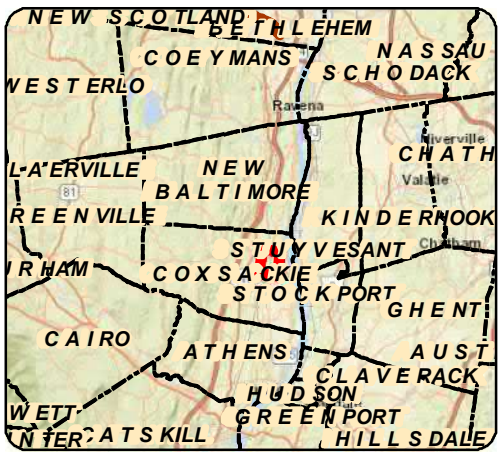
B211.2-1
211.3
211.4
211.5
B211.5-1
211.6
211.7
B211.7-1
211.8
211.9
COXSACKIE
212
B212.0-1
212.1
212.2
B212.2-1
212.3
212.4
SC-2E

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Selkirk_to_Catskill_Boring_Locations_Mapset_May_2021_Report.mxd

TEST BORING LOG

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

BORING	**B211.7-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
13.5'	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	11/29/2012
DATE COMPLETED	11/29/2012

DEPTH	A	B				C	DESCRIPTION	Wn	REMARKS
	S-1	3	2	2	4		***BROWN F/M SAND*** 2.0		
	S-2	4	6	7	10			33.8	
5	S-3	9	10	7	9		***RED/BROWN SILT, TR CLAY***		
	S-4	6	4	5	4			32.8	
10	S-5	7	9	10	6		10.0		
15	S-6	4	6	6			***GRAY SILT***	41.2	
20	S-7	2	1	2			20.0	47.1	
							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

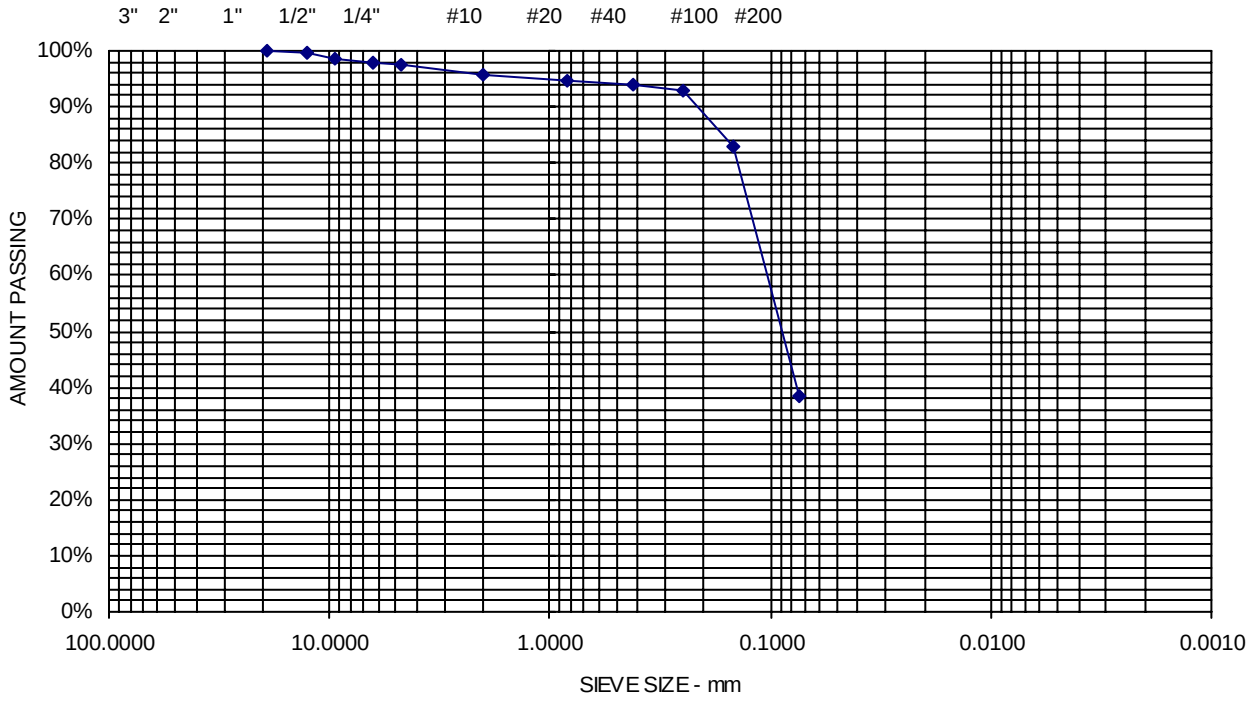
Report of Gradation

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	10433S
Exploration	**B211.7-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 3-5 FEET**	Date Completed	12/7/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**99**	
6.3 mm	**1/4"**	**98**	
4.75 mm	**No. 4**	**97**	2.6% Gravel
2.00 mm	**No. 10**	**96**	
850 um	**No. 20**	**95**	
425 um	**No. 40**	**94**	59% Sand
250 um	**No. 60**	**93**	
150 um	**No. 100**	**83**	
75 um	**No. 200**	**38.4**	38.4% Fines

BROWN SILT AND SAND TRACE GRAVEL (SM)



Comments: MOISTURE CONTENT = 27.2%

Sheet

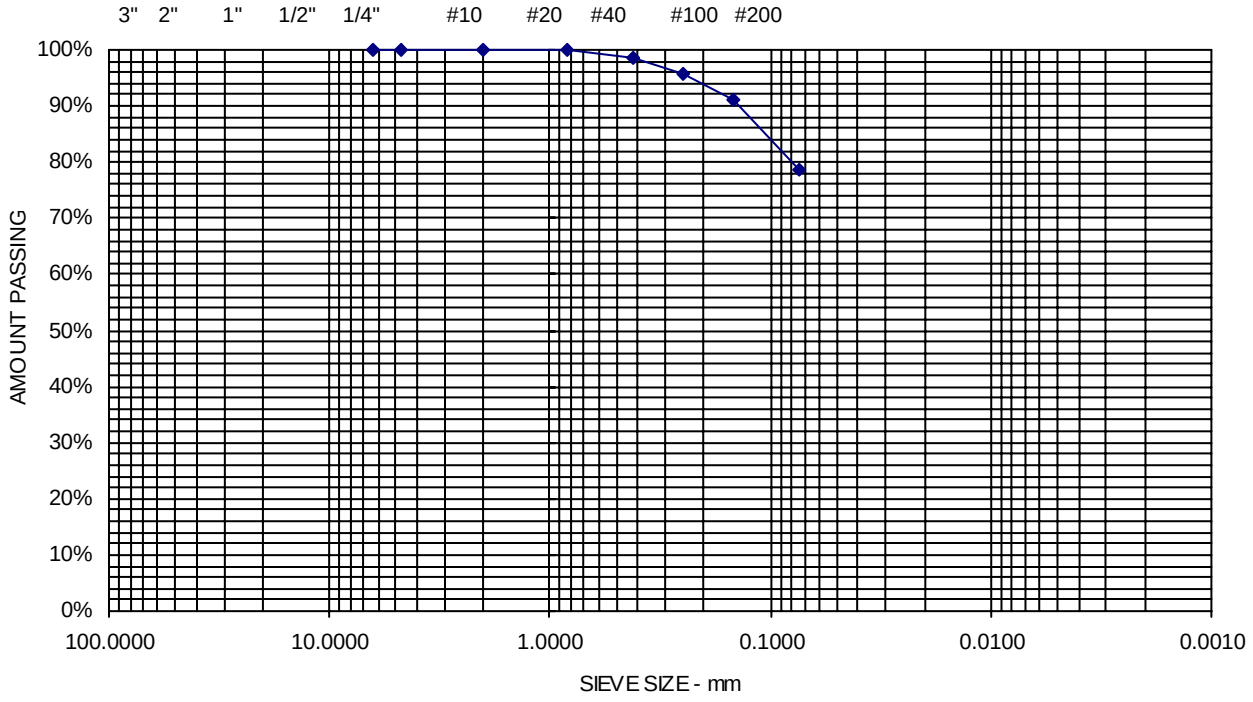
Report of Gradation

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	10434S
Exploration	**B211.7-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 10-15 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**	21.4% Sand
250 um	**No. 60**	**96**	
150 um	**No. 100**	**91**	
75 um	**No. 200**	**78.6**	78.6% Fines

BROWN SANDY SILTY CLAY (CL)



Comments: MOISTURE CONTENT = 33.3%

Sheet

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

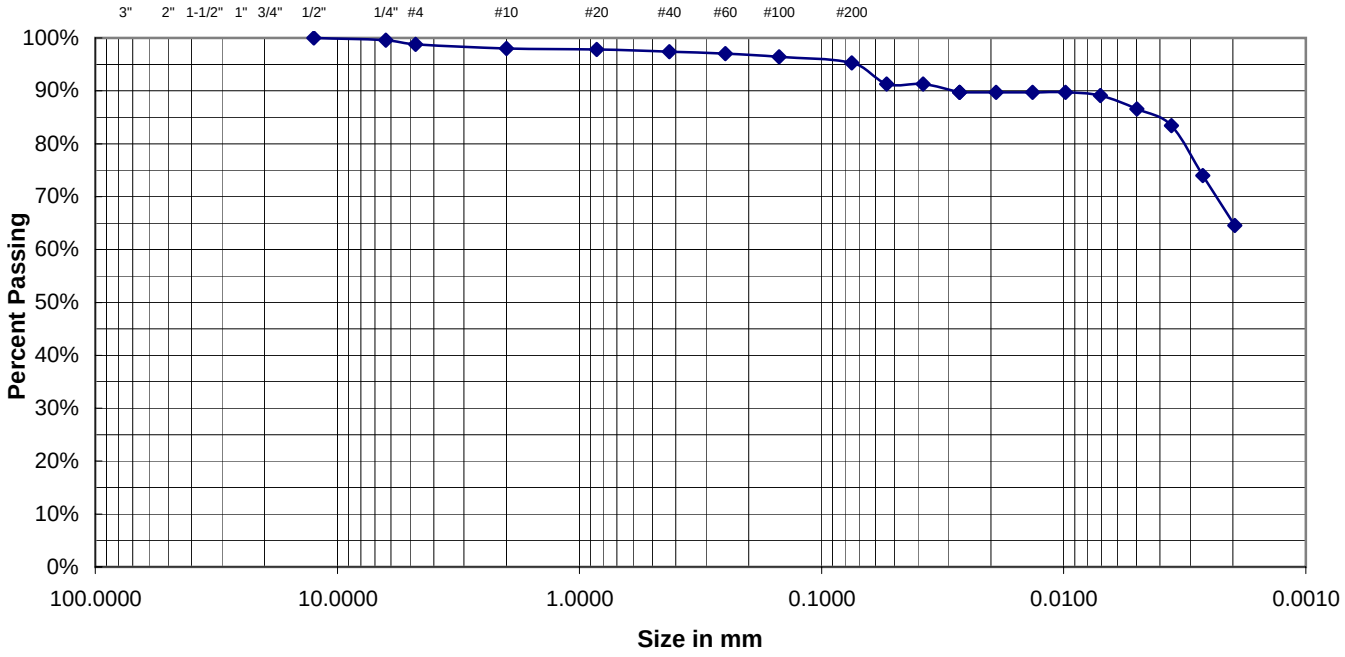
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10435S
Material Type	BROWN CLAY SOME SILT TRACE SAND AND GRAVEL (OL)	Date Received	12/5/2012
Material Source	15'-20'	Date Completed	12/14/2012
Exploration	B211.7-1	Tested By	MJS

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	**97**
No. 60	0.25	**97**
No. 100	0.15	**96**
No. 200	0.075	**95.3**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.054	91.3
0.038	91.3
0.027	89.7
0.019	89.7
0.013	89.7
0.010	89.7
0.007	89.1
0.005	86.6
0.004	83.4
0.003	74.0
0.002	64.5



Particle Distribution	
Gravel, retained on #4	1.2%
Sand, passing #4 and retained on #200	3.6%
Fines, 0.074 to 0.005	8.7%
Clay Fraction, <0.005	86.6%

Comments: MOISTURE CONTENT = 43.2%

Chad B. Michaud

Reviewed By

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

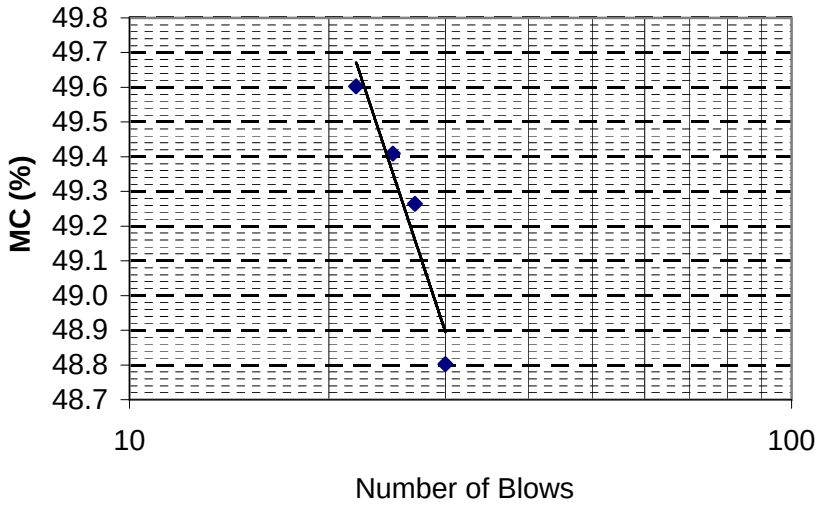
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10435S
Soil Description	BR CLAY SOME SILT TRACE SAND AND GVL (OL)	Date Received	12/5/2012
Soil Source	B211.7-1, 15'-20'	Date Completed	12/7/2012
		Tested By	JJR

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
3%	49	28	21

LIQUID LIMIT CURVE

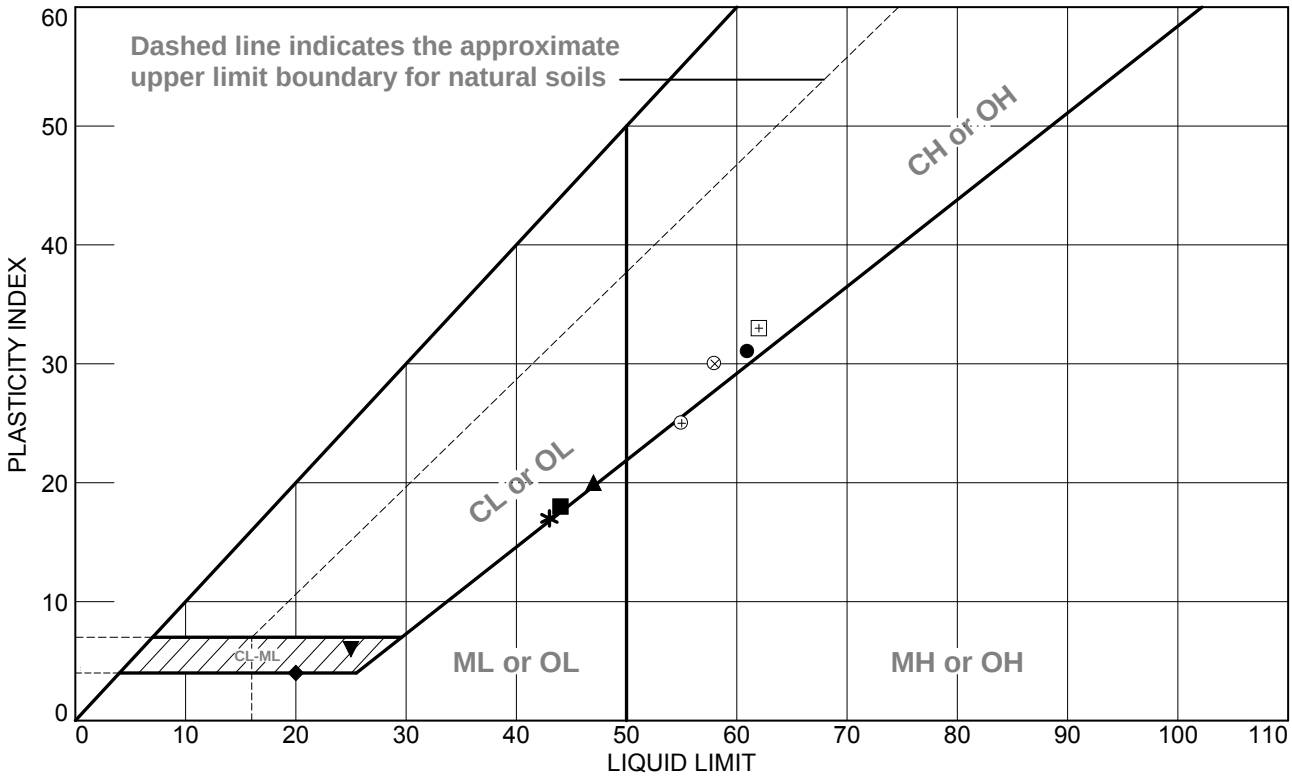


SUMMARY OF LABORATORY TEST DATA

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
●	B211.7-1	S-4	6.0-8.0 FT	32.8	30	61	31	CH
■	B211.7-1	S-6	13.5-15.0 FT	41.2	26	44	18	CL
▲	B212.0-1	S-4 & S-5	6.0-10.0 FT	35.8	27	47	20	CL
◆	B212.2-1	S-4	6.0-8.0 FT	17.2	16	20	4	CL-ML
▼	B212.2-1	S-6	13.5-15.0 FT		19	25	6	CL-ML
✱	B214.1-1	S-3	4.0-6.0 FT	29.1	26	43	17	CL
⊕	B214.5-1	S-7 & S-8	18.5-25.0 FT	36.3	30	55	25	MH
⊞	B215.5-1	S-5	8.0-10.0 FT	36.9	29	62	33	CH
⊗	B216.1-1	S-7	18.5-20.0 FT	32.2	28	58	30	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

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

Project No.: 195651 **Figure** 6

Terracon GeoReport

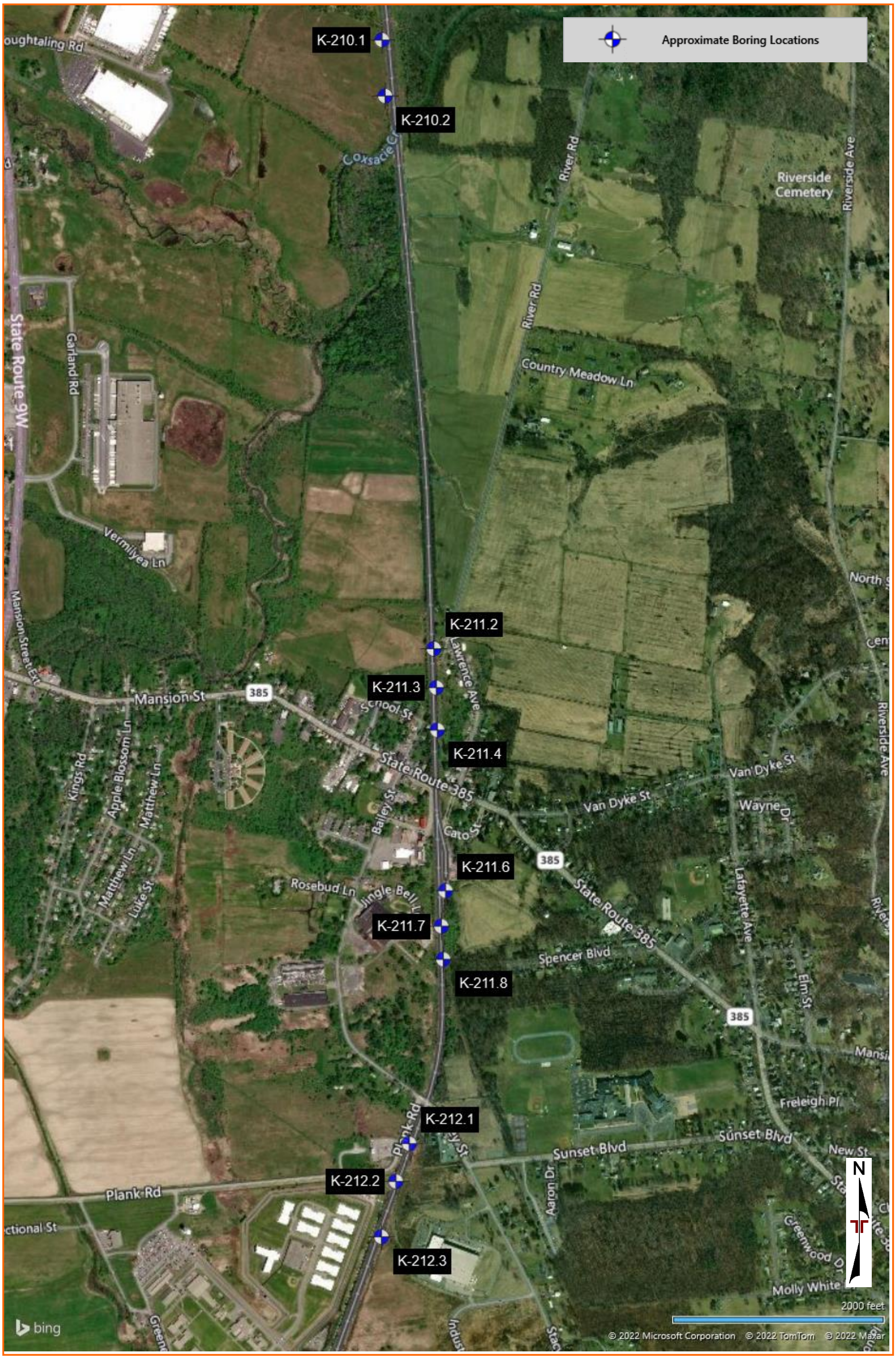


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-211.6

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: 42.3573° Longitude: -73.8157°

Surface Elev.: 140.8 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
2.0	139	**FILL - BALLAST, CINDERS AND FLY ASH**, black, very dense
3.0	138	**SILTY SAND (SM)**, brown, medium dense
20.0	121	**SANDY SILT (ML)**, brown and gray, very soft to stiff
		SILT (ML), brown and gray, very soft
		grades gray

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		24	100-76-30-15 N=106			
		21	4-3-6-5 N=9			
5		14	6-6-8-8 N=14			
		24	4-4-3-3 N=7	34.9	49-28-21	68
		24	2-1-2-2 N=3			
10		24	WOH-WOH-1-1 N=1	56.1		
15		24	WOH-WOH-WOH-1			
20		24	WOH-WOH-WOH-WOH 3" Split Spoon With Ring Samplers	66.2	36-33-3	92
25		24	WOH-WOH-WOH-WOH			

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: 02-15-2022

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 6/23/22

BORING LOG NO. K-211.6

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: 42.3573° Longitude: -73.8157°

Surface Elev.: 140.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SILT (ML), brown and gray, very soft *(continued)*		30						
			X	24	WOH-WOH-WOH-WOH			
		35						
			X	24	WOH-WOH-WOH-WOH	43.6		
		40						
			X	24	WOH-WOH-WOH-WOH			
42.0	99							
Boring Terminated at 42 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: 02-15-2022

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 6/23/22

BORING LOG NO. K-211.7

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: 42.3564° Longitude: -73.8158°

Surface Elev.: 141.5 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - CINDERS, ASH, GRAVEL AND SAND, black, medium dense		24	18-17-7-4 N=24			
2.0	139.5	**SILT WITH SAND (ML)**, brown, soft to stiff		12	3-1-3-4 N=4			
			5	12	3-4-6-8 N=10			
				6	3-3-6-8 N=9	34.6	45-29-16	83
8.0	133.5	**LEAN CLAY (CL)**, gray, very soft to soft		5	2-1-1-2 N=2			
			10	2	1-1-1-1 N=2	60.3		
			15	24	WOH-WOH-WOH-WOH			
			20	24	WOH-WOH-WOH-3 3" Split Spoon With Ring Samplers	38.4	33-20-13	95
			25	24	WOH-2-2-3 N=4			

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

Hammer Type: Automatic

Advancement Method:
3 1/4" ID HSA to 30'

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: 77.4% +/-2.7%
Hammer Efficiency Correction (CE):1.29
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-16-2022 | Boring Completed: 02-17-2022

Drill Rig: CME 550x | 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-211.7

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: 42.3564° Longitude: -73.8158°

Surface Elev.: 141.5 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
29.0	112.5	**LEAN CLAY (CL)**, gray, very soft to soft *(continued)*				
30.0	111.5	**WEATHERED ROCK**, gray, very dense			2	50/4"
		GRAYWACKE, moderately weathered, close to moderate fractured, fair RQD, gray	30			REC = 94% RQD = 70%
35.0	106.5	**GRAYWACKE**, occasional calcite veins, moderate to highly weathered, very close to moderate fractured, thinly bedded, fair RQD, gray	35			REC = 100% RQD = 63%
40.0	101.5	***Boring Terminated at 40 Feet***	40			

GRAPHIC LOG | WATER LEVEL OBSERVATIONS | 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:
3 1/4" ID HSA to 30'

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: 77.4% +/-2.7%
Hammer Efficiency Correction (CE):1.29
WOH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-16-2022 | Boring Completed: 02-17-2022

Drill Rig: CME 550x | 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-211.8

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: 42.3555° Longitude: -73.8158°

Surface Elev.: 143.1 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.5	142.5	**FILL - CINDERS, ASH, GRAVEL AND SAND**, black, loose
		SILT (ML), brown, soft to very stiff
12.0	131	
		SILT AND CLAY (CL-ML), gray, very soft
21.0	122	
		GRAVELLY LEAN CLAY (CL), gray
23.0	120	
		SILT AND CLAY (CL-ML), gray, very soft to very stiff

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		13-2-2-3 N=4			
	18	2-2-2-4 N=4			
5	10	3-4-7-9 N=11			
	18	4-8-9-10 N=17	33.6	43-27-16	88
	12	7-6-4-3 N=10			
10	21	1-1-2-1 N=3	40.4		
15	24	WOH-WOH WOH-WOH			
20	24	1-1-2-1 3" Split Spoon With Ring Samplers	45.5	40-23-17	57
25	24	WOH-WOH WOH-1			

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

Hammer Type: Automatic

Advancement Method:
3 1/4" ID HSA to 30'

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: 77.4% +/-2.7%
Hammer Efficiency Correction (CE):1.29
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: CME 550x | 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-211.8

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: 42.3555° Longitude: -73.8158°

Surface Elev.: 143.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SILT AND CLAY (CL-ML), gray, very soft to very stiff *(continued)*		30		12	WOH-7-9-5 N=16			
		35		12	5-2-5-17 N=7	7.8		
37.0	106							
WEATHERED ROCK, gray								
38.2	105							
GRAYWACKE, moderately weathered, close to moderate fractured, fair RQD, gray					REC = 100% RQD = 67%			
40.2	103	40						
Boring Terminated at 40.2 Feet								

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

Hammer Type: Automatic

Advancement Method:
3 1/4" ID HSA to 30'

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: 77.4% +/-2.7%
Hammer Efficiency Correction (CE):1.29
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

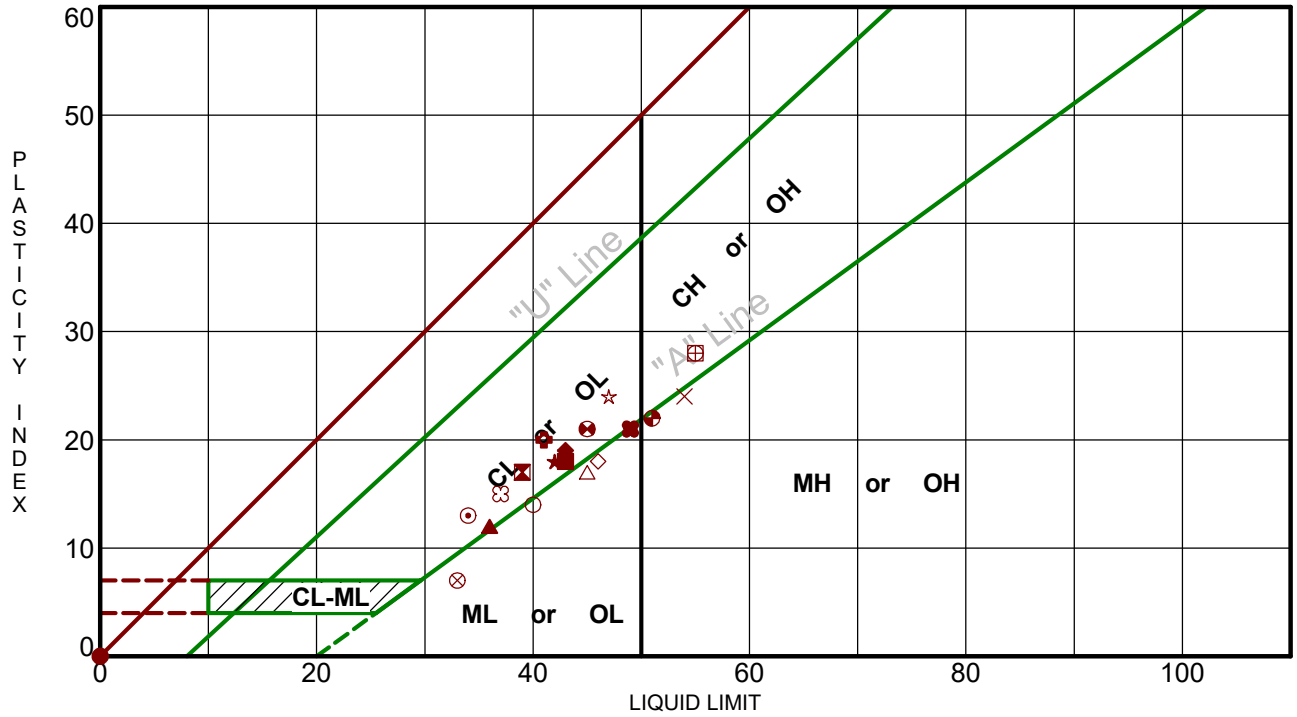
Drill Rig: CME 550x | Driller: S. Kahn

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

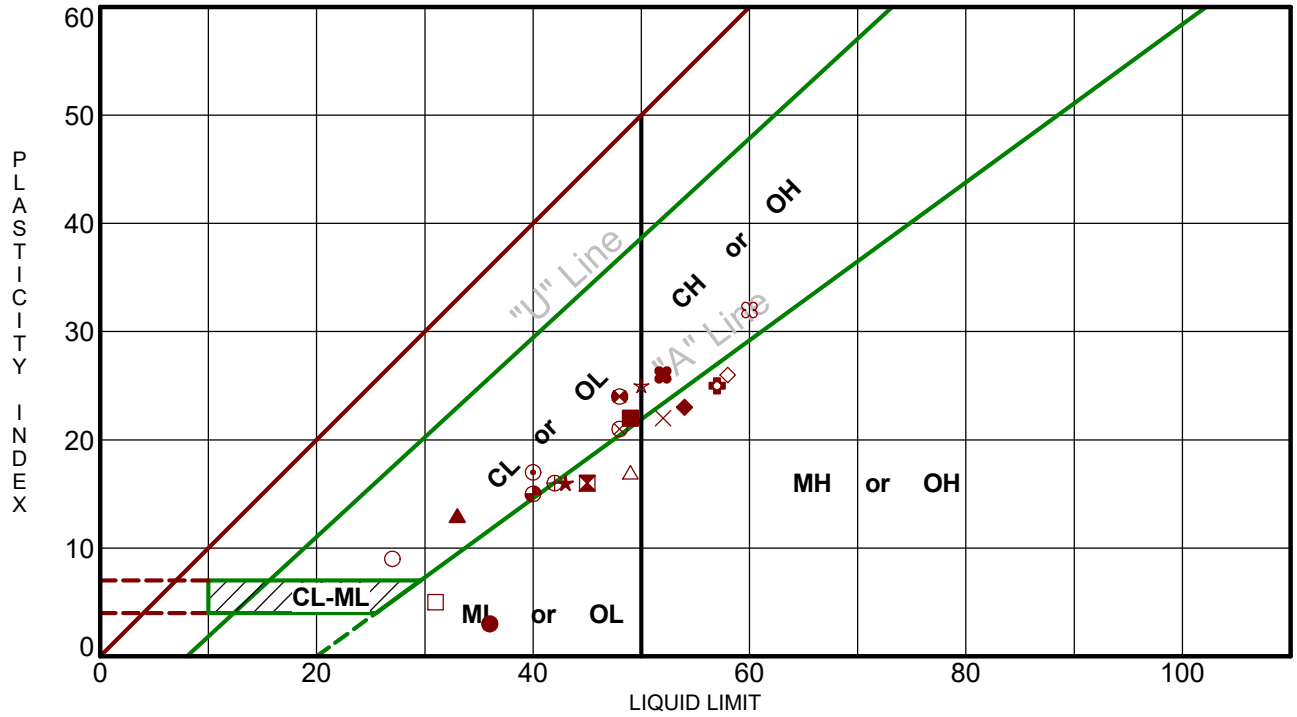
PROJECT NUMBER: JB215256C

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

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-211.6	20 - 22	36	33	3	91.8	ML	SILT
⊠	K-211.7	6 - 8	45	29	16	83.1	ML	SILT with SAND
▲	K-211.7	21 - 23	33	20	13	95.0	CL	LEAN CLAY
★	K-211.8	6 - 8	43	27	16	88.3	ML	SILT
⊙	K-211.8	21 - 23	40	23	17	56.9	CL	GRAVELLY LEAN CLAY
✿	K-212.1	6 - 8	57	32	25	49.5	SM	SILTY SAND
○	K-212.1	25 - 27	27	18	9	97.2	CL	LEAN CLAY
△	K-212.2	10 - 12	49	32	17	70.5	ML	SILT with SAND
⊗	K-212.2	23 - 25	48	27	21	83.9	CL	LEAN CLAY with SAND
⊕	K-212.3	10 - 12	42	26	16	37.7	SM	SILTY SAND
□	K-212.3	23 - 25	31	26	5	73.3	ML	SILT with SAND
⊛	K-214.5	28 - 30	48	24	24	74.1	CL	LEAN CLAY with SAND
◕	K-214.5	35 - 37	40	25	15	90.9	CL	LEAN CLAY
☆	K-216.2	10 - 12	50	25	25	75.9	CH	FAT CLAY with SAND
✿	K-216.2	18 - 20	60	28	32	71.7	CH	FAT CLAY with SAND
■	K-216.2	30 - 31.5	49	27	22	96.0	CL	LEAN CLAY
◆	K-216.6	8 - 10	54	31	23	74.1	MH	ELASTIC SILT with SAND
◇	K-216.6	18 - 20	58	32	26	78.2	MH	ELASTIC SILT with SAND
×	K-216.6	30 - 31.5	52	30	22	72.3	MH	ELASTIC SILT with SAND
✖	K-216.7	10 - 12	52	26	26	64.0	CH	SANDY FAT CLAY

