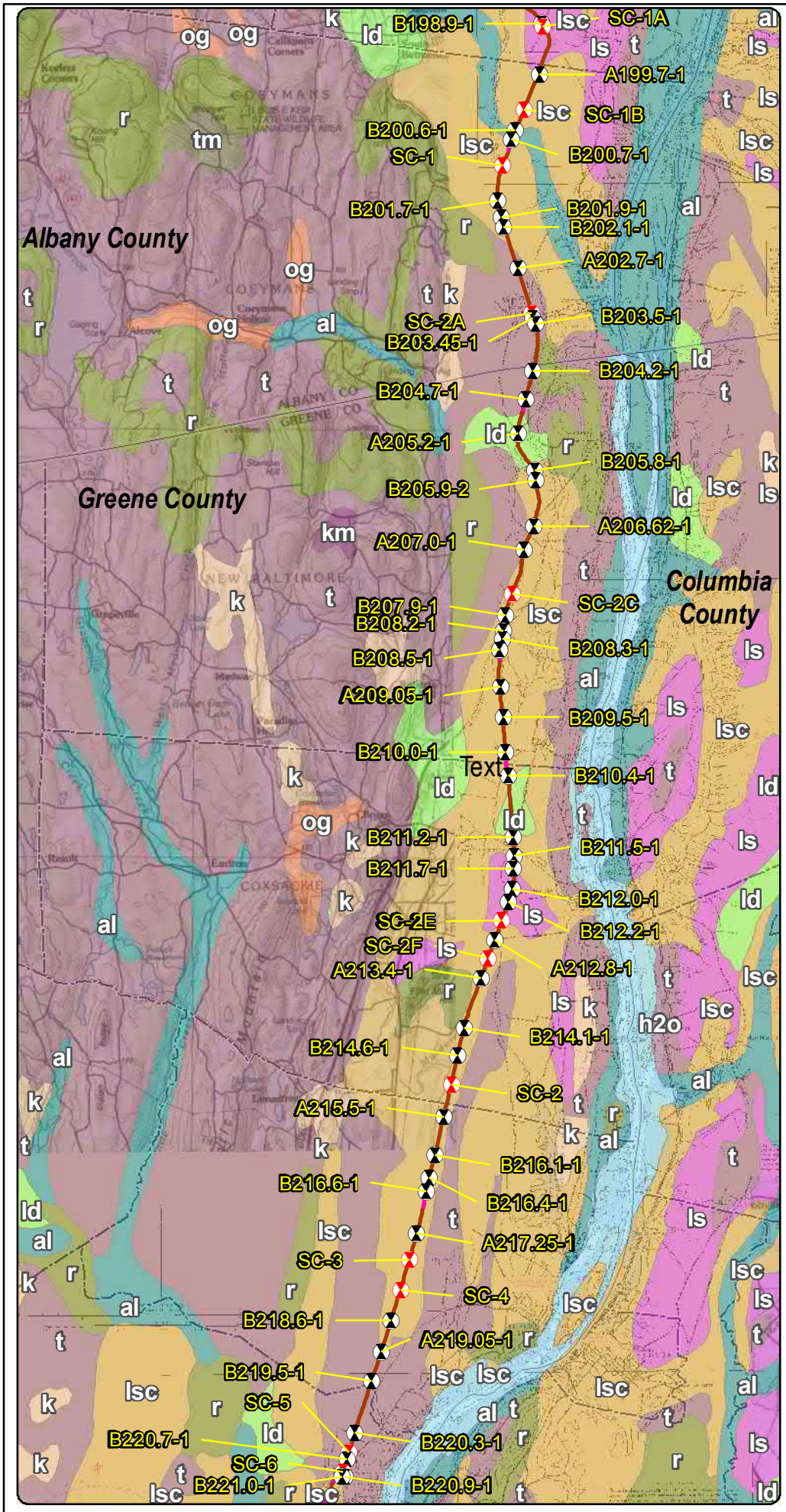
HDD 102
Borings B210.0-1, K-210.1,
K-210.2, B210.4-1
Segment 10 - Design Package 6

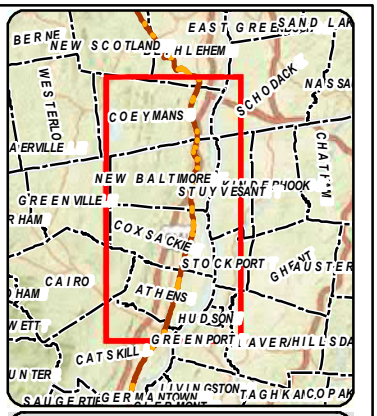
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	B209.5-1	1295695.1	676165.1	137.5
	B210.0-1	1293021.1	676353.2	109.9
	B210.4-1	1291223.1	676583.0	120.5
	B211.2-1	1286509.8	676960.2	132.6
	B211.5-1	1285068.8	677013.1	140.7
	B211.7-1	1284088.5	676965.4	141.5
	B212.0-1	1282469.0	676857.5	138.9
	B212.2-1	1281498.0	676590.5	130.8
	B214.6-1	1269721.4	672670.9	124.9
	B216.1-1	1262073.1	670916.0	127.0
	B216.4-1	1260344.1	670520.5	128.3
	B216.6-1	1259315.9	670290.2	129.8
	B219.5-1	1244816.4	666093.7	130.4
AECOM**	SC-1A	1348656.7	679220.0	176.4
	SC-2A	1326692.2	678361.5	178.9
	SC-2C	1305133.1	676877.4	160.6

Notes:
- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.
*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:
AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- h2o - Water
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- r - Bedrock
- t - Till
- tm - Till moraine

1 0.5 0 1 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

Prepared on 5/3/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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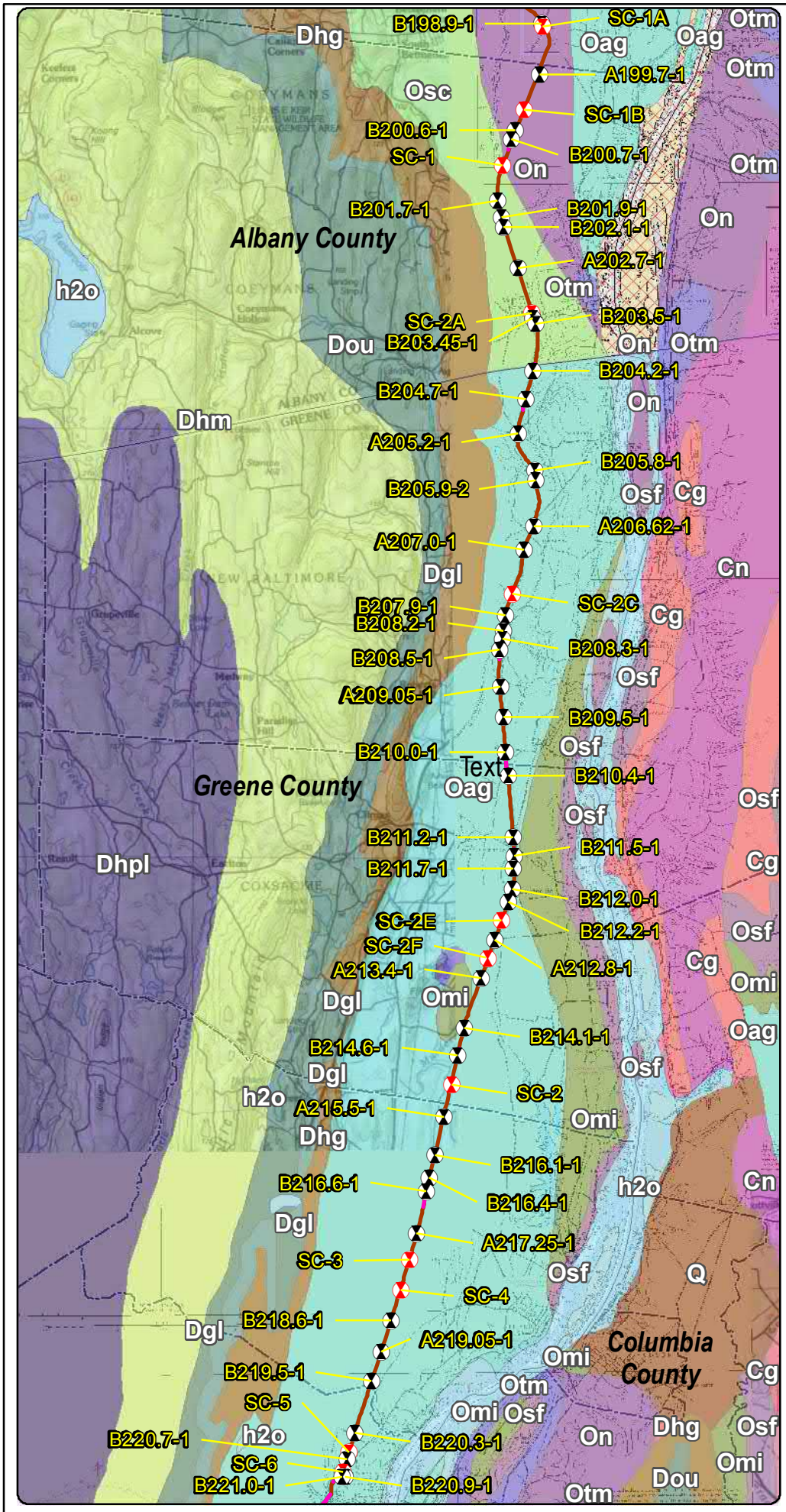

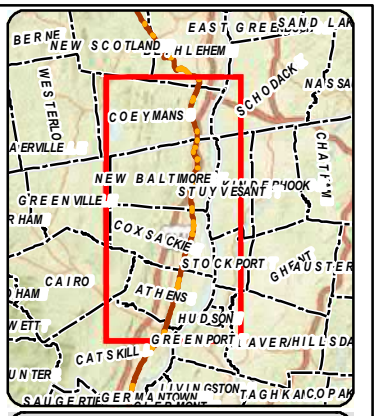

LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cg - Germantown Formation
- Cn - Nassau Formation
- Dgl - Glenerie Formation
- Dhg - Port Ewen Formation
- Dhm - Undiff Lower Hamilton Group
- Dhpl - Plattekill Formation
- Dou - Onondaga Limestone
- No Label
- Oag - Austin Glen Form (graywacke, shale)
- Omi - Mount Merino Formation
- On - Normanskill Shale
- Osc - Schenectady Formation
- Osf - Stuyvesant Falls Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- h2o - Water

* Schenectady Formation includes: graywacke, sandstone, siltstone, shale

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Selkirk to Catskill Figure 4-10

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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B210.0-1
210.1
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210.3
B210.4-1
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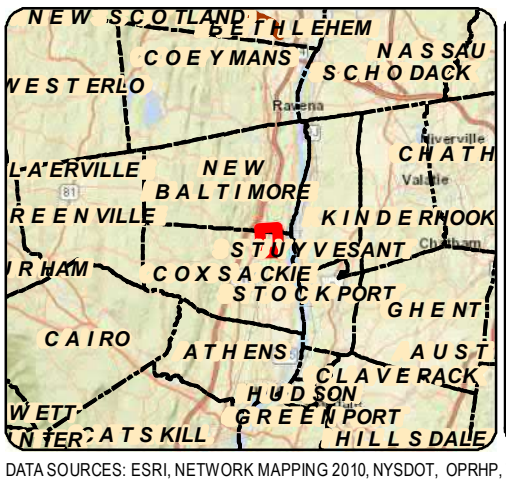
210.9
211
211.1
211.2
B211.2-1

NEW BALTIMORE
COXSACKIE

E Van Gurpin Ln
River Rd
Country Meadow Ln
Whitbeck St

0 1,000
Feet



LEGEND

- 111.8 Certified Milepost - Tenths
- 135 Certified Milepost
- 111.8 Preferred Alternative Milepost - Tenths
- 135 Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership: TOWN NAME

Road Name: Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Selkirk to Catskill

Figure A-10

Sheet 10 of 18

Prepared by: AECOM 5/19/2021

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

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TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B210.0-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED 0.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	25.0 '

DRILLER	R.CARUSO
HELPER	C. SMART
INSPECTOR	C. POPPE
DATE STARTED	11/30/2012
DATE COMPLETED	11/30/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	2 4 5 5		***GRAY/BROWN SILT, TR TO SM CLAY*** 2.0		WATER TABLE DETERMINED FROM WETNESS OF SAMPLE
	S-2	5 5 8 11		***BROWN CLAY, SM SILT*** 4.0	20.8	
5	S-3	5 12 17 17		***BROWN SILT, TR F/ SAND, TR CLAY*** 6.0		
	S-4	2 7 7 8		***BROWN SILT, TR CLAY*** 8.0	24.8	
10	S-5	11 19 25 24			33.7	
15	S-6	12 14 14			29.5	
20	S-7	9 10 9		***BROWN CLAY, TR M/F SAND, TR SILT*** 23.5	29.1	
25	S-8	7 8 10		***GRAY SILT, SM CLAY*** 25.0		
				END OF BORING AT 25'		
30						
35						

DRN.	TBT
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B210.4-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 2

GROUNDWATER DATA			
FIRST ENCOUNTERED DRY			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
d	FROM	0.0 '	TO	40.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	02/07/2013
DATE COMPLETED	02/07/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	50/0.1				
	S-2	50/0		***DARK GRAY BALLAST STONE AND GROUT (FILL)***		
				4.0		
5	S-3	12 11 9 8		***BROWN ROCK FRAGMENTS, TR SILT (FILL)***		
				6.0		
	S-4	7 9 8 7			31.5	
10	S-5	6 6 5 4		***GRAY-BROWN CLAY, TR SILT, TR GRAVEL-SIZED ROCK FRAGMENTS***		
				13.5		
15	S-6	8 8 10 11			32.7	
20	S-7	9 9 10		***OLIVE-BROWN SILT***	30.0	
				23.5		
25	S-8	8 7 8			30.7	
30	S-9	7 6 7		***BROWN TO GRAY CLAY, TR SILT***		
35	S-10	6 5 5				

DRN.	JPB
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B210.4-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	2 OF 2

DEPTH		A	B	C	DESCRIPTION	Wn	REMARKS
					BROWN TO GRAY CLAY, TR SILT		
40		S-11	4 5 4		40.0		
					END OF BORING AT 40'		
45							
50							
55							
60							
65							
70							
75							

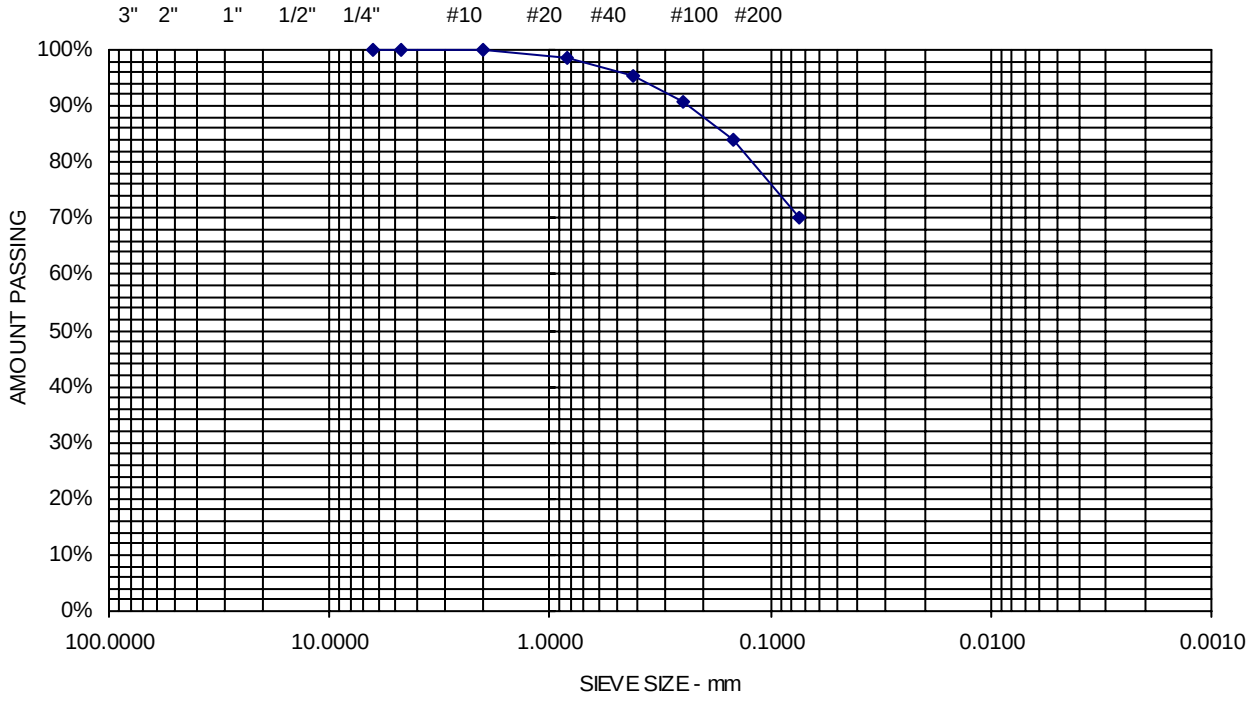
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10429S
Exploration	**B210.0-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 2-4 FEET**	Date Completed	12/7/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**99**	
425 um	**No. 40**	**95**	30.1% Sand
250 um	**No. 60**	**91**	
150 um	**No. 100**	**84**	
75 um	**No. 200**	**69.9**	69.9% Fines

BROWN SANDY SILT (ML)