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

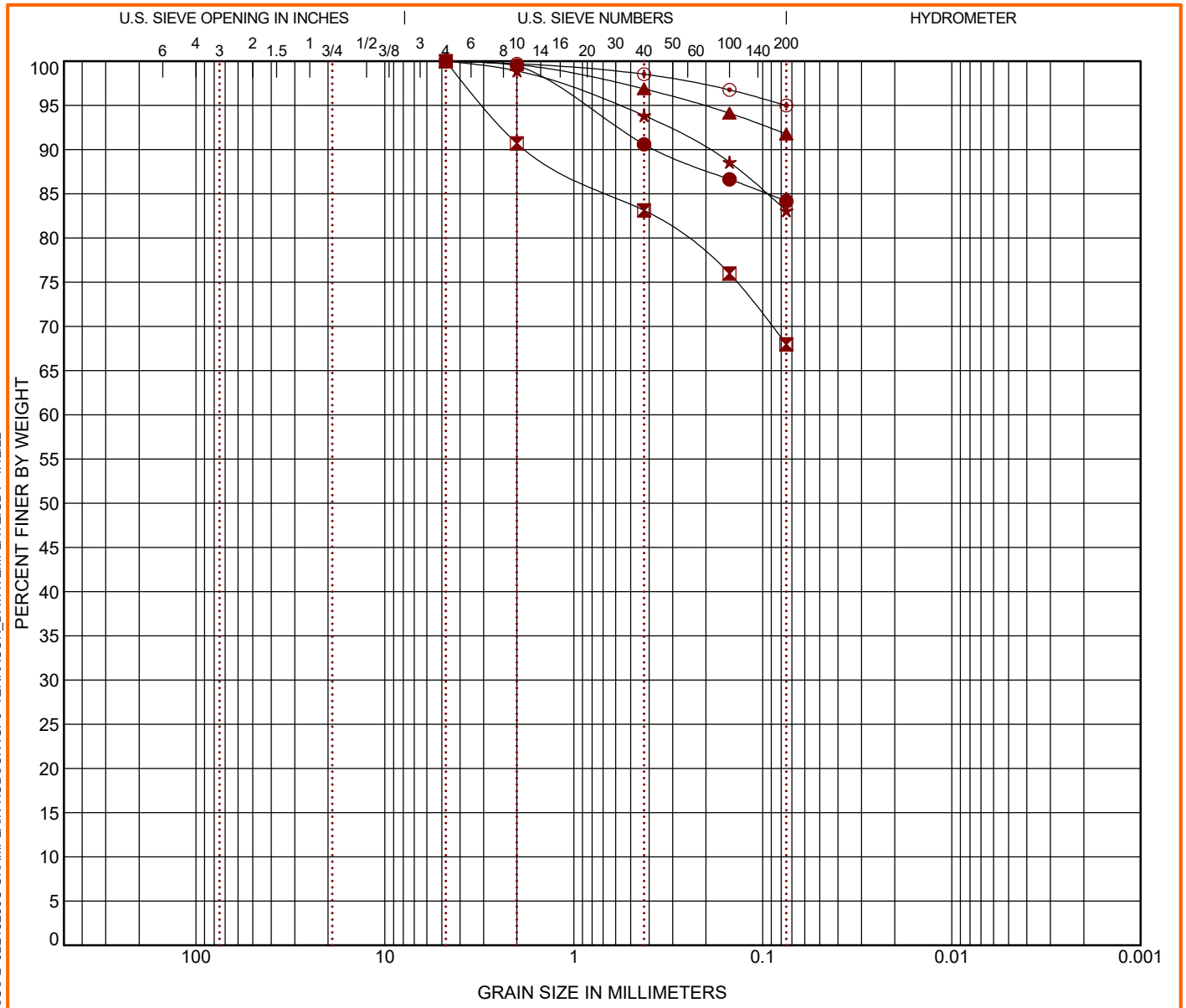
PROJECT NUMBER: JB215256C

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-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

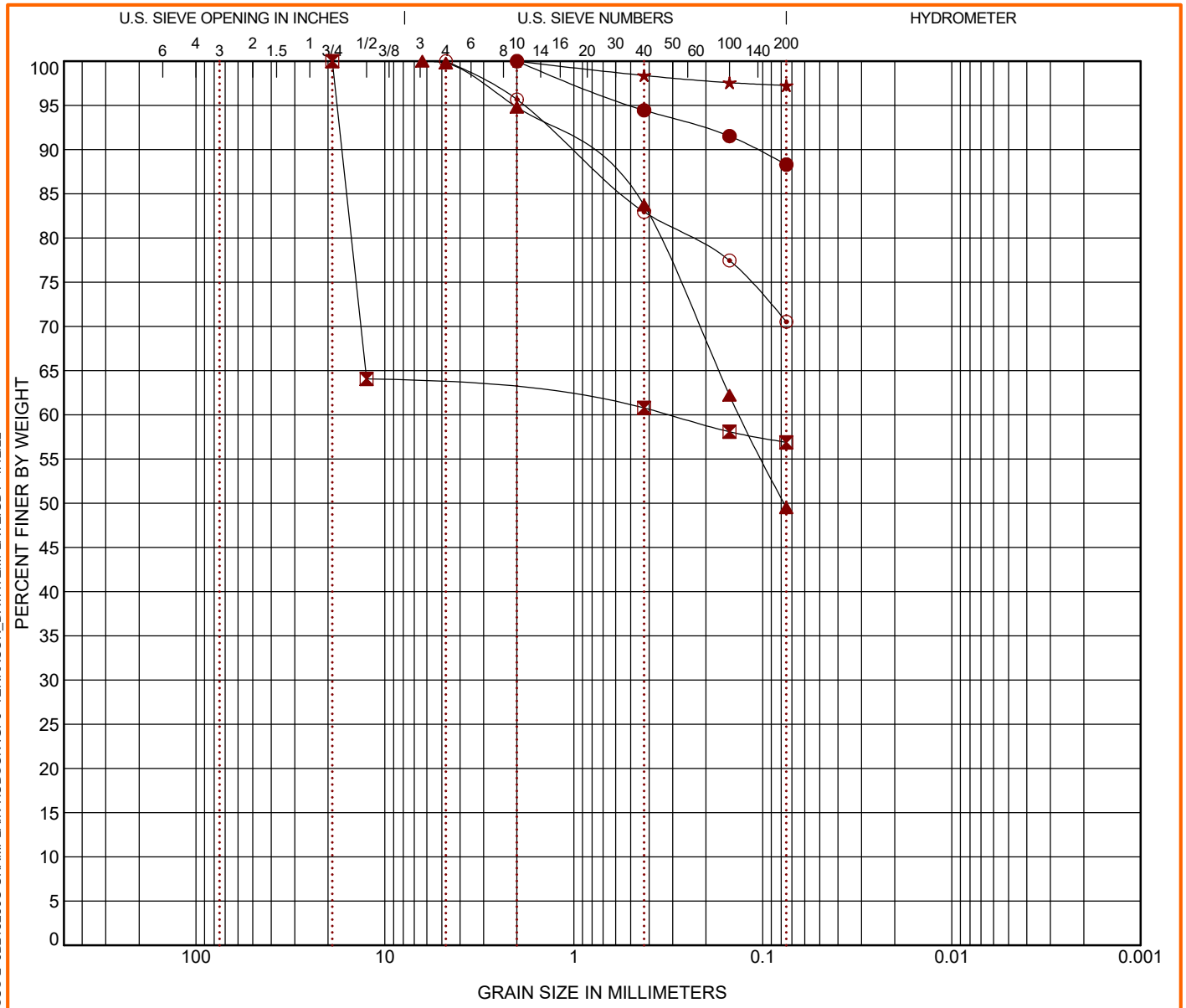
PROJECT NUMBER: JB215256C

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

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-211.8	6 - 8	SILT (ML)	33.6	43	27	16		
⊠	K-211.8	21 - 23	GRAVELLY LEAN CLAY (CL)	45.5	40	23	17		
▲	K-212.1	6 - 8	SILTY SAND (SM)	33.0	57	32	25		
★	K-212.1	25 - 27	LEAN CLAY (CL)	34.8	27	18	9		
⊙	K-212.2	10 - 12	SILT with SAND (ML)	36.0	49	32	17		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-211.8	6 - 8	2				0.0	0.0	11.7		88.3	
⊠	K-211.8	21 - 23	19	0.315			0.0	36.9	6.2		56.9	
▲	K-212.1	6 - 8	6.35	0.133			0.0	0.2	50.3		49.5	
★	K-212.1	25 - 27	2				0.0	0.0	2.8		97.2	
⊙	K-212.2	10 - 12	4.75				0.0	0.0	29.5		70.5	

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 12, 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 106 – 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 106 is STA 60707+00 (42.35092° N, 73.81698° 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.

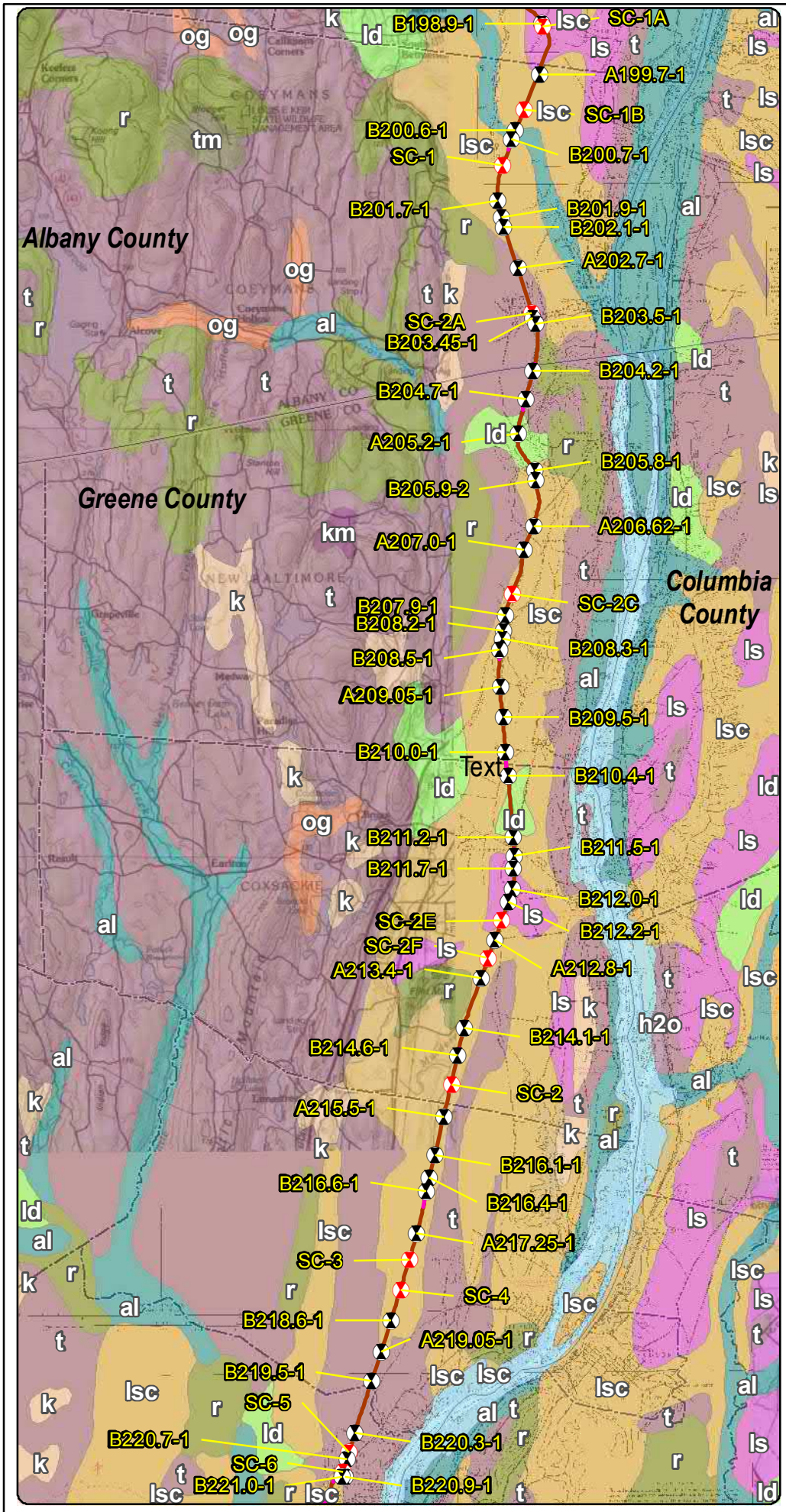
HDD 106
Borings B212.0-1,K-212.1,
K-212.2, B212.2-1, K-212.3
Segment 10 - Design Package 6

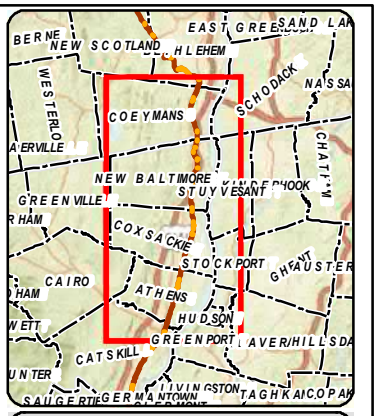
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

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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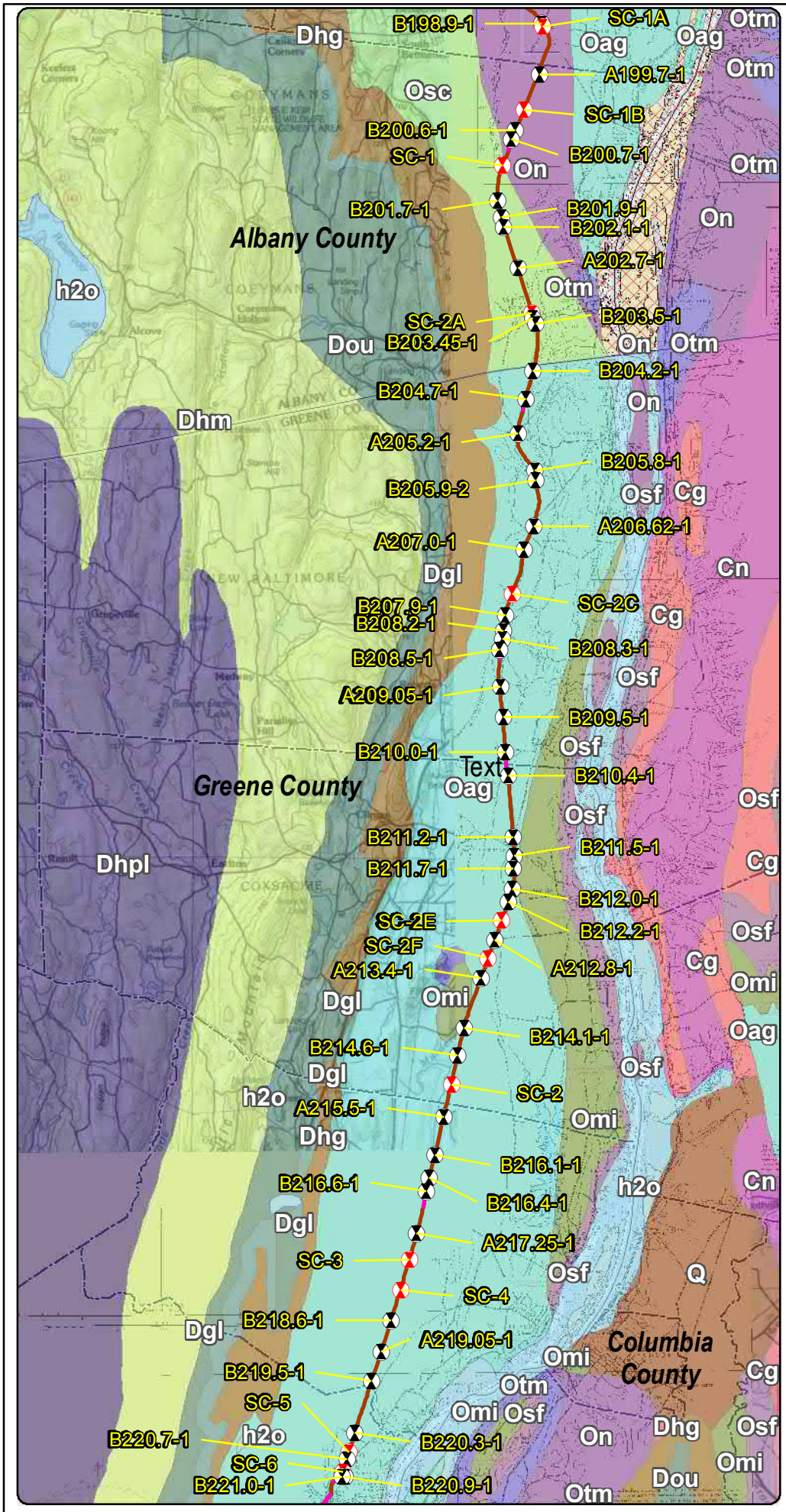

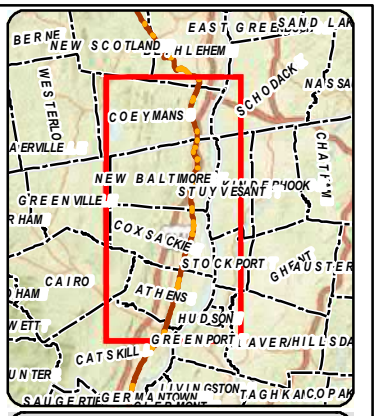

LEGEND

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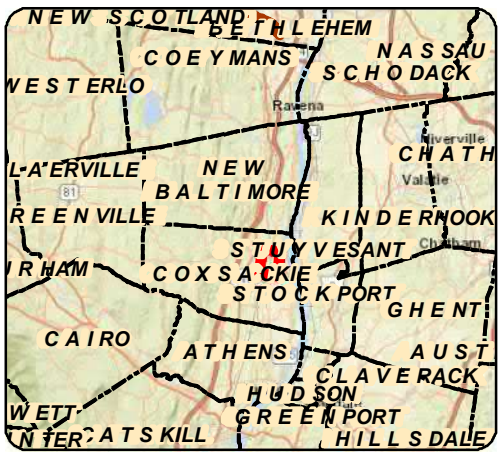
B211.2-1
211.3
211.4
211.5
B211.5-1
211.6
211.7
B211.7-1
211.8
211.9
COXSACKIE
212
B212.0-1
212.1
212.2
B212.2-1
212.3
212.4
SC-2E

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Selkirk_to_Catskill_Boring_Locations_Mapset_May_2021_Report.mxd

TEST BORING LOG

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

BORING	**B212.0-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED 2.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

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

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

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	16 10 8 5		***BLACK F/ GRAVEL-SIZED ROCK FRAGMENTS, TR TO SM M/C SAND (FILL)*** 2.0		WATER TABLE DETERMINED FROM WETNESS OF SAMPLE
	S-2	5 6 10 15		***BROWN SILT, TR CLAY***	34.0	
5	S-3	8 8 11 14		6.0		
	S-4	5 6 8 9				
10	S-5	4 5 4 3		***LIGHT BROWN/TAN CLAYEY SILT***	35.8	
				13.5		
15	S-6	4 4 3		***GRAY-BROWN CLAY, TR TO SM C/F GRAVEL, TR M/F/C SAND***	30.9	
				18.5		
20	S-7	3 1 2		***GRAY SILT, TR CLAY*** 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	**B212.2-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
DRY	NR	11/30	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	6	4	7	3		***BROWN F/ SAND, TR SILT*** 2.0	22.1	
	S-2	5	5	3	4		***BROWN SILT, SM F/ SAND***	16.8	
5	S-3	7	8	5	9		6.0		
	S-4	6	6	6	9		***GRAY-BROWN SILT, TR TO SM CLAY***	17.2	
10	S-5	4	3	6	4		13.5	17.6	
15	S-6	4	5	6			***GRAY SILT***		
20	S-7	2	3	2			20.0	24.9	
							END OF BORING AT 20'		
25									
30									
35									

DRN.	TBT
CKD.	PWK

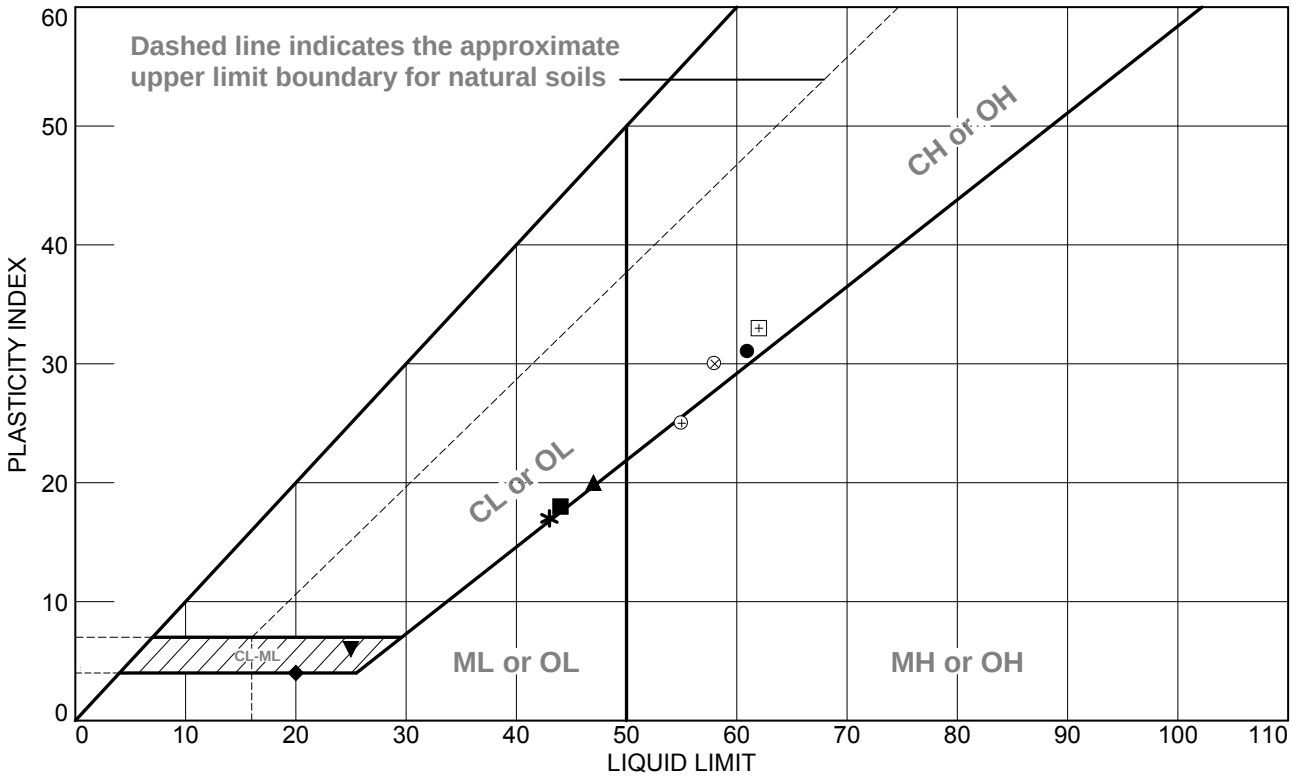
NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

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)					
B212.0-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	34.0	89.6	-	-
	S-4	6.0-8.0	CL	-	-	-	-	47	27	20	0.4	-	35.8	-	-	-
	S-5	8.0-10.0														
	S-6	13.5-15.0	CL	14.4	7.1	78.5		-	-	-	-	-	30.9	-	-	-
B212.2-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	22.1	-	-	-
	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	16.8	-	-	-
	S-4	6.0-8.0	CL-ML	-	-	-	-	20	16	4	0.3	-	17.2	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	17.6	-	-	-
	S-6	13.5-15.0	CL-ML	-	-	-	-	25	19	6	-	-	-	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	24.9	-	-	-
B212.8-1	R-1	7.1-7.8	-	-	-	-	-	-	-	-	-	-	-	164.8	460	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

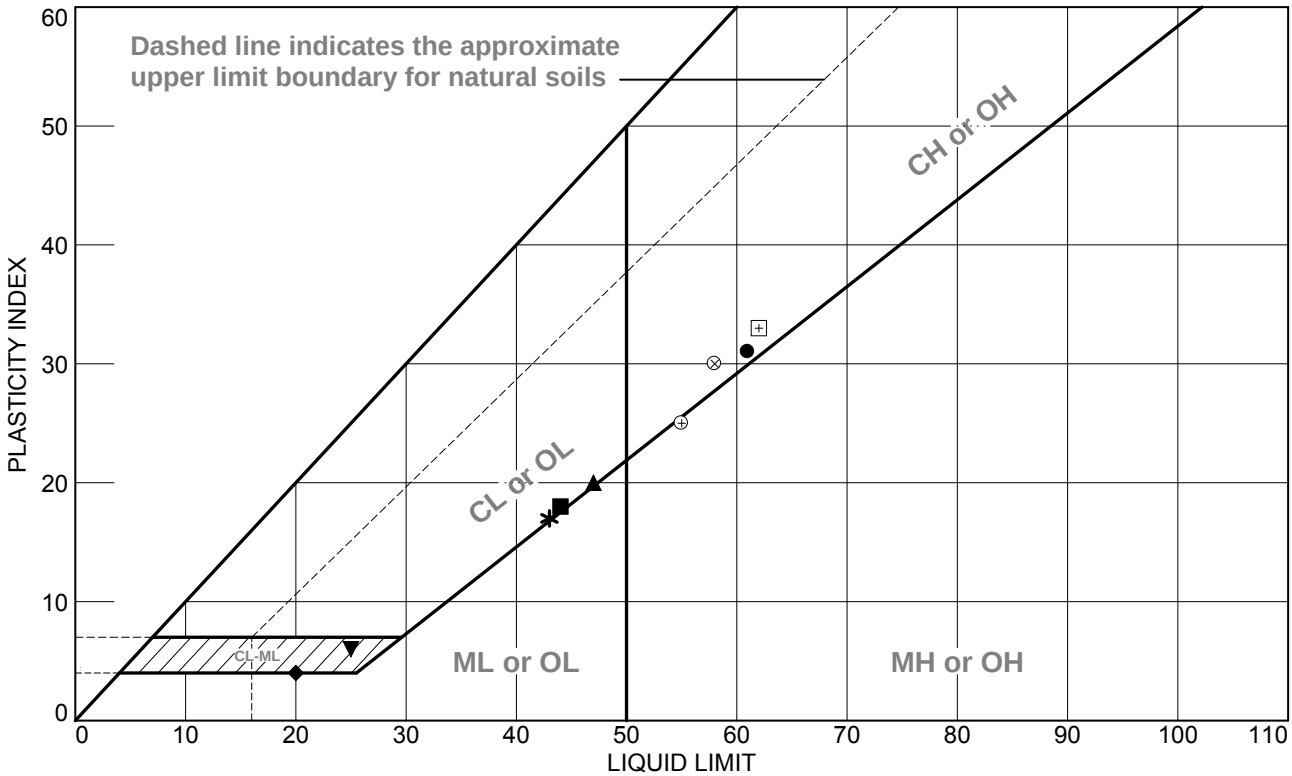
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B211.7-1	S-4	6.0-8.0 FT	32.8	30	61	31	CH
■	B211.7-1	S-6	13.5-15.0 FT	41.2	26	44	18	CL
▲	B212.0-1	S-4 & S-5	6.0-10.0 FT	35.8	27	47	20	CL
◆	B212.2-1	S-4	6.0-8.0 FT	17.2	16	20	4	CL-ML
▼	B212.2-1	S-6	13.5-15.0 FT		19	25	6	CL-ML
✱	B214.1-1	S-3	4.0-6.0 FT	29.1	26	43	17	CL
⊕	B214.5-1	S-7 & S-8	18.5-25.0 FT	36.3	30	55	25	MH
⊞	B215.5-1	S-5	8.0-10.0 FT	36.9	29	62	33	CH
⊗	B216.1-1	S-7	18.5-20.0 FT	32.2	28	58	30	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