Comments: MOISTURE CONTENT = 20.8%

Sheet

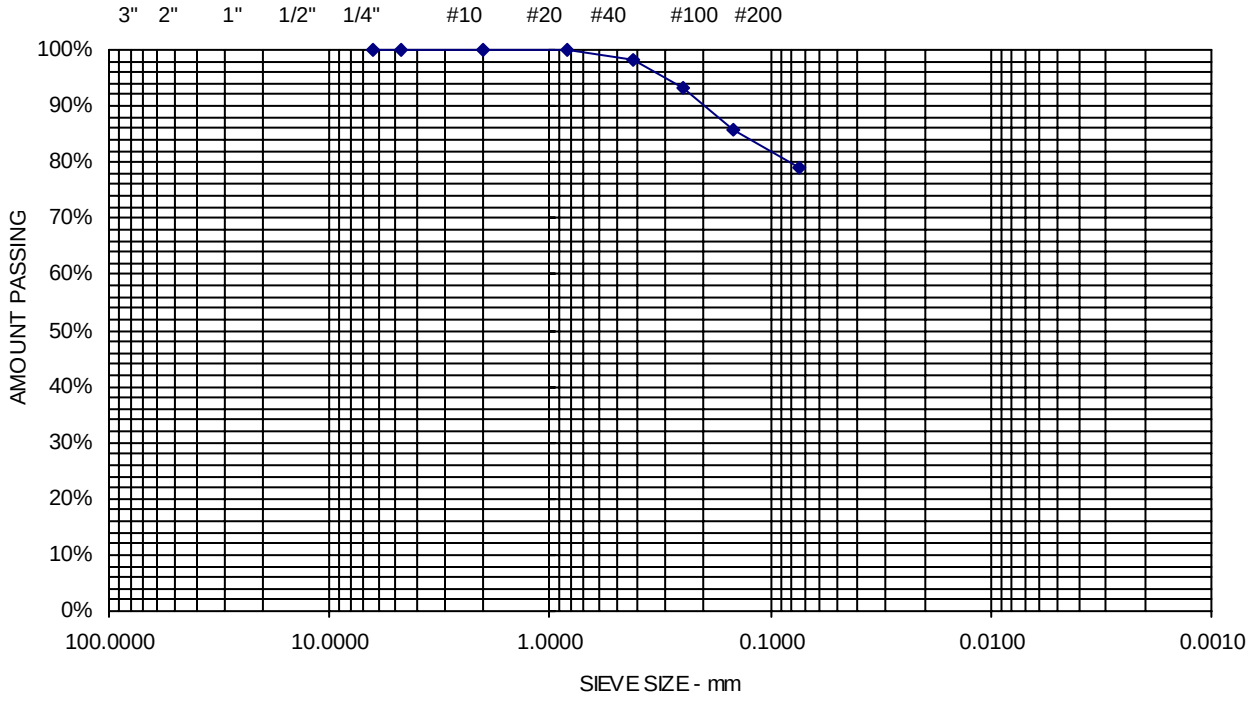
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10430S
Exploration	**B210.0-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 13-15 FEET**	Date Completed	12/7/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**98**	21% Sand
250 um	**No. 60**	**93**	
150 um	**No. 100**	**86**	
75 um	**No. 200**	**79.0**	79% Fines

BROWN SANDY SILTY CLAY (CL)



Comments: MOISTURE CONTENT = 51.9%

Sheet

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

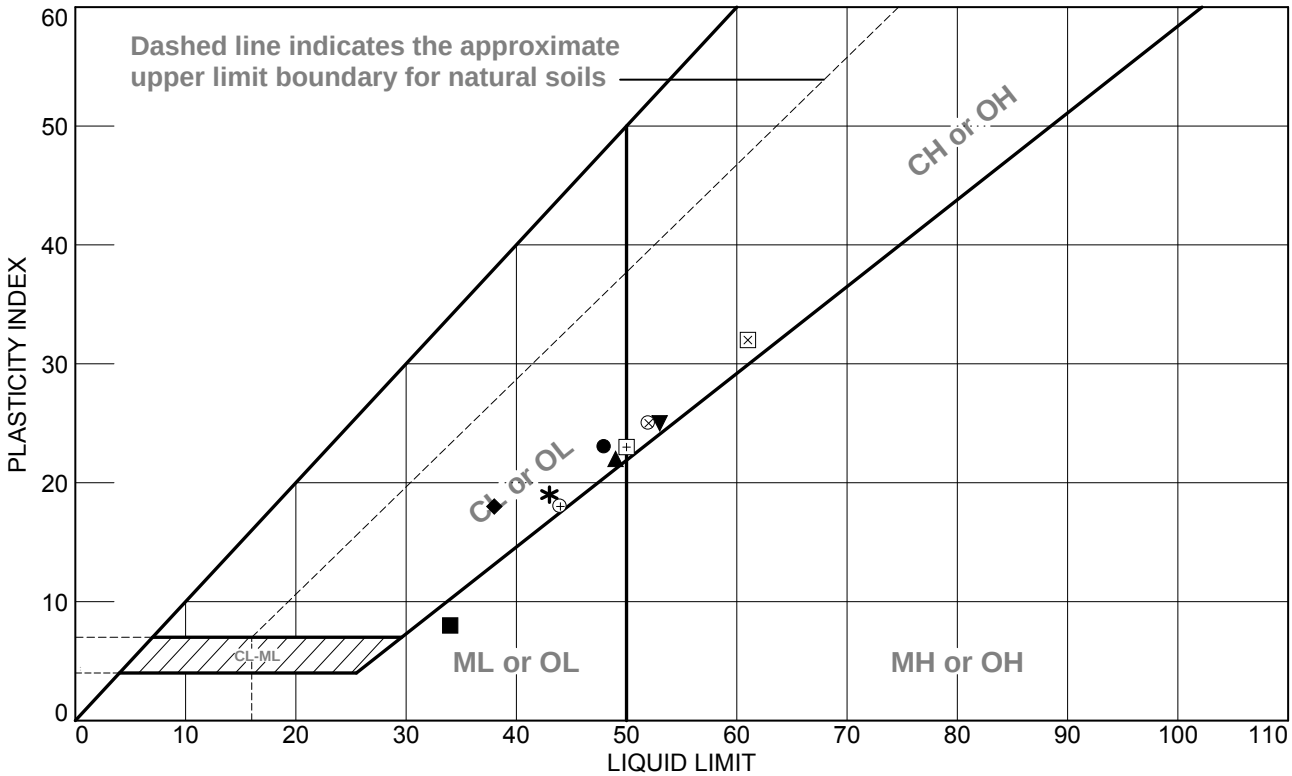
SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	26.9	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	34.3	-	-	-
B209.5-1	S-3	4.0-6.0	-	13.3	34.6	52.1		-	-	-	-	-	31.5	-	-	-
	S-4	6.0-8.0														
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	33.2	-	-	-
	S-6	13.5-20.0	CL	-	-	-	-	49	27	22	0.2	-	30.9	-	-	-
B210.0-1	S-2	2.0-4.0	CL	-	-	-		38	20	18	0.0	-	20.8	105.0	-	-
	S-4	6.0-8.0	-	-	-	-		-	-	-	-	-	24.8	-	-	-
	S-5	8.0-10.0	CH	0.0	3.0	2.2	94.8	53	28	25	0.2	2.83	33.7	-	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	29.5	96.3	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	29.1	-	-	-

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
B210.4-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	31.5	-	-	-
	S-6	13.5-15.0		0.0	1.4	18.1	80.5	-	-	-	-	2.79	32.7	-	-	-
	S-7	18.5-20.0	CL	-	-	-	-	43	24	19	0.3	-	30.0	-	-	-
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	30.7	-	-	-
B211.2-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	28.0	-	-	-
	S-2	2.0-4.0	CL	-	-	-	-	44	26	18	-	-	-	-	-	-
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	36.2	85.8	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	28.0	-	-	-
	S-5	8.0-10.0	SM	5.8	71.9	22.3		-	-	-	-	-	19.8	-	-	-
	S-6	13.5-15.0	CH	0.0	2.6	6.7	90.7	50	27	23	0.9	2.80	47.5	-	-	-
	S-7	18.5-20.0														

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

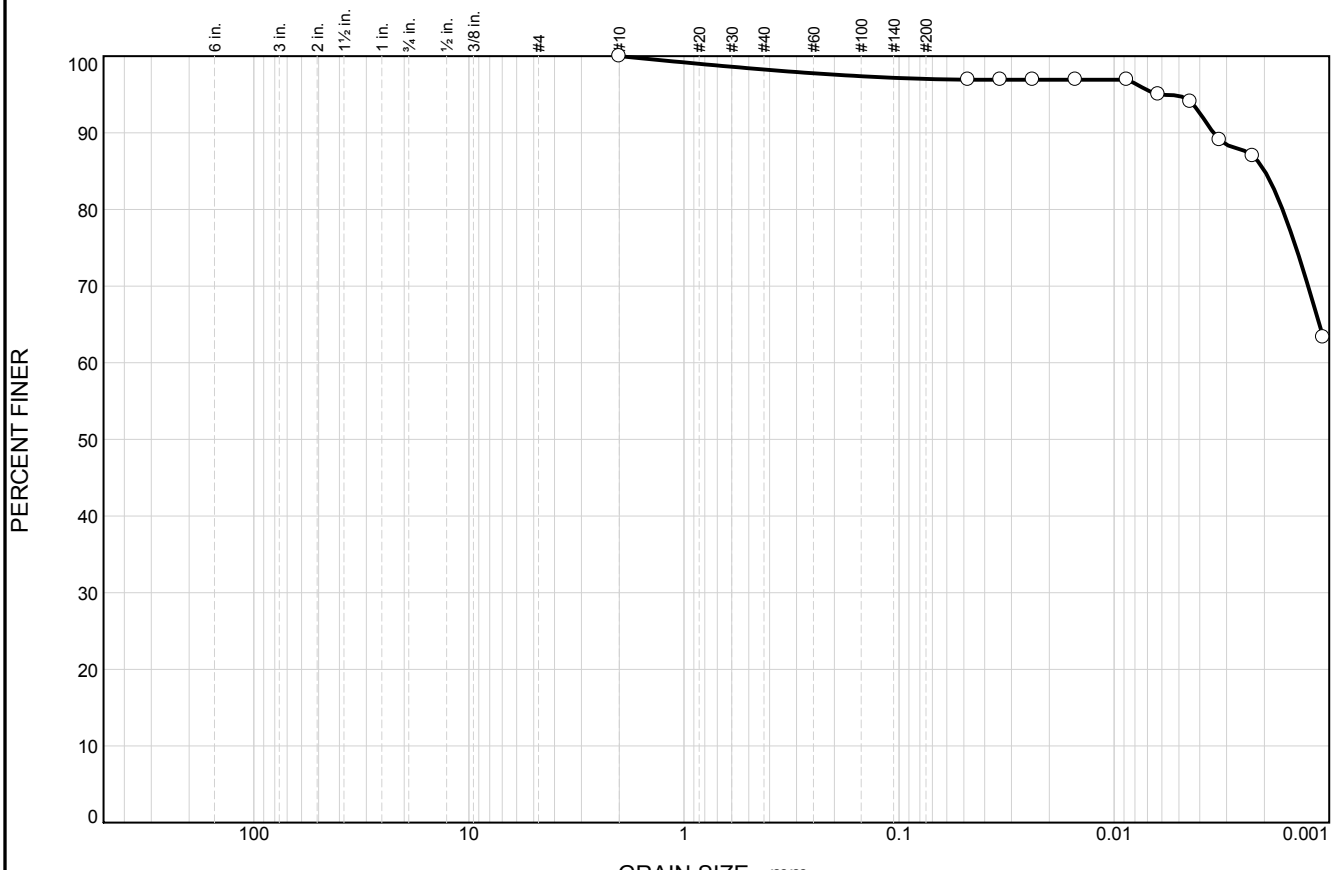
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B208.3-1	S-7	18.5-20.0 FT	30.2	25	48	23	CL
■	B208.5-1	S-7	18.5-20.0 FT	33.0	26	34	8	ML
▲	B209.5-1	S-6	13.5-15.0 FT	30.9	27	49	22	CL
◆	B210.0-1	S-2	2.0-4.0 FT	20.8	20	38	18	CL
▼	B210.0-1	S-5	8.0-10.0 FT	33.7	28	53	25	CH
✱	B210.4-1	S-7	18.5-20.0 FT	30.0	24	43	19	CL
⊕	B211.2-1	S-2	2.0-4.0 FT		26	44	18	CL
⊞	B211.2-1	S-6 & S-7	13.5-20.0 FT	47.5	27	50	23	CH
⊗	B211.5-1	S-5	8.0-10.0 FT	35.9	27	52	25	CH
⊠	B211.5-1	S-8 & S-9	23.5-30.0 FT	52.1	29	61	32	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

Client: TRANSMISSION DEVELOPERS INC.
Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

Project No.: 195651 **Figure** 5

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	1.7	1.3	2.2	94.8

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	53	28	0.0020							

Material Description	USCS	AASHTO
○ BROWN CLAY, TR M/F SAND, TR SILT	CH	A-7-6(29)

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B210.0-1 **Depth:** 8.0-10.0 FT **Sample Number:** S-5

Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

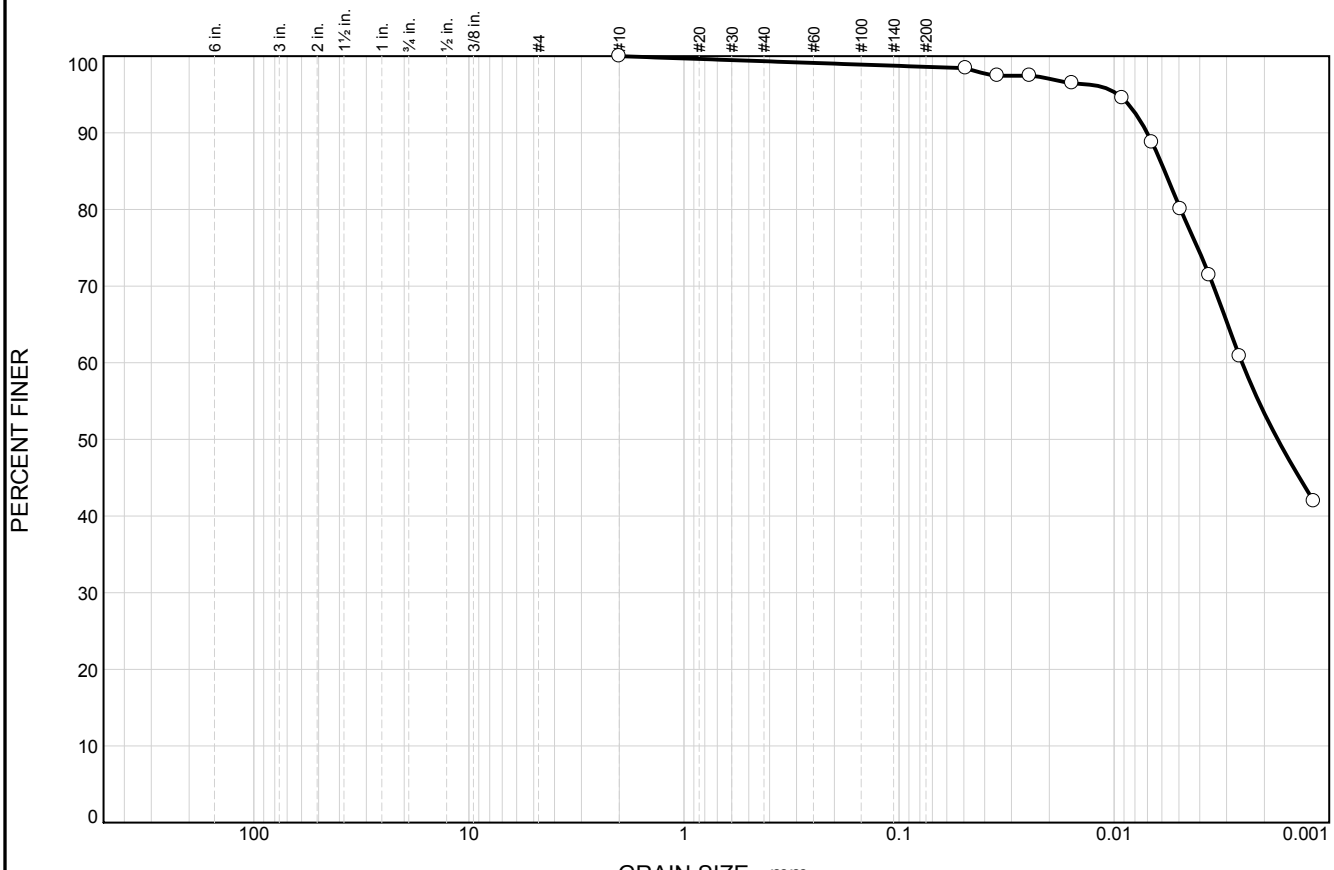
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 91

Tested By: TBT 01/08/13 **Checked By:** JPB 03/12/13

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.7	0.7	18.1	80.5

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0058	0.0025	0.0017					

Material Description	USCS	AASHTO
○ BROWN CLAY, SM SILT, TR F/M SAND		

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B210.4-1 **Depth:** 13.5-15.0 FT **Sample Number:** S-6

Remarks:
○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 92

Tested By: TBT 02/26/13 **Checked By:** JPB 03/12/13

Terracon GeoReport

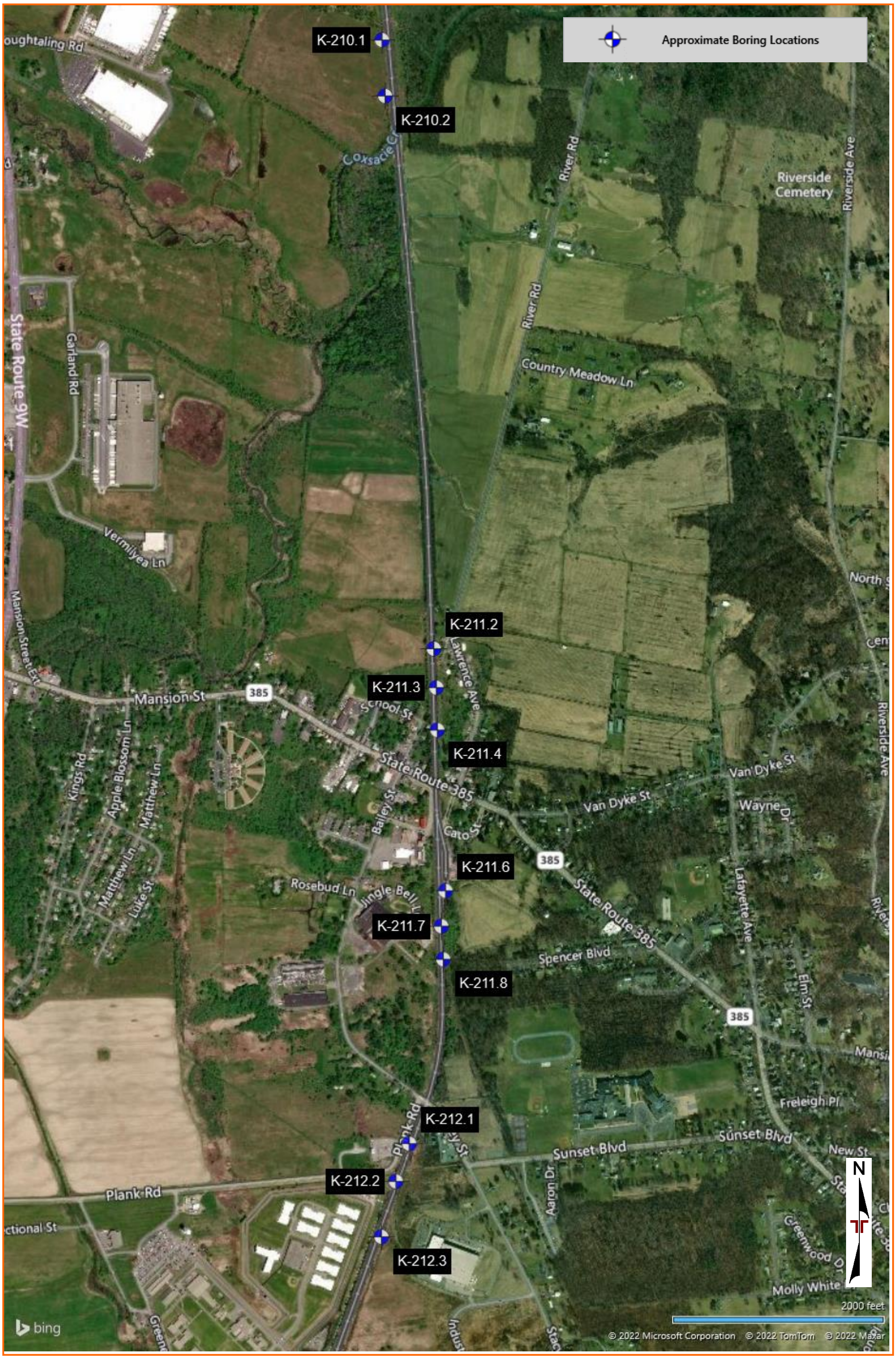


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-210.1

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3794° Longitude: -73.8178°

Surface Elev.: 120.9 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
		FILL - POORLY GRADED GRAVEL, black, loose to medium dense
4.0	117	
		FILL - POORLY GRADED SAND WITH GRAVEL, black, loose
6.0	115	
		SANDY FAT CLAY (CH), brown, very soft to very stiff

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	1	10-9-6-4 N=15			
	0	3-2-3-2 N=5			
5	3	2-2-2-2 N=4			
	12	2-2-3-3 N=5	21.9		
	20	3-5-7-9 N=12			
10	22	10-10-13-12 N=23			
15	15	3-5-7 N=12	34.5	55-27-28	63
20	16	3-5-6 N=11			
25	19	2-3-6 N=9	31.9		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: AV
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-01-2022 | Boring Completed: 03-01-2022

Drill Rig: CME 750X | Driller: J. Lamm

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-210.1

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3794° Longitude: -73.8178°

Surface Elev.: 120.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY FAT CLAY (CH), brown, very soft to very stiff *(continued)*							
		30						
				11	2-4-7 N=11			
		35						
				22	2-3-4 N=7			
				24	2-2-4-4	47.7	55-27-28	66
		40			3" Split Spoon With Ring Samplers WOH/24"			
42.0	79							
	Boring Terminated at 42 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: AV
Hammer Efficiency Summary:

Energy Transfer Ratio: 91.3% +/-2.7%

Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-01-2022 | Boring Completed: 03-01-2022

Drill Rig: CME 750X | Driller: J. Lamm

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-210.2

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3776° Longitude: -73.8176°

Surface Elev.: 118.3 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - POORLY GRADED GRAVEL WITH SAND, gray, medium dense	9	22-15-12-8 N=27			
2.0	116.5	**FILL - POORLY GRADED SAND**, trace gravel, black, very loose to loose	14	8-3-2-2 N=5			
		trace clay noted	15	3-2-1-2 N=3			
		becomes brown	9	3-3-5-8 N=8			
8.0	110.5	**WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM)**, black, loose	10	5-3-3-3 N=6	7.7		12
10.0	108.5	**SILT AND CLAY (CL-ML)**, brown and gray, soft to medium stiff	10	3-2-2-3 N=4			
			6	3-3-3 N=6			
20.0	98.5	**CLAYEY SAND (SC)**, brown and gray, medium dense	10	3-5-7 N=12	26.6	45-24-21	29
			16	4-7-10 N=17			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: AV
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-01-2022 | Boring Completed: 03-01-2022

Drill Rig: CME 750X | Driller: J. Lamm

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-210.2

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3776° Longitude: -73.8176°

Surface Elev.: 118.3 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
30.0	88.5	**CLAYEY SAND (SC)**, brown and gray, medium dense *(continued)*			20	3-7-8-8 N=15			
32.0	86.5	**ELASTIC SILT WITH SAND (MH)**, brown and gray	30		22	6-11-13-17	30.6	51-29-22	74
		SILT AND CLAY (CL-ML), gray, very soft to medium stiff				3" Split Spoon With Ring Samplers			
			35		23	2-3-3 N=6			
			40		24	WOH-WOH -WOH-1			
42.0	76.5	***Boring Terminated at 42 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: AV
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-01-2022 | Boring Completed: 03-01-2022

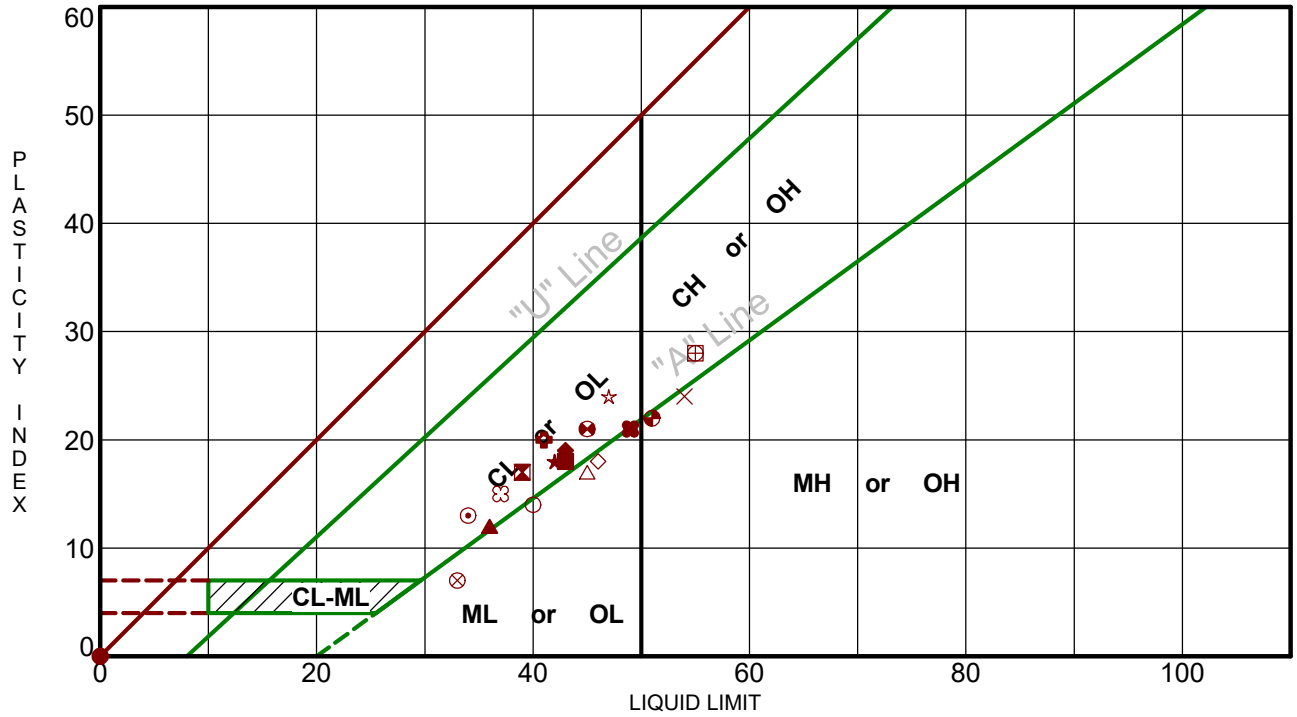
Drill Rig: CME 750X | Driller: J. Lamm

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-207.7	25 - 25.8	NP	NP	NP	21.3	SM	SILTY SAND with GRAVEL
⊠	K-208.1	25 - 27	39	22	17	93.7	CL	LEAN CLAY
▲	K-208.1	35 - 37	36	24	12	91.9	CL	LEAN CLAY
★	K-208.2	15 - 17	42	24	18	83.9	CL	LEAN CLAY with SAND
⊙	K-208.2	25 - 27	34	21	13	89.4	CL	LEAN CLAY
✿	K-208.2	35 - 37	41	21	20	97.6	CL	LEAN CLAY
○	K-208.6	13 - 14.5	40	26	14	73.8	ML	SILT with SAND
△	K-208.7	8 - 10	45	28	17	43.8	SM	SILTY SAND with GRAVEL
⊗	K-208.7	18 - 20	33	26	7	92.8	ML	SILT
⊕	K-210.1	15 - 17	55	27	28	62.6	CH	SANDY FAT CLAY
□	K-210.1	38 - 40	55	27	28	65.8	CH	SANDY FAT CLAY
✖	K-210.2	20 - 22	45	24	21	29.0	SC	CLAYEY SAND
◕	K-210.2	30 - 32	51	29	22	73.8	MH	ELASTIC SILT with SAND
☆	K-211.2	10 - 12	47	23	24	69.7	CL	SANDY LEAN CLAY
✿	K-211.2	19 - 21	37	22	15	88.7	CL	LEAN CLAY
■	K-211.3	10 - 12	43	25	18	59.3	CL	SANDY LEAN CLAY with GRAVEL
◆	K-211.3	20 - 22	43	24	19	95.4	CL	LEAN CLAY
◇	K-211.4	10 - 12	46	28	18	65.1	ML	SANDY SILT
×	K-211.4	28 - 30	54	30	24	84.2	MH	ELASTIC SILT with SAND
✖	K-211.6	6 - 8	49	28	21	68.0	ML	SANDY SILT

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

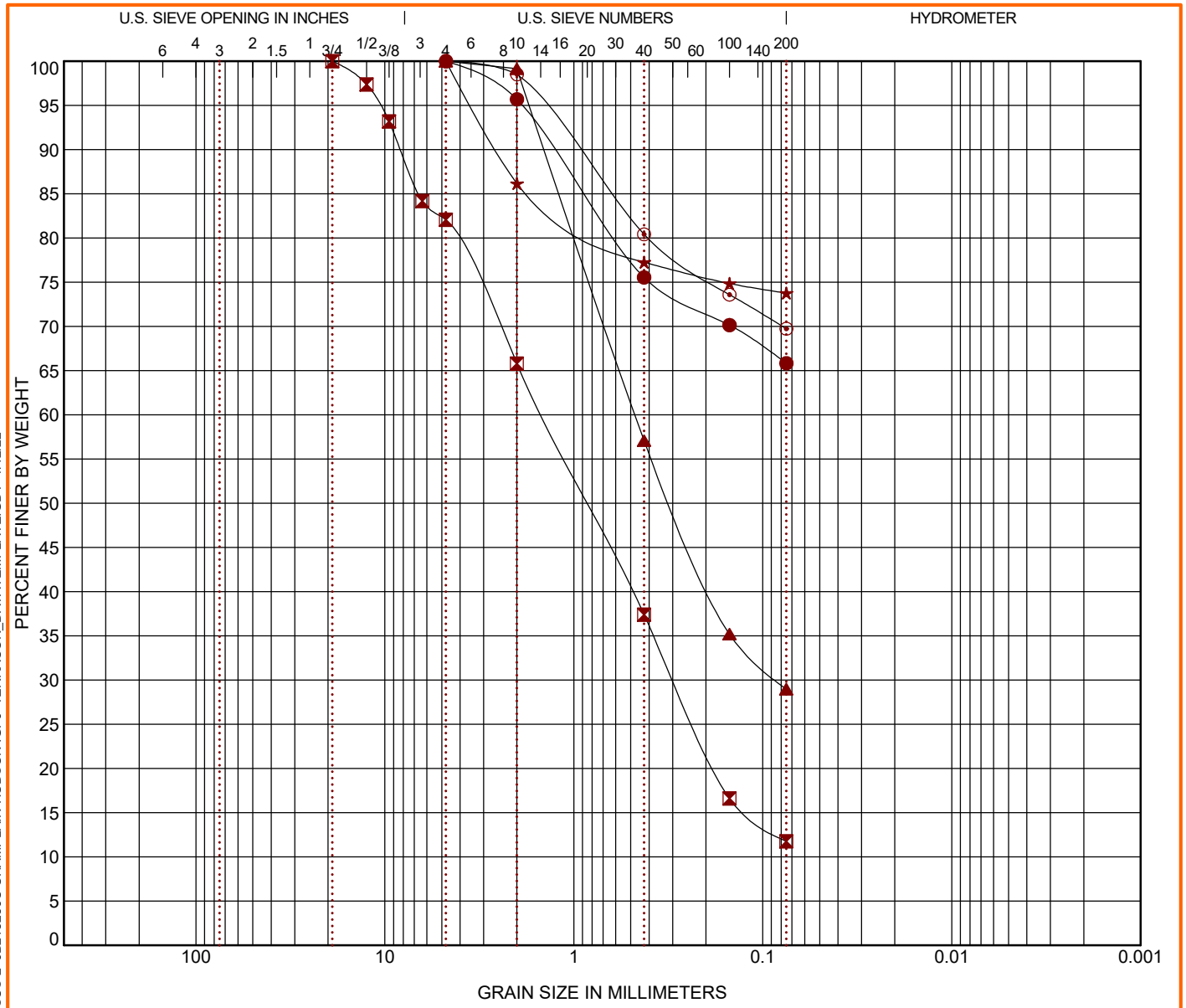
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/13/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	K-210.1	38 - 40	SANDY FAT CLAY (CH)	47.7	55	27	28		
⊠	K-210.2	8 - 10	WELL-GRADED SAND with SILT and GRAVEL (SW-SM)	7.7				1.01	25.04
▲	K-210.2	20 - 22	CLAYEY SAND (SC)	26.6	45	24	21		
★	K-210.2	30 - 32	ELASTIC SILT with SAND (MH)	30.6	51	29	22		
⊙	K-211.2	10 - 12	SANDY LEAN CLAY (CL)	34.0	47	23	24		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-210.1	38 - 40	4.75				0.0	0.0	34.2		65.8	
⊠	K-210.2	8 - 10	19	1.459	0.293		0.0	17.9	70.3		11.8	
▲	K-210.2	20 - 22	4.75	0.473	0.084		0.0	0.0	71.0		29.0	
★	K-210.2	30 - 32	4.75				0.0	0.0	26.2		73.8	
⊙	K-211.2	10 - 12	4.75				0.0	0.0	30.3		69.7	

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

Kiewit

MEMORANDUM

DATE: April 7, 2023

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 103 and 104 – Revision 2
Champlain Hudson Power Express Project
Coxsackie, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located north of Coxsackie, New York. The approximate station for the start of HDD crossing number 103 and 104 is STA 60659+00 (42.3637° N, 73.8165° W).

The geotechnical data at this HDD crossing is attached. The available data is taken from the previous investigation by TRC and data from recent investigations by Terracon, referenced below.

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 177.6-228.2, dated March 15, 2013.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Package 6, Selkirk to Catskill, Rev-1, dated June 28, 2022.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express-Phase 4 HDD Borings – Package 6 and 7A, Schenectady to Selkirk, dated February 8, 2023.

Contact us if you have questions or require additional information.

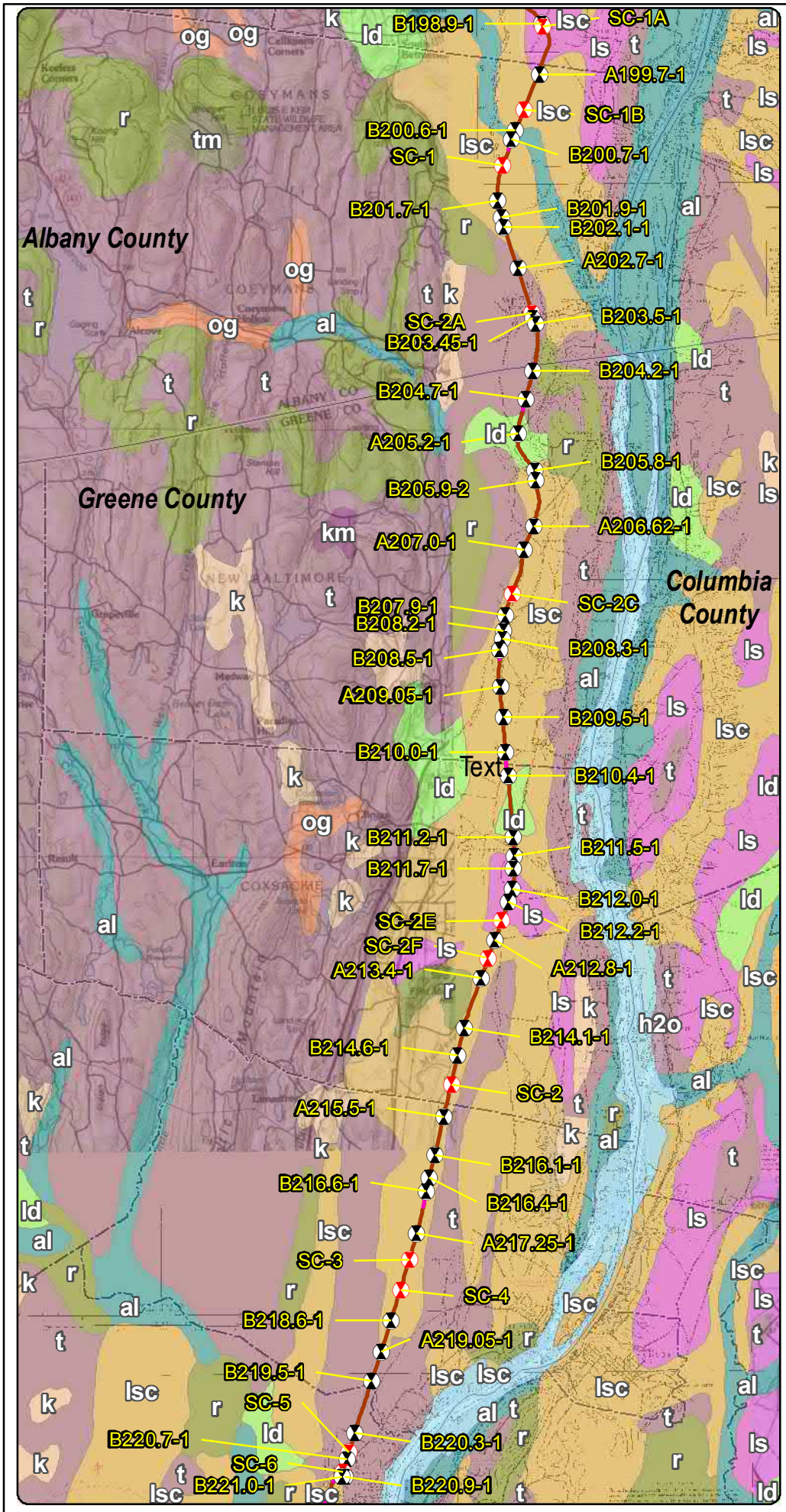
HDD 103 and 104
Borings B211.2-1, B211.5-1, K-211.2,
K-211.3, K-211.4, KB-211.4B
Segment 10 - Design Package 6