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

Project No.: 195651 **Figure** 6

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

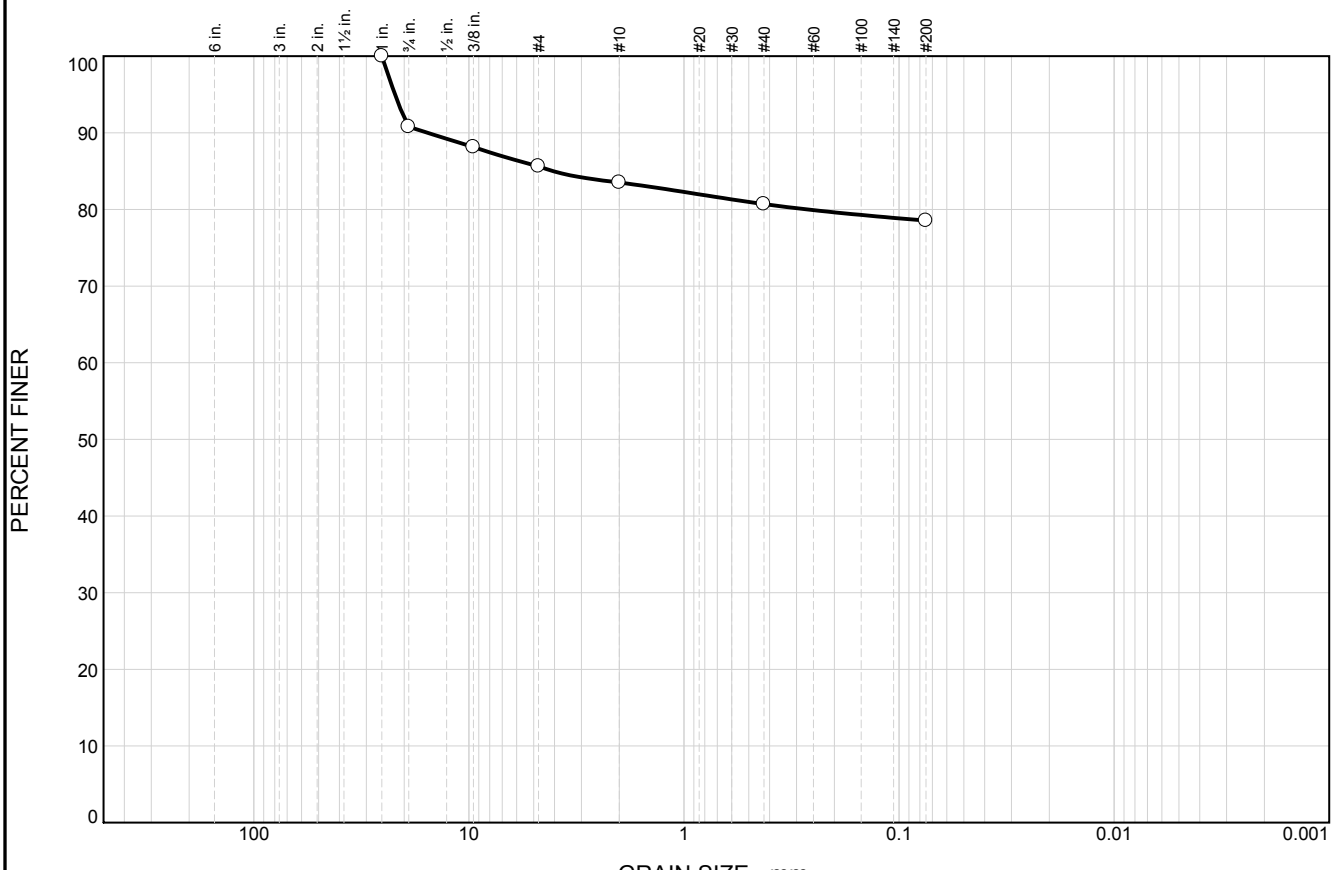
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B211.7-1	S-4	6.0-8.0 FT	32.8	30	61	31	CH
■	B211.7-1	S-6	13.5-15.0 FT	41.2	26	44	18	CL
▲	B212.0-1	S-4 & S-5	6.0-10.0 FT	35.8	27	47	20	CL
◆	B212.2-1	S-4	6.0-8.0 FT	17.2	16	20	4	CL-ML
▼	B212.2-1	S-6	13.5-15.0 FT		19	25	6	CL-ML
✱	B214.1-1	S-3	4.0-6.0 FT	29.1	26	43	17	CL
⊕	B214.5-1	S-7 & S-8	18.5-25.0 FT	36.3	30	55	25	MH
⊞	B215.5-1	S-5	8.0-10.0 FT	36.9	29	62	33	CH
⊗	B216.1-1	S-7	18.5-20.0 FT	32.2	28	58	30	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

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

Project No.: 195651 **Figure** 6

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	9.2	5.2	2.1	2.8	2.2	78.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			4.0553							

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

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

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B212.0-1 **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 98

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

Terracon GeoReport

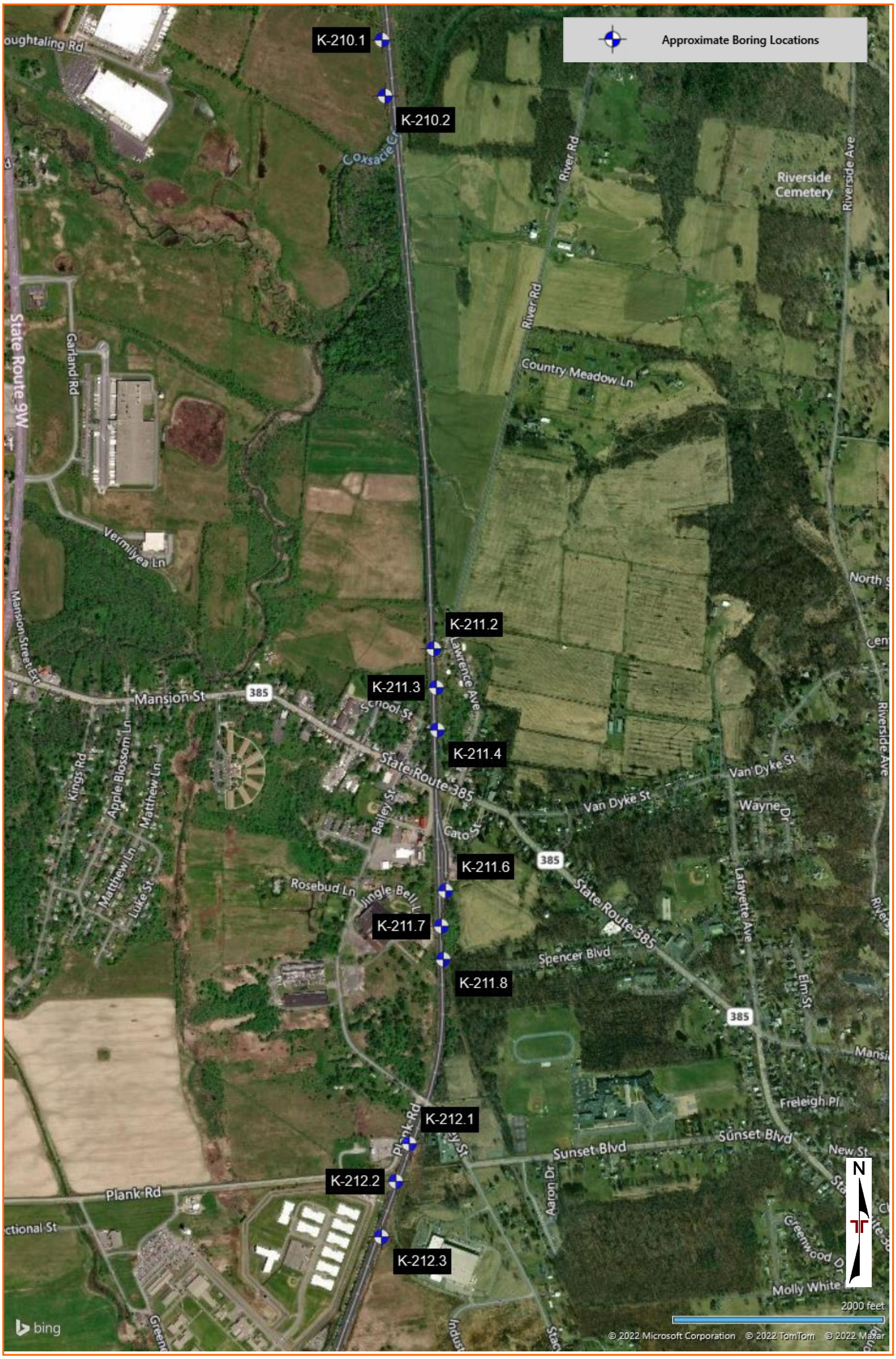


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-212.1

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: 42.3508° Longitude: -73.8170°

Surface Elev.: 135.5 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.0	135.5	
2.0	133.5	**FILL - POORLY GRADED GRAVEL**, trace sand, black, loose
4.0	131.5	**POORLY GRADED SAND (SP)**, brown, very loose
6.0	129.5	**SILT AND CLAY (CL-ML)**, brown, stiff
8.0	127.5	**SILTY SAND (SM)**, brown, medium dense
15.0	120.5	**SILT AND CLAY (CL-ML)**, brown, stiff to very stiff
		LEAN CLAY (CL), gray, very soft to medium stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		18	17-4-2-2 N=6			
		13	1-1-1-2 N=2			
5		13	2-3-6-7 N=9			
		15	18-9-10-10 N=19	33.0	57-32-25	49
		18	2-4-6-7 N=10			
10		20	7-9-9-9 N=18	31.0		
15		24	WOH-2-3-3 N=5			
20		24	WOH-WOH-WOH-WOH			
25		24	WOH-WOH-2-3 3" Split Spoon With Ring Samplers	34.8	27-18-9	97
			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: 02-16-2022 | Boring Completed: 02-16-2022

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-212.1

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: 42.3508° Longitude: -73.8170°

Surface Elev.: 135.5 (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
		LEAN CLAY (CL), gray, very soft to medium stiff *(continued)*				24	WOH-WOH			
			30			24	WOH-WOH-WOH-WOH	31.2		
			35			24	WOH-WOH-WOH-WOH			
37.0	98.5									
		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: 02-16-2022	Boring Completed: 02-16-2022
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-212.2

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: 42.3497° Longitude: -73.8175°

Surface Elev.: 133.7 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
2.0	131.5	**FILL - POORLY GRADED GRAVEL**, trace sand, black, medium dense
4.0	129.5	**POORLY GRADED SAND (SP)**, trace gravel and silt, brown, very loose
20.0	113.5	**SILT WITH SAND (ML)**, brown, very soft to very stiff
		LEAN CLAY WITH SAND (CL), gray, very soft to soft

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		14	13-11-2-2 N=13			
		8	1-1-1-1 N=2			
5		13	WOH-WOH-1-1 N=1			
		18	3-5-6-7 N=11	33.3		
		16	3-5-9-12 N=14			
10		20	10-11-10-12 N=21	36.0	49-32-17	71
15		24	1-3-4-4 N=7			
20		18	1-2-2-2 N=4			
		24	1-2-3-2	53.6	48-27-21	84
25		24	3" Split Spoon with Ring Samplers WOH-WOH-WOH-WOH			

WATER LEVEL OBSERVATIONS: ▽ While drilling

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

▽ *While drilling*

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-17-2022 | Boring Completed: 02-17-2022

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-212.2

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: 42.3497° Longitude: -73.8175°

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
	LEAN CLAY WITH SAND (CL), gray, very soft to soft *(continued)*									
			30			24	WOH-WOH-WOH-WOH	48.3		
			35			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:
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

While drilling

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-17-2022	Boring Completed: 02-17-2022
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-212.3

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: 42.3484° Longitude: -73.8182°

Surface Elev.: 130.3 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0	130.3	
2.0	128.5	**FILL - POORLY GRADED GRAVEL**, brown, loose
6.0	124.5	**POORLY GRADED SAND (SP)**, brown, very loose
8.0	122.5	**SILTY SAND WITH GRAVEL (SM)**, brown, medium dense
10.0	120.5	**SILT AND CLAY (CL-ML)**, brown, soft
12.0	118.5	**SILTY SAND (SM)**, brown, loose
23.0	107.5	**SILT AND CLAY (CL-ML)**, brown, medium stiff to stiff
		SILT WITH SAND (ML), gray, very soft to soft

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		13	7-4-2-2 N=6			
		4	1-1-1-1 N=2			
5		6	1-1-1-10 N=2			
		9	10-8-4-2 N=12	9.0		13
		15	1-2-2-3 N=4			
10		15	3-3-4-4 N=7	33.0	42-26-16	38
15		22	3-6-9-9 N=15			
20		24	3-3-5-6 N=8			
		24	3-3-6-7	37.5	31-26-5	73
25		24	3" Split Spoon With Ring Samplers WOH-WOH-2-3 N=2			

WATER LEVEL OBSERVATIONS

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

While drilling

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-18-2022	Boring Completed: 02-18-2022
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-212.3

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: 42.3484° Longitude: -73.8182°

Surface Elev.: 130.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SILT WITH SAND (ML), gray, very soft to soft *(continued)*								
		30	X	24	WOH-WOH-WOH-WOH	46.1		
		35	X	24	WOH-WOH-WOH-WOH			
37.0	93.5							
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

While drilling

No measurable groundwater prior to grouting

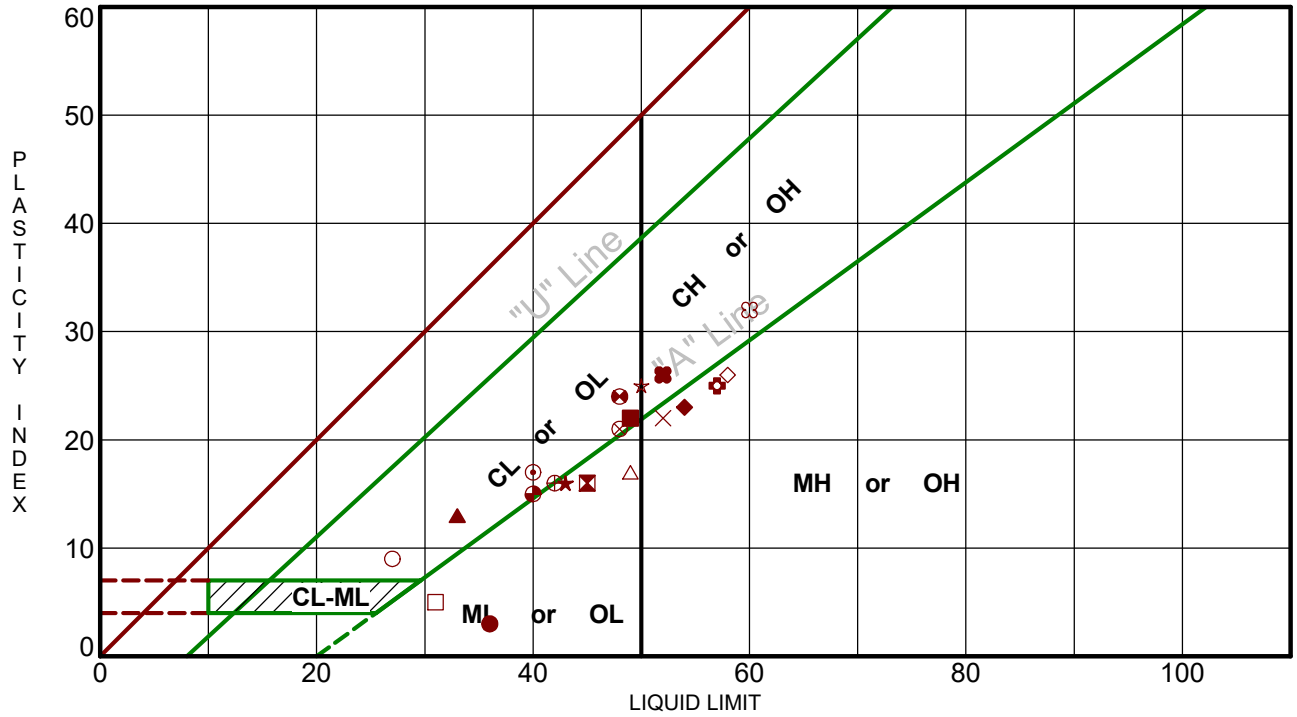
Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-18-2022	Boring Completed: 02-18-2022
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-211.6	20 - 22	36	33	3	91.8	ML	SILT
⊠	K-211.7	6 - 8	45	29	16	83.1	ML	SILT with SAND
▲	K-211.7	21 - 23	33	20	13	95.0	CL	LEAN CLAY
★	K-211.8	6 - 8	43	27	16	88.3	ML	SILT
⊙	K-211.8	21 - 23	40	23	17	56.9	CL	GRAVELLY LEAN CLAY
✿	K-212.1	6 - 8	57	32	25	49.5	SM	SILTY SAND
○	K-212.1	25 - 27	27	18	9	97.2	CL	LEAN CLAY
△	K-212.2	10 - 12	49	32	17	70.5	ML	SILT with SAND
⊗	K-212.2	23 - 25	48	27	21	83.9	CL	LEAN CLAY with SAND
⊕	K-212.3	10 - 12	42	26	16	37.7	SM	SILTY SAND
□	K-212.3	23 - 25	31	26	5	73.3	ML	SILT with SAND
⊛	K-214.5	28 - 30	48	24	24	74.1	CL	LEAN CLAY with SAND
◕	K-214.5	35 - 37	40	25	15	90.9	CL	LEAN CLAY
☆	K-216.2	10 - 12	50	25	25	75.9	CH	FAT CLAY with SAND
✿	K-216.2	18 - 20	60	28	32	71.7	CH	FAT CLAY with SAND
■	K-216.2	30 - 31.5	49	27	22	96.0	CL	LEAN CLAY
◆	K-216.6	8 - 10	54	31	23	74.1	MH	ELASTIC SILT with SAND
◇	K-216.6	18 - 20	58	32	26	78.2	MH	ELASTIC SILT with SAND
×	K-216.6	30 - 31.5	52	30	22	72.3	MH	ELASTIC SILT with SAND
✖	K-216.7	10 - 12	52	26	26	64.0	CH	SANDY FAT CLAY

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

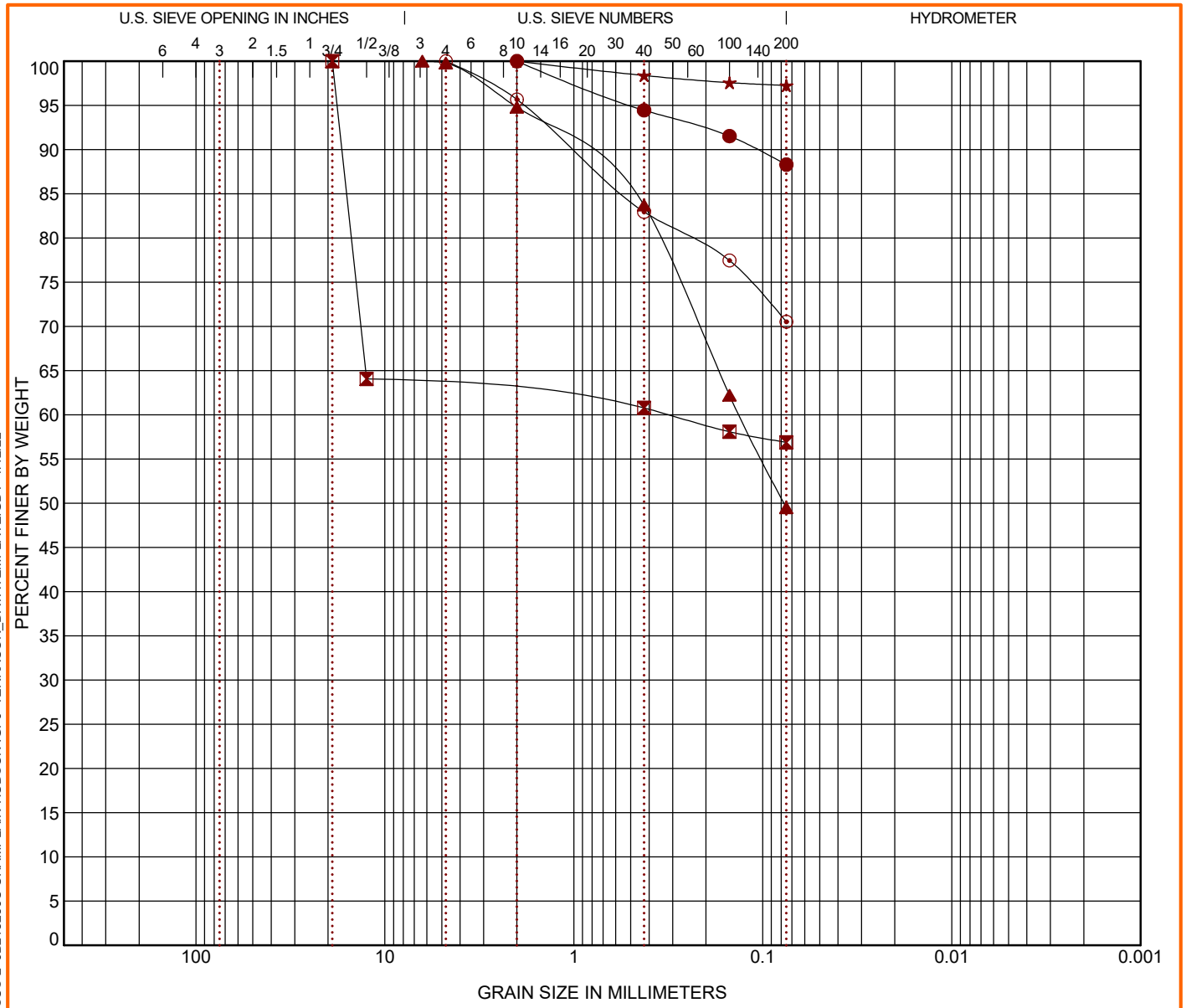
PROJECT NUMBER: JB215256C

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-211.8	6 - 8	SILT (ML)	33.6	43	27	16		
⊠	K-211.8	21 - 23	GRAVELLY LEAN CLAY (CL)	45.5	40	23	17		
▲	K-212.1	6 - 8	SILTY SAND (SM)	33.0	57	32	25		
★	K-212.1	25 - 27	LEAN CLAY (CL)	34.8	27	18	9		
⊙	K-212.2	10 - 12	SILT with SAND (ML)	36.0	49	32	17		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-211.8	6 - 8	2				0.0	0.0	11.7		88.3	
⊠	K-211.8	21 - 23	19	0.315			0.0	36.9	6.2		56.9	
▲	K-212.1	6 - 8	6.35	0.133			0.0	0.2	50.3		49.5	
★	K-212.1	25 - 27	2				0.0	0.0	2.8		97.2	
⊙	K-212.2	10 - 12	4.75				0.0	0.0	29.5		70.5	

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

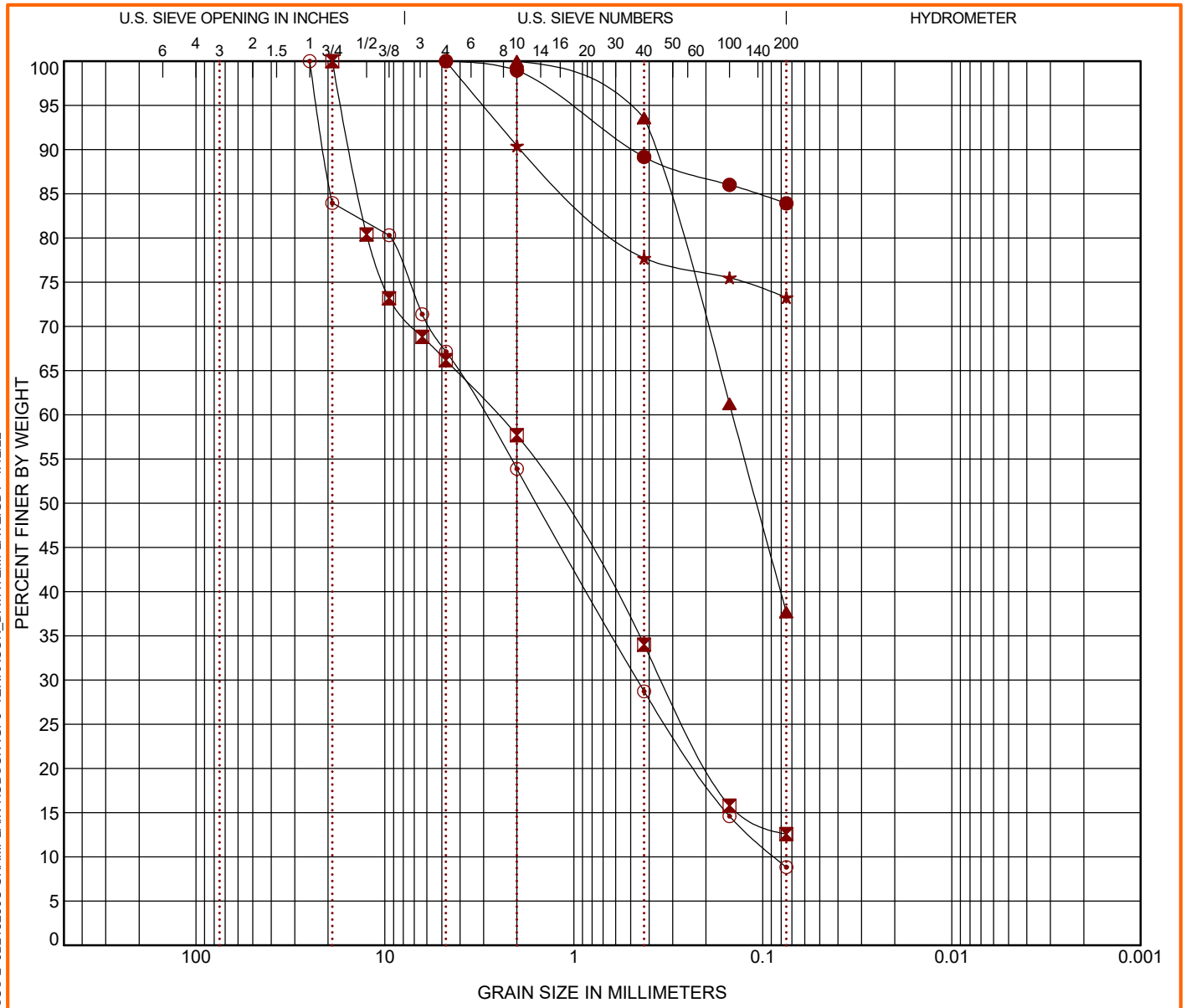
PROJECT NUMBER: JB215256C

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-212.2	23 - 25	LEAN CLAY with SAND (CL)	53.6	48	27	21		
⊠	K-212.3	6 - 8	SILTY SAND with GRAVEL (SM)	9.0					
▲	K-212.3	10 - 12	SILTY SAND (SM)	33.0	42	26	16		
★	K-212.3	23 - 25	SILT with SAND (ML)	37.5	31	26	5		
⊙	K-214.5	8 - 10	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	31.0				0.82	34.55

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-212.2	23 - 25	4.75				0.0	0.0	16.1		83.9	
⊠	K-212.3	6 - 8	19	2.532	0.338		0.0	33.8	53.6		12.6	
▲	K-212.3	10 - 12	2	0.145			0.0	0.0	62.3		37.7	
★	K-212.3	23 - 25	4.75				0.0	0.0	26.7		73.3	
⊙	K-214.5	8 - 10	25	2.98	0.46	0.086	0.0	32.9	58.3		8.8	

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: August 21, 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 107.A
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 107.A is STA 62745+00 (42.3427°N, 73.8213°W).

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

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 177.6-228.2, dated March 15, 2013.
- AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.

Contact us if you have questions or require additional information.

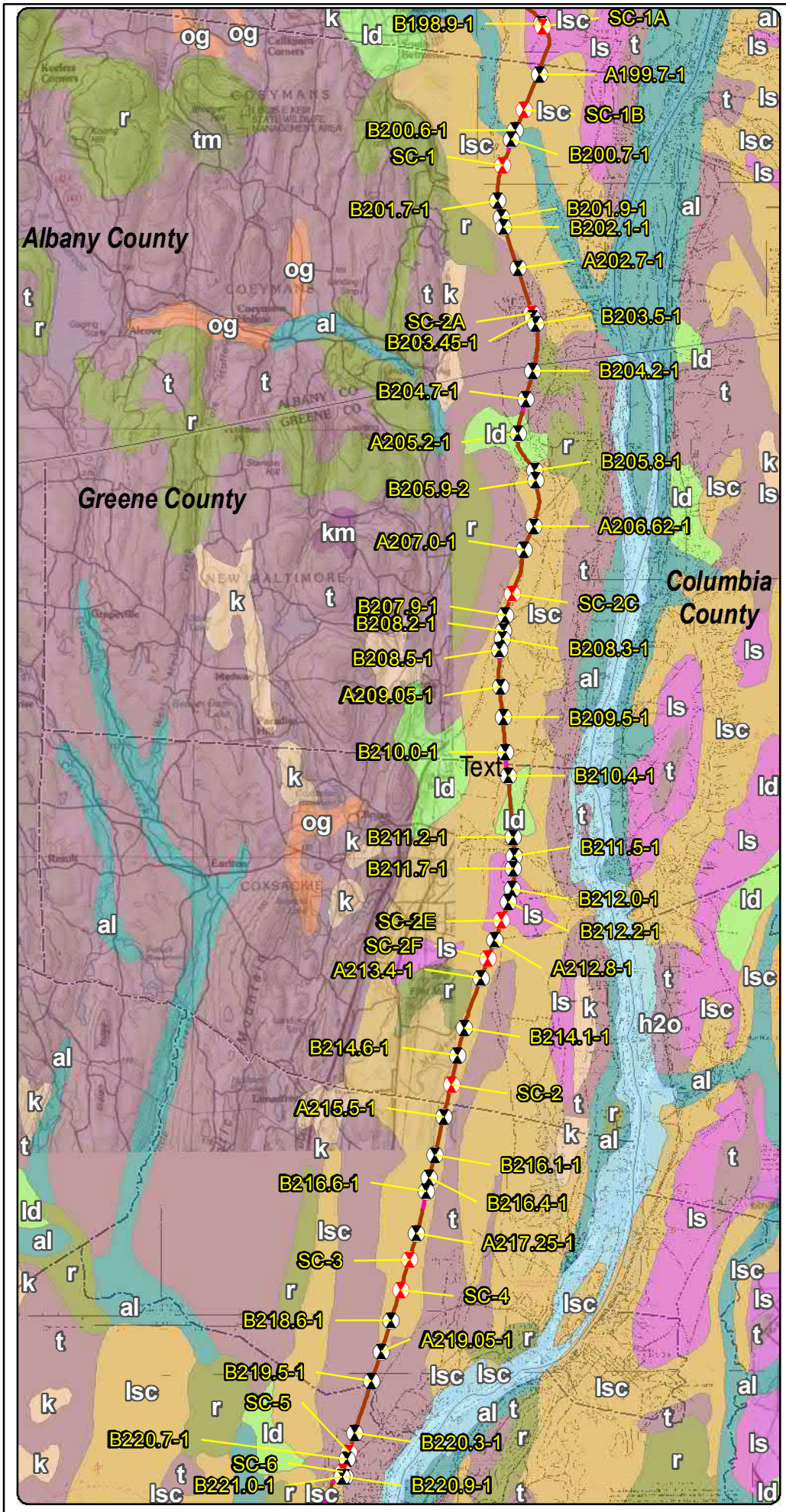
HDD 107A
Borings A212.8-1, SC-2E, SC-2F
Segment 10 - Design Package 6

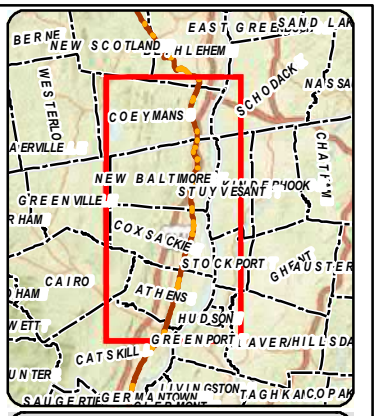
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

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
	A212.8-1	1278640.0	675529.0	132.5
	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
	B214.1-1	1271859.2	673172.5	132.8
	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
	SC-2E	1280068.4	676069.0	121.0
	SC-2F	1277157.5	675015.4	124.5