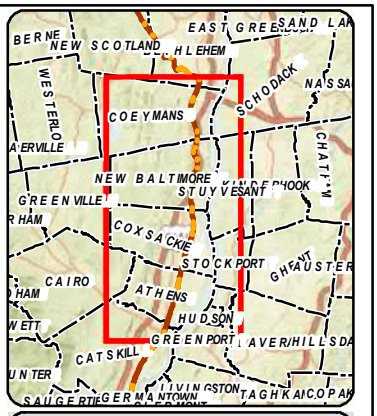
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	B209.5-1	1295695.1	676165.1	137.5
	B210.0-1	1293021.1	676353.2	109.9
	B210.4-1	1291223.1	676583.0	120.5
	B211.2-1	1286509.8	676960.2	132.6
	B211.5-1	1285068.8	677013.1	140.7
	B211.7-1	1284088.5	676965.4	141.5
	B212.0-1	1282469.0	676857.5	138.9
	B212.2-1	1281498.0	676590.5	130.8
	B214.6-1	1269721.4	672670.9	124.9
	B216.1-1	1262073.1	670916.0	127.0
	B216.4-1	1260344.1	670520.5	128.3
	B216.6-1	1259315.9	670290.2	129.8
	B219.5-1	1244816.4	666093.7	130.4
AECOM**	SC-1A	1348656.7	679220.0	176.4
	SC-2A	1326692.2	678361.5	178.9
	SC-2C	1305133.1	676877.4	160.6

Notes:
- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.
*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:
AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- h2o - Water
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- r - Bedrock
- t - Till
- tm - Till moraine

1 0.5 0 1 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

Prepared on 5/3/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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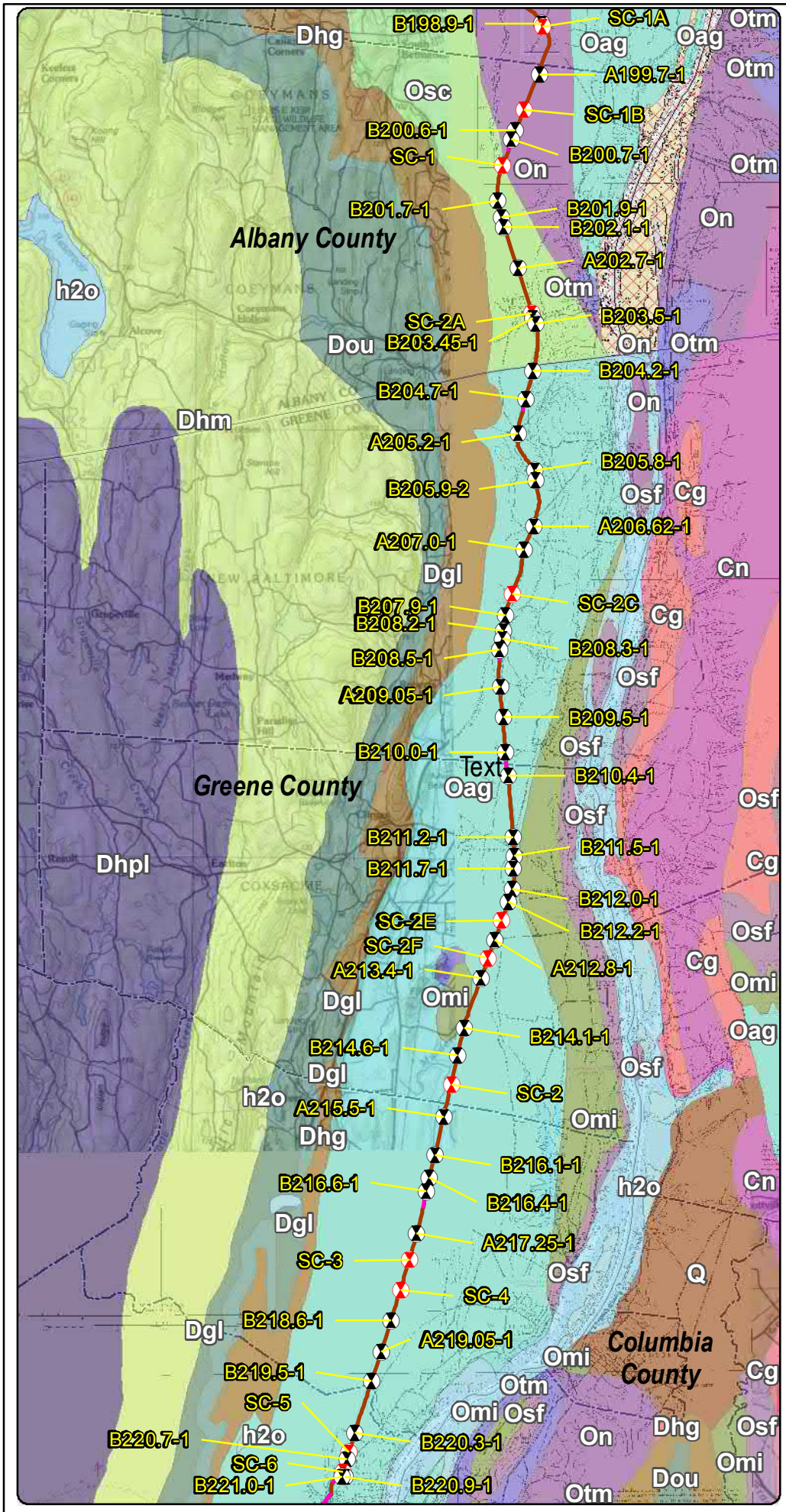

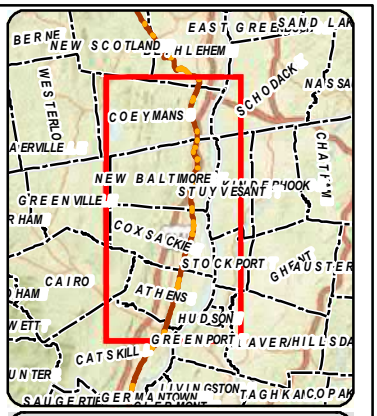

LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cg - Germantown Formation
- Cn - Nassau Formation
- Dgl - Glenerie Formation
- Dhg - Port Ewen Formation
- Dhm - Undiff Lower Hamilton Group
- Dhpl - Plattekill Formation
- Dou - Onondaga Limestone
- No Label
- Oag - Austin Glen Form (graywacke, shale)
- Omi - Mount Merino Formation
- On - Normanskill Shale
- Osc - Schenectady Formation
- Osf - Stuyvesant Falls Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- h2o - Water

* Schenectady Formation includes: graywacke, sandstone, siltstone, shale

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Selkirk to Catskill Figure 4-10

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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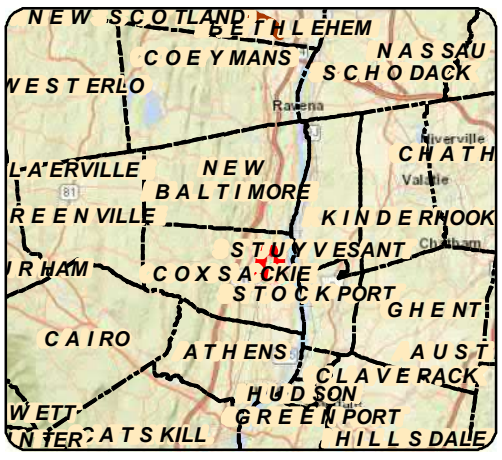
B211.2-1
211.3
211.4
211.5
B211.5-1
211.6
211.7
B211.7-1
211.8
211.9
COXSACKIE
212
B212.0-1
212.1
212.2
B212.2-1
212.3
212.4
SC-2E

Mansion St
School St
Lawrence Ave
Whitbeck St
Bethany Vlg
Van Dyck St
Hoag Pl
Cato St
Peppertree Dr
Birch Ct
Ash Ct
Bailey St
Rosebud Ln
Jingle Bell Ln
Spencer Blvd
Mansion Sq
Sunset Blvd
Aaron Ct
Plank Rd
Stacey Rd
Industrial Pkwy
Greene County Orchard St

0 1,000
Feet



LEGEND

- 111.8 Certified Milepost - Tenths
- 135 Certified Milepost
- 111.8 Preferred Alternative Milepost - Tenths
- 135 Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership: TOWN NAME

Road Name: Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Selkirk to Catskill

Figure A-10

Sheet 11 of 18

Prepared by: AECOM 5/19/2021

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

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TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B211.2-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
8.0'	NR	11/29	0 HR

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	20.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	11/27/2012
DATE COMPLETED	11/27/2012

DEPTH	A	B				C	DESCRIPTION	Wn	REMARKS
	S-1	4	4	3	1		***LIGHT BROWN F/M SAND*** 2.0		
	S-2	3	7	6	4		***LIGHT BROWN SILT***		
5	S-3	9	9	8	10		6.0		
	S-4	7	7	5	7				
10	S-5	6	5	7	7		***BROWN TO BROWN GRAY F/C/M SAND, SM SILT, TR F/ GRAVEL*** 13.5		
15	S-6	4	5	6					
							GRAY CLAY, TR SILT, TR M/F SAND		
20	S-7	7	3	2			20.0		
							END OF BORING AT 20'		
25									
30									
35									

DRN.	TBT
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B211.5-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 2

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
24.2'	9:30	11/15	0 HR

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	40.0 '

DRILLER	R.CARUSO
HELPER	C. SMART
INSPECTOR	C. POPPE
DATE STARTED	11/14/2012
DATE COMPLETED	11/15/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	24 28 42 23		***BROWN M/F/C SAND, SM SILT, SM F/ GRAVEL (FILL)***		
	S-2	24 18 15 10		4.0	8.7	
5	S-3	6 4 8 12		6.0 ***BROWN SILT, SM F/C GRAVEL-SIZED ROCK FRAGMENTS, TR TO SM CLAY, TR F/M SAND (POSSIBLE FILL)***		
	S-4	5 5 7 10			21.8	
10	S-5	10 13 16 19			35.9	
				BROWN CLAY, TR SILT, TR M/F SAND		
15	S-6	5 5 3			48.6	
				18.5		
20	S-7	4 3 3		***GRAY SILT, TR TO SM F/ SAND, TR CLAY***		
				23.5		
25	S-8	3 2 2				
30	S-9	2 2 2		***GRAY CLAY, TR SILT, TR M/F SAND***	52.1	
35	S-10	3 2 2			46.0	

DRN.	TBT
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS
LOCATION: CSX RAILROAD ROW, NY

BORING	**B211.5-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	2 OF 2

DEPTH		A	B	C	DESCRIPTION	Wn	REMARKS
					GRAY CLAY, TR SILT, TR M/F SAND		
40		S-11	2 1 1		40.0		
					END OF BORING AT 40'		
45							
50							
55							
60							
65							
70							
75							

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

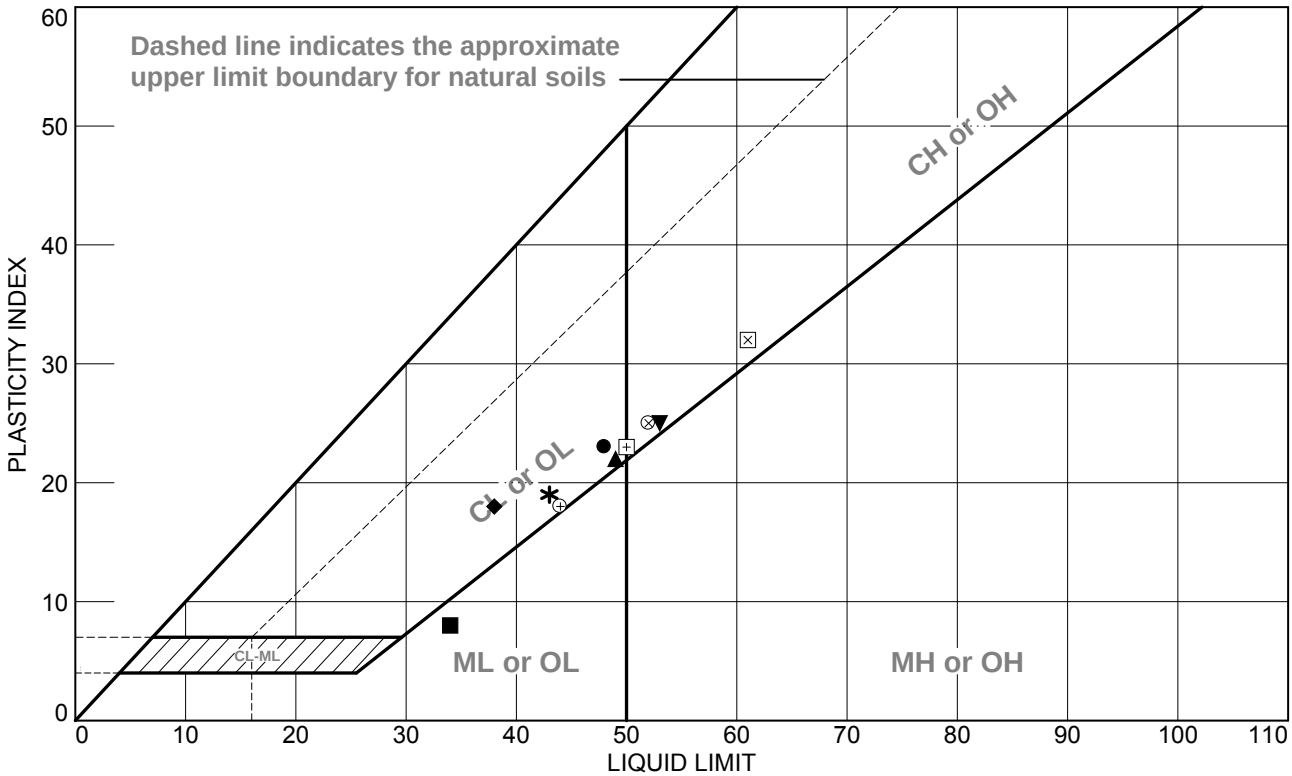
SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
B210.4-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	31.5	-	-	-
	S-6	13.5-15.0		0.0	1.4	18.1	80.5	-	-	-	-	2.79	32.7	-	-	-
	S-7	18.5-20.0	CL	-	-	-	-	43	24	19	0.3	-	30.0	-	-	-
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	30.7	-	-	-
B211.2-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	28.0	-	-	-
	S-2	2.0-4.0	CL	-	-	-	-	44	26	18	-	-	-	-	-	-
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	36.2	85.8	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	28.0	-	-	-
	S-5	8.0-10.0	SM	5.8	71.9	22.3		-	-	-	-	-	19.8	-	-	-
	S-6	13.5-15.0	CH	0.0	2.6	6.7	90.7	50	27	23	0.9	2.80	47.5	-	-	-
	S-7	18.5-20.0														

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CSX
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
B211.5-1	S-2	2.0-4.0	SM	18.6	57.5	23.9		-	-	-	-	-	8.7	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	21.8	-	-	-
	S-5	8.0-10.0	CH	0.0	6.0	8.0	86.0	52	27	25	0.4	2.82	35.9	87.5	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	48.6	-	-	-
	S-8	23.5-25.0	CH	0.0	3.4	9.3	87.3	61	29	32	0.7	2.81	52.1	-	-	-
	S-9	28.5-30.0														
	S-10	33.5-35.0	-	-	-	-	-	-	-	-	-	-	46.0	-	-	-
B211.7-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	33.8	89.0	-	-
	S-4	6.0-8.0	CH	-	-	-	-	61	30	31	0.1	-	32.8	-	-	-
	S-6	13.5-15.0	CL	-	-	-	-	44	26	18	0.8	-	41.2	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	47.1	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