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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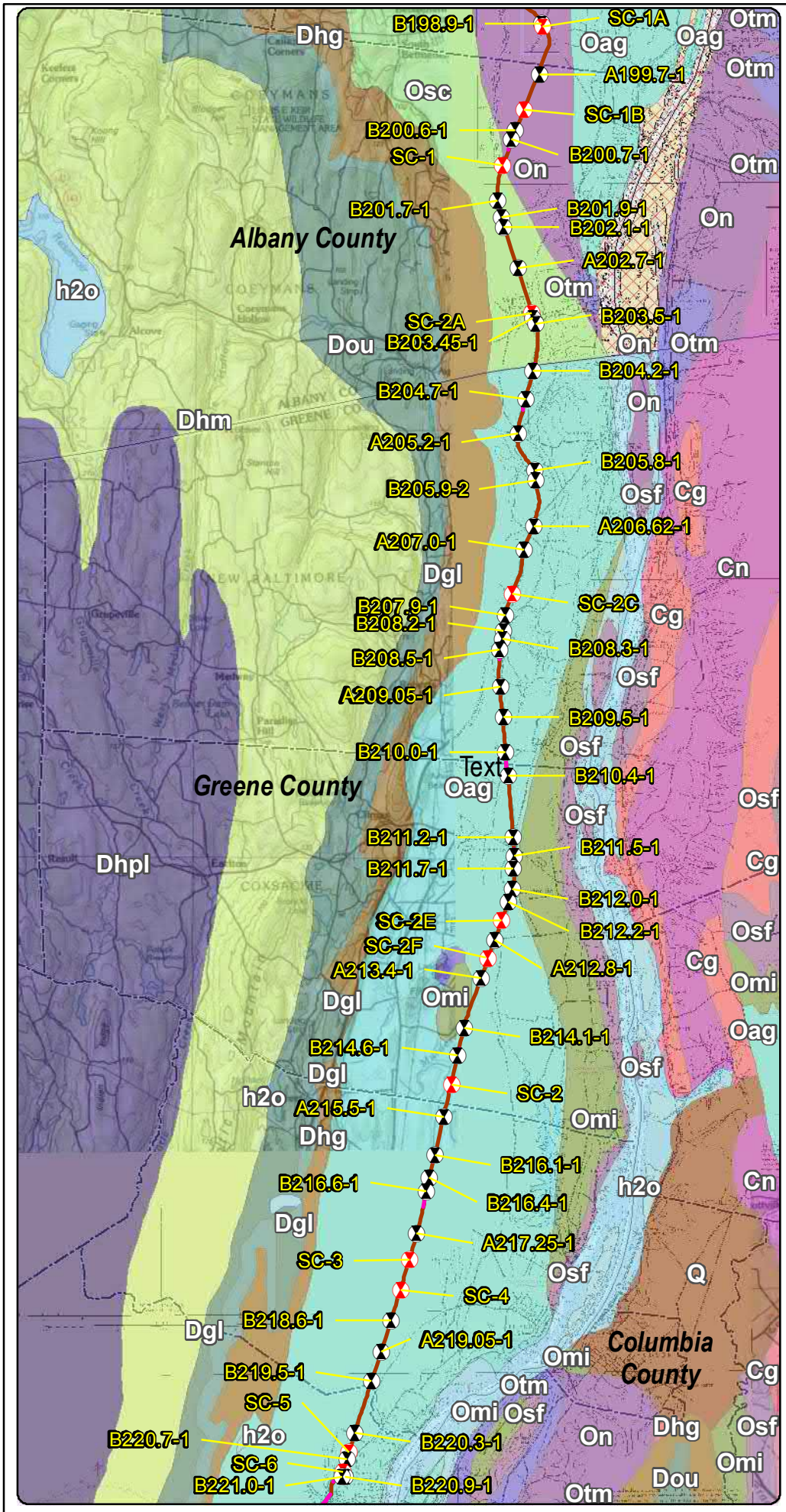

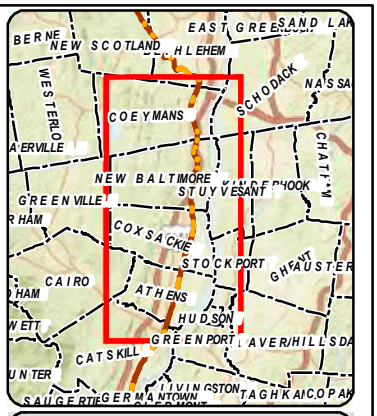

LEGEND

- 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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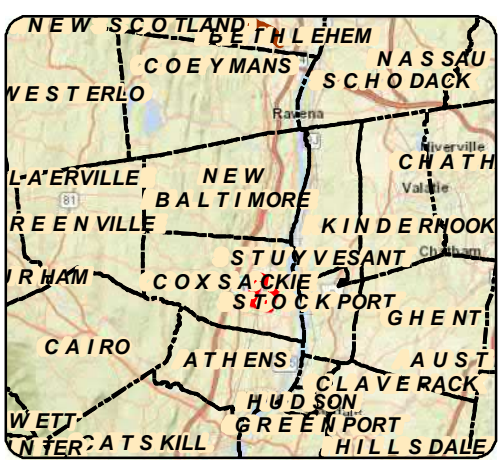
SC-2E
212.6
Greene Correctional St
Conrail
212.7
A212.8-1
Flint Mine Rd
Coxsackie Correctional St
212.9
Farm To Market Rd
213
Flint Mine Rd
SC-2F
COXSACKIE
213.2
Meier Rd
213.3
Flint Mine Rd
A213.4-1
213.5
213.6
Flint Mine Rd
213.7
0
1,000
Feet



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 12 of 18

Prepared by: AECOM 5/19/2021

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

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BORING CONTRACTOR: ADT	AECOM	SHEET 1 OF 1
DRILLER: Chris Chaillou		PROJECT NAME: CHPE -
		PROJECT NO.: 60323056
		HOLE NO.: **SC-2E**
SOILS ENGINEER/GEOLOGIST: Chris French		START DATE: 1/26/21
	BORING LOG	FINISH DATE: 1/26/21
LOCATION: Selkirk, NY MP - 212.50 (CSX Rail)		OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: CME LC-55
Water at 11' (inferred)	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit		BORING TYPE: SPT
	SIZE I.D.	4"	2.5"	- -		BORING O.D.: 4.5"
	SIZE O.D.	4.5"	3"	3 7/8"		SURFACE ELEV.:
	HAMMER WT.	140 lbs	140 lbs			LONGITUDE:
	HAMMER FALL	30"	30"			LATITUDE:

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-5'				Hand Cleared					OL	Top-Soil	0.0': Brown SILT organics; soft, moist
1.0													
											CL	CLAY and SILT	1.1': Light gray CLAY and silt, trace fine-medium sand; medium stiff, moist
2.0													
3.0													
		3'-5'	S-1										TR-1; (3.0'-5.0')
4.0													
5.0													
		5'-7'	S-2	24"	20"	7	13	18	18	20	CL		5.0': Brown and gray CLAY and silt; stiff, moist
6.0													
7.0												Silty CLAY	
		7'-9'	S-3	24"	24"	5	8	9	10	11	CL		Brown silty CLAY; stiff, moist
8.0													TR-2; (8.0'-8.5')
9.0													
		9'-11'	S-4	24"	24"	WOH	4	5	6	6	CL		Brown silty CLAY, occasional very thin gray silt laminates; medium stiff, moist
10.0													
11.0													
		11'-'13'	S-5	24"	24"	6	8	8	7	10	CL		Gray silty CLAY; soft, wet
12.0													TR-3; (12.0'-12.5')
13.0													
		13'-15'	S-6	24"	24"	4	4	4	5	5	CL		SAA
14.0													
15.0													
		15'-16'	S-7	12"	13"	3	6	-	-	-	CL		SAA
16.0													TR-4; (15.0'-15.5')
													SC-2E terminated at 16', grouted to surface
17.0													
18.0													
19.0													
20.0													

NOTES:

(1) Thick-wall ring lined drive sampler (California sampler) used for SPT samples. Rings dimensions = 2-1/2" O.D. by 2-7/16" I.D. by 6" length.

(2) Correction factor: $N_{corr}=N*(2.0^2-1.375^2)in./(3.0^2-2.4^2)in. = N*0.65$.

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE:	S= SPLIT SPOON	U=SHELBY TUBE	R=ROCK CORE	
PROPORTIONS:	TRACE=1-10%	LITTLE=10-20%	SOME=20-35%	AND=35-50%

BORING CONTRACTOR: ADT	AECOM	SHEET 1 OF 1
DRILLER: Chris Chaillon		PROJECT NAME: CHPE -
		PROJECT NO.: 60323056
		HOLE NO.: **SC-2F**
SOILS ENGINEER/GEOLOGIST: Chris French		START DATE: 1/26/21
	BORING LOG	FINISH DATE: 1/26/21
LOCATION: Selkirk, NY MP 213.10 (CSX Rail)		OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: CME LC-55
No water observed	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit	NQ	BORING TYPE: SPT/Core
	SIZE I.D.	4"	2.5"	- -	1 7/8"	BORING O.D.: 4.5"/3"
	SIZE O.D.	4.5"	3"	3 7/8"	3"	SURFACE ELEV.:
	HAMMER WT.	140 lbs	140 lbs			NORTHING
	HAMMER FALL	30"	30"			EASTING

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)	N Corr.(2)	RQD	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-5'				Hand Cleared	-	SP/ML	Silty SAND	Black SILT, little fine to medium sand; frozen 0.6'-1.5'; Black fine to coarse SAND, little subrounded gravel, little silt; loose, saturated
1.0										
2.0								CL	CLAY and SILT	1.5'-5.0'; Light gray-light tan CLAY and silt, trace fine to medium sand; medium stiff, moist
3.0										
		3'-5'	S-1							TR-1; (3.0'-5.0')
4.0										
5.0										
		5'-7'	S-2	13"	12"	11 28 75/1"			Sandy SILT (till)	Brown and gray SILT, some fine to medium sand, little clay, little rounded-subrounded gravel; stiff, moist, angular gravel piece in shoe
6.0										
7.0										TR-2; (5.5'-6.0')
	5	7'-12'	R-1	60"	58"	RQD: 58" = 97%			Sandstone	Gray sandstone, unweathered, unjointed, fine grained
8.0										
9.0										
10.0										
11.0										
12.0										
	4.2	12'-16'	R-2	48"	46"	RQD: 45" = 94%				Very slight mechanical jointing
13.0										TR-3 (12.85'-13.55")
14.0										
15.0										
16.0										
										SC-2F terminated at 16', grouted to surface
17.0										
18.0										
19.0										
20.0										

NOTES:

(1) Thick-wall ring lined drive sampler (California sampler) used for SPT samples. Rings dimensions = 2-1/2" O.D. by 2-7/16" I.D. by 6" length.

(2) Correction factor: $N_{corr}=N*(2.0^2-1.375^2)in./(3.0^2-2.4^2)in. = N*0.65$.

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

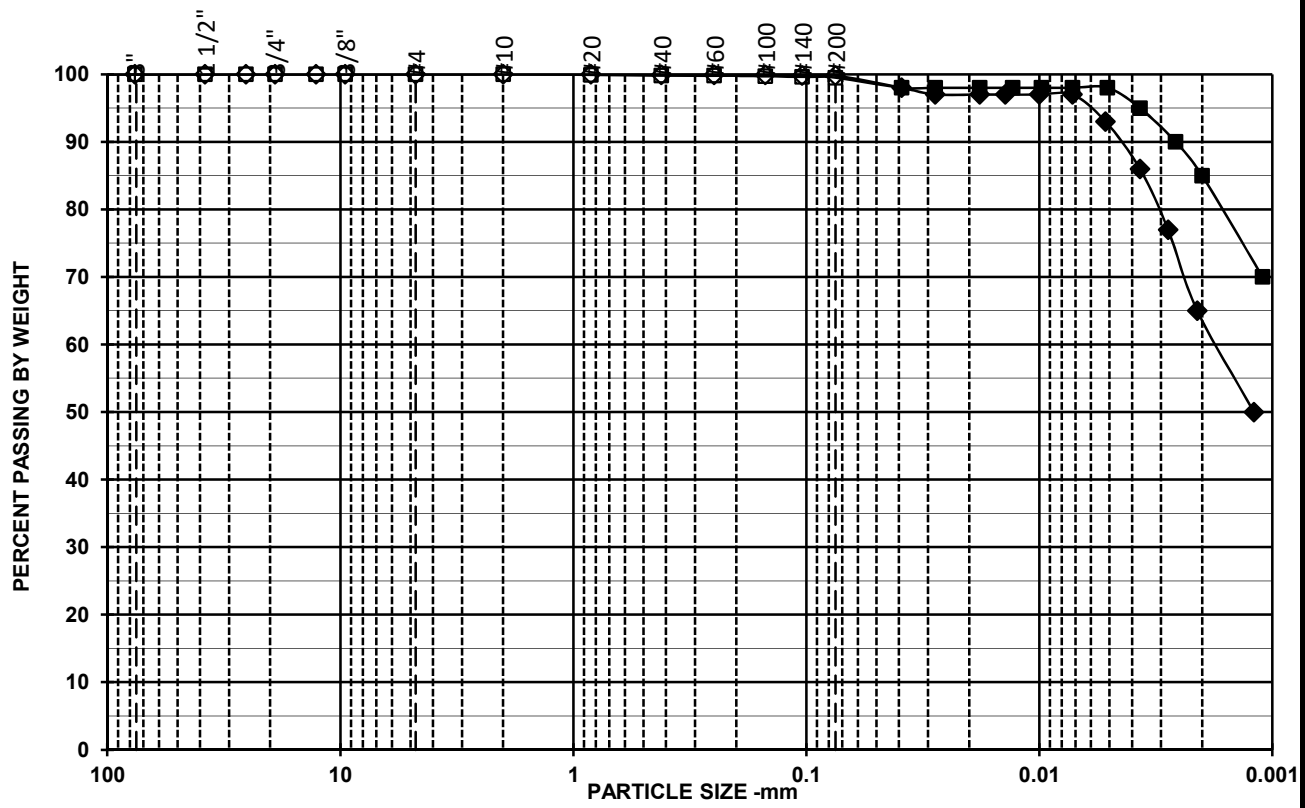
The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE:	S= SPLIT SPOON	U=SHELBY TUBE	R=ROCK CORE	
PROPORTIONS:	TRACE=1-10%	LITTLE=10-20%	SOME=20-35%	AND=35-50%

Aquifer
CHPE - Selkirk Catskill Borings
LABORATORY SOIL TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS							REMARKS
			WATER CONTENT (%)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 μm (%)	
SC-1	S-2	5-7	28.2	54	23	31	CH	99.4	45	
SC-1	S-4	9-11	25.8	44	22	22	CL	96.8	44	
SC-1A	S-3	7-9	11.7				SM	34.1	4	
SC-1A	S-8	20-22	22.6				SM	37.8	3	
SC-1A	S-10	30-32	35.3	37	19	18	CL	99.9	44	
SC-2C	S-2	5-7	5.8				GP-GM	8		
SC-2C	S-7	15-17	19.1	36	19	17	GC	35	14	
SC-2C	S-9	24-29	5.0	15	10	5	GC-GM	21	5	
SC-2E	S-2	5-7	38.1	61	25	36	CH	99.5	85	
SC-2E	S-5	11-13	39.5	47	23	24	CL	99.8	64	
SC-3	S-2	5-7	32.9	76	28	48	CH	99.4	93	
SC-3	S-8	20-22	62.4	55	24	31	CH	100	76	
SC-3	S-10	30-32	7.4				GW-GM	5	3	
SC-5	S-2	5-7	20.7	28	18	10	CL	77	15	
SC-5	S-6	13-15	24.9	40	21	19	CL	76	31	
SC-6	S-3	7-9	29.5	49	24	25	CL	99.9	50	
SC-6	S-8	20-22	35.2	49	23	26	CL	100	63	
SC-6	S-10	30-32	34.9	43	21	22	OL	99.9	62	

Note: (1) USCS symbol based on visual observation and Sieve and Atterberg limits reported.



Open Symbols: Sieve analysis by ASTM D6913
Filled symbols: Hydrometer analysis by ASTM D7928 corrected for complete sample

SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	38.1	61	25	36	CH		Brown, Fat clay	04/08/21
◇	39.5	47	23	24	CL		Gray, Lean clay	04/08/21
○								

Symbol	□	◇	○
Boring	SC-2E	SC-2E	
Sample	S-2	S-5	
Depth	5-7	11-13	
% +3"	0	0	
% Gravel	0	0	
% SAND	0.5	0.2	
%C SAND	0	0	
%M SAND	0.2	0.1	
%F SAND	0.3	0.1	
% FINES	99.5	99.8	
D_{100} (mm)	2	2	
D_{60} (mm)		0.002	
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	
4"	100.0	100.0	
3"	100.0	100.0	
1 1/2"	100.0	100.0	
1"	100.0	100.0	
3/4"	100.0	100.0	
1/2"	100.0	100.0	
3/8"	100.0	100.0	
#4	100.0	100.0	
#10	100.0	100.0	
#20	99.9	100.0	
#40	99.8	99.9	
#60	99.8	99.9	
#100	99.7	99.9	
#140	99.6	99.8	
#200	99.5	99.8	
5μ m	98	92	
2μ m	85	64	
1μ m	68	45	

Aquifer

TerraSense, LLC #7853-21008

CHPE - Selkirk Catskill Borings

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Aquifer
CHPE Selkirk Catskill Borings
SUMMARY OF ROCK TESTING

SAMPLE IDENTIFICATION			STATE PROPERTIES			ENGINEERING PROPERTY TESTS				
Boring (Sample)	Run	Depth (ft)	WATER CONTENT (1) (%)	TOTAL UNIT WGT. (pcf)	DRY UNIT WGT. (pcf)	TEST TYPE (2)	Mohs HARDNESS (-)	UNCONFINED COMPRESSION TESTS (ASTM D7012)		
								COMPRESSIVE STRENGTH (psi)	AXIAL STRAIN @ FAILURE (%)	ESTIMATED (5) ELASTIC MODULUS (psi)
SC-2F	R-1	10.6-11	0.6	168	167	UC		17520	0.31	6E+06
SC-2F	R-1	11.4-11.8				M	7			
SC-5	R-1	16.1-16.5	0.4	169	168	UC		21310	0.41	5E+06
SC-5	R-1	16.8-17.1				M	6-7			
SC-5	R-4	32.2-32.6	0.6	170	169	UC		14630	0.37	4E+06
SC-5	R-4	32.8				M	4			
(MP208.58)						M	7			
(MP 208.63)			0.5	166	165	UC		6910	0.26	3E+06
(MP208.63)						M	6			
(MP 208.65)			0.5	167	166	UC		12670	0.27	5E+06
(MP208.65)						M	7			

Notes: (1) Water contents determined after trimming and shearing.
(2) Test Type Abbreviations: M: Mohs Hardness, UC: UC Compression test with estimated elastic moduli
(5) Modulus estimated based on corrected gross deformations.

ROCK CORE PHOTOGRAPHIC LOG

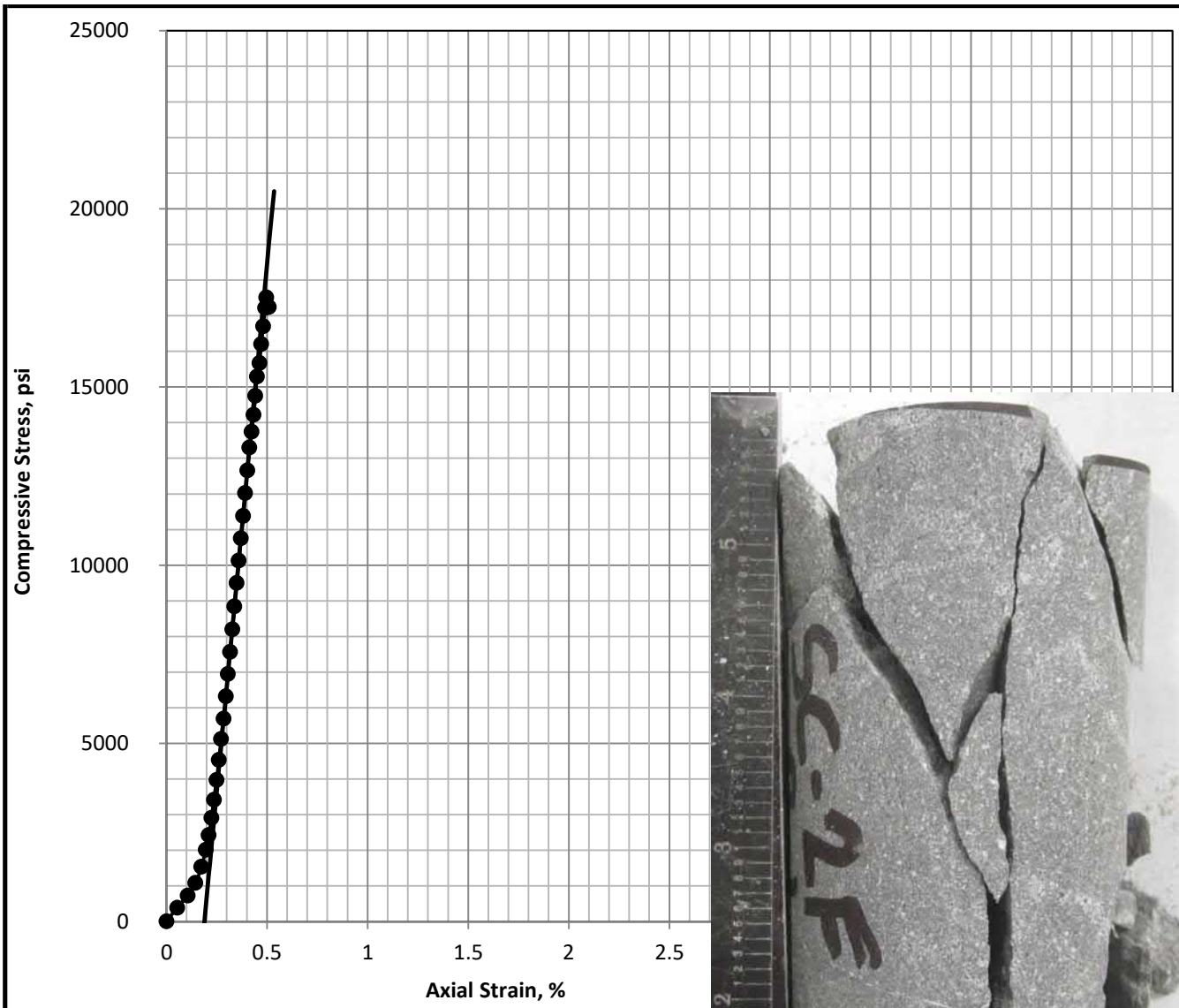
AECOM Project No: **60323056**
Project Name: **CHPE – Upstate New York Upland Geotechnical Investigation**
Location: **Selkirk - Catskill Segment**

AECOM

Boring No.	Depth (ft.)
SC-2F	7.0-16.0

Boring No.	Depth (ft.)
SC-5	16.0-40.0

Note: Black foam inserts represent core pieces that were removed for geotechnical and/or thermal resistivity laboratory testing



Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.58	168	167	4.391	1.968

Specimen meets ASTM D4543 shape tolerances

FAILURE PHOTO

Test Summary

Strain Rate (%/min)	Corrected Strain Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.11	0.31	17520	6E+06

Test by: DM
Test Date: Apr-13-21
Reviewed by: GET

Aquifer	**CHPE** **Selkirk Catskill Borings**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH TEST**
TerraSense, LLC **Project # 7853-21008**		**Boring: SC-2F Run: R-1** **Depth 10.6-11 ft.**

TEST BORING LOG

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

BORING	**A212.8-1**
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	4.0 '
d	FROM	4.0 '	TO	6.0 '
c_2	FROM	6.0 '	TO	10.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	C. POPPE
DATE STARTED	02/14/2013
DATE COMPLETED	02/14/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	4 3 4 3		***BLACK TO BROWN GRAVEL-SIZED ROCK FRAGMENTS, SM SILT, TR TO SM M/C SAND (FILL)***		
	S-2	4 6 7 9	4.0			
	S-3	50/0.3				
5			6.0	***DARK GRAY CLAY AND GRAVEL-SIZED ROCK FRAGMENTS, TR TO SM M/C SAND***		
			6.7	***COBBLES***		
			8.8	***GRAY, MODERATELY WEATHERED, MEDIUM HARD GRAYWACKE, CLOSE TO MODERATELY CLOSE, 0 TO 45 DEGREE FRACTURES***		
10	R-1	REC =100% RQD =90%	10.0	***DARK GRAY, MODERATELY TO SEVERELY WEATHERED, SOFT SHALE, VERY CLOSE 0 TO 45 DEGREE FRACTURES***		
				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)					
B212.0-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	34.0	89.6	-	-
	S-4	6.0-8.0	CL	-	-	-	-	47	27	20	0.4	-	35.8	-	-	-
	S-5	8.0-10.0														
	S-6	13.5-15.0	CL	14.4	7.1	78.5		-	-	-	-	-	30.9	-	-	-
B212.2-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	22.1	-	-	-
	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	16.8	-	-	-
	S-4	6.0-8.0	CL-ML	-	-	-	-	20	16	4	0.3	-	17.2	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	17.6	-	-	-
	S-6	13.5-15.0	CL-ML	-	-	-	-	25	19	6	-	-	-	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	24.9	-	-	-
B212.8-1	R-1	7.1-7.8	-	-	-	-	-	-	-	-	-	-	-	164.8	460	-

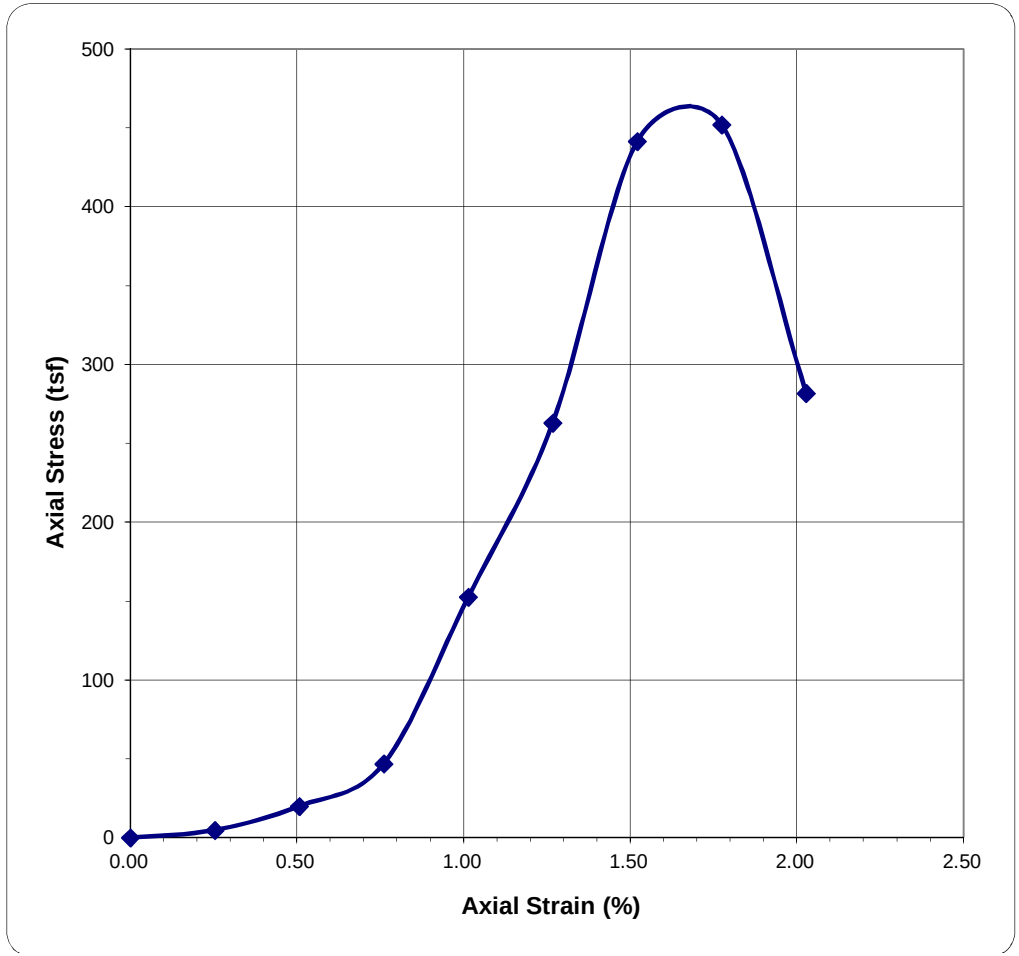
TRC Engineers, Inc.
Soil Mechanics Laboratory

Unconfined Compression Strength Test of Rock Core

Project Name:	TDI				
Project No.:	195651	**Average Sample Diameter (in.):**	1.976	**Sample Description:**	
Boring No.:	B212.8-1	**Cross Sectional Area (sq. in.)**	3.067	GRAY GRAYWACKE	
Sample No:	R-1	**Average Sample Height (in.):**	3.946		
Depth (ft):	7.1-7.8	**Sample Mass-Dry (g):**	523.32		
Elevation (ft):		**Unit Weight (PCF)**	164.8		

Test Data

Strain Dial (in.)	Load (lb)	Strain (%)	Stress (tsf)
0.000	0	0.00	0
0.010	200	0.25	5
0.020	850	0.51	20
0.030	2000	0.76	47
0.040	6500	1.01	153
0.050	11200	1.27	263
0.060	18800	1.52	441
0.070	19250	1.77	452
0.080	12000	2.03	282



Failure Conditions:

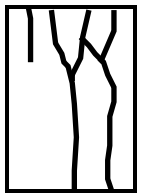


FIGURE: 151

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 108 – 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 in Coxsackie, New York. The approximate station for the start of HDD crossing number 108 is STA 60813+00 (42.3237° N, 73.8296° 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, 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.

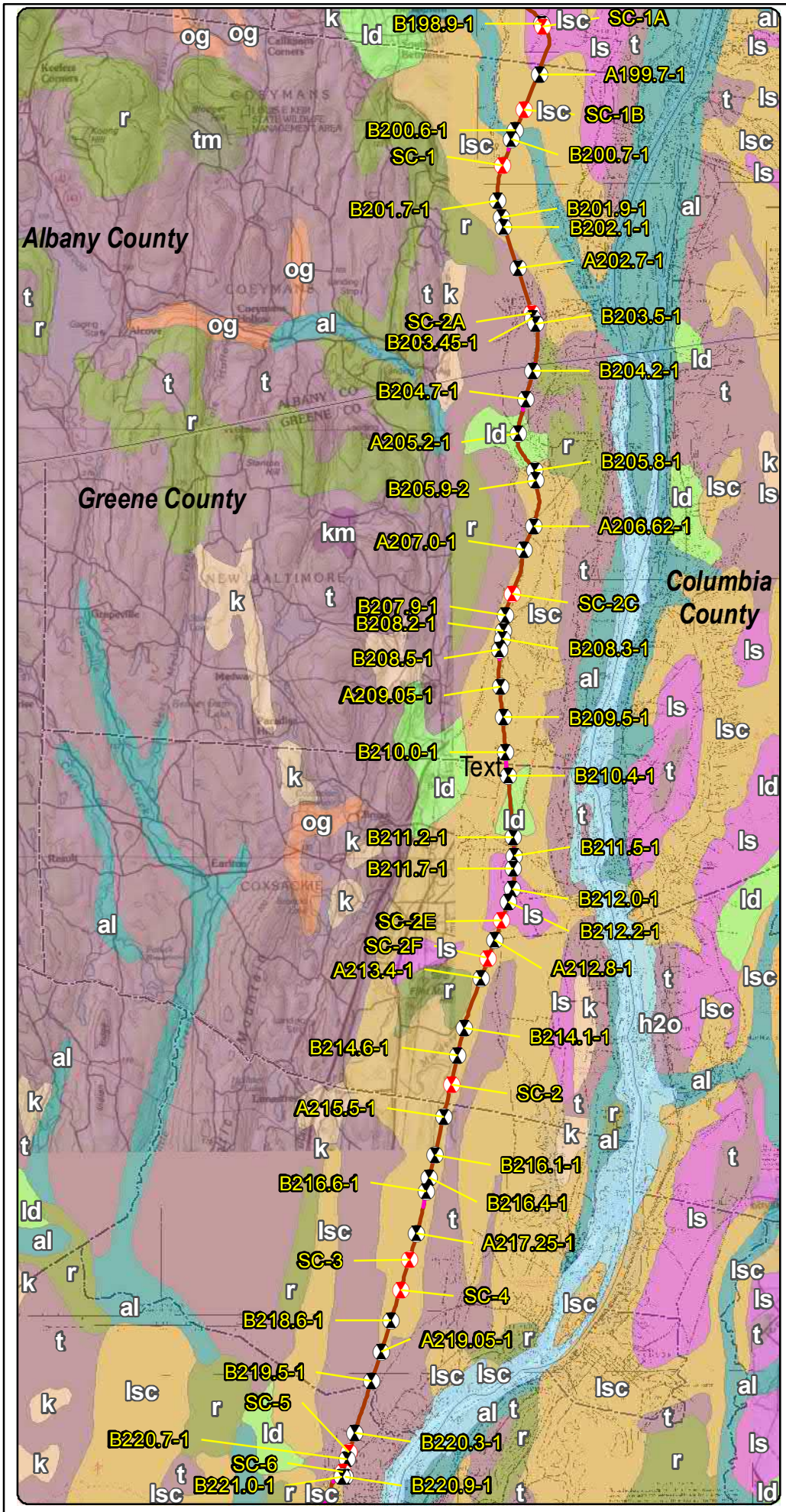
HDD 108
Borings B214.1-1, B214.6-1,
K-214.5, KB-214.4, KB-214.4A
Segment 10 - Design Package 6

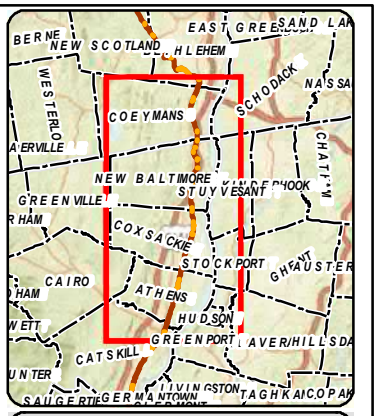
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

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
	B214.1-1	1271859.2	673172.5	132.8
	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.