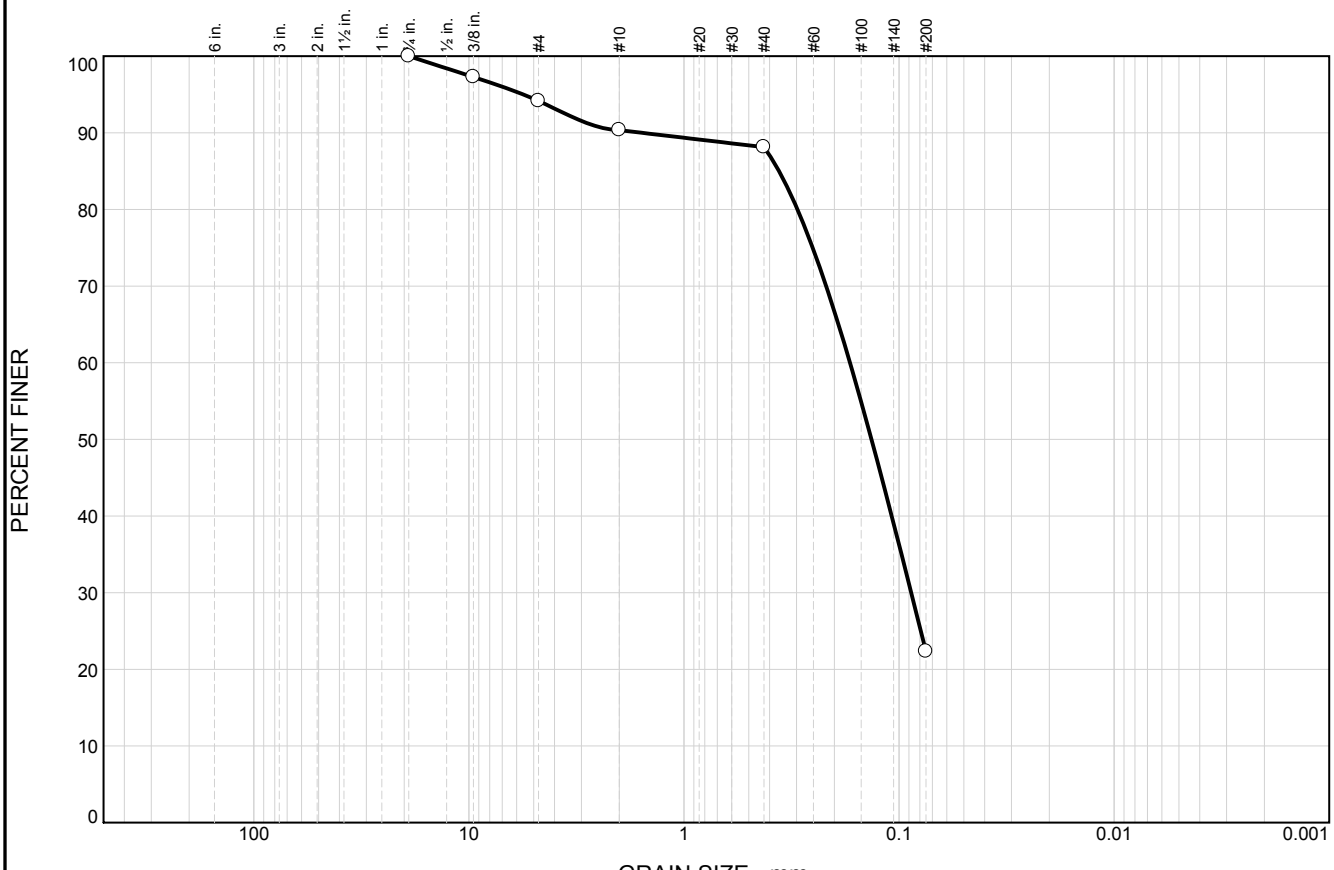
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B208.3-1	S-7	18.5-20.0 FT	30.2	25	48	23	CL
■	B208.5-1	S-7	18.5-20.0 FT	33.0	26	34	8	ML
▲	B209.5-1	S-6	13.5-15.0 FT	30.9	27	49	22	CL
◆	B210.0-1	S-2	2.0-4.0 FT	20.8	20	38	18	CL
▼	B210.0-1	S-5	8.0-10.0 FT	33.7	28	53	25	CH
✱	B210.4-1	S-7	18.5-20.0 FT	30.0	24	43	19	CL
⊕	B211.2-1	S-2	2.0-4.0 FT		26	44	18	CL
⊞	B211.2-1	S-6 & S-7	13.5-20.0 FT	47.5	27	50	23	CH
⊗	B211.5-1	S-5	8.0-10.0 FT	35.9	27	52	25	CH
⊠	B211.5-1	S-8 & S-9	23.5-30.0 FT	52.1	29	61	32	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

Client: TRANSMISSION DEVELOPERS INC.
Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

Project No.: 195651 **Figure** 5

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	5.8	3.9	2.2	65.8	22.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.3615	0.1691	0.1343	0.0878				

Material Description	USCS	AASHTO
○ BROWN TO BROWN-GRAY F/C/M SAND, SM SILT, TR F/ GRAVEL	SM	

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B211.2-1 **Depth:** 8.0-10.0 FT **Sample Number:** S-5

Remarks:
○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

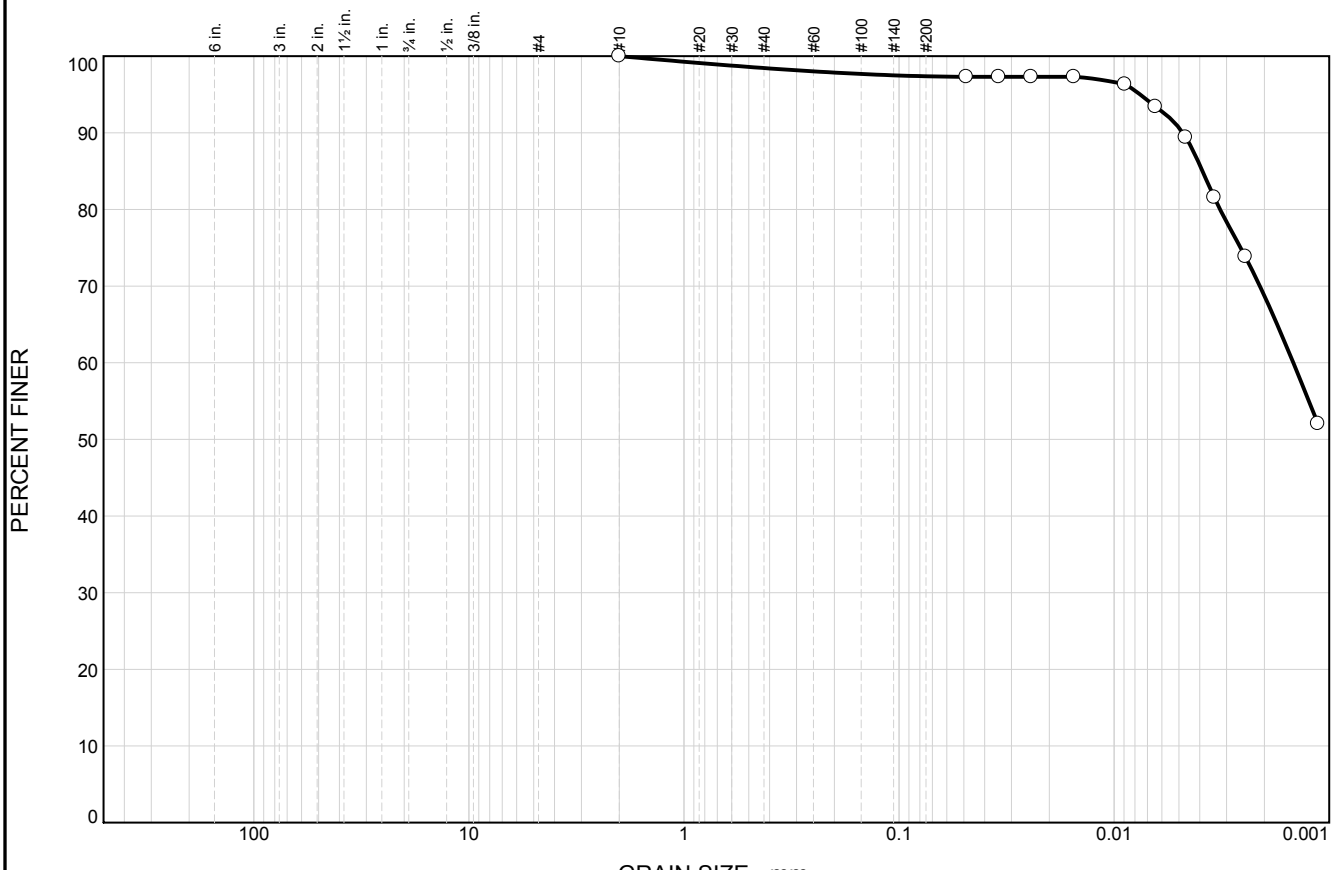
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 93

Tested By: TBT 01/07/13 **Checked By:** JPB 03/12/13

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	1.5	1.1	6.7	90.7

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	50	27	0.0039	0.0015						

Material Description	USCS	AASHTO
○ GRAY CLAY, TR SILT, TR M/F SAND	CH	A-7-6(26)

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Sample Source:** B211.2-1 **Depth:** 13.5-20.0 FT **Sample No.:** S-6 & S-7

Remarks:
○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

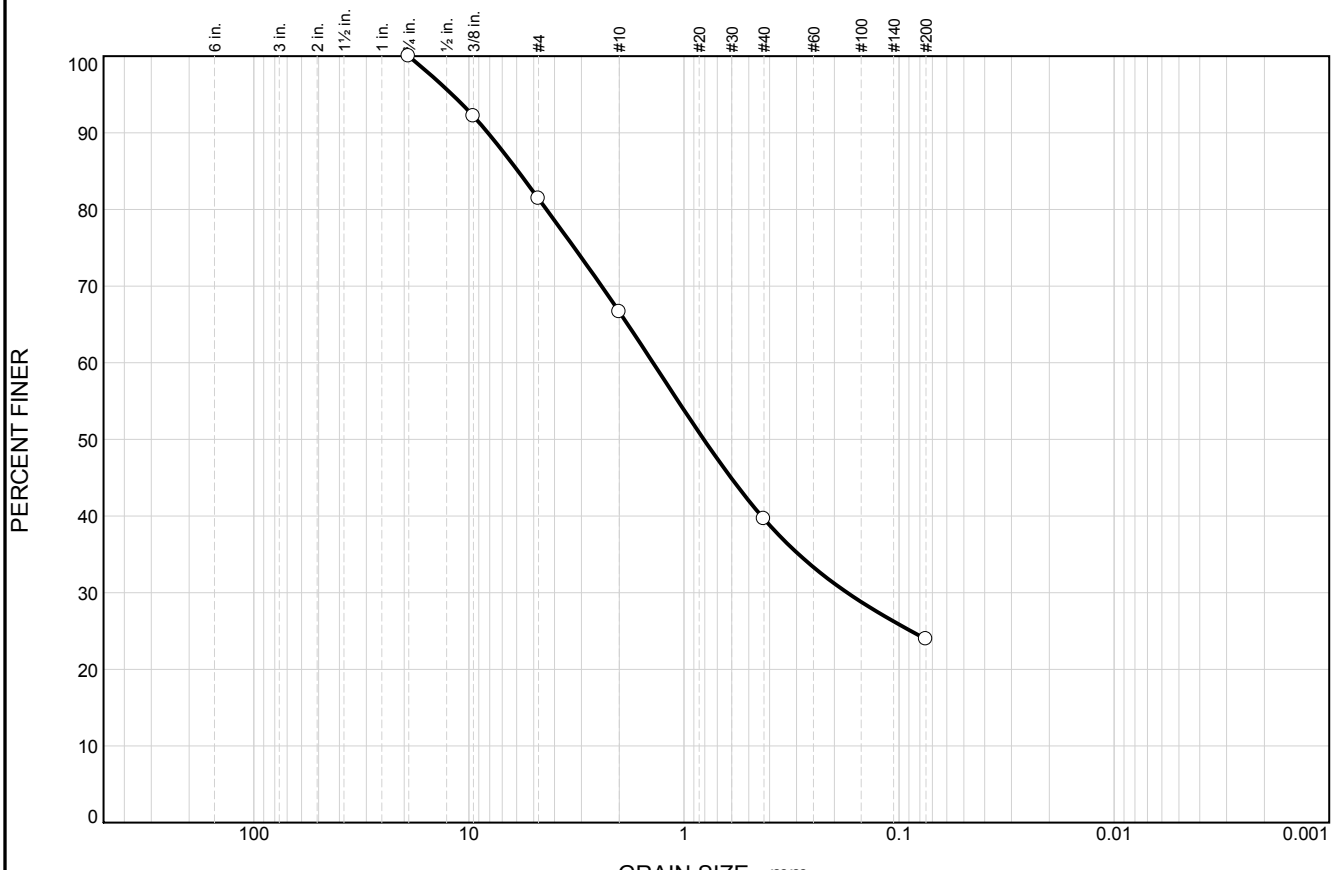
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 94

Tested By: TBT 01/10/13 **Checked By:** JPB 03/12/13

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	18.6	14.8	27.0	15.7	23.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			5.9109	1.3935	0.8089	0.1742				

Material Description	USCS	AASHTO
○ BROWN M/F/C SAND, SM SILT, SM F/ GRAVEL	SM	

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B211.5-1 **Depth:** 2.0-4.0 FT **Sample Number:** S-2

Remarks:
○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

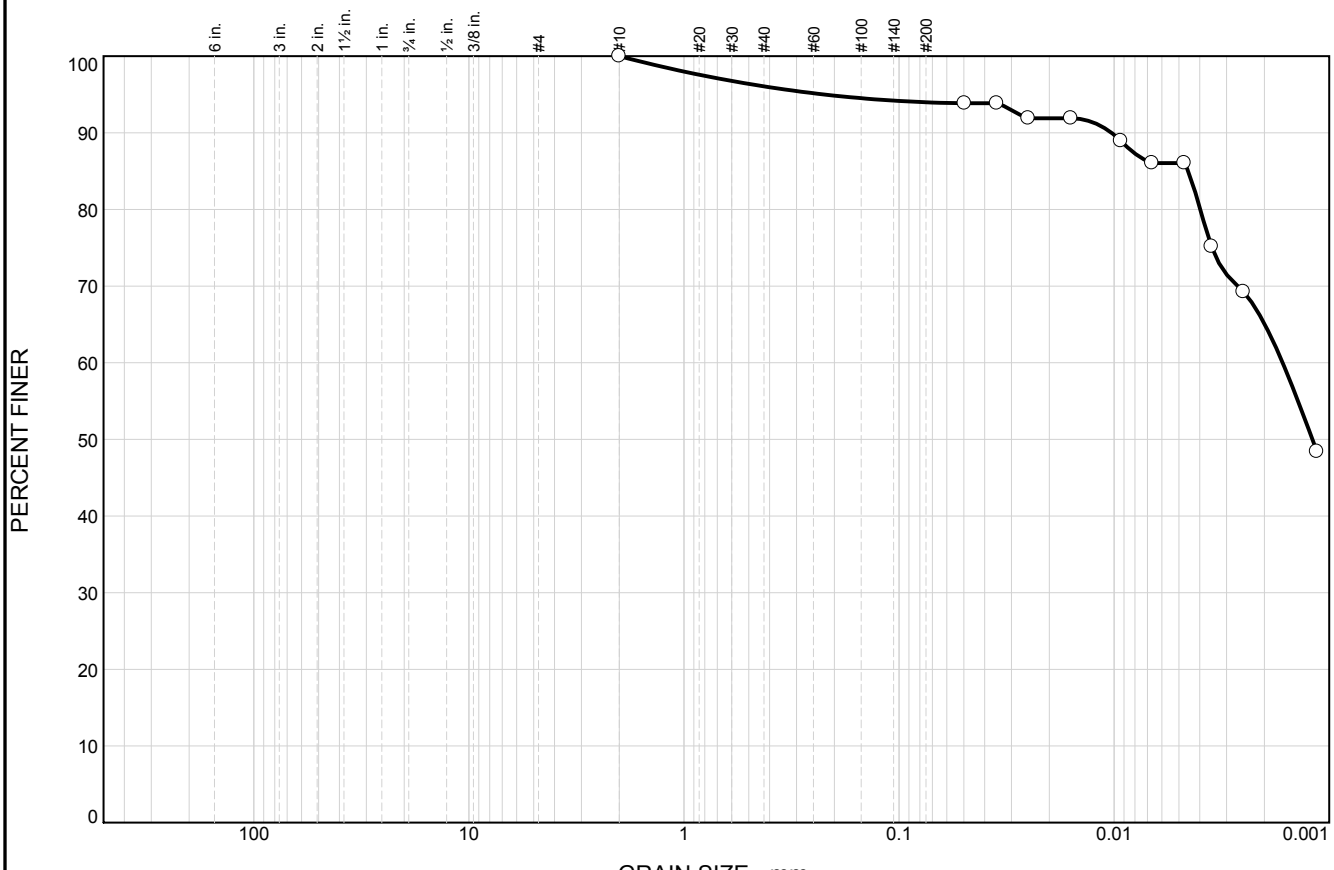
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 95

Tested By: TBT 12/19/12 **Checked By:** JPB 03/12/13

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	3.9	2.1	8.0	86.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	52	27	0.0045	0.0016	0.0012					

Material Description	USCS	AASHTO
○ BROWN CLAY, TR SILT, TR M/F SAND	CH	A-7-6(27)

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B211.5-1 **Depth:** 8.0-10.0 FT **Sample Number:** S-5

Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

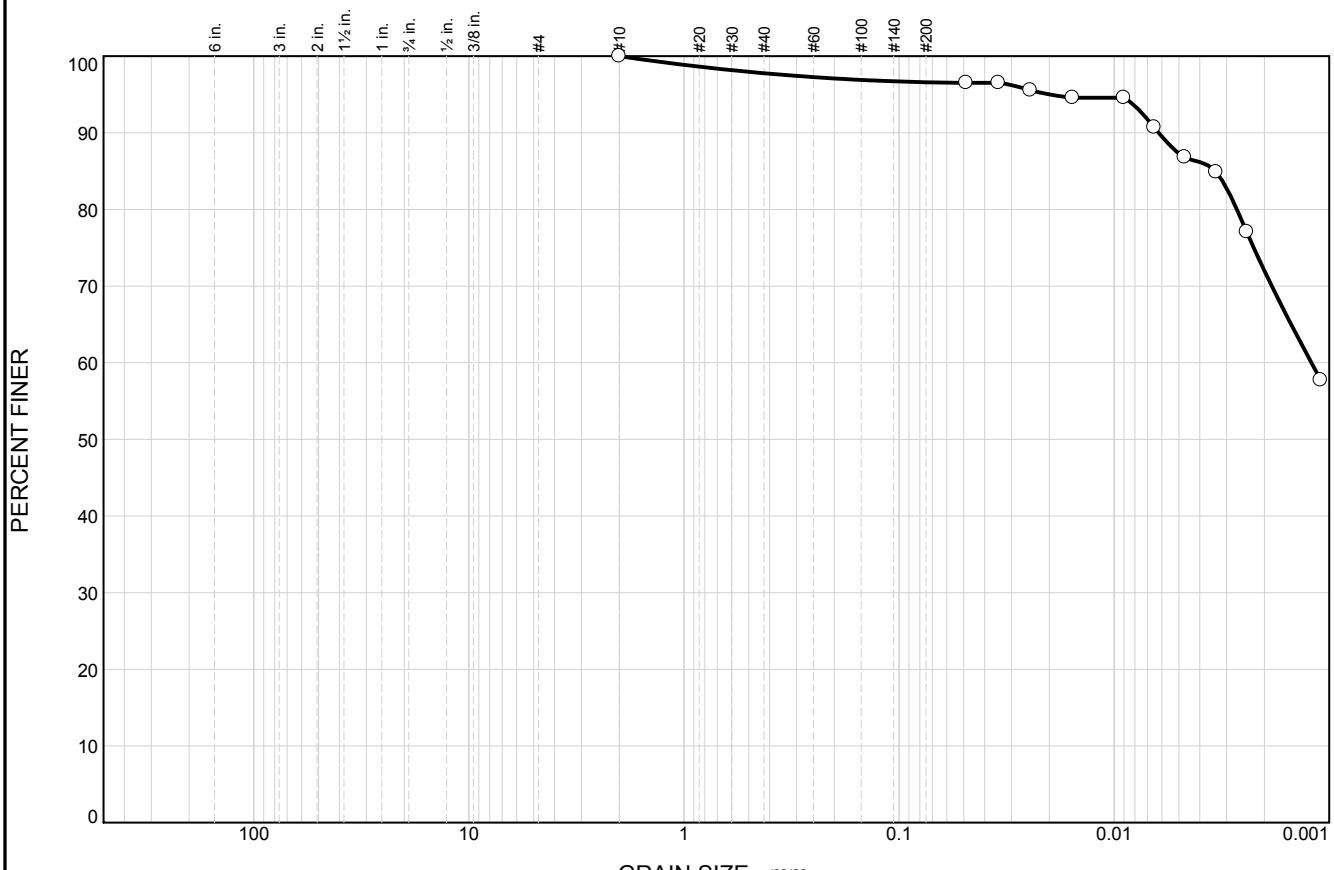
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 96