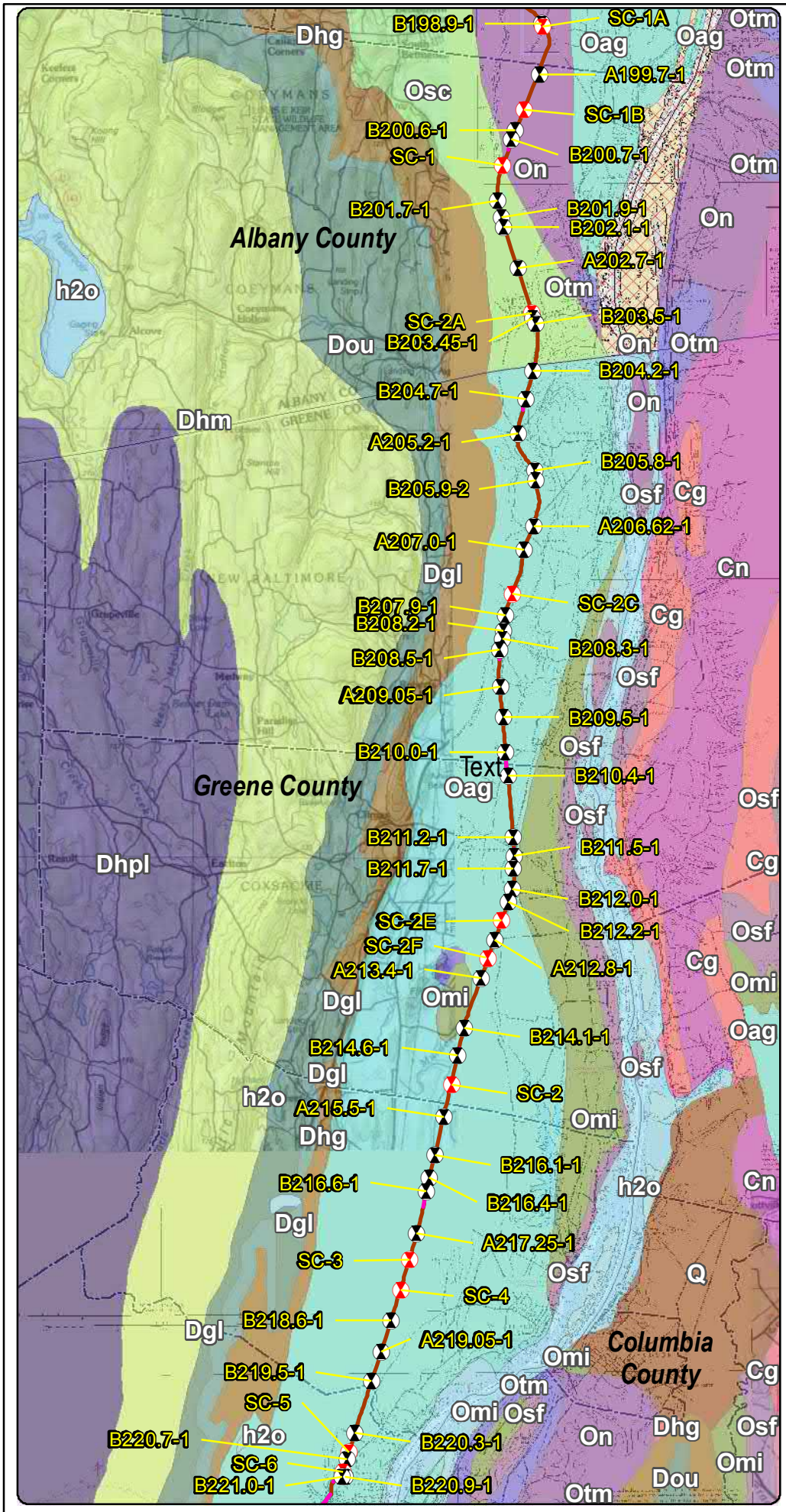
Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

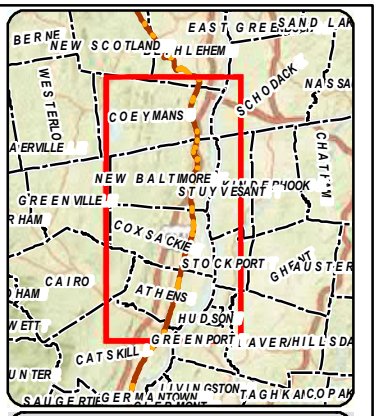
Prepared on 5/3/2021

by: AECOM

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

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

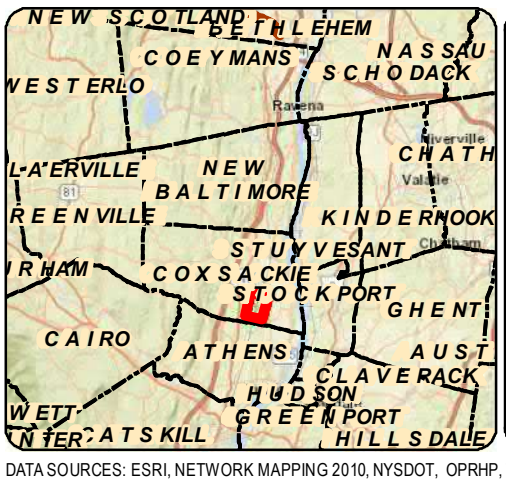
Prepared on 5/18/2021

by: AECOM

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Selkirk_to_Catskill_Boring_Locations_Bedrock_May_2021_Report.mxd

213.8
213.9
214
214.1
B214.1-1
214.2
214.3
214.4
COXSACKIE
214.5
B214.6-1
214.7
214.8
214.9
Flint Mine Rd
Flint Mine Rd
Flint Mine Rd
Flint Mine Rd
Flats Rd
Flats Rd
Flats Rd
Swartout Rd
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 13 of 18

Prepared by: AECOM 5/19/2021

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Selkirk_to_Catskill_Boring_Locations_Mapset_May_2021_Report.mxd

TEST BORING LOG

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

BORING	**B214.1-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED 2.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

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

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

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	11 17 6 5		***BROWN SILT, SM F/C GRAVEL-SIZED ROCK FRAGMENTS, TR CLAY (POSSIBLE FILL)***		WATER TABLE DETERMINED FROM WETNESS OF SAMPLE
	S-2	5 4 6 10		4.0		
5	S-3	10 14 17 21			29.1	
	S-4	8 1 13 14		***GRAY-BROWN CLAY, TR SILT, TR M/F SAND***		
10	S-5	14 14 15 17		13.5		
15	S-6	8 8 8		***GRAY-BROWN CLAY, TR TO SM SILT***	34.2	
				18.5		
20	S-7	6 5 7		***GRAY SILT, TR TO SM CLAY*** 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	**B214.6-1**
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	10.0 '
d	FROM	10.0 '	TO	25.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	12/04/2012
DATE COMPLETED	12/04/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	8 8 8 7		***BLACK M/C SAND, SM F/ GRAVEL-SIZED ROCK FRAGMENTS, TR SILT (FILL)*** 2.0		
	S-2	9 7 5 3		***BROWN M/C SAND, TR TO SM F/ GRAVEL, TR SILT***	8.2	
5	S-3	13 7 6 3		6.0		
	S-4	4 4 6 8				
10	S-5	7 7 7 6		***BROWN SILT, SM F/M SAND, TR TO SM F/C GRAVEL-SIZED ROCK FRAGMENTS*** 13.5	19.7	
15	S-6	6 8 7				
20	S-7	4 6 7		***LIGHT BROWN SILT, TR TO SM CLAY***		
25	S-8	6 6 8		25.0	36.3	
				END OF BORING AT 25'		
30						
35						

DRN.	TBT
CKD.	PWK

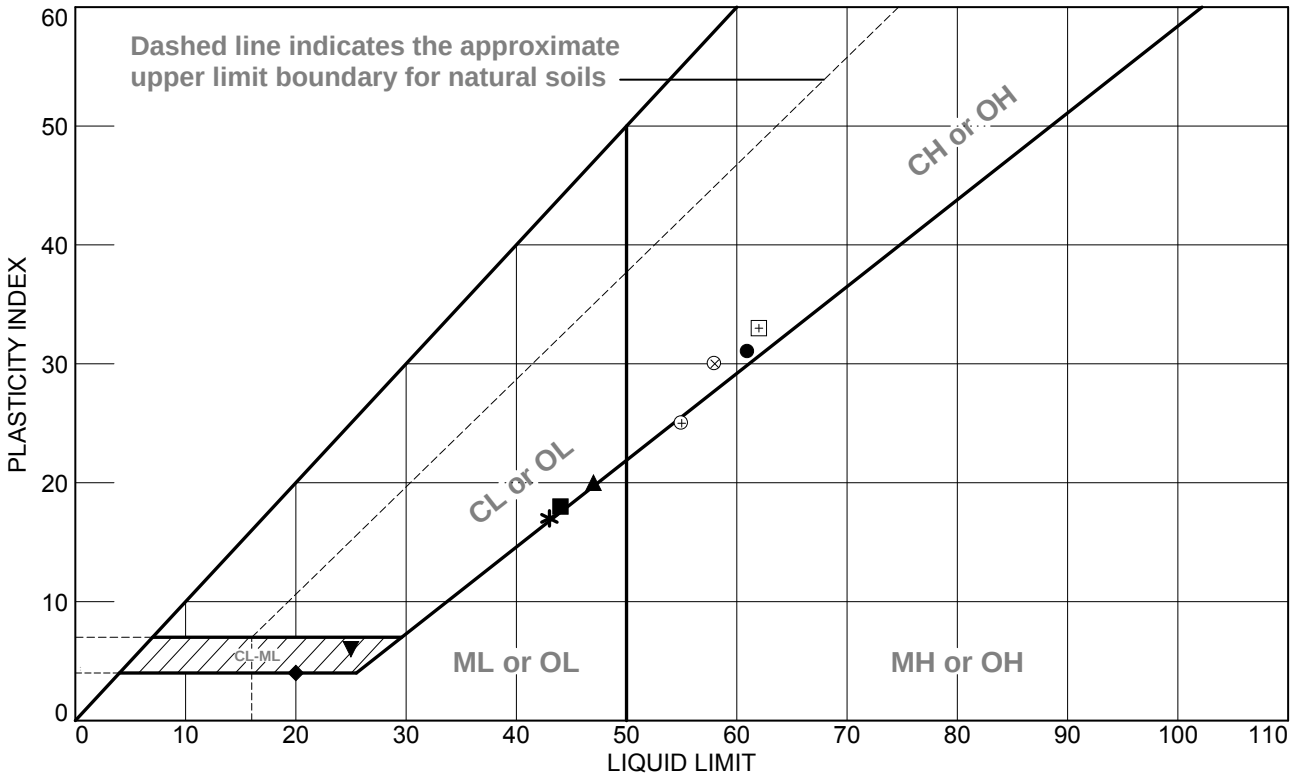
NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

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)					
A213.4-1	S-2	2.0-4.0	ML	13.4	14.0	72.6		-	-	-	-	-	21.3	-	-	-
	S-3	4.0-6.0	-	-	-	-		-	-	-	-	-	22.8	102.3	-	-
	S-4	6.0-8.0	-	-	-	-		-	-	-	-	-	22.1	-	-	-
	S-5	8.0-10.0	-	0.0	2.6	7.8	89.6	-	-	-	-	2.83	30.1	93.5	-	-
B214.1-1	S-3	4.0-6.0	CL	0.0	3.4	4.6	92.0	43	26	17	0.2	2.81	29.1	-	-	-
	S-6	13.5-15.0	-	0.0	0.1	99.9		-	-	-	-	-	34.2	-	-	-
B214.5-1	S-2	2.0-4.0	-	-	-	-		-	-	-	-	-	8.2	-	-	-
	S-4	6.0-8.0	CL-ML	13.2	35.7	51.1		-	-	-	-	-	19.7	-	-	-
	S-5	8.0-10.0														
	S-7	18.5-20.0	MH	0.0	3.5	3.0	93.5	55	30	25	0.3	2.83	36.3	83.2	-	-
	S-8	23.5-25.0												-		

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

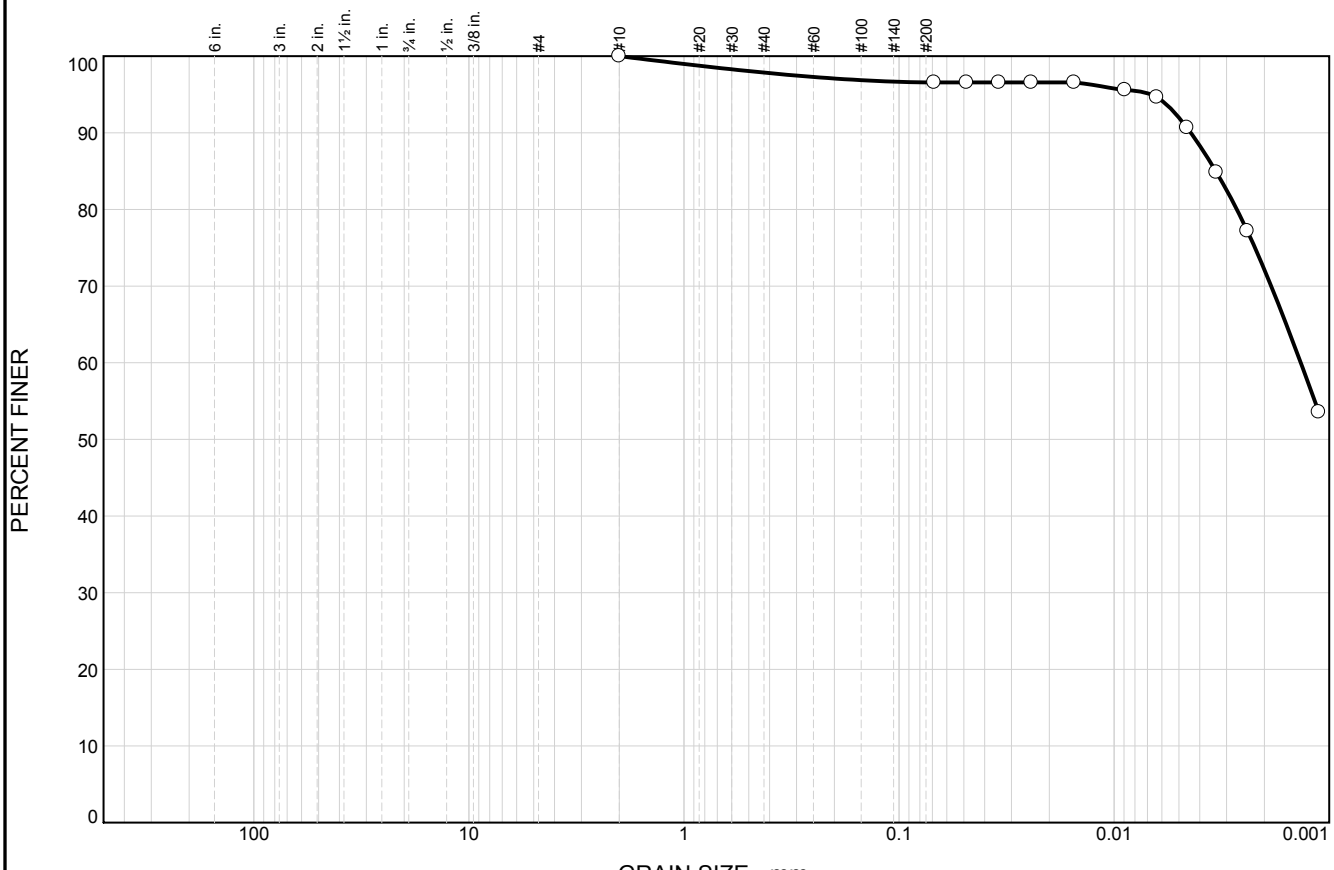
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B211.7-1	S-4	6.0-8.0 FT	32.8	30	61	31	CH
■	B211.7-1	S-6	13.5-15.0 FT	41.2	26	44	18	CL
▲	B212.0-1	S-4 & S-5	6.0-10.0 FT	35.8	27	47	20	CL
◆	B212.2-1	S-4	6.0-8.0 FT	17.2	16	20	4	CL-ML
▼	B212.2-1	S-6	13.5-15.0 FT		19	25	6	CL-ML
✱	B214.1-1	S-3	4.0-6.0 FT	29.1	26	43	17	CL
⊕	B214.5-1	S-7 & S-8	18.5-25.0 FT	36.3	30	55	25	MH
⊞	B215.5-1	S-5	8.0-10.0 FT	36.9	29	62	33	CH
⊗	B216.1-1	S-7	18.5-20.0 FT	32.2	28	58	30	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

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

Project No.: 195651 **Figure** 6

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	2.1	1.3	4.6	92.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	43	26	0.0034	0.0014						

Material Description	USCS	AASHTO
○ GRAY-BROWN CLAY, TR SILT, TR M/F SAND	CL	A-7-6(19)

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

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B214.1-1 **Depth:** 4.0-6.0 FT **Sample Number:** S-3

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

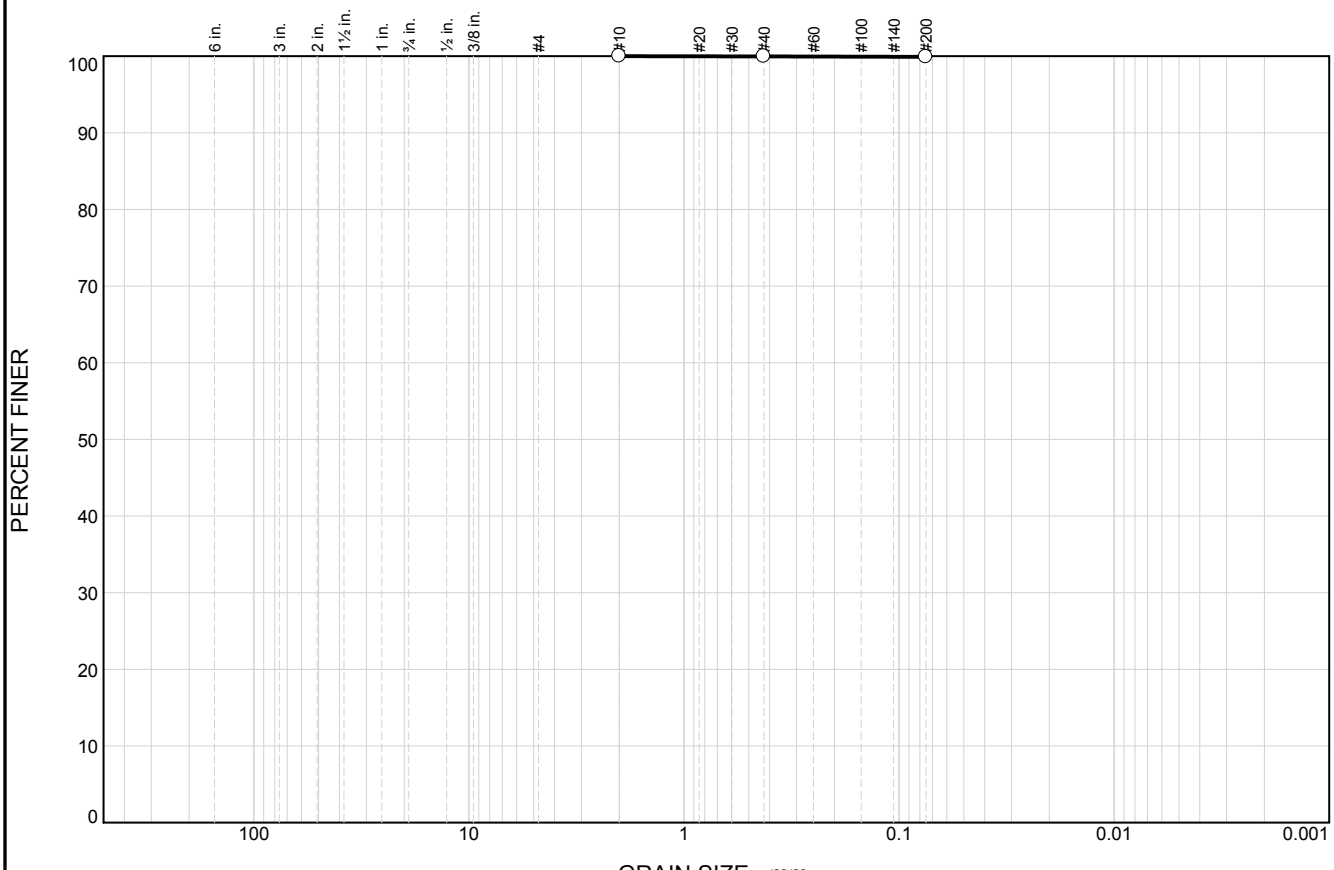
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 101

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	0.0	0.0	0.0	0.1	99.9	

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

Material Description	USCS	AASHTO
○ GRAY-BROWN CLAY, TR TO SM SILT		

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

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B214.1-1 **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 102

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

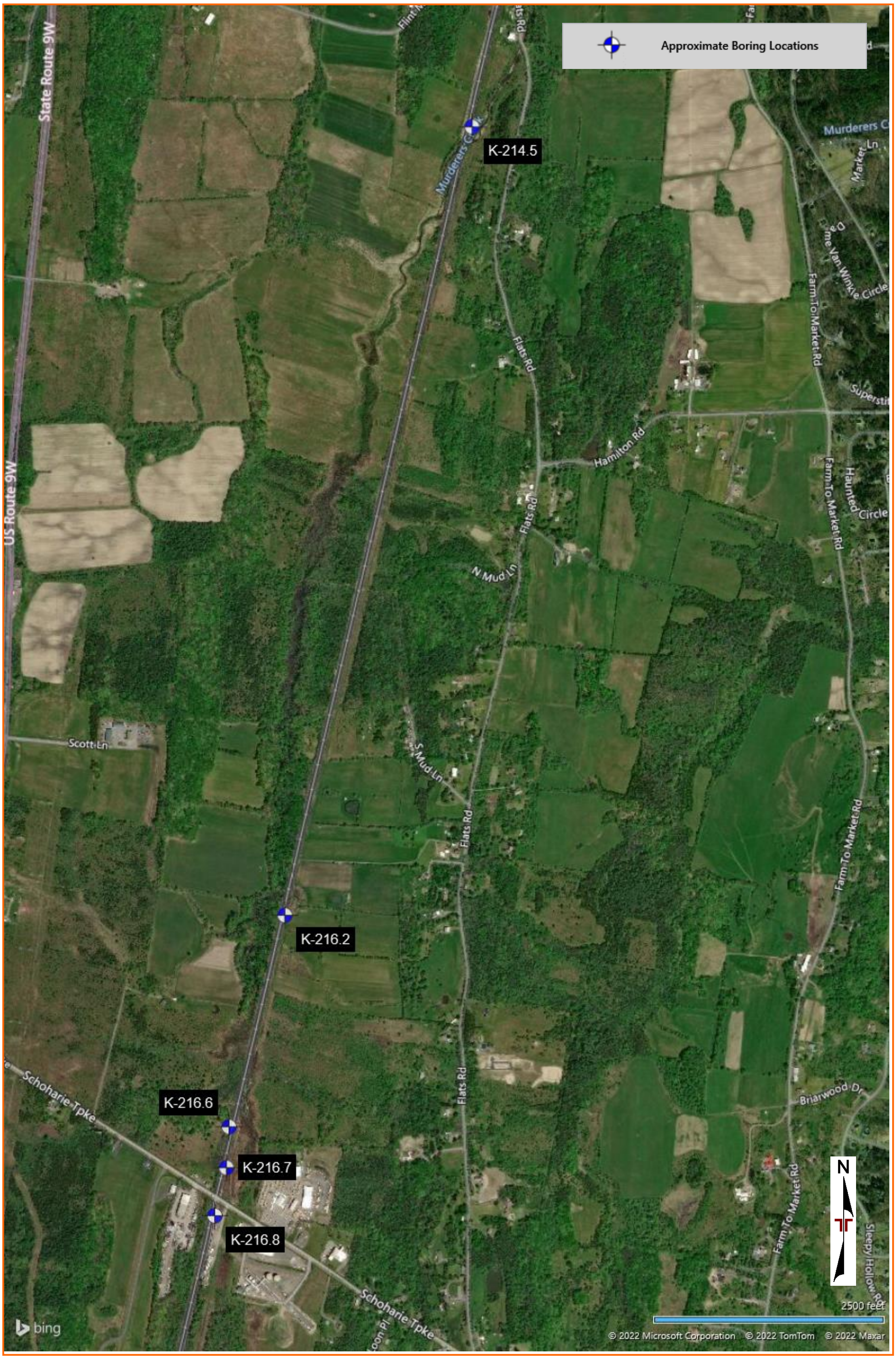


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-214.5

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: 42.3185° Longitude: -73.8321°

Surface Elev.: 126.8 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
		FILL - POORLY GRADED SAND WITH GRAVEL, gray, medium dense
4.0	123	
		FILL - LEAN CLAY WITH GRAVEL, gray, stiff to hard
8.0	119	
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), brown, loose
10.0	117	
		SILT AND CLAY (CL-ML), brown, medium stiff to stiff
28.0	99	

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		6	6-13-14-7 N=27			
		9	5-5-5-6 N=10			
5		12	3-5-7-10 N=12			
		3	13-15-16-16 N=31			
		5	2-2-1-1 N=3	31.0		9
10		3	2-2-3-5 N=5			
15		18	4-6-8-10 N=14	30.1		
20		22	2-2-5-8 N=7			
25		24	1-3-3-3 N=6			

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: 02-18-2022 | Boring Completed: 02-18-2022

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-214.5

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: 42.3185° Longitude: -73.8321°

Surface Elev.: 126.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY WITH SAND (CL), gray, very soft								
		30		24	3-3-4-4	41.3	48-24-24	74
				24	3" Split Spoon With Ring Samplers WOH-WOH-WOH-3			
35.0	92	35						
LEAN CLAY (CL), gray, very soft				22	WOH-WOH-WOH-WOH	45.0	40-25-15	91
		40		24	WOH-WOH-WOH-WOH			
42.0	85							
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: 02-18-2022 | Boring Completed: 02-18-2022

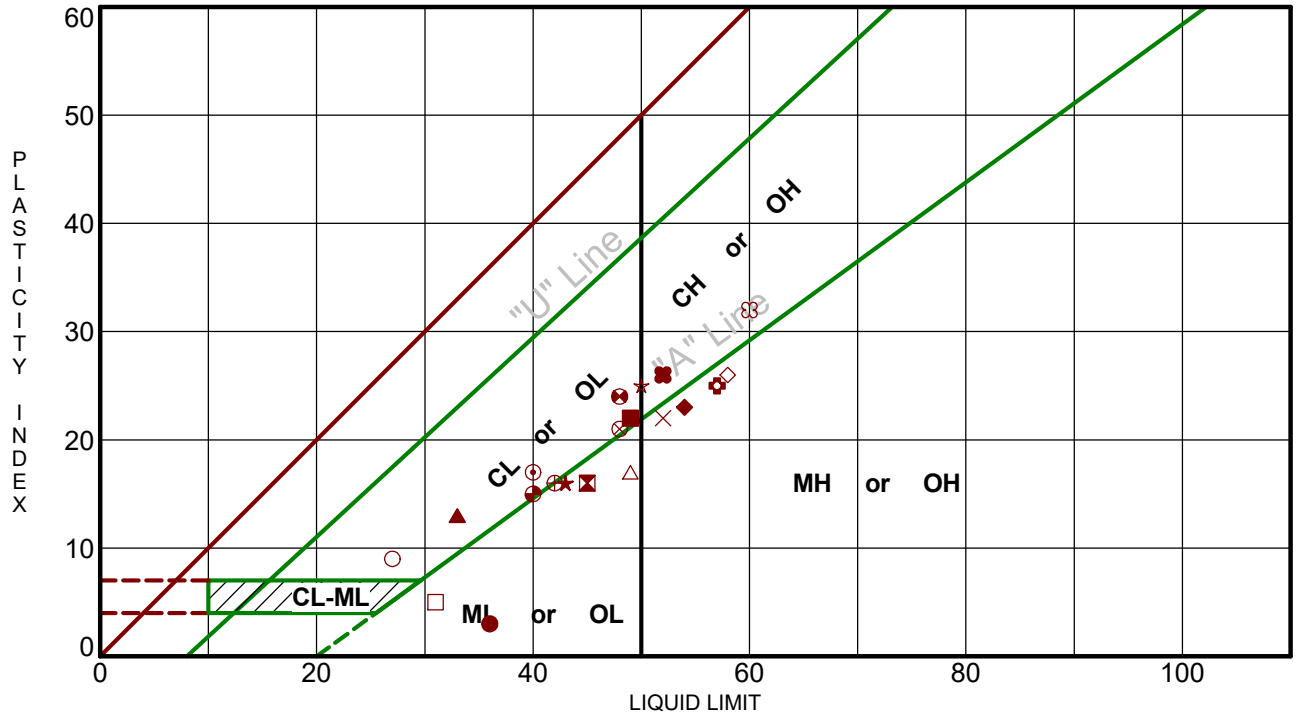
Drill Rig: CME 750X | Driller: J. Lamm

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-211.6	20 - 22	36	33	3	91.8	ML	SILT
⊠	K-211.7	6 - 8	45	29	16	83.1	ML	SILT with SAND
▲	K-211.7	21 - 23	33	20	13	95.0	CL	LEAN CLAY
★	K-211.8	6 - 8	43	27	16	88.3	ML	SILT
⊙	K-211.8	21 - 23	40	23	17	56.9	CL	GRAVELLY LEAN CLAY
✿	K-212.1	6 - 8	57	32	25	49.5	SM	SILTY SAND
○	K-212.1	25 - 27	27	18	9	97.2	CL	LEAN CLAY
△	K-212.2	10 - 12	49	32	17	70.5	ML	SILT with SAND
⊗	K-212.2	23 - 25	48	27	21	83.9	CL	LEAN CLAY with SAND
⊕	K-212.3	10 - 12	42	26	16	37.7	SM	SILTY SAND
□	K-212.3	23 - 25	31	26	5	73.3	ML	SILT with SAND
⊛	K-214.5	28 - 30	48	24	24	74.1	CL	LEAN CLAY with SAND
◕	K-214.5	35 - 37	40	25	15	90.9	CL	LEAN CLAY
☆	K-216.2	10 - 12	50	25	25	75.9	CH	FAT CLAY with SAND
✿	K-216.2	18 - 20	60	28	32	71.7	CH	FAT CLAY with SAND
■	K-216.2	30 - 31.5	49	27	22	96.0	CL	LEAN CLAY
◆	K-216.6	8 - 10	54	31	23	74.1	MH	ELASTIC SILT with SAND
◇	K-216.6	18 - 20	58	32	26	78.2	MH	ELASTIC SILT with SAND
×	K-216.6	30 - 31.5	52	30	22	72.3	MH	ELASTIC SILT with SAND
✖	K-216.7	10 - 12	52	26	26	64.0	CH	SANDY FAT CLAY

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

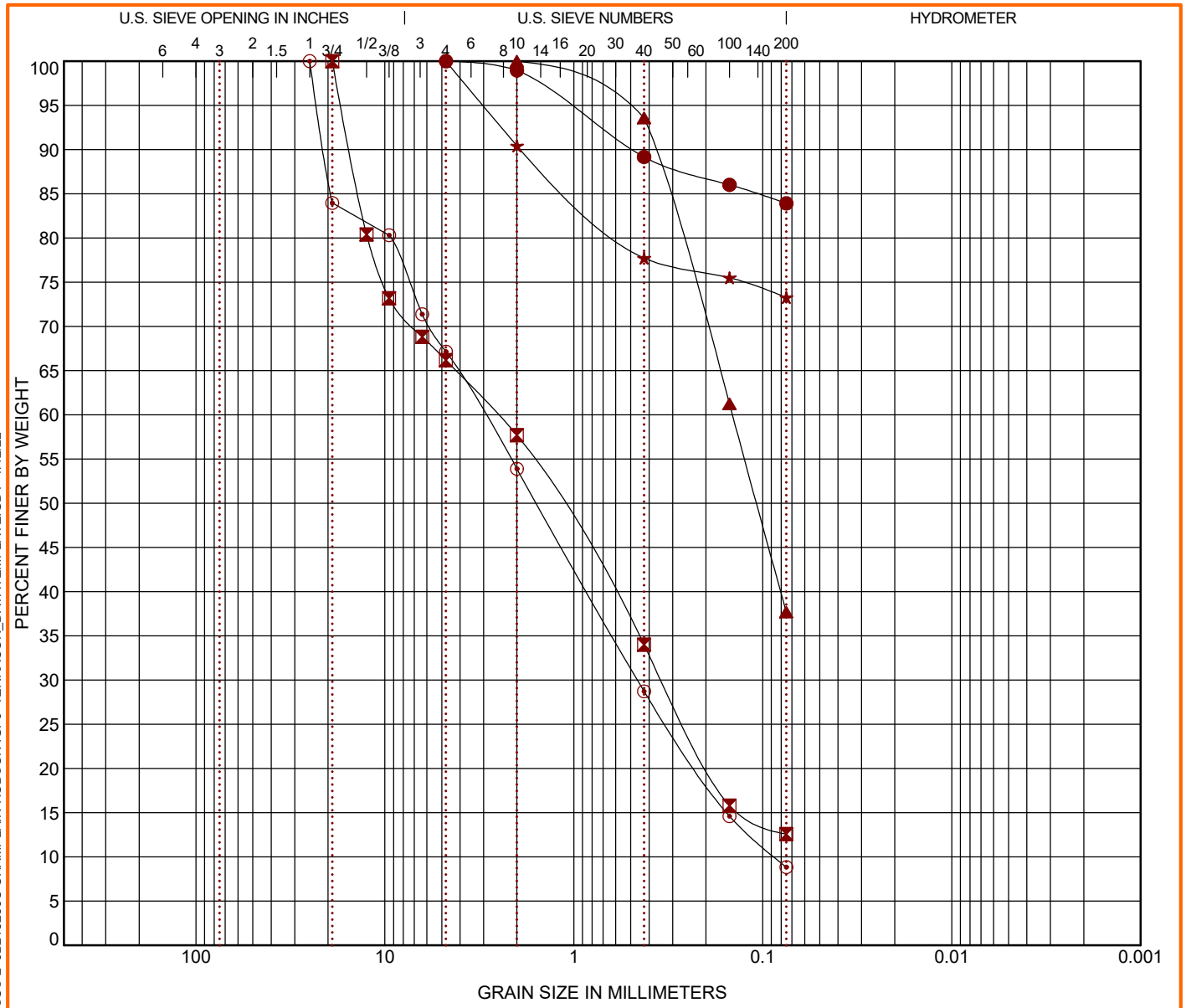
PROJECT NUMBER: JB215256C

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-212.2	23 - 25	LEAN CLAY with SAND (CL)	53.6	48	27	21		
⊠	K-212.3	6 - 8	SILTY SAND with GRAVEL (SM)	9.0					
▲	K-212.3	10 - 12	SILTY SAND (SM)	33.0	42	26	16		
★	K-212.3	23 - 25	SILT with SAND (ML)	37.5	31	26	5		
⊙	K-214.5	8 - 10	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	31.0				0.82	34.55

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-212.2	23 - 25	4.75				0.0	0.0	16.1		83.9	
⊠	K-212.3	6 - 8	19	2.532	0.338		0.0	33.8	53.6		12.6	
▲	K-212.3	10 - 12	2	0.145			0.0	0.0	62.3		37.7	
★	K-212.3	23 - 25	4.75				0.0	0.0	26.7		73.3	
⊙	K-214.5	8 - 10	25	2.98	0.46	0.086	0.0	32.9	58.3		8.8	

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

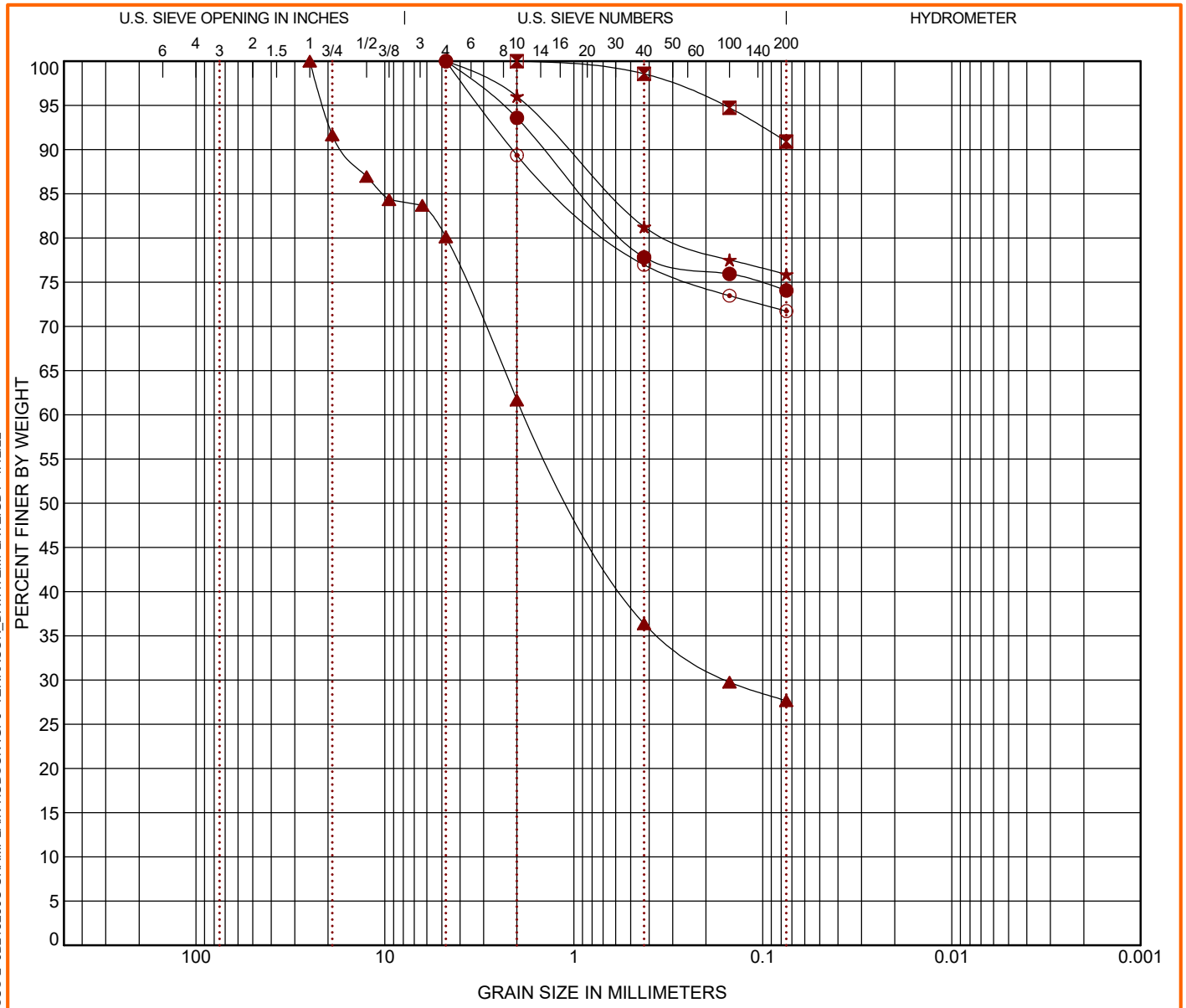
PROJECT NUMBER: JB215256C

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-214.5	28 - 30	LEAN CLAY with SAND (CL)	41.3	48	24	24		
⊠	K-214.5	35 - 37	LEAN CLAY (CL)	45.0	40	25	15		
▲	K-216.2	6 - 8	SILTY SAND with GRAVEL (SM)	29.0					
★	K-216.2	10 - 12	FAT CLAY with SAND (CH)	31.8	50	25	25		
⊙	K-216.2	18 - 20	FAT CLAY with SAND (CH)	36.8	60	28	32		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-214.5	28 - 30	4.75				0.0	0.0	25.9		74.1	
⊠	K-214.5	35 - 37	2				0.0	0.0	9.1		90.9	
▲	K-216.2	6 - 8	25	1.807	0.156		0.0	19.9	52.4		27.7	
★	K-216.2	10 - 12	4.75				0.0	0.0	24.1		75.9	
⊙	K-216.2	18 - 20	4.75				0.0	0.0	28.3		71.7	

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

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-214.4

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3195° Longitude: -73.8311°

Surface Elev.: 116.1 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.3	115.9	**TOPSOIL**
		ELASTIC SILT WITH SAND (MH), varved silt and clay, brown, soft to very stiff
		grades mottled brown and gray
15.0	101.1	
		FAT CLAY (CH), varved silt and clay, brown, very soft to medium stiff
		grades gray

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		14	WH-WH-4-5 N=4			
		18	4-7-10-11 N=17			
5		18	4-6-7-9 N=13	33.7	65-33-32	84
		18	4-10-11-11 N=21			
		24	3-5-7-8 N=12			
10		24	3-5-6-8 N=11			
15		24	3-2-4-5 N=6	37.6	57-29-28	95
20		24	2-2-3-4 N=5			
25						

WATER LEVEL OBSERVATIONS

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

Hammer Type: Automatic

Advancement Method:
3 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:

Hammer Efficiency Summary:
Energy Transfer Ratio: 84.7% +/-5.0%
Hammer Efficiency Correction (CE): 1.41
Logged by JCH
WH = Weight of hammer

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 11-04-2022 | Boring Completed: 11-04-2022

Drill Rig: Mobil B-57 | Driller: L. Zito

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-214.4

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3195° Longitude: -73.8311°

Surface Elev.: 116.1 (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
30.0	86.1	**FAT CLAY (CH)**, varved silt and clay, gray, very soft to medium stiff *(continued)*				24	WH/12"-1-2 N=1			
			30			24	WH/18"-1	49.7	45-30-15	93
37.0	79.1	**SILT (ML)**, varved silt and clay, gray, very soft	35	▽		24	WH-WH-2-6 3" Split Spoon with ring samplers			

Boring Terminated at 37 Feet

Artesian water condition encountered after 35 to 37 foot sample. Ran augers to 45 feet, encountered running sands. Hole abandoned.

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

Hammer Type: Automatic

Advancement Method:
3 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:

Hammer Efficiency Summary:
Energy Transfer Ratio: 84.7% +/-5.0%
Hammer Efficiency Correction (CE): 1.41
Logged by JCH
WH = Weight of hammer

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 11-04-2022	Boring Completed: 11-04-2022
Drill Rig: Mobil B-57	Driller: L. Zito
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-214.4A

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3195° Longitude: -73.8312°

Surface Elev.: 116.7 (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
	Drilled to 10 ' with 4" solid stem auger. Removed auger and drove 3" ID casing to 40 feet without running tricone to create a soil plug to prevent artesian condition. Tricone drill bit was run through the casing and soil plug to 40 feet. First SPT taken at 40'		5, 10, 15, 20, 25							

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

Hammer Type: Automatic

Advancement Method:
See Log for Info

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: 84.7% +/-5.0%
Hammer Efficiency Correction (CE): 1.41
Logged by JCH
WH = Weight of hammer

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

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

Drill Rig: Mobil B-57 | Driller: L. Zito

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-214.4A

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3195° Longitude: -73.8312°

Surface Elev.: 116.7 (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
		Drilled to 10 ' with 4" solid stem auger. Removed auger and drove 3" ID casing to 40 feet without running tricone to create a soil plug to prevent artesian condition. Tricone drill bit was run through the casing and soil plug to 40 feet. First SPT taken at 40' *(continued)*	30, 35							
40.0	76.7	**LEAN CLAY (CL)**, varved silt and clay, gray, very soft	40		X	24	WH-WH-WH-1			
46.5	70.2	**gravel in tip of spoon**	45	▽	X	18	WH-WH-WH			
		SILTY SAND WITH GRAVEL (SM), gray, medium dense, (GLACIAL TILL) **Artesian condition encountered again after driving 45 to 46.5' sample. Drove casing down to 50' and took SPT.**	50							

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

Hammer Type: Automatic

Advancement Method:
See Log for Info

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: 84.7% +/-5.0%
Hammer Efficiency Correction (CE): 1.41
Logged by JCH
WH = Weight of hammer

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 11-11-2022	Boring Completed: 11-11-2022
Drill Rig: Mobil B-57	Driller: L. Zito
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-214.4A

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.3195° Longitude: -73.8312°

Surface Elev.: 116.7 (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
	SILTY SAND WITH GRAVEL (SM), gray, medium dense, (GLACIAL TILL) (continued)					3	17-6-6 N=12			
	51.5 **Artesian condition re-established while driving 50'-51.5' sample**	65.2								
	Boring Terminated at 51.5 Feet									

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

Hammer Type: Automatic

Advancement Method:
See Log for Info

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: 84.7% +/-5.0%
Hammer Efficiency Correction (CE): 1.41
Logged by JCH
WH = Weight of hammer

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

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

Drill Rig: Mobil B-57 | Driller: L. Zito

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

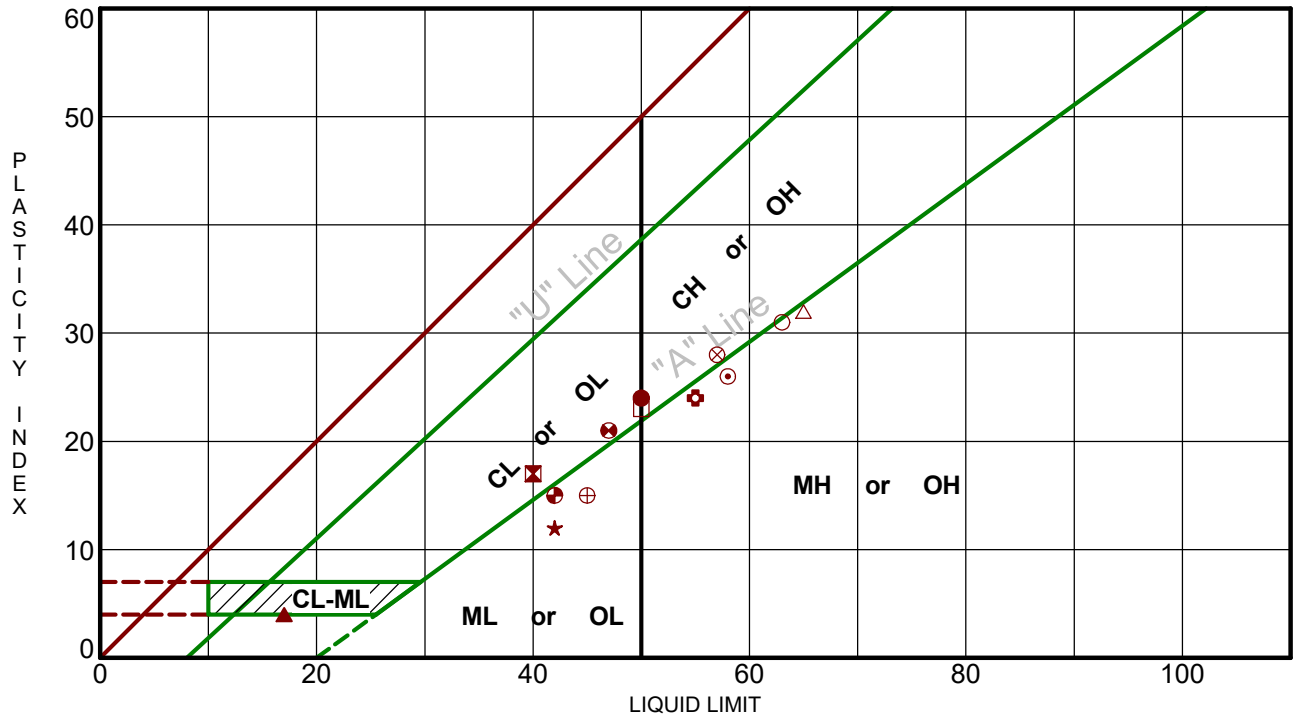
PROJECT NUMBER: JB215256J

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

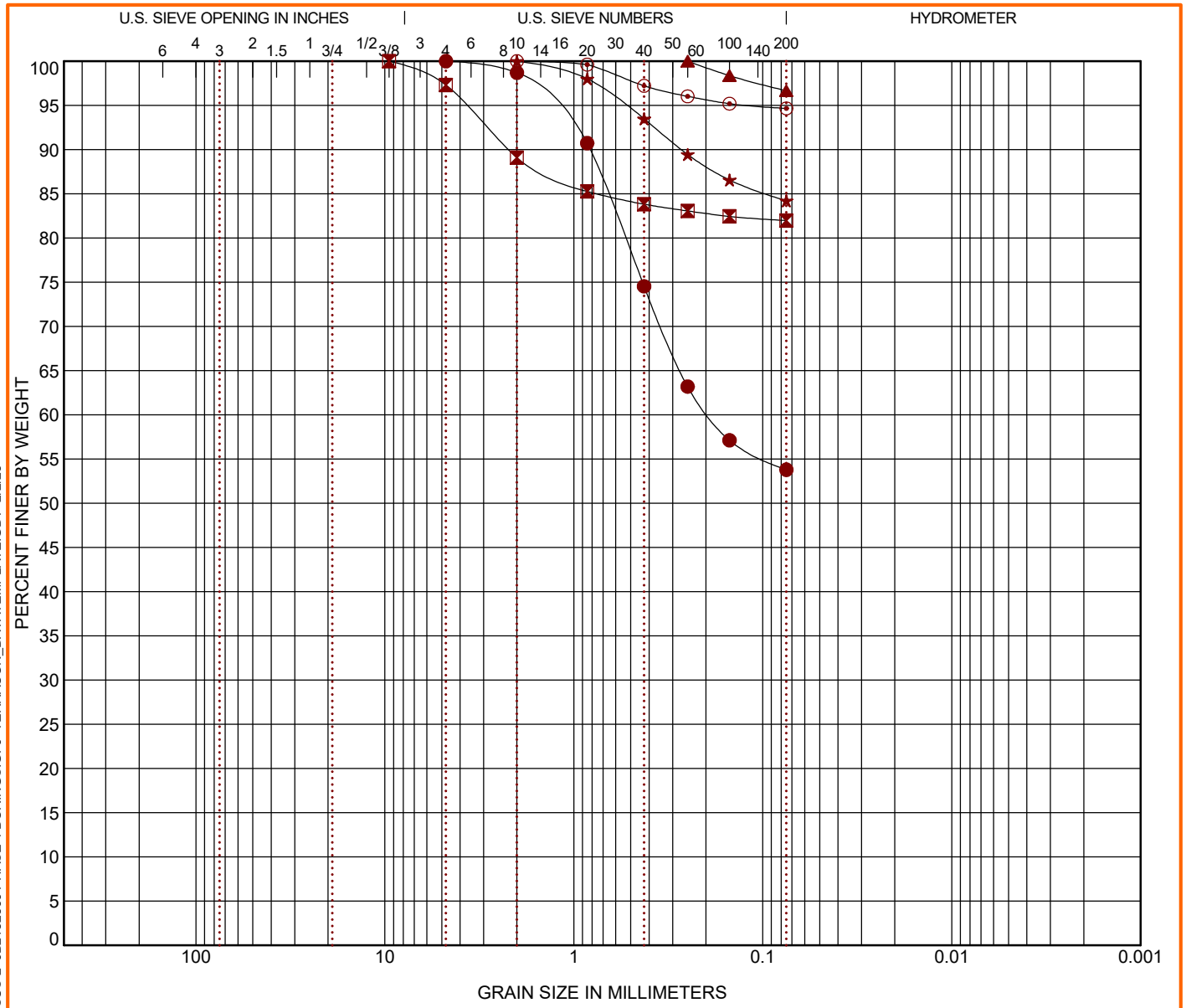
PROJECT NUMBER: JB215256J

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

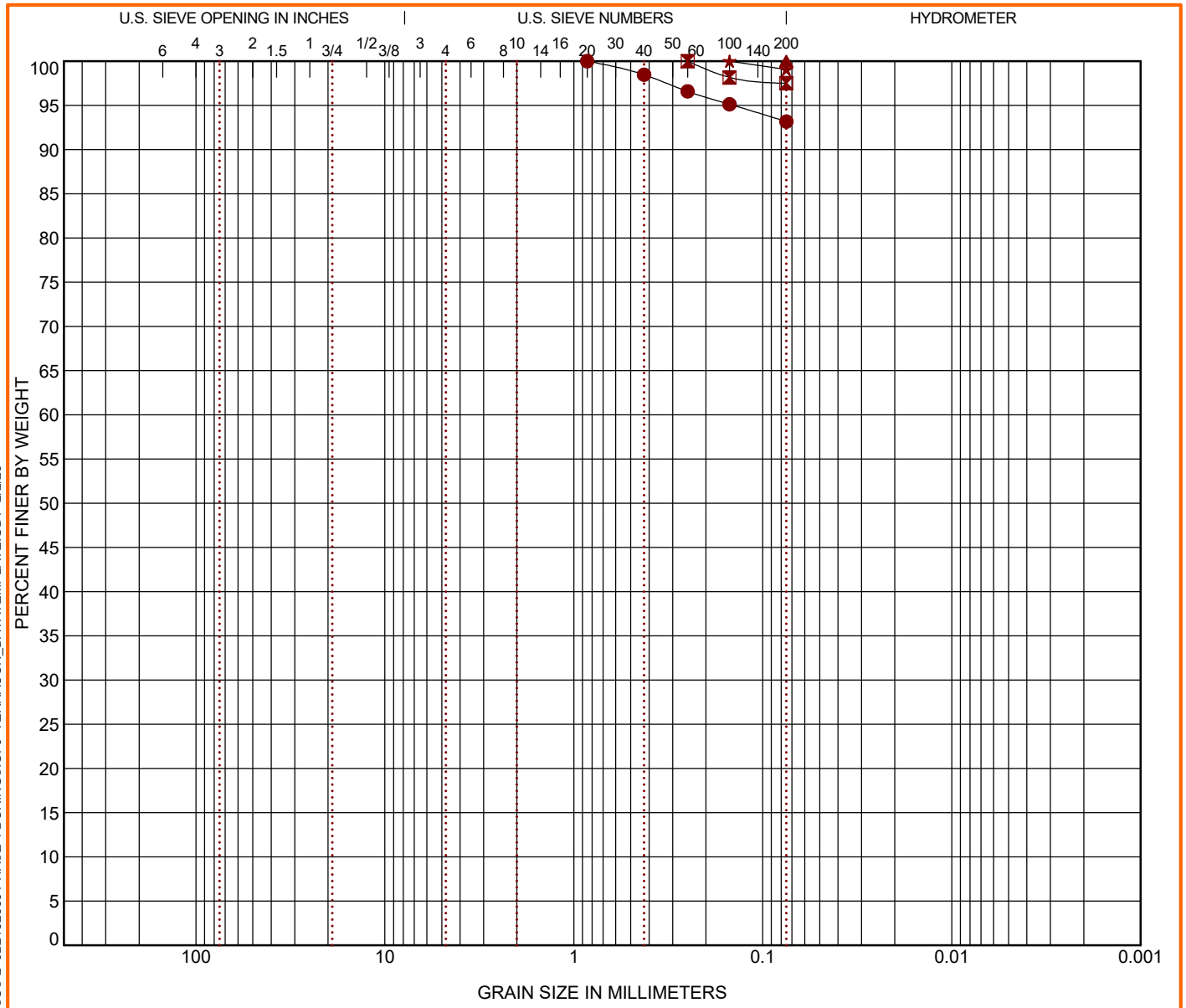
Terracon
30 Corporate Cir Ste 201
Albany, NY

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

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-214.4	30 - 32	SILT (ML)	49.7	45	30	15		
⊠	KB-220.9	4 - 6	FAT CLAY (CH)	31.0	50	27	23		
▲	KB-220.9	20 - 22	LEAN CLAY (CL)	39.6	47	26	21		
★	KB-220.9	45 - 47	SILT (ML)	33.6	42	27	15		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-214.4	30 - 32	0.85				0.0	0.0	6.8		93.2	
⊠	KB-220.9	4 - 6	0.25				0.0	0.0	2.5		97.5	
▲	KB-220.9	20 - 22	0.075				0.0	0.0	0.0		100.0	
★	KB-220.9	45 - 47	0.15				0.0	0.0	0.9		99.1	

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 2/2/23

Kiewit

MEMORANDUM

DATE: November 12, 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 109 – 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 south of Coxsackie, New York. The approximate station for the start of HDD crossing number 109 is STA 60917+00 (42.2959° N, 73.83885° 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.

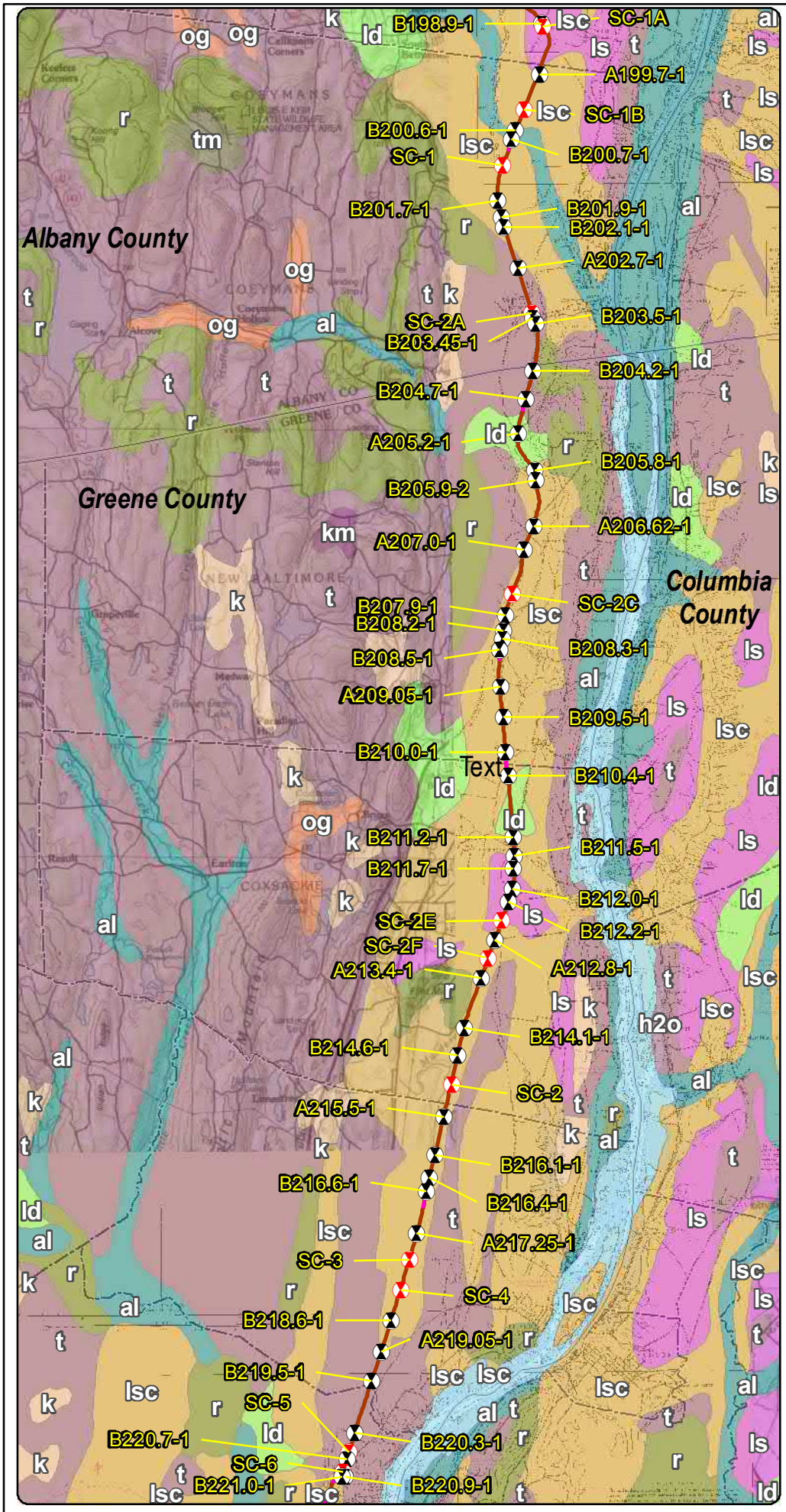
HDD 109
Borings B216.1-1, K-216.2
Segment 10 - Design Package 6

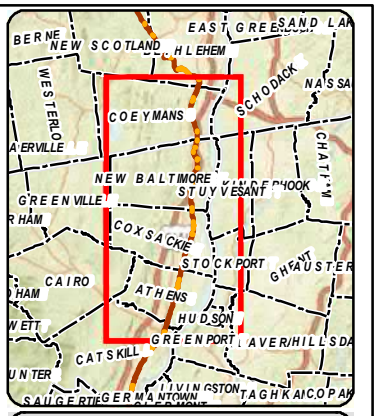
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

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.