Tested By: TBT 12/28/12 **Checked By:** JPB 03/12/13

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	2.2	1.2	9.3	87.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	61	29	0.0034	0.0012						

Material Description	USCS	AASHTO
○ GRAY CLAY, TR SILT, TR M/F SAND	CH	A-7-6(37)

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Sample Source:** B211.5-1 **Depth:** 23.5-30.0 FT **Sample No.:** S-8 & S-9

Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 97

Tested By: TBT 12/21/12 **Checked By:** JPB 03/12/13

Terracon GeoReport

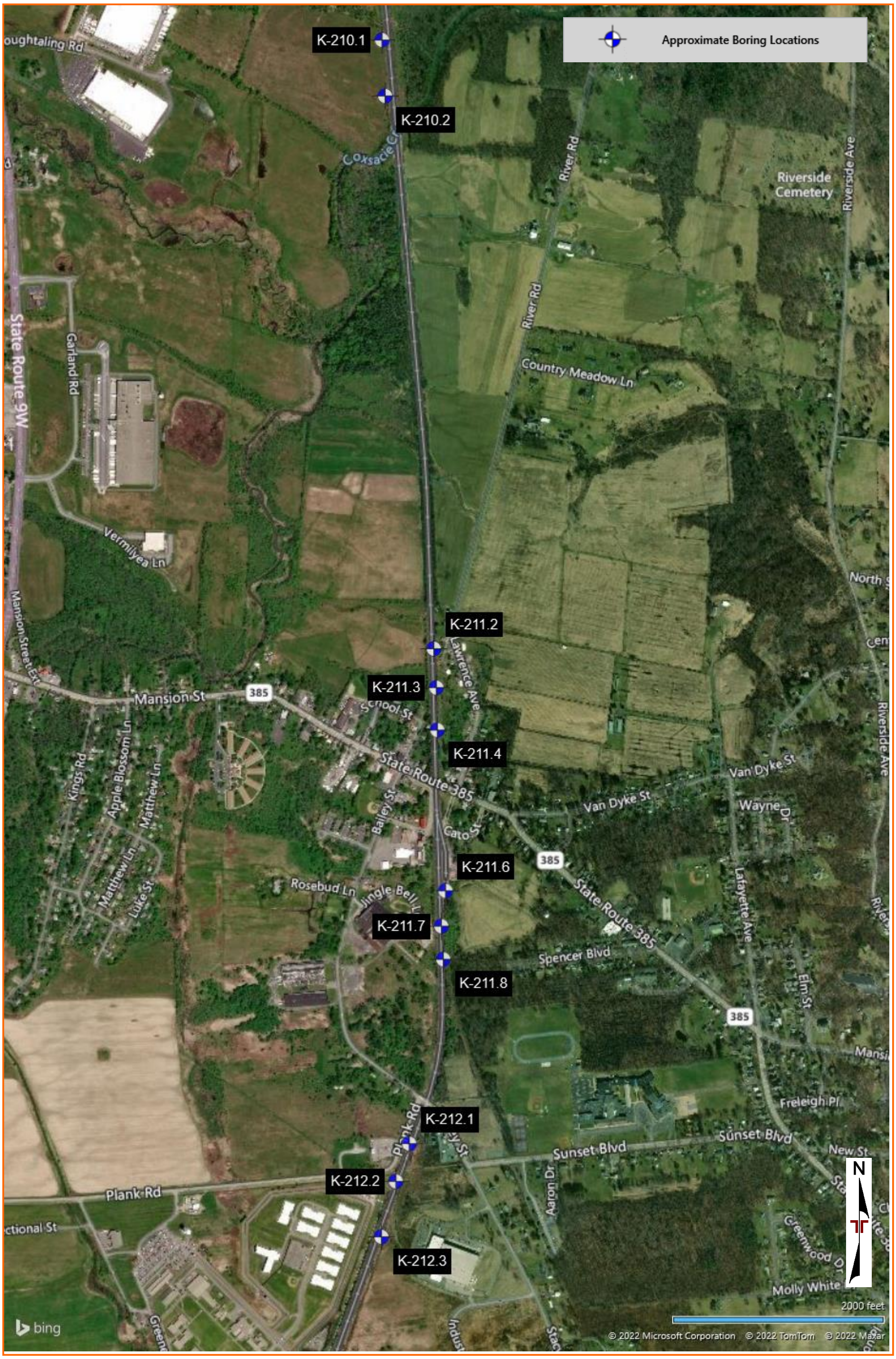


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-211.2

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3636° Longitude: -73.8162°

Surface Elev.: 134.8 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0	134.8	**FILL - POORLY GRADED GRAVEL WITH SAND**, black, very loose
4.0	131	**SANDY LEAN CLAY (CL)**, brown, medium stiff to very stiff
19.0	116	**LEAN CLAY (CL)**, gray, very soft to soft

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	0	3-1-1-1 N=2			
	1	1-1-1-1 N=2			
5	4	2-2-3-5 N=5			
	10	6-6-7-7 N=13	27.8		
	20	4-6-9-10 N=15			
10	24	9-10-10-9 N=20	34.0	47-23-24	70
15	20	1-2-3 N=5			
20	24	1-2-3-4	37.7	37-22-15	89
	24	3" Split Spoon With Ring Samplers WOH-1-1 N=2			
25	24	WOH-WOH-WOH			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: AV
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-07-2022 | Boring Completed: 03-07-2022

Drill Rig: CME 750X | Driller: J. Lamm

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/28/22

BORING LOG NO. K-211.2

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3636° Longitude: -73.8162°

Surface Elev.: 134.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), gray, very soft to soft *(continued)*		30						
			X	24	WOH-WOH-WOH	61.1		
		35						
			X	24	WOH-WOH-WOH			
37.0	98							
Boring Terminated at 37 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: AV
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-07-2022	Boring Completed: 03-07-2022
Drill Rig: CME 750X	Driller: J. Lamm
Project No.: JB215256C	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/28/22

BORING LOG NO. K-211.3

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3627° Longitude: -73.8161°

Surface Elev.: 133.7 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
		FILL - BALLAST, CINDERS, GRAVEL AND ASH, black, loose to medium dense
		similar with increased clay content
8.0	125.5	
		SILT AND CLAY (CL-ML), brown, very stiff
10.0	123.5	
		SANDY LEAN CLAY WITH GRAVEL (CL), brown, stiff
12.0	121.5	
		LEAN CLAY (CL), brown, soft
22.0	111.5	
		SILT AND CLAY (CL-ML), gray, very soft

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	12	30-14-6-6 N=20			
	10	2-3-5-4 N=8			
5	0	3-3-3-6 N=6			
	9	9-9-6-6 N=15	21.2		
	13	9-9-10-13 N=19			
10	9	4-6-6-7 N=12	42.7	43-25-18	59
15	24	2-2-2-3 N=4			
20	24	2-3-3-6 3" Split Spoon With Ring Samplers	40.2	43-24-19	95
25	24	WOH-WOH-1-1 N=1			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: MO
Hammer Efficiency Summary:
Energy Transfer Ratio: 86.9 +/- 2.2%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-15-2022 | Boring Completed: 02-16-2022

Drill Rig: Mobile B-57 | Driller: B. Duffy

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/28/22

BORING LOG NO. K-211.3

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3627° Longitude: -73.8161°

Surface Elev.: 133.7 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILT AND CLAY (CL-ML), gray, very soft *(continued)*									
			30		X	24	WOH-WOH-WOH-WOH	60.4		
			35		X	24	WOH-WOH-WOH-WOH			
	37.0	96.5								
	Boring Terminated at 37 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: MO
Hammer Efficiency Summary:
Energy Transfer Ratio: 86.9 +/- 2.2%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-15-2022 | Boring Completed: 02-16-2022

Drill Rig: Mobile B-57 | Driller: B. Duffy

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/28/22

BORING LOG NO. K-211.4

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3597° Longitude: -73.8160°

Surface Elev.: 138.9 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.0		**FILL - POORLY GRADED GRAVEL WITH SAND**, gray, medium dense
2.0	137	**FILL - SILTY SAND (SM)**, trace silt and clay, gray and black, very loose to loose
8.0	131	**SANDY SILT (ML)**, brown and gray, soft to very stiff
20.0	119	**SILT AND CLAY (CL-ML)**, gray, very soft
28.0	111	

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		16	7-13-13-16 N=26			
		16	14-4-3-3 N=7			
5		1	1-1-1-1 N=2			
		22	1-1-2-4 N=3	28.4		34
		18	3-5-7-7 N=12			
10		20	12-12-11-10 N=23	33.0	46-28-18	65
15		22	1-1-1 N=2			
20		24	WOR-WOH-WOH-WOH			
25		24	WOH-WOH-WOH-WOH			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: AV
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer
WOR = Weight of Rod

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-03-2022 | Boring Completed: 03-03-2022

Drill Rig: CME 750X | Driller: J. Lamm

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

BORING LOG NO. K-211.4

PROJECT: Champlain-Hudson Power Express Package 6

CLIENT: Kiewit Engineering (NY) Corp.

SITE: Champlain to Hudson HDD Crossings Selkrik to Catskill, NY

LOCATION See Exploration Plan

Latitude: 42.3597° Longitude: -73.8160°

Surface Elev.: 138.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
ELASTIC SILT WITH SAND (MH), gray, very soft			22	WOH-WOH-WOH-2 3" Split Spoon With Ring Samplers	65.1	54-30-24	84
		30	24	WOH-WOH-WOH			
		35	24	WOR-WOH-WOH			
		40	24	WOR-WOR-WOR	61.6		
42.0	97						
Boring Terminated at 42 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: AV
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
WOH = Weight of Hammer
WOR = Weight of Rod

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-03-2022 | Boring Completed: 03-03-2022

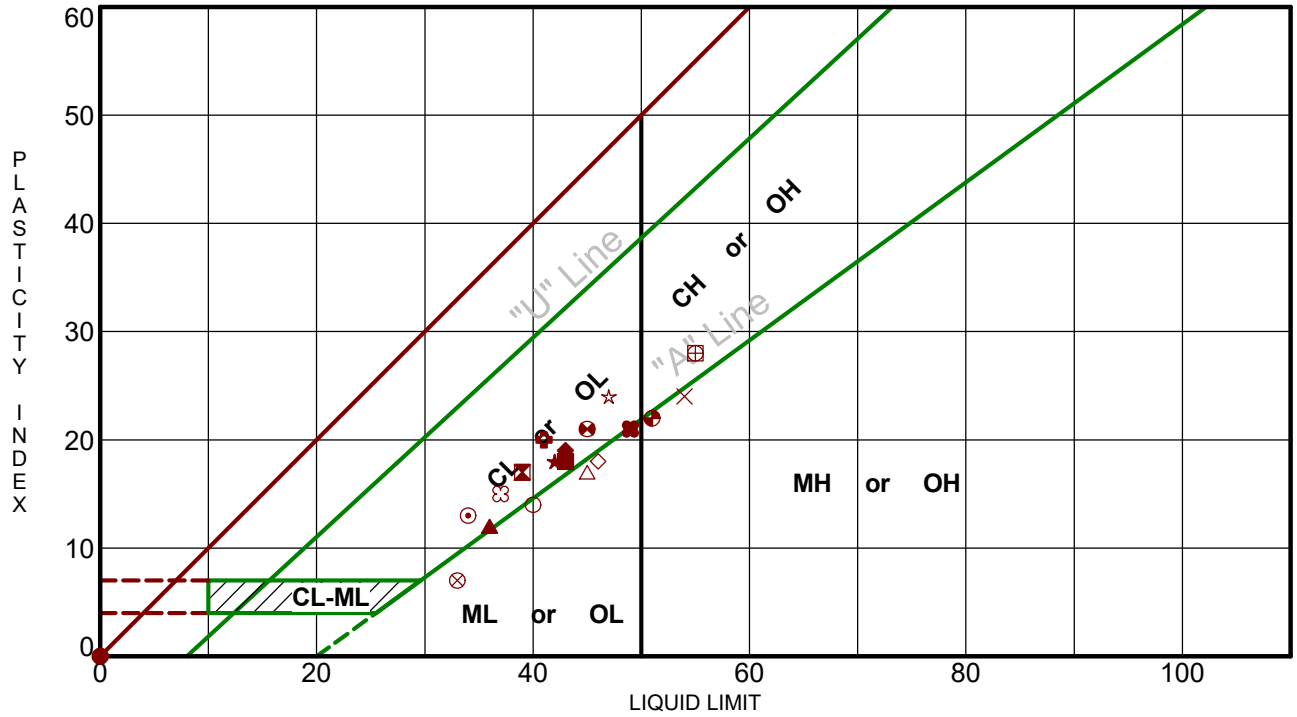
Drill Rig: CME 750X | Driller: J. Lamm

Project No.: JB215256C

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/23/22

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-207.7	25 - 25.8	NP	NP	NP	21.3	SM	SILTY SAND with GRAVEL
⊠	K-208.1	25 - 27	39	22	17	93.7	CL	LEAN CLAY
▲	K-208.1	35 - 37	36	24	12	91.9	CL	LEAN CLAY
★	K-208.2	15 - 17	42	24	18	83.9	CL	LEAN CLAY with SAND
⊙	K-208.2	25 - 27	34	21	13	89.4	CL	LEAN CLAY
✿	K-208.2	35 - 37	41	21	20	97.6	CL	LEAN CLAY
○	K-208.6	13 - 14.5	40	26	14	73.8	ML	SILT with SAND
△	K-208.7	8 - 10	45	28	17	43.8	SM	SILTY SAND with GRAVEL
⊗	K-208.7	18 - 20	33	26	7	92.8	ML	SILT
⊕	K-210.1	15 - 17	55	27	28	62.6	CH	SANDY FAT CLAY
□	K-210.1	38 - 40	55	27	28	65.8	CH	SANDY FAT CLAY
✖	K-210.2	20 - 22	45	24	21	29.0	SC	CLAYEY SAND
◕	K-210.2	30 - 32	51	29	22	73.8	MH	ELASTIC SILT with SAND
☆	K-211.2	10 - 12	47	23	24	69.7	CL	SANDY LEAN CLAY
✿	K-211.2	19 - 21	37	22	15	88.7	CL	LEAN CLAY
■	K-211.3	10 - 12	43	25	18	59.3	CL	SANDY LEAN CLAY with GRAVEL
◆	K-211.3	20 - 22	43	24	19	95.4	CL	LEAN CLAY
◇	K-211.4	10 - 12	46	28	18	65.1	ML	SANDY SILT
×	K-211.4	28 - 30	54	30	24	84.2	MH	ELASTIC SILT with SAND
✖	K-211.6	6 - 8	49	28	21	68.0	ML	SANDY SILT

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

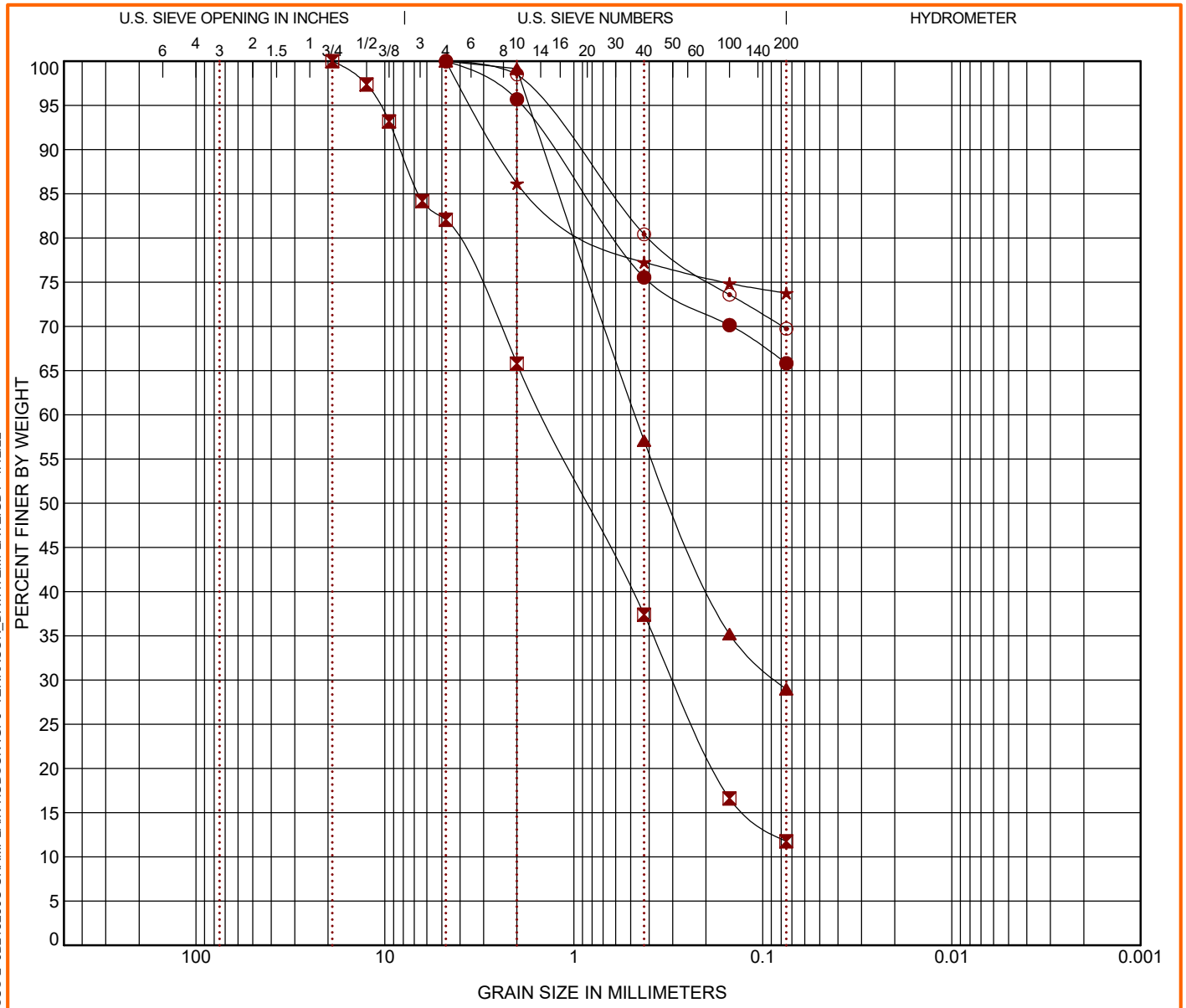
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/13/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	K-210.1	38 - 40	SANDY FAT CLAY (CH)	47.7	55	27	28		
⊠	K-210.2	8 - 10	WELL-GRADED SAND with SILT and GRAVEL (SW-SM)	7.7				1.01	25.04
▲	K-210.2	20 - 22	CLAYEY SAND (SC)	26.6	45	24	21		
★	K-210.2	30 - 32	ELASTIC SILT with SAND (MH)	30.6	51	29	22		
⊙	K-211.2	10 - 12	SANDY LEAN CLAY (CL)	34.0	47	23	24		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-210.1	38 - 40	4.75				0.0	0.0	34.2		65.8	
⊠	K-210.2	8 - 10	19	1.459	0.293		0.0	17.9	70.3		11.8	
▲	K-210.2	20 - 22	4.75	0.473	0.084		0.0	0.0	71.0		29.0	
★	K-210.2	30 - 32	4.75				0.0	0.0	26.2		73.8	
⊙	K-211.2	10 - 12	4.75				0.0	0.0	30.3		69.7	

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

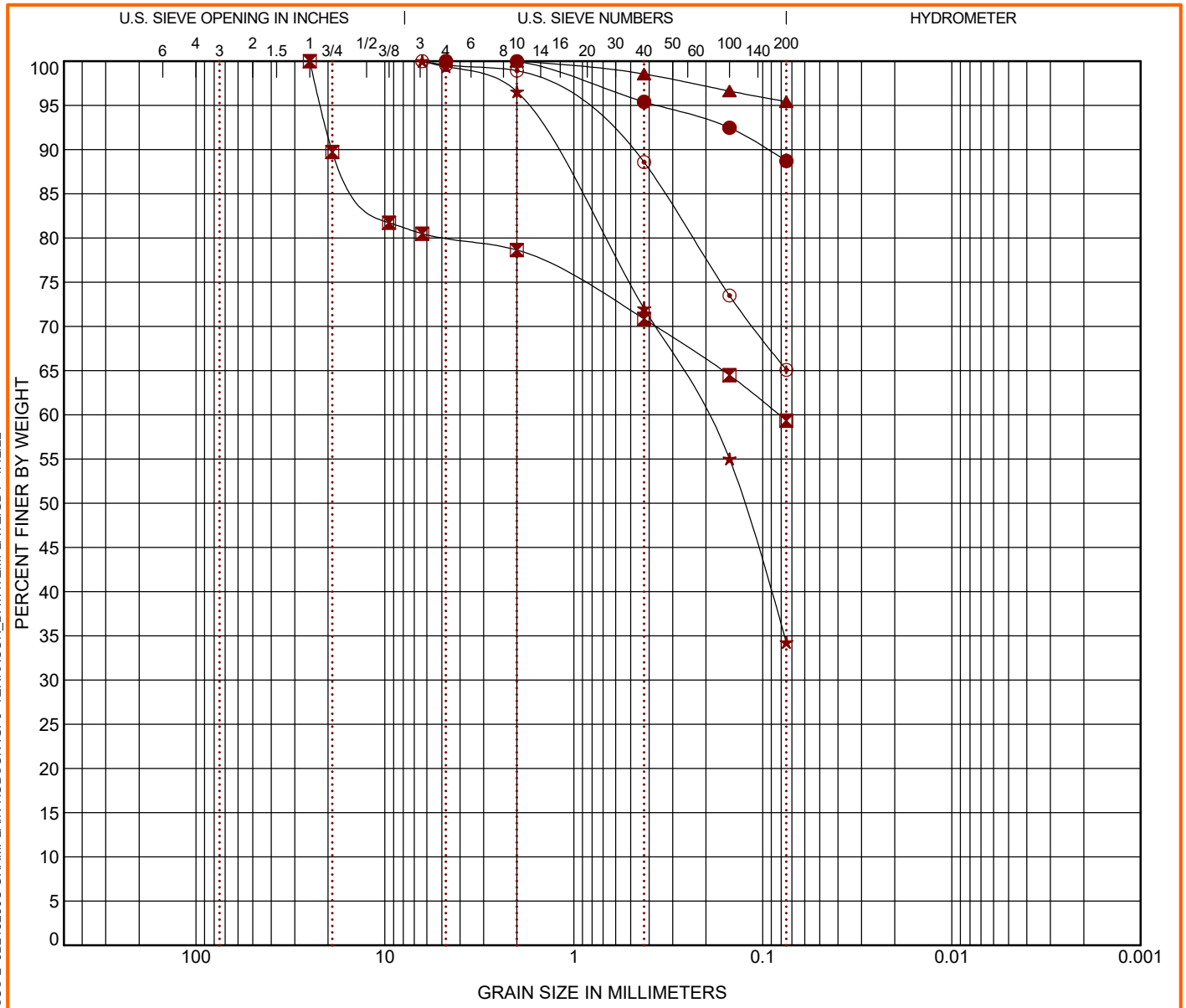
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	K-211.2	19 - 21	LEAN CLAY (CL)	37.7	37	22	15		
⊠	K-211.3	10 - 12	SANDY LEAN CLAY with GRAVEL (CL)	42.7	43	25	18		
▲	K-211.3	20 - 22	LEAN CLAY (CL)	40.2	43	24	19		
★	K-211.4	6 - 8	SILTY SAND (SM)	28.4					
⊙	K-211.4	10 - 12	SANDY SILT (ML)	33.0	46	28	18		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-211.2	19 - 21	4.75				0.0	0.0	11.3		88.7	
⊠	K-211.3	10 - 12	25	0.082			0.0	20.0	20.7		59.3	
▲	K-211.3	20 - 22	2				0.0	0.0	4.6		95.4	
★	K-211.4	6 - 8	6.35	0.203			0.0	0.6	65.1		34.3	
⊙	K-211.4	10 - 12	6.35				0.0	0.4	34.5		65.1	

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

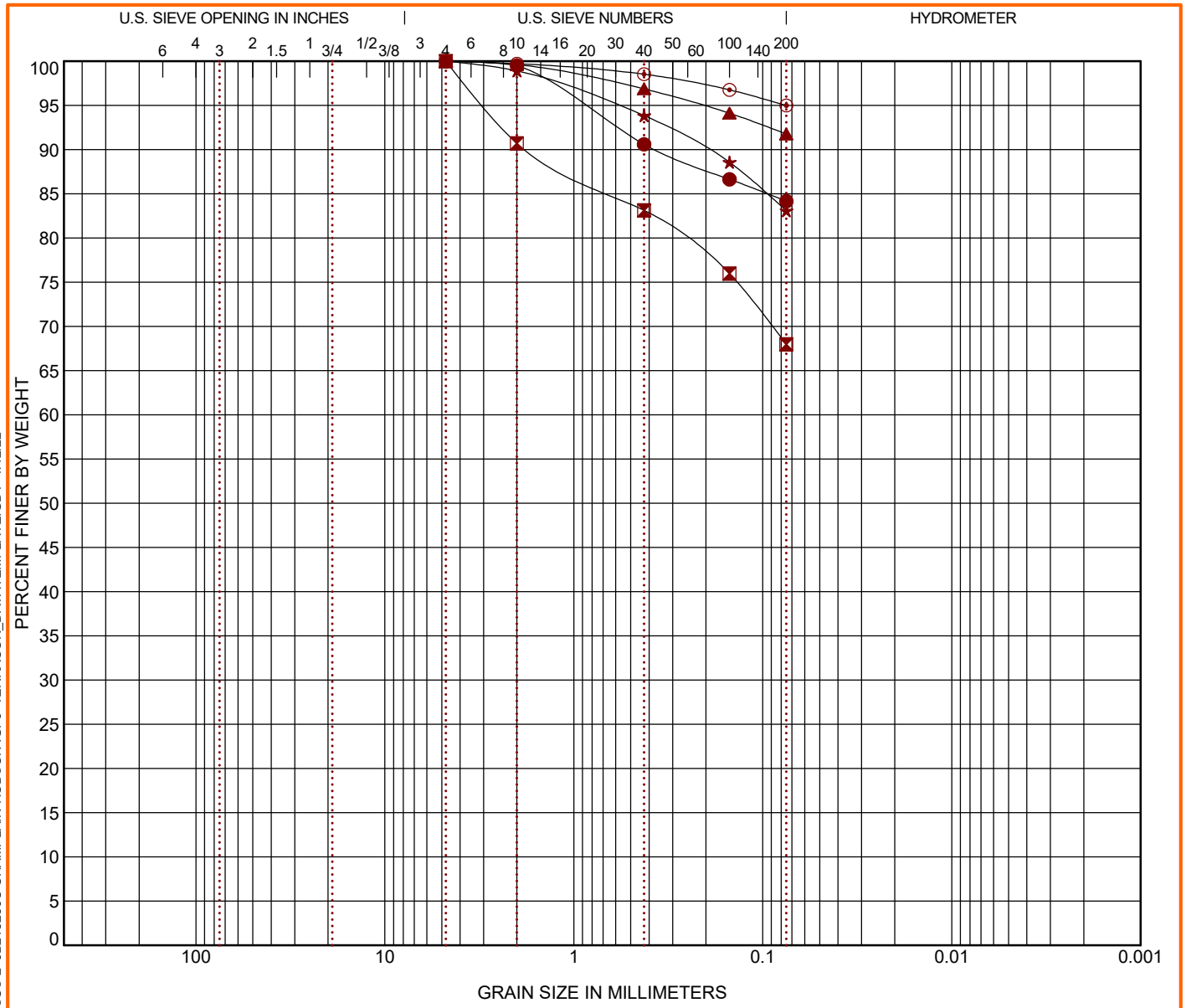
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	K-211.4	28 - 30	ELASTIC SILT with SAND (MH)	65.1	54	30	24		
⊠	K-211.6	6 - 8	SANDY SILT (ML)	34.9	49	28	21		
▲	K-211.6	20 - 22	SILT (ML)	66.2	36	33	3		
★	K-211.7	6 - 8	SILT with SAND (ML)	34.6	45	29	16		
⊙	K-211.7	21 - 23	LEAN CLAY (CL)	38.4	33	20	13		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-211.4	28 - 30	4.75				0.0	0.0	15.8		84.2	
⊠	K-211.6	6 - 8	4.75				0.0	0.0	32.0		68.0	
▲	K-211.6	20 - 22	4.75				0.0	0.0	8.2		91.8	
★	K-211.7	6 - 8	4.75				0.0	0.0	16.9		83.1	
⊙	K-211.7	21 - 23	4.75				0.0	0.0	5.0		95.0	

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkirk to Catskill, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

EXPLORATION PLAN

Champlain-Hudson Power Express- Phase 4 HDD Borings – Package 6 and 7A
Schenectady through Selkirk, NY
February 8, 2023 ■ Terracon Project No. JB215256J

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. KB-211.4B

PROJECT: Phase 4 Borings

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3614° Longitude: -73.8158°

Surface Elev.: 132.0 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SANDY ELASTIC SILT (MH), varved silt and clay, brown, very soft to very stiff			2	WH/18"-1			
					18	2-3-5-8 N=8			
		grades mottled brown and gray	5		18	6-6-9-10 N=15	32.8	58-32-26	54
					18	11-10-10-11 N=20			
			10		20	10-9-11-11 N=20			
15.0	117		15						
		ELASTIC SILT WITH SAND (MH), varved silt and clay, gray, very soft to soft			24	WH-1-2-2 N=3	48.0	55-31-24	82
			20		24	WH/18"-2			
			25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0-10' 4" Casing
10'-77' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Hammer Efficiency Summary:
Energy Transfer Ratio: 84.8% +/-3.7%
Hammer Efficiency Correction (CE): 1.41
Logged by AEB
WH = Weight of hammer
WR = Weight of rods

WATER LEVEL OBSERVATIONS

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-20-2022 | Boring Completed: 12-21-2022
Drill Rig: Acker Renegade | Driller: L. Spicher
Project No.: JB215256J

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 2/8/23

BORING LOG NO. KB-211.4B

PROJECT: Phase 4 Borings

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3614° Longitude: -73.8158°

Surface Elev.: 132.0 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	ELASTIC SILT WITH SAND (MH), varved silt and clay, gray, very soft to soft *(continued)*							
				24	WR/12"-WH/12"			
		30		24	WR/12"-WH/12"			
		35		24	WR/12"-WH-2 3" Split Spoon With Ring Samplers			
40.0	92							
	ELASTIC SILT (MH), varved silt and clay, gray, very soft	40		24	WR/24"	36.7	63-32-31	97
		45		24	WR/24"			
		50						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0-10' 4" Casing
10'-77' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Hammer Efficiency Summary:
Energy Transfer Ratio: 84.8% +/-3.7%
Hammer Efficiency Correction (CE): 1.41
Logged by AEB
WH = Weight of hammer
WR = Weight of rods

WATER LEVEL OBSERVATIONS

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-20-2022 | Boring Completed: 12-21-2022
Drill Rig: Acker Renegade | Driller: L. Spicher
Project No.: JB215256J

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 2/8/23

BORING LOG NO. KB-211.4B

PROJECT: Phase 4 Borings

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3614° Longitude: -73.8158°

Surface Elev.: 132.0 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	ELASTIC SILT (MH), varved silt and clay, gray, very soft *(continued)*					24	WR/24"			
			55			24	WR/24"			
			60							
			65			24	WR/24"			
			70							
			75							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0-10' 4" Casing
10'-77' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Hammer Efficiency Summary:
Energy Transfer Ratio: 84.8% +/-3.7%
Hammer Efficiency Correction (CE): 1.41
Logged by AEB
WH = Weight of hammer
WR = Weight of rods

WATER LEVEL OBSERVATIONS

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-20-2022 | Boring Completed: 12-21-2022

Drill Rig: Acker Renegade | Driller: L. Spicher

Project No.: JB215256J

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 2/8/23

BORING LOG NO. KB-211.4B

PROJECT: Phase 4 Borings

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3614° Longitude: -73.8158°

Surface Elev.: 132.0 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	ELASTIC SILT (MH), varved silt and clay, gray, very soft *(continued)*					24	WR/24"			
	77.0	55								
	Boring Terminated at 77 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0-10' 4" Casing
10'-77' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Hammer Efficiency Summary:
Energy Transfer Ratio: 84.8% +/-3.7%
Hammer Efficiency Correction (CE): 1.41
Logged by AEB
WH = Weight of hammer
WR = Weight of rods

WATER LEVEL OBSERVATIONS

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-20-2022 | Boring Completed: 12-21-2022

Drill Rig: Acker Renegade | Driller: L. Spicher

Project No.: JB215256J

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 2/8/23

Summary of Laboratory Results

BORING ID	Depth (Ft.)	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
KB-206.8	4-6	29.4	50	26	24
KB-206.8	15-17	32.9	40	23	17
KB-206.8	35-37	11.0	17	13	4
KB-207.0	4-6	23.7	42	30	12
KB-207.1	4-6	15.1			
KB-211.4B	4-6	32.8	58	32	26
KB-211.4B	15-17	48.0	55	31	24
KB-211.4B	40-42	36.7	63	32	31
KB-214.4	4-6	33.7	65	33	32
KB-214.4	15-17	37.6	57	29	28
KB-214.4	30-32	49.7	45	30	15
KB-220.9	4-6	31.0	50	27	23
KB-220.9	20-22	39.6	47	26	21
KB-220.9	45-47	33.6	42	27	15

PROJECT: Phase 4 Borings

SITE: Champlain to Hudson HDD Crossings

Terracon
30 Corporate Cir Ste 201
Albany, NY

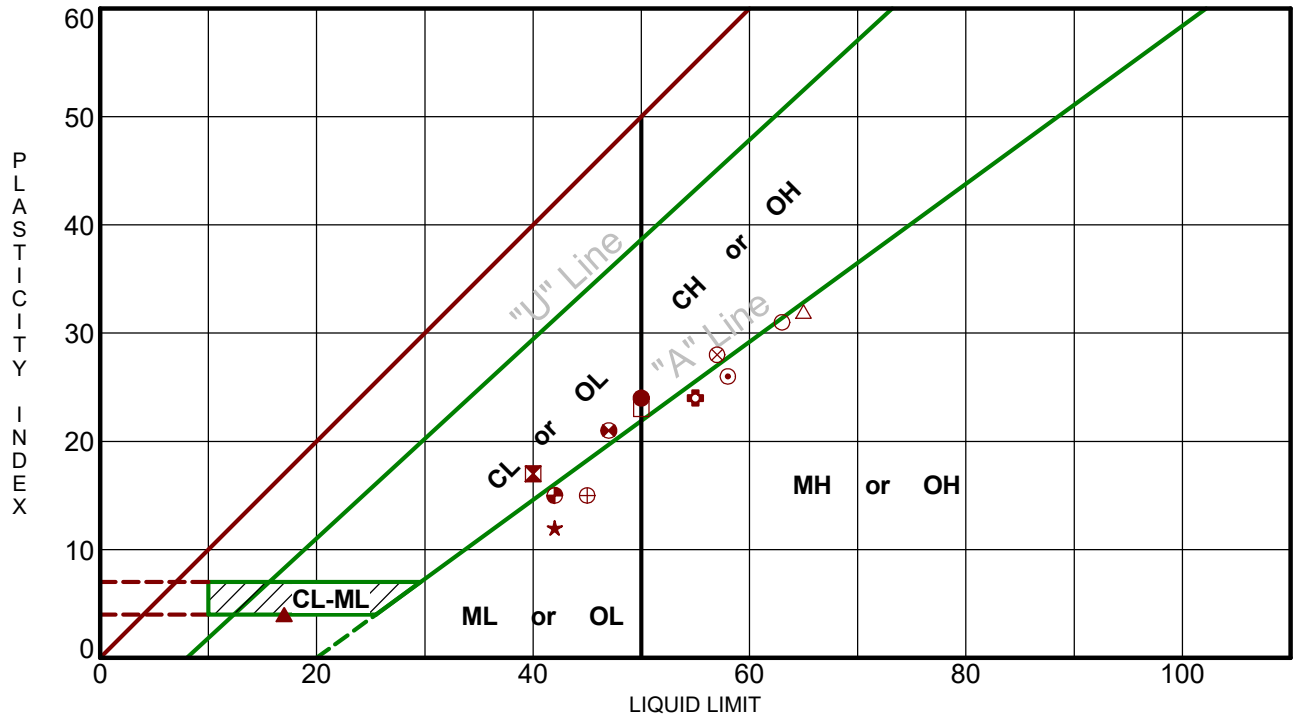
PROJECT NUMBER: JB215256J

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART LAB SUMMARY-PORTRAIT JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 2/8/23