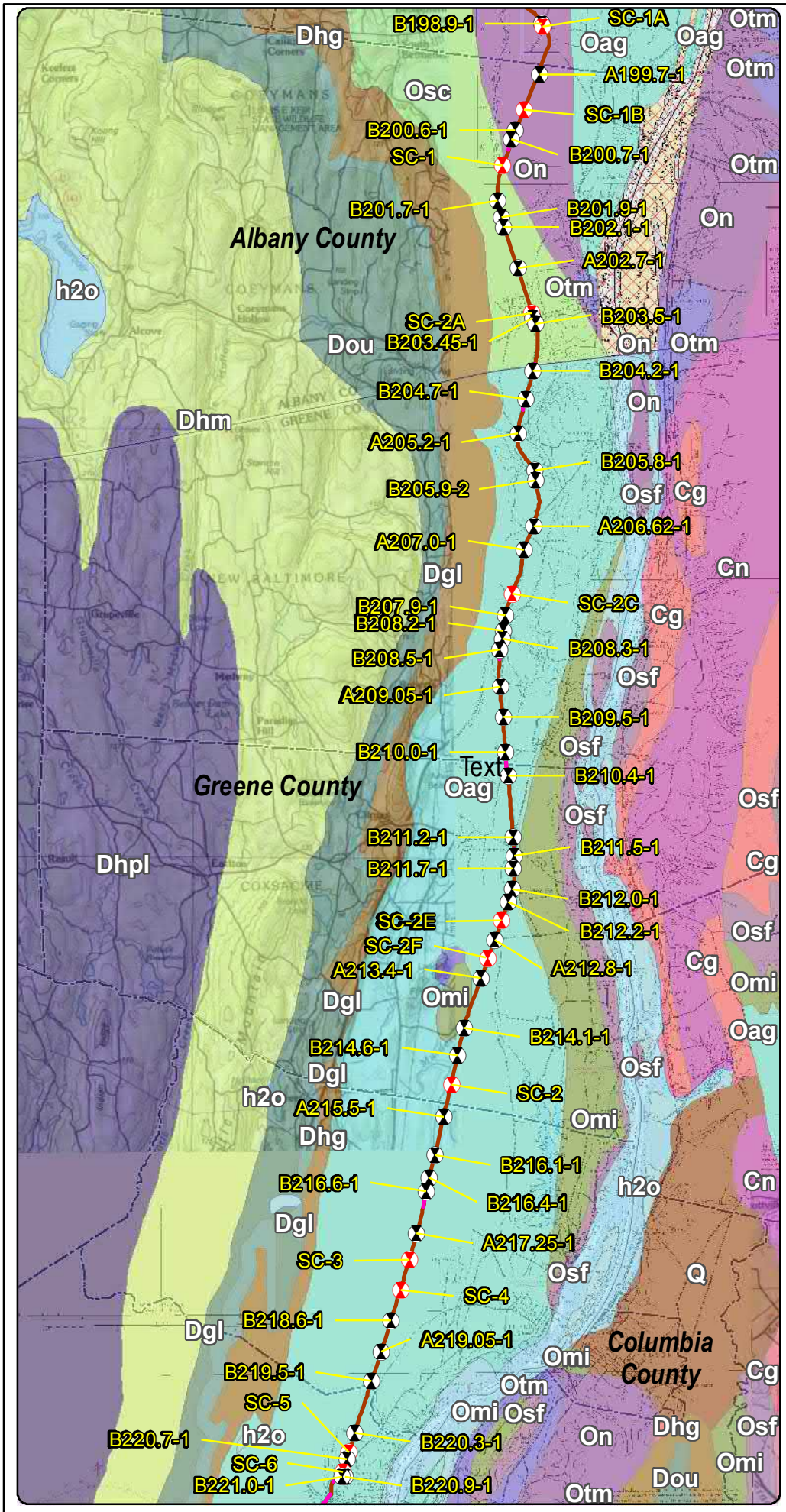
Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

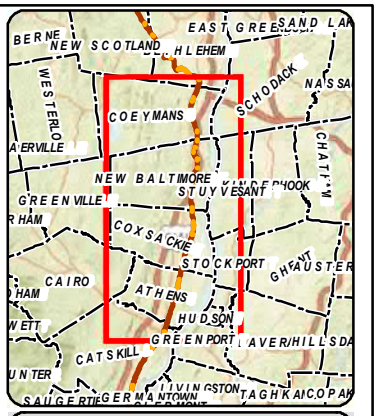
Prepared on 5/3/2021

by: AECOM

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

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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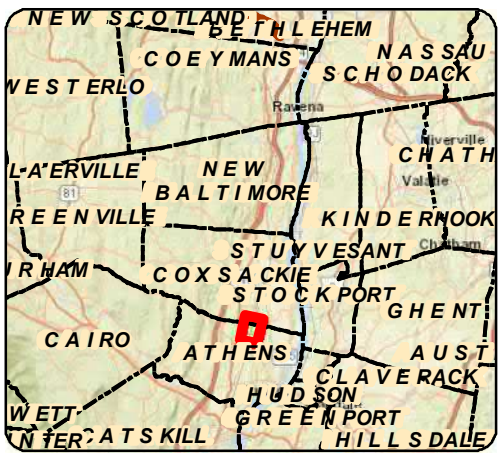
SC-2
215.1
COXSACKIE
215.2
215.3
215.4
A215.5-1
215.6
215.7
ATHENS
215.8
215.9
216
B216.1-1
216.2
Flats Rd
Hamilton Rd
N Mud Ln
S Mud Ln
Scott Ln
0
1,000
Feet



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 14 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	**B216.1-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
DRY	NR	12/4	0 HR

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	12/04/2012
DATE COMPLETED	12/04/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	7 10 10 8		***BLACK F/C GRAVEL SIZED ROCK FRAGMENTS AND F/M/C SAND, TR SILT (FILL)***		
	S-2	5 7 6 6		4.0		
5	S-3	3 3 2 4		***DARK BROWN M/F/C SAND, SM F/ GRAVEL, SM SILT (FILL)***	7.6	
	S-4	2 3 3 4		6.0 ***DARK GRAY SILT, SM CLAY (POSSIBLE FILL)***	43.7	
10	S-5	6 5 7 9		8.0	40.9	
				GRAY-BROWN SILT, TR TO SM CLAY		
15	S-6	8 10 13		13.5		
20	S-7	9 10 13		***BROWN TO DARK GRAY CLAY, TR SILT, TR M/F SAND***	32.2	
				23.5		
25	S-8	5 6 8		***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

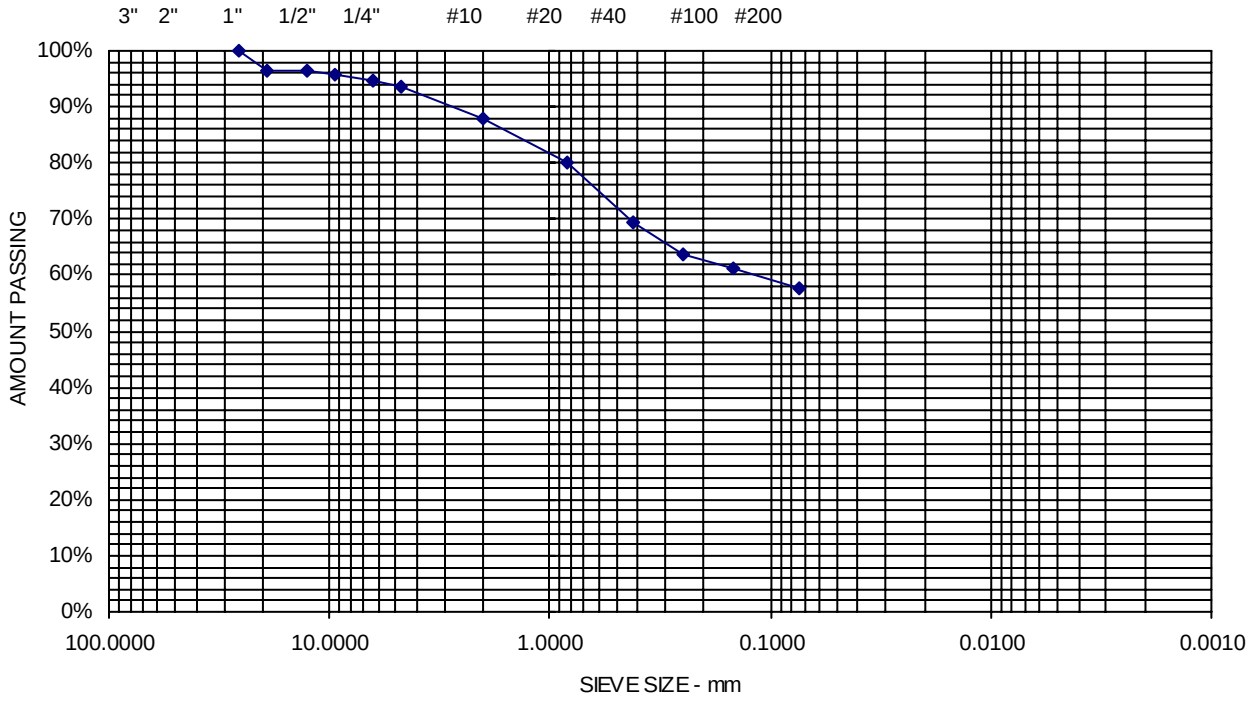
Report of Gradation

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	10444S
Exploration	**B216.1-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 6-10 FEET**	Date Completed	12/10/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**96**	
12.5 mm	**1/2"**	**96**	
9.5 mm	**3/8"**	**96**	
6.3 mm	**1/4"**	**95**	
4.75 mm	**No. 4**	**94**	6.5% Gravel
2.00 mm	**No. 10**	**88**	
850 um	**No. 20**	**80**	
425 um	**No. 40**	**69**	35.8% Sand
250 um	**No. 60**	**64**	
150 um	**No. 100**	**61**	
75 um	**No. 200**	**57.7**	57.7% Fines

BROWN SAND AND SILT SOME GRAVEL (ML)



Comments: MOISTURE CONTENT = 21.4%

Sheet

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

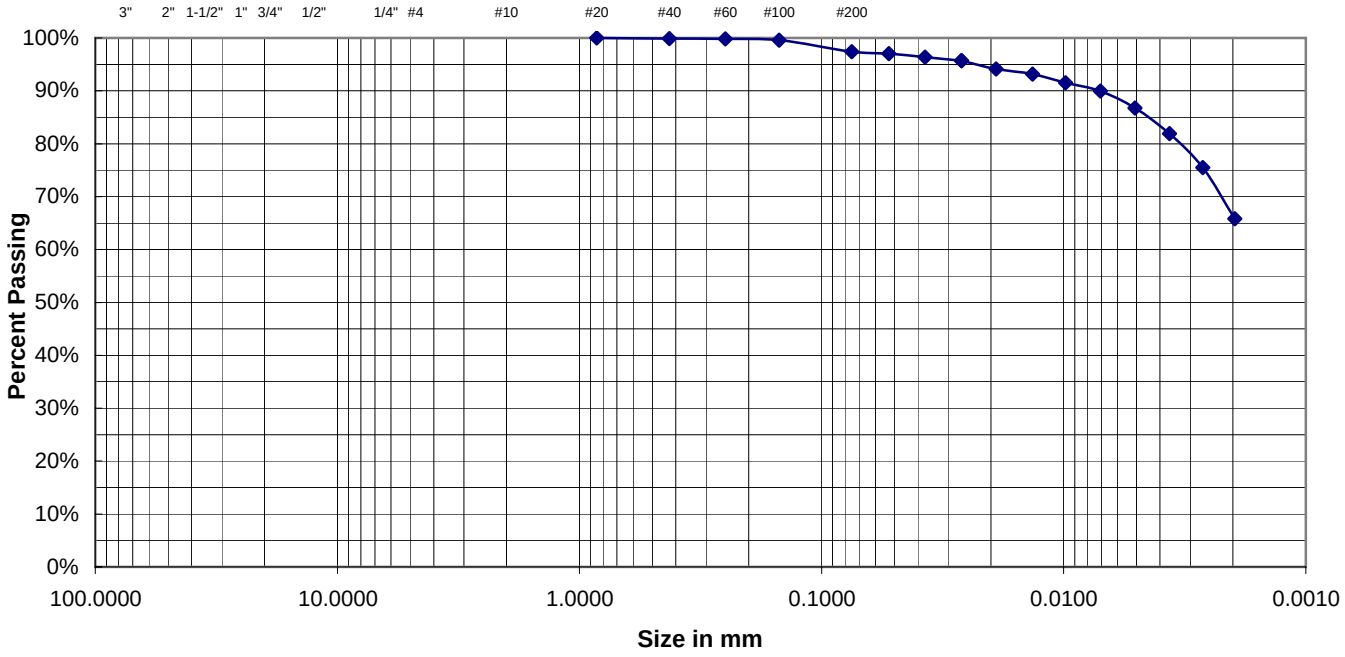
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10445S
Material Type	DARK GRAY CLAY SOME SILT TRACE SAND (CH)	Date Received	12/5/2012
Material Source	18.5'-20'	Date Completed	12/14/2012
Exploration	B216.1-1	Tested By	MJS

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	**100**
No. 10	2	**100**
No. 20	0.85	**100**
No. 40	0.425	**100**
No. 60	0.25	**100**
No. 100	0.15	**100**
No. 200	0.075	**97.4**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.053	97.0
0.037	96.4
0.026	95.7
0.019	94.1
0.013	93.2
0.010	91.5
0.007	89.9
0.005	86.7
0.004	81.9
0.003	75.5
0.002	65.8



Particle Distribution	
Gravel, retained on #4	0.0%
Sand, passing #4 and retained on #200	2.6%
Fines, 0.074 to 0.005	10.9%
Clay Fraction, <0.005	86.5%

Comments: MOISTURE CONTENT = 32.4%

Chad B. Michaud

Reviewed By

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

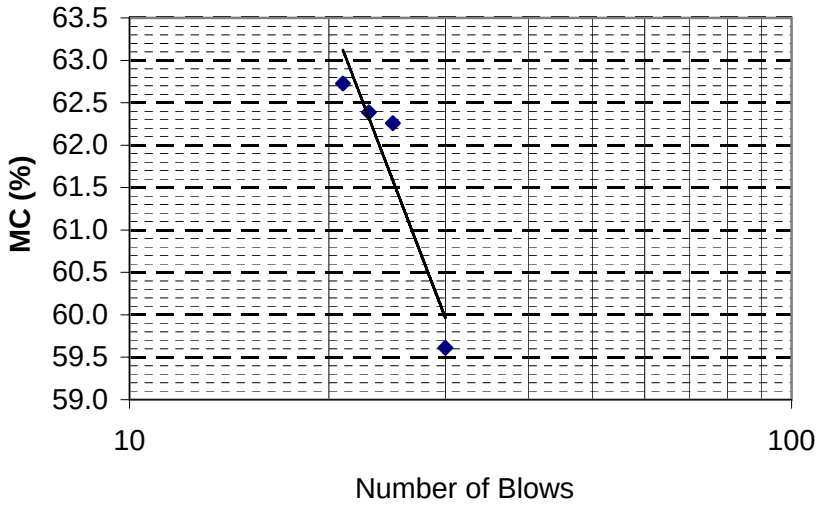
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10445S
Soil Description	DARK GRAY CLAY SOME SILT TRACE SAND (CH)	Date Received	12/5/2012
Soil Source	B216.1-1, 18.5'-20'	Date Completed	12/7/2012
		Tested By	JJR

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
0%	62	28	34

LIQUID LIMIT CURVE

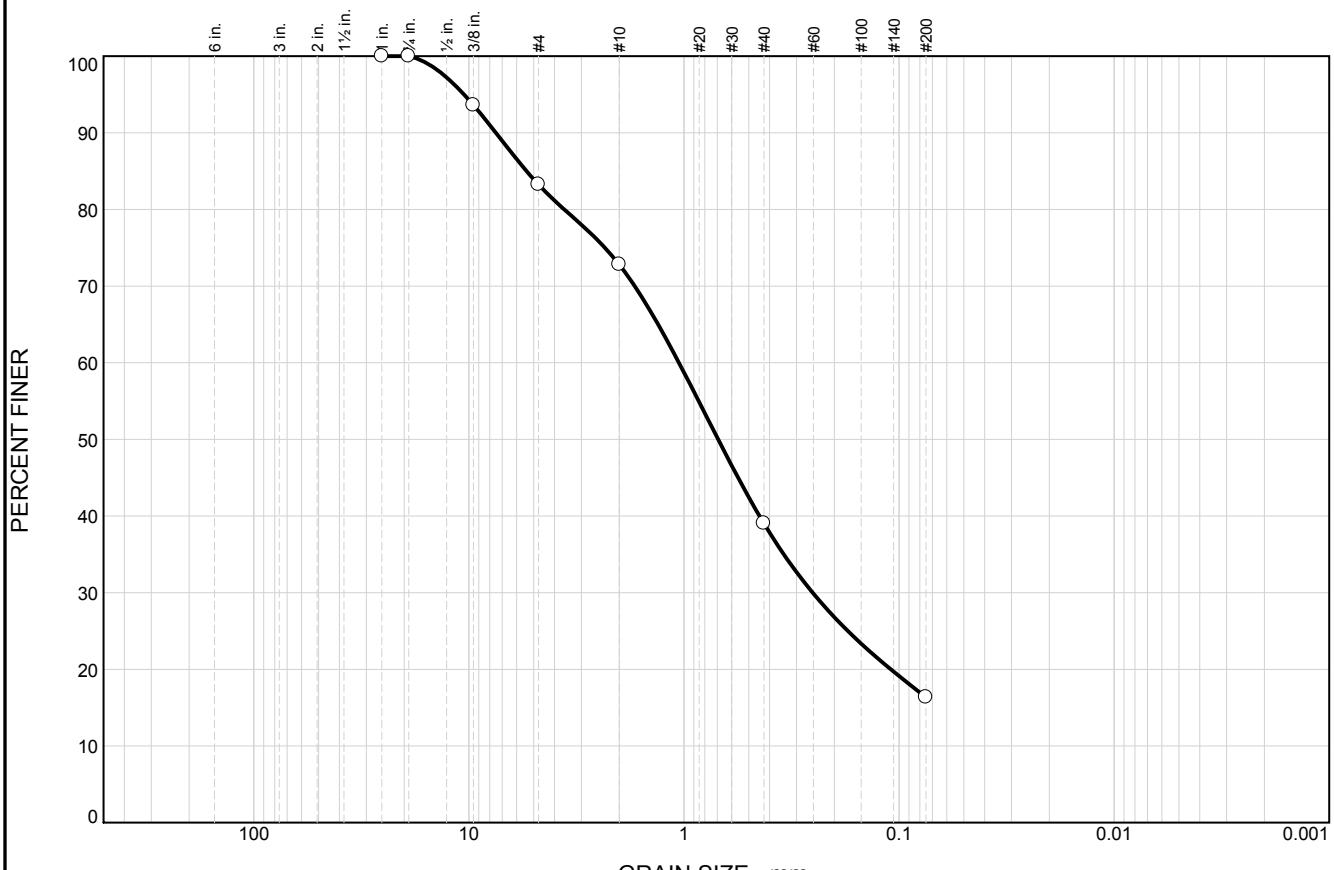


SUMMARY OF LABORATORY TEST DATA

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)					
B215.5-1	S-2	2.0-4.0	SM	19.4	55.7	24.9		-	-	-	-	-	18.1	-	-	-
	S-3	4.0-6.0														
	S-5	8.0-10.0	CH	-	-	-		62	29	33	0.2	-	36.9	84.4	-	-
B216.1-1	S-3	4.0-6.0	SM	16.7	66.9	16.4		-	-	-	-	-	7.6	-	-	-
	S-4	6.0-8.0	-	-	-	-		-	-	-	-	-	43.7	-	-	-
	S-5	8.0-10.0	-	-	-	-		-	-	-	-	-	40.9	86.1	-	-
	S-7	18.5-20.0	CH	0.0	6.7	4.7	88.6	58	28	30	0.1	2.80	32.2	-	-	-
B216.4-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	7.5	-	-	-
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	16.3	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	41.4	-	-	-
	S-5	8.0-10.0	CH	-	-	-	-	69	29	40	-0.1	-	25.4	-	-	-

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	16.7	10.5	33.8	22.6	16.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			5.3946	1.0555	0.6935	0.2522				

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

Project No. 195651 **Client:** TRANSMISSION DEVELOPERS INC.
Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B216.1-1 **Depth:** 4.0-6.0 FT **Sample Number:** S-3

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

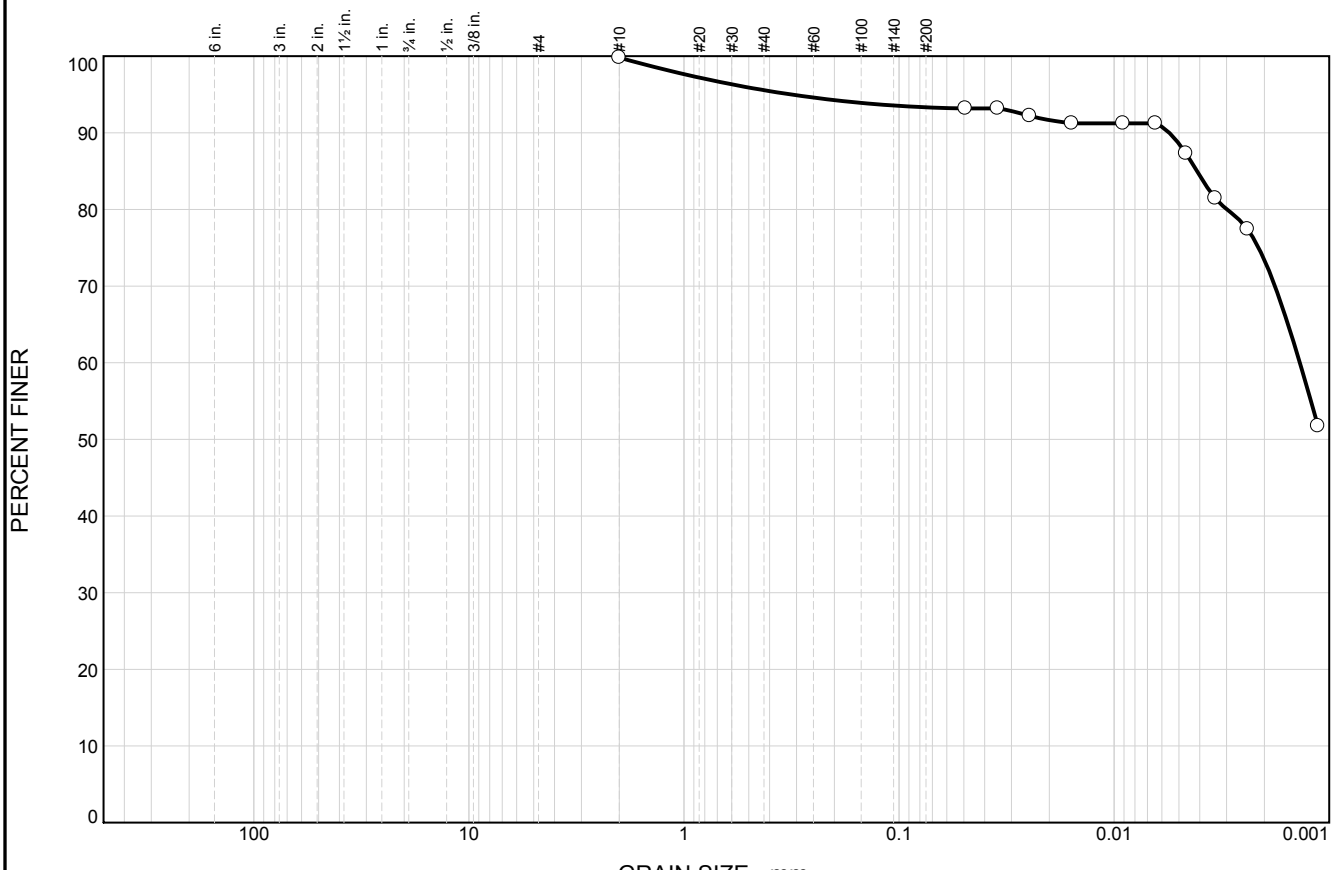
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 106

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
○					4.2	2.3	4.7	88.6

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	58	28	0.0041	0.0014						

Material Description	USCS	AASHTO
○ BROWN TO DARK GRAY CLAY, TR SILT, TR M/F SAND	CH	A-7-6(32)

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

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B216.1-1 **Depth:** 18.5-20.0 FT **Sample Number:** S-7

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

TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 107

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

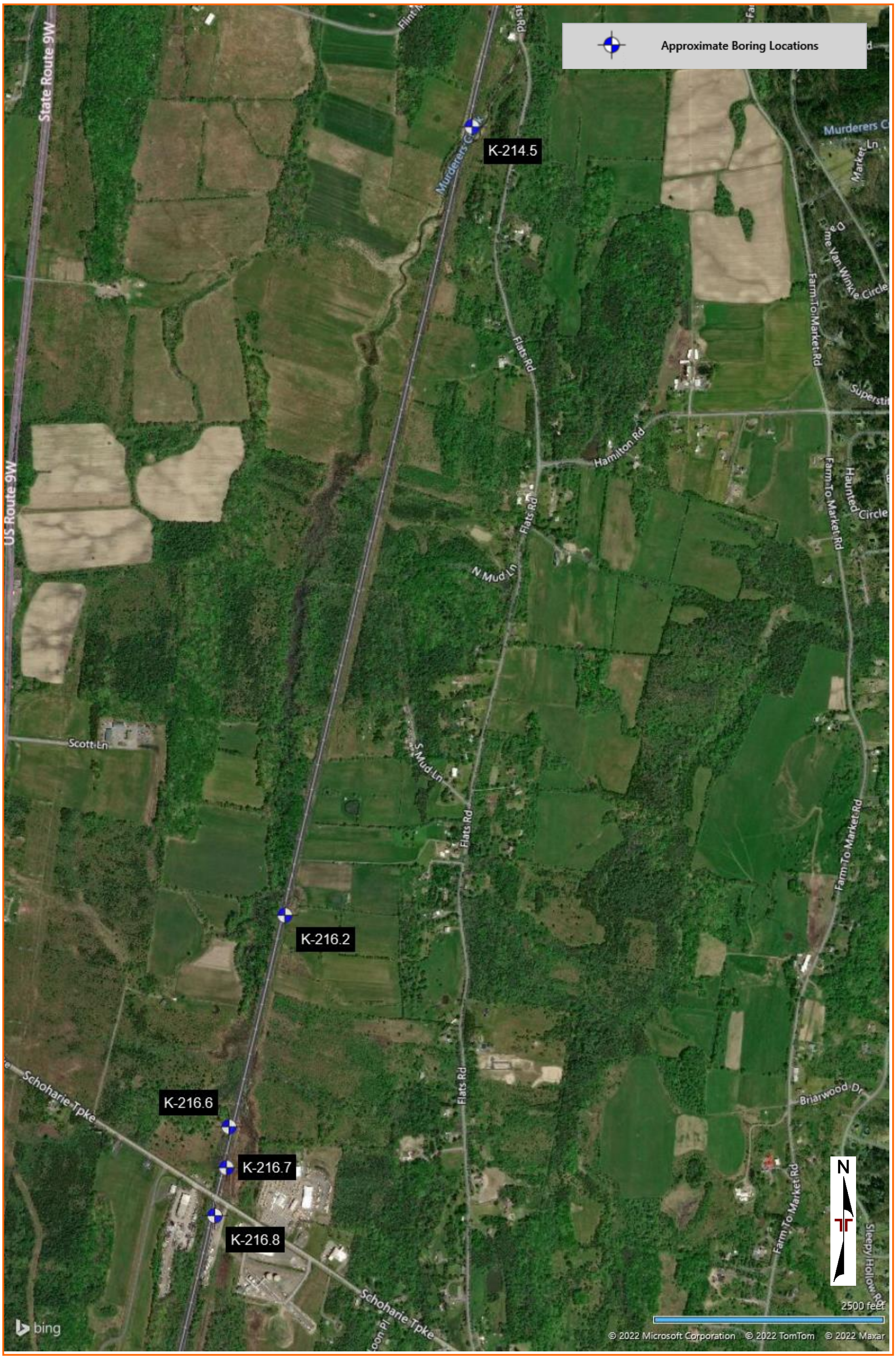


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-216.2

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: 42.2945° Longitude: -73.8395°

Surface Elev.: 121.8 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
2.0	120	**FILL - POORLY GRADED SAND**, organics noted, black, very loose
6.0	116	**FILL - SILT AND CLAY**, brown, medium stiff to very stiff **trace fine sand** **organics noted**
8.0	114	**FILL - SILTY SAND WITH GRAVEL (SM)**, brown, medium dense
10.0	112	**SILT AND CLAY (CL-ML)**, brown, stiff
		FAT CLAY WITH SAND (CH), brown, very soft to very stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		4	3-1-1-1 N=2			
		15	2-2-3-4 N=5			
5		15	2-6-6-8 N=12			
		20	9-9-10-10 N=19	29.0		28
		18	4-6-6-9 N=12			
10		24	9-10-12-12 N=22	31.8	50-25-25	76
15		12	3-5-6 N=11			
		24	4-5-8-11	36.8	60-28-32	72
20		13	3" Split Spoon With Ring Samplers 1-2-3 N=5			
25		18	2-3-3 N=6			

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: 02-23-2022 | Boring Completed: 02-23-2022

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-216.2

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: 42.2945° Longitude: -73.8395°

Surface Elev.: 121.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
FAT CLAY WITH SAND (CH), brown, medium stiff to very stiff *(continued)*								
30.0	92	30						
LEAN CLAY (CL), gray, very soft to medium stiff			X	18	2-3-3 N=6	40.9	49-27-22	96
		35	X	24	WOH-WOH WOH-WOH			
37.0	85							
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: 02-23-2022 | Boring Completed: 02-23-2022

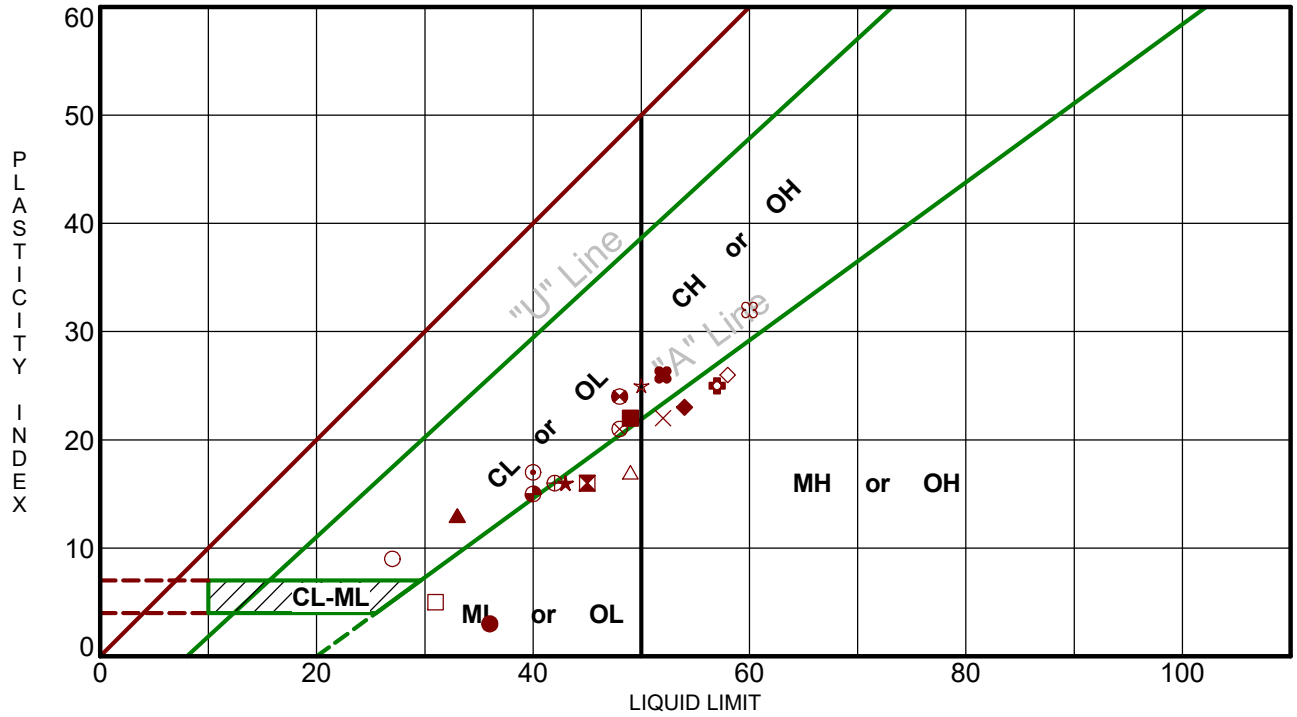
Drill Rig: CME 750X | Driller: J. Lamm

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-211.6	20 - 22	36	33	3	91.8	ML	SILT
⊠	K-211.7	6 - 8	45	29	16	83.1	ML	SILT with SAND
▲	K-211.7	21 - 23	33	20	13	95.0	CL	LEAN CLAY
★	K-211.8	6 - 8	43	27	16	88.3	ML	SILT
⊙	K-211.8	21 - 23	40	23	17	56.9	CL	GRAVELLY LEAN CLAY
✿	K-212.1	6 - 8	57	32	25	49.5	SM	SILTY SAND
○	K-212.1	25 - 27	27	18	9	97.2	CL	LEAN CLAY
△	K-212.2	10 - 12	49	32	17	70.5	ML	SILT with SAND
⊗	K-212.2	23 - 25	48	27	21	83.9	CL	LEAN CLAY with SAND
⊕	K-212.3	10 - 12	42	26	16	37.7	SM	SILTY SAND
□	K-212.3	23 - 25	31	26	5	73.3	ML	SILT with SAND
⊛	K-214.5	28 - 30	48	24	24	74.1	CL	LEAN CLAY with SAND
◕	K-214.5	35 - 37	40	25	15	90.9	CL	LEAN CLAY
☆	K-216.2	10 - 12	50	25	25	75.9	CH	FAT CLAY with SAND
✿	K-216.2	18 - 20	60	28	32	71.7	CH	FAT CLAY with SAND
■	K-216.2	30 - 31.5	49	27	22	96.0	CL	LEAN CLAY
◆	K-216.6	8 - 10	54	31	23	74.1	MH	ELASTIC SILT with SAND
◇	K-216.6	18 - 20	58	32	26	78.2	MH	ELASTIC SILT with SAND
×	K-216.6	30 - 31.5	52	30	22	72.3	MH	ELASTIC SILT with SAND
✖	K-216.7	10 - 12	52	26	26	64.0	CH	SANDY FAT CLAY