ATTERBERG LIMITS RESULTS

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	KB-206.8	4 - 6	50	26	24	87.8	CH	FAT CLAY
⊠	KB-206.8	15 - 17	40	23	17	99.4	CL	LEAN CLAY
▲	KB-206.8	35 - 37	17	13	4	37.5	SC-SM	SILTY, CLAYEY SAND with GRAVEL
★	KB-207.0	4 - 6	42	30	12	86.9	ML	SILT
⊙	KB-211.4B	4 - 6	58	32	26	53.8	MH	SANDY ELASTIC SILT
✿	KB-211.4B	15 - 17	55	31	24	82.0	MH	ELASTIC SILT with SAND
○	KB-211.4B	40 - 42	63	32	31	96.7	MH	ELASTIC SILT
△	KB-214.4	4 - 6	65	33	32	84.2	MH	ELASTIC SILT with SAND
⊗	KB-214.4	15 - 17	57	29	28	94.7	CH	FAT CLAY
⊕	KB-214.4	30 - 32	45	30	15	93.2	ML	SILT
□	KB-220.9	4 - 6	50	27	23	97.5	CH	FAT CLAY
⊗	KB-220.9	20 - 22	47	26	21	100.0	CL	LEAN CLAY
◕	KB-220.9	45 - 47	42	27	15	99.1	ML	SILT

PROJECT: Phase 4 Borings

SITE: Champlain to Hudson HDD Crossings

Terracon
30 Corporate Cir Ste 201
Albany, NY

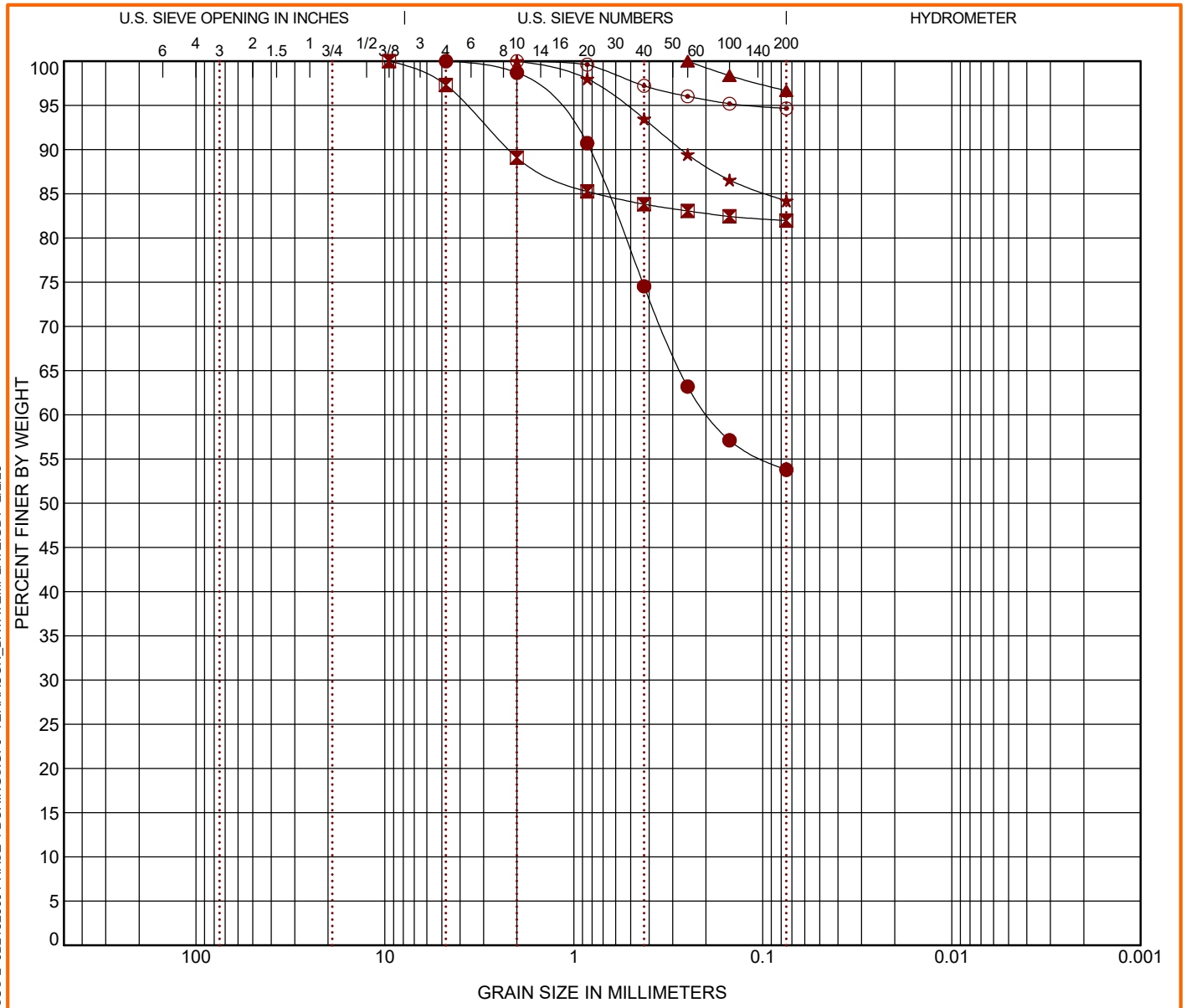
PROJECT NUMBER: JB215256J

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 2/2/23

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-211.4B	4 - 6	SANDY ELASTIC SILT (MH)	32.8	58	32	26		
⊠	KB-211.4B	15 - 17	ELASTIC SILT with SAND (MH)	48.0	55	31	24		
▲	KB-211.4B	40 - 42	ELASTIC SILT (MH)	36.7	63	32	31		
★	KB-214.4	4 - 6	ELASTIC SILT with SAND (MH)	33.7	65	33	32		
⊙	KB-214.4	15 - 17	FAT CLAY (CH)	37.6	57	29	28		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-211.4B	4 - 6	4.75	0.191			0.0	0.0	46.2		53.8	
⊠	KB-211.4B	15 - 17	9.5				0.0	2.7	15.3		82.0	
▲	KB-211.4B	40 - 42	0.25				0.0	0.0	3.3		96.7	
★	KB-214.4	4 - 6	2				0.0	0.0	15.8		84.2	
⊙	KB-214.4	15 - 17	2				0.0	0.0	5.3		94.7	

PROJECT: Phase 4 Borings

PROJECT NUMBER: JB215256J

SITE: Champlain to Hudson HDD Crossings

Terracon
30 Corporate Cir Ste 201
Albany, NY

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256J PHASE 4 BORINGS.GPJ TERRACON_DATATEMPLATE.GDT 2/2/23

Kiewit

MEMORANDUM

DATE: November 11, 2022

TO: Todd Kilduff; Kilduff Underground Engineering, Inc. MKH

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp.
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 105 – Revision 1
Champlain Hudson Power Express Project
Coxsackie, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located in Coxsackie, New York. The approximate station for the start of HDD crossing number 105 is STA 60684+00 (42.3570° N, 73.81550° W).

The geotechnical data at this HDD crossing is attached. The available data is taken from the previous investigation by TRC and data from a recent investigation by Terracon, referenced below.

- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Package 6, Selkirk to Catskill, Rev-1, dated June 28, 2022.
- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 177.6-228.2, dated March 15, 2013.

Contact us if you have questions or require additional information.

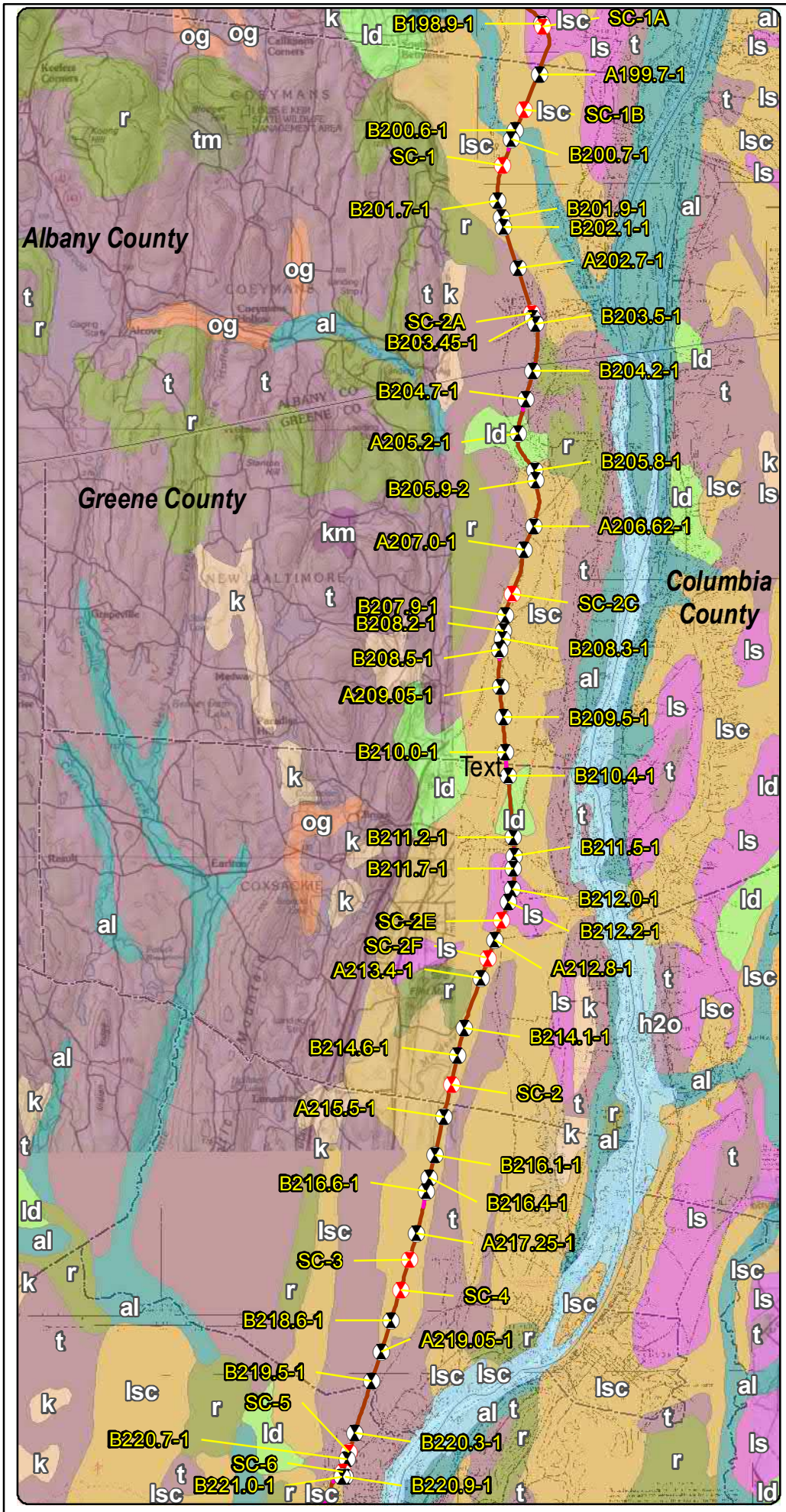
HDD 105
Borings K-211.6, K-211.7,
B211.7-1, K-211.8
Segment 10 - Design Package 6

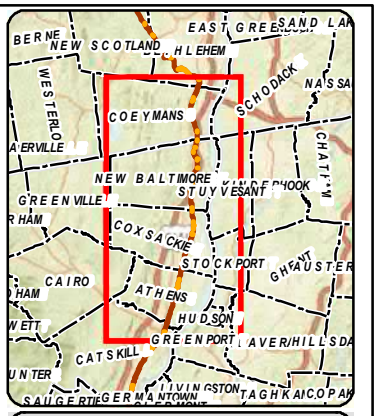
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	B209.5-1	1295695.1	676165.1	137.5
	B210.0-1	1293021.1	676353.2	109.9
	B210.4-1	1291223.1	676583.0	120.5
	B211.2-1	1286509.8	676960.2	132.6
	B211.5-1	1285068.8	677013.1	140.7
	B211.7-1	1284088.5	676965.4	141.5
	B212.0-1	1282469.0	676857.5	138.9
	B212.2-1	1281498.0	676590.5	130.8
	B214.6-1	1269721.4	672670.9	124.9
	B216.1-1	1262073.1	670916.0	127.0
	B216.4-1	1260344.1	670520.5	128.3
	B216.6-1	1259315.9	670290.2	129.8
	B219.5-1	1244816.4	666093.7	130.4
AECOM**	SC-1A	1348656.7	679220.0	176.4
	SC-2A	1326692.2	678361.5	178.9
	SC-2C	1305133.1	676877.4	160.6

Notes:
- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.
*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:
AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- h2o - Water
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- r - Bedrock
- t - Till
- tm - Till moraine

1 0.5 0 1 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

Prepared on 5/3/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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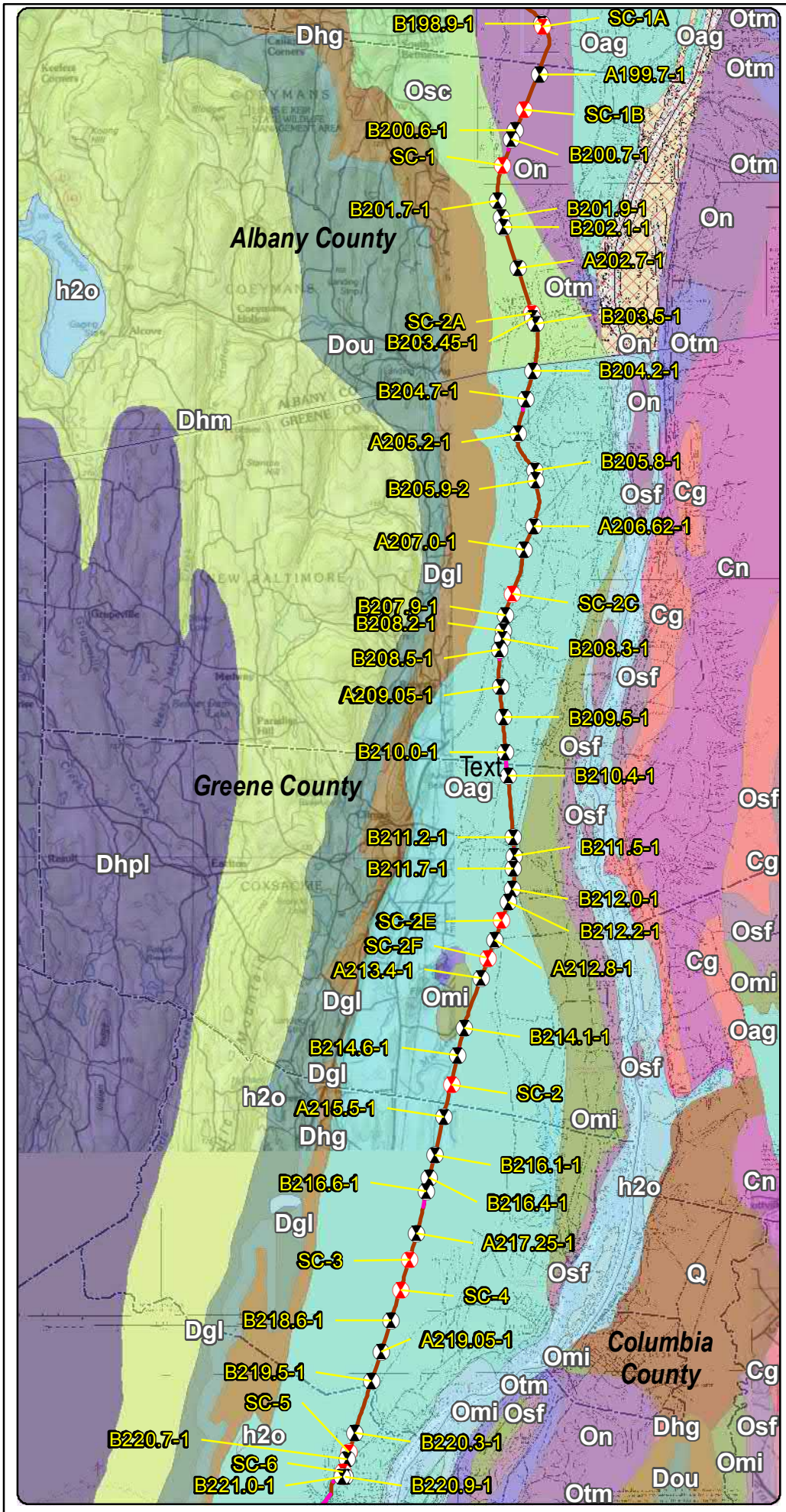

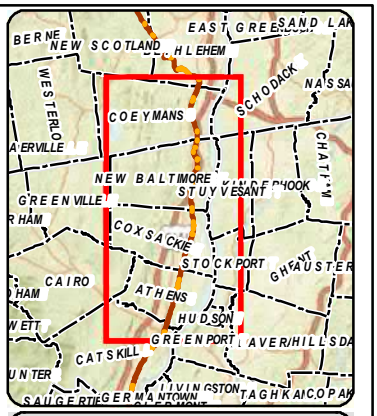

LEGEND

- 2021 Boring Location
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Bedrock Geology

- Cg - Germantown Formation
- Cn - Nassau Formation
- Dgl - Glenerie Formation
- Dhg - Port Ewen Formation
- Dhm - Undiff Lower Hamilton Group
- Dhpl - Plattekill Formation
- Dou - Onondaga Limestone
- No Label
- Oag - Austin Glen Form (graywacke, shale)
- Omi - Mount Merino Formation
- On - Normanskill Shale
- Osc - Schenectady Formation
- Osf - Stuyvesant Falls Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- h2o - Water

* Schenectady Formation includes: graywacke, sandstone, siltstone, shale

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Selkirk to Catskill Figure 4-10

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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