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

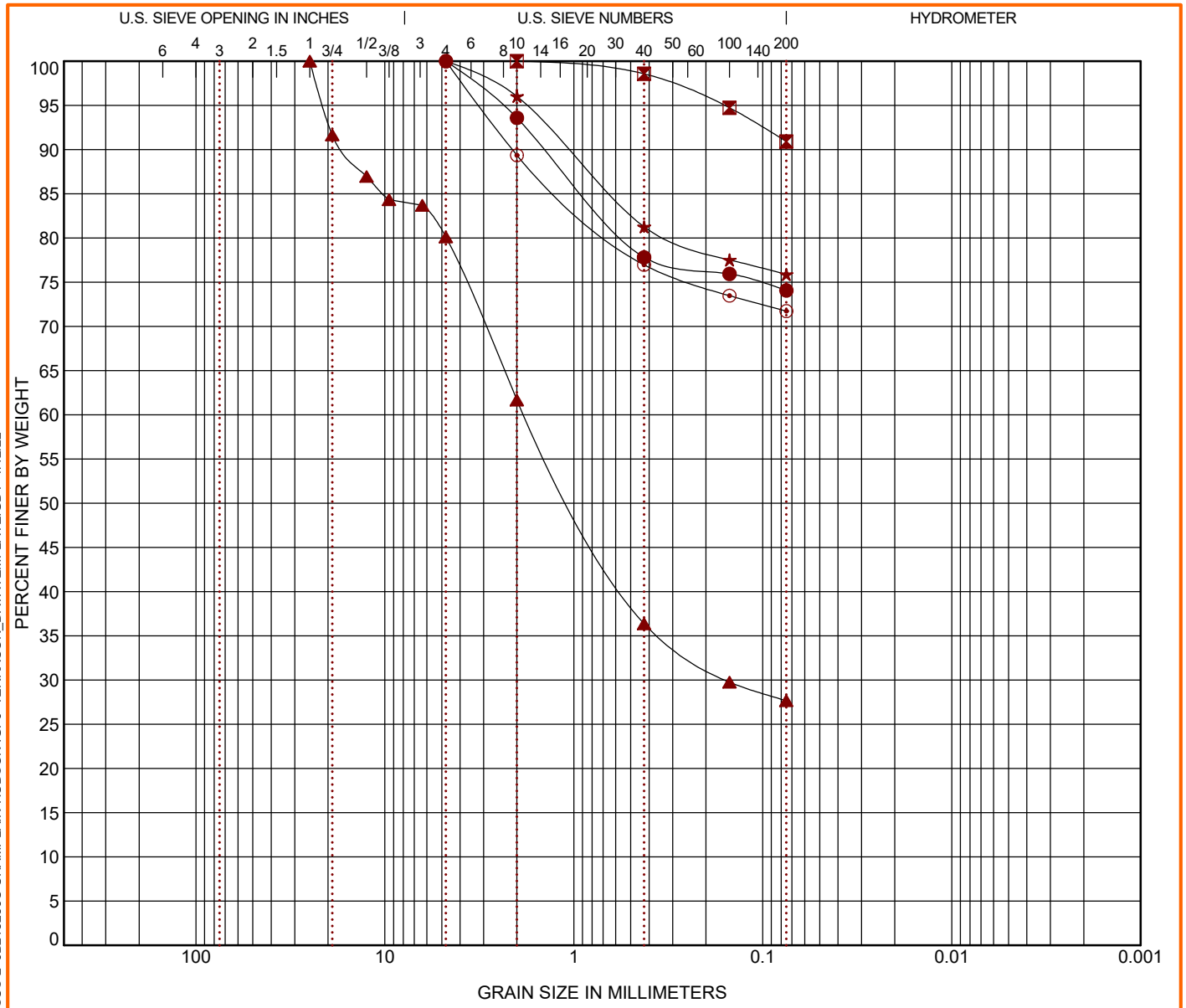
PROJECT NUMBER: JB215256C

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-214.5	28 - 30	LEAN CLAY with SAND (CL)	41.3	48	24	24		
⊠	K-214.5	35 - 37	LEAN CLAY (CL)	45.0	40	25	15		
▲	K-216.2	6 - 8	SILTY SAND with GRAVEL (SM)	29.0					
★	K-216.2	10 - 12	FAT CLAY with SAND (CH)	31.8	50	25	25		
⊙	K-216.2	18 - 20	FAT CLAY with SAND (CH)	36.8	60	28	32		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-214.5	28 - 30	4.75				0.0	0.0	25.9		74.1	
⊠	K-214.5	35 - 37	2				0.0	0.0	9.1		90.9	
▲	K-216.2	6 - 8	25	1.807	0.156		0.0	19.9	52.4		27.7	
★	K-216.2	10 - 12	4.75				0.0	0.0	24.1		75.9	
⊙	K-216.2	18 - 20	4.75				0.0	0.0	28.3		71.7	

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

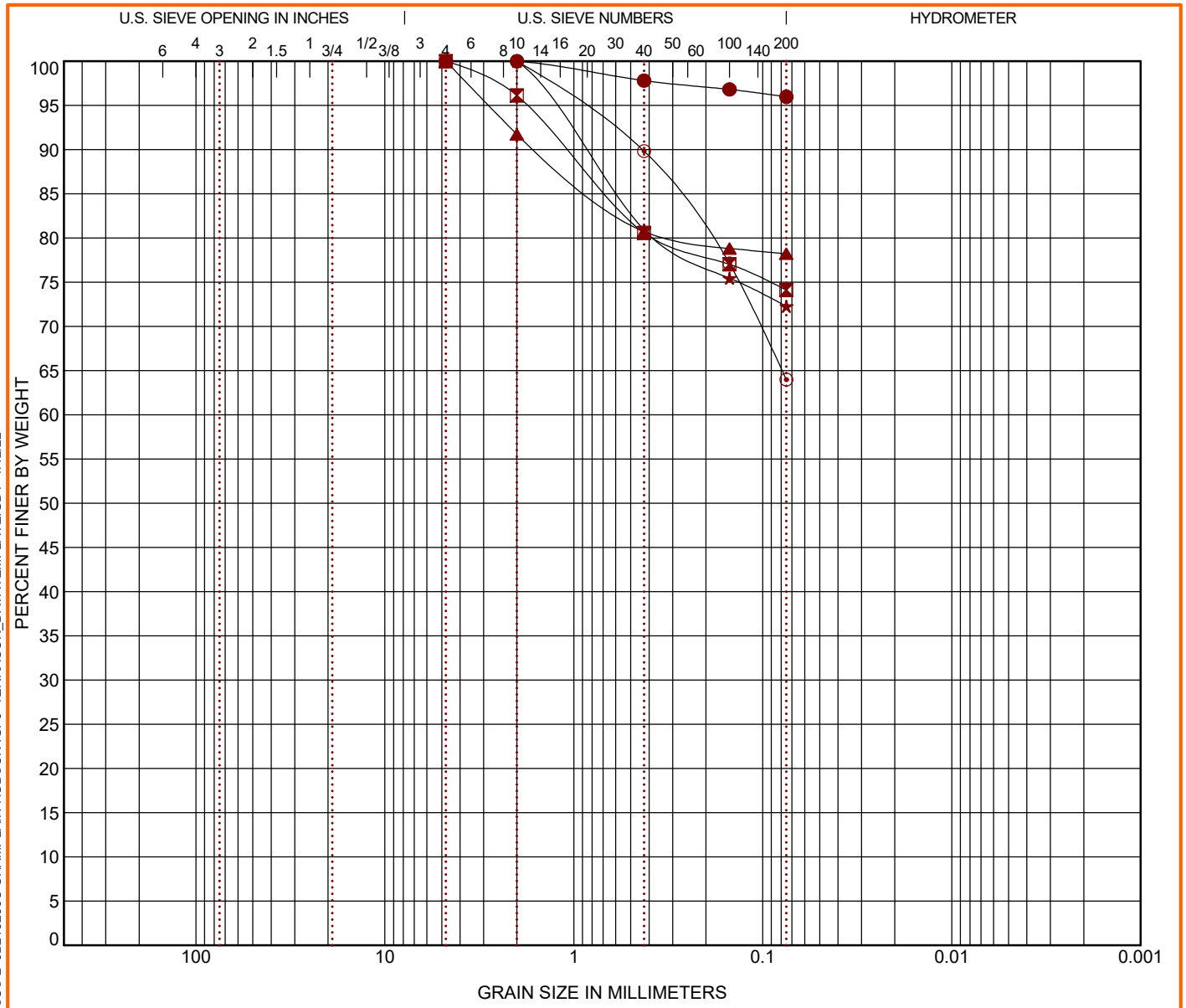
PROJECT NUMBER: JB215256C

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-216.2	30 - 31.5	LEAN CLAY (CL)	40.9	49	27	22		
⊠	K-216.6	8 - 10	ELASTIC SILT with SAND (MH)	33.2	54	31	23		
▲	K-216.6	18 - 20	ELASTIC SILT with SAND (MH)	45.5	58	32	26		
★	K-216.6	30 - 31.5	ELASTIC SILT with SAND (MH)	46.4	52	30	22		
⊙	K-216.7	10 - 12	SANDY FAT CLAY (CH)	32.1	52	26	26		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-216.2	30 - 31.5	4.75				0.0	0.0	4.0		96.0	
⊠	K-216.6	8 - 10	4.75				0.0	0.0	25.9		74.1	
▲	K-216.6	18 - 20	4.75				0.0	0.0	21.8		78.2	
★	K-216.6	30 - 31.5	4.75				0.0	0.0	27.7		72.3	
⊙	K-216.7	10 - 12	2				0.0	0.0	36.0		64.0	

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

Kiewit

MEMORANDUM

DATE: November 12, 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 110 – 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 south of Coxsackie, New York. The approximate station for the start of HDD crossing number 110 is STA 60934+50 (42.29124° N, 73.84018° 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.

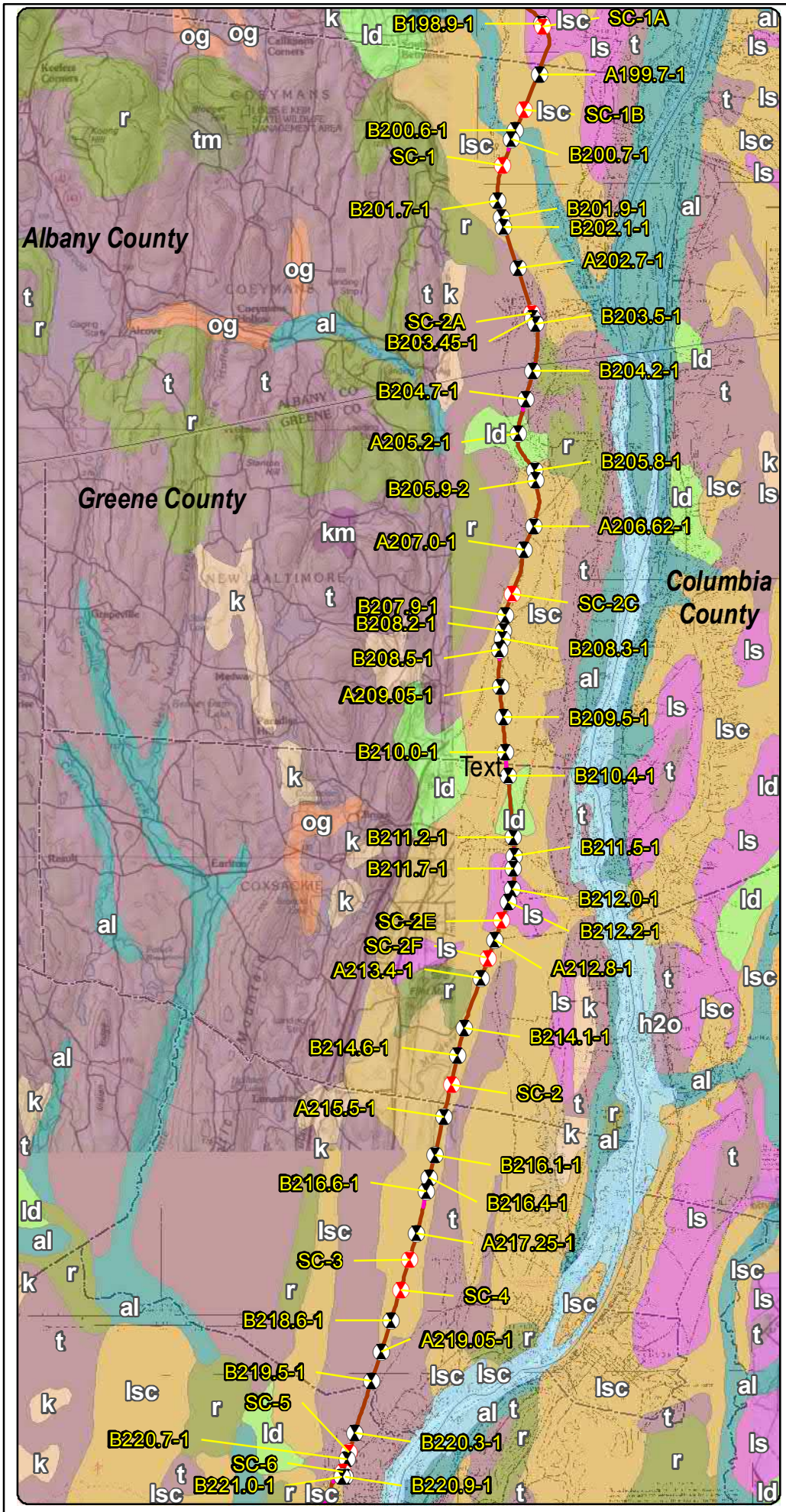
HDD 110
Borings B216.4-1, B216.6-1,
K-216.6
Segment 10 - Design Package 6

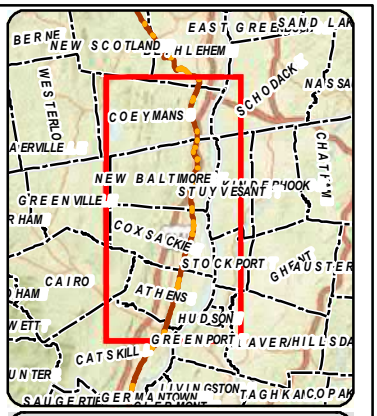
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

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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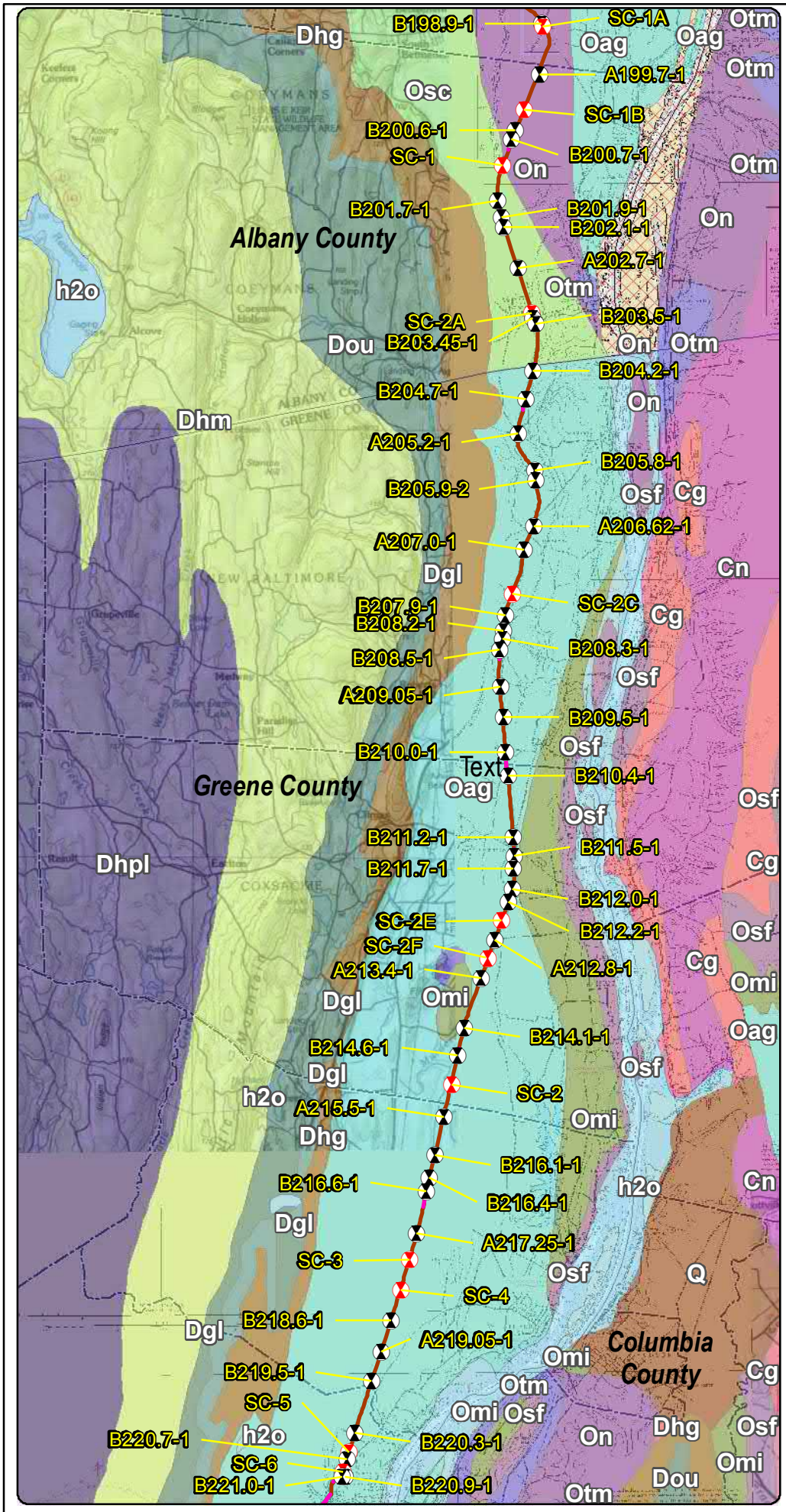

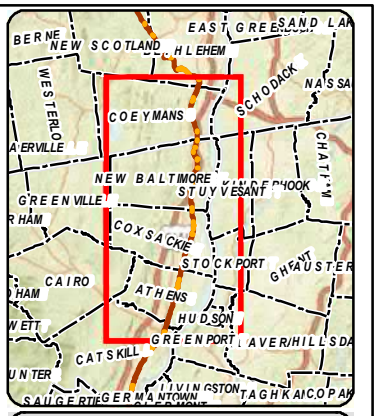

LEGEND

- 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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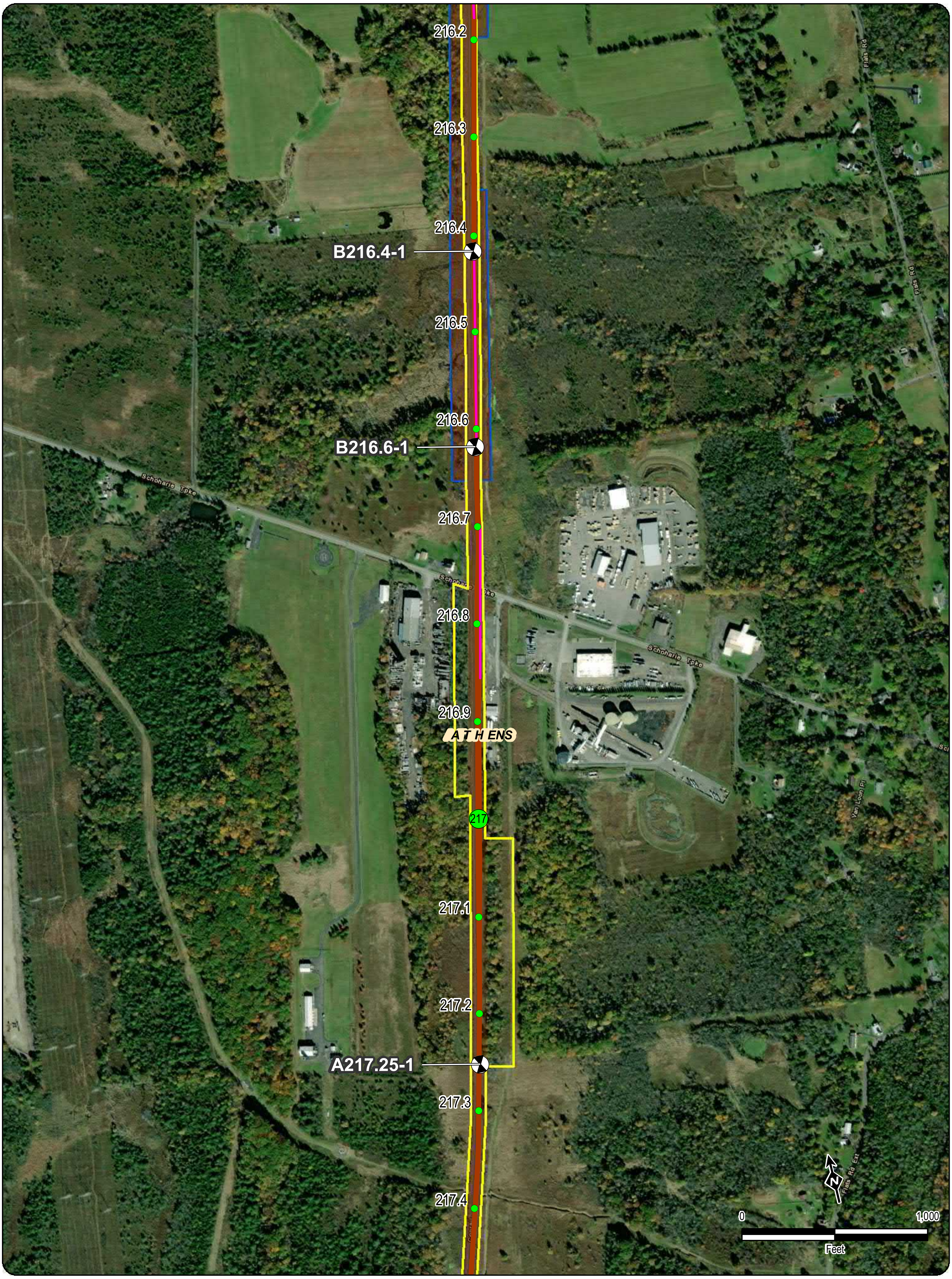
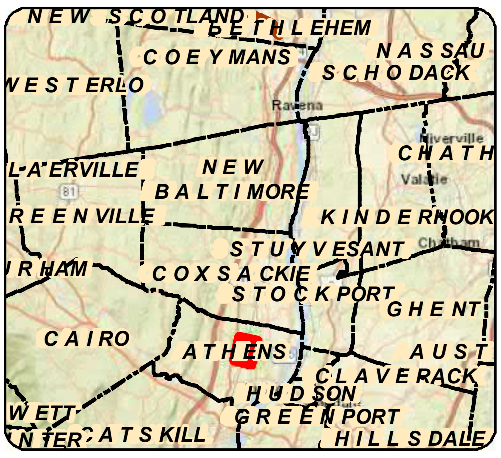




LEGEND

- 111.8 Certified Milepost - Tenths
- 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 15 of 18

Prepared by: AECOM 5/19/2021

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Selkirk_to_Catskill_Boring_Locations_Mapset_May_2021_Report.mxd

TEST BORING LOG

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

BORING	**B216.4-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
DRY	NR	12/4	0 HR

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	30.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	C. POPPE
DATE STARTED	12/04/2012
DATE COMPLETED	12/04/2012

DEPTH	A	B				C	DESCRIPTION	Wn	REMARKS
	S-1	7	9	8	7		***BLACK F/M/C SAND, SM F/C GRAVEL-SIZED ROCK FRAGMENTS, TR SILT (FILL)***	7.5	
	S-2	15	10	9	10		4.0		
5	S-3	8	8	3	4		***BROWN SILT, TR TO SM CLAY (POSSIBLE FILL)*** 6.0	16.3	
	S-4	3	2	3	7		***GRAY CLAYEY SILT*** 8.0	41.4	
10	S-5	7	3	9	10			25.4	
15	S-6	6	8	6				25.2	
20	S-7	3	4	6			***BROWN SILT, TR TO SM CLAY***	45.4	
25	S-8	2	3	4				36.4	
							28.5		
30	S-9	2	2	3			***GRAY SILT, TR CLAY*** 30.0		
							END OF BORING AT 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	**B216.6-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
DRY	NR	12/4	0 HR

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	30.0 '

DRILLER	R. CARUSO
HELPER	C. SMART
INSPECTOR	C. POPPE
DATE STARTED	12/04/2012
DATE COMPLETED	12/04/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	7 8 10 7		***BROWN M/C SAND (FILL)*** 2.0	15.6	
	S-2	9 14 10 8		***BROWN F/M/C SAND, SM F/ GRAVEL-SIZED ROCK FRAGMENTS (FILL)***		
5	S-3	7 4 4 7		6.0		
	S-4	3 4 6 6		***GRAY CLAYEY SILT, TR M/C SAND*** 8.0	29.5	
10	S-5	11 12 16 21			24.7	
15	S-6	8 10 11		***BROWN SILT*** 18.5	32.9	
20	S-7	5 6 9		***BROWN/GRAY SILT, TR TO SM CLAY*** 23.5	33.1	
25	S-8	WOR 7 9			45.4	
30	S-9	6 7 7		***GRAY CLAYEY SILT*** 30.0		
35				***END OF BORING AT 30'***		

DRN.	TBT
CKD.	PWK

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

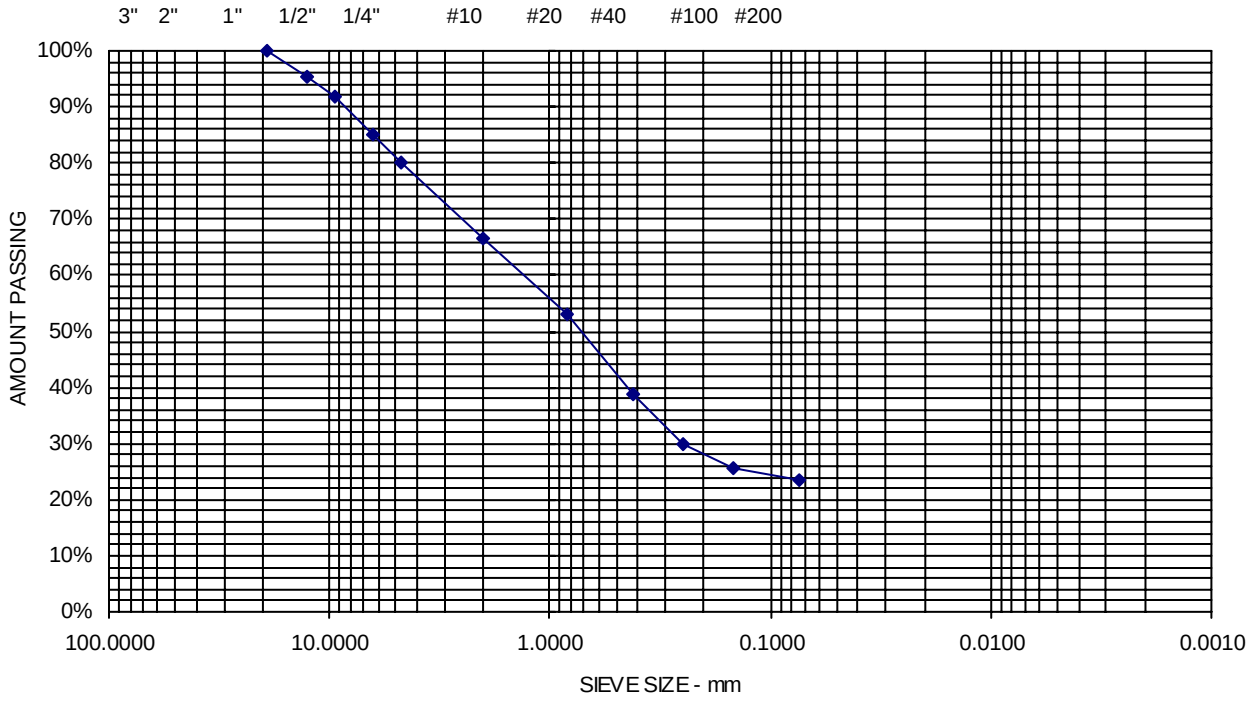
Report of Gradation

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	10447S
Exploration	**B216.4**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 0-10 FEET**	Date Completed	12/10/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**95**	
9.5 mm	**3/8"**	**92**	
6.3 mm	**1/4"**	**85**	
4.75 mm	**No. 4**	**80**	20% Gravel
2.00 mm	**No. 10**	**66**	
850 um	**No. 20**	**53**	
425 um	**No. 40**	**39**	56.6% Sand
250 um	**No. 60**	**30**	
150 um	**No. 100**	**26**	
75 um	**No. 200**	**23.3**	23.3% Fines

BROWN GRAVELLY SILTY SAND (SM)



Comments: MOISTURE CONTENT = 13.7%

Sheet

S.W.COLE ENGINEERING, INC.

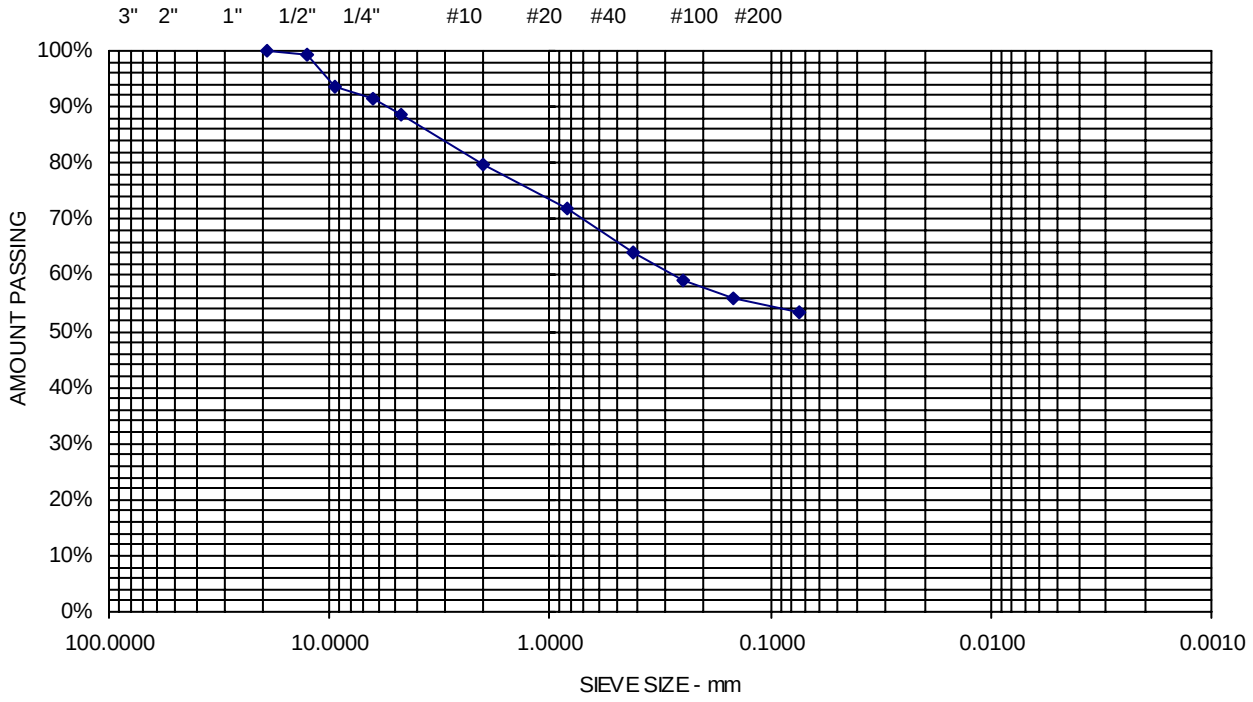
Report of Gradation

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	10448S
Exploration	**B216.4**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 10-15 FEET**	Date Completed	12/10/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**99**	
9.5 mm	**3/8"**	**94**	
6.3 mm	**1/4"**	**92**	
4.75 mm	**No. 4**	**89**	11.2% Gravel
2.00 mm	**No. 10**	**80**	
850 um	**No. 20**	**72**	
425 um	**No. 40**	**64**	35.3% Sand
250 um	**No. 60**	**59**	
150 um	**No. 100**	**56**	
75 um	**No. 200**	**53.5**	53.5% Fines

BROWN SAND AND SILT SOME GRAVEL (ML)



Comments: MOISTURE CONTENT = 24.7%

Sheet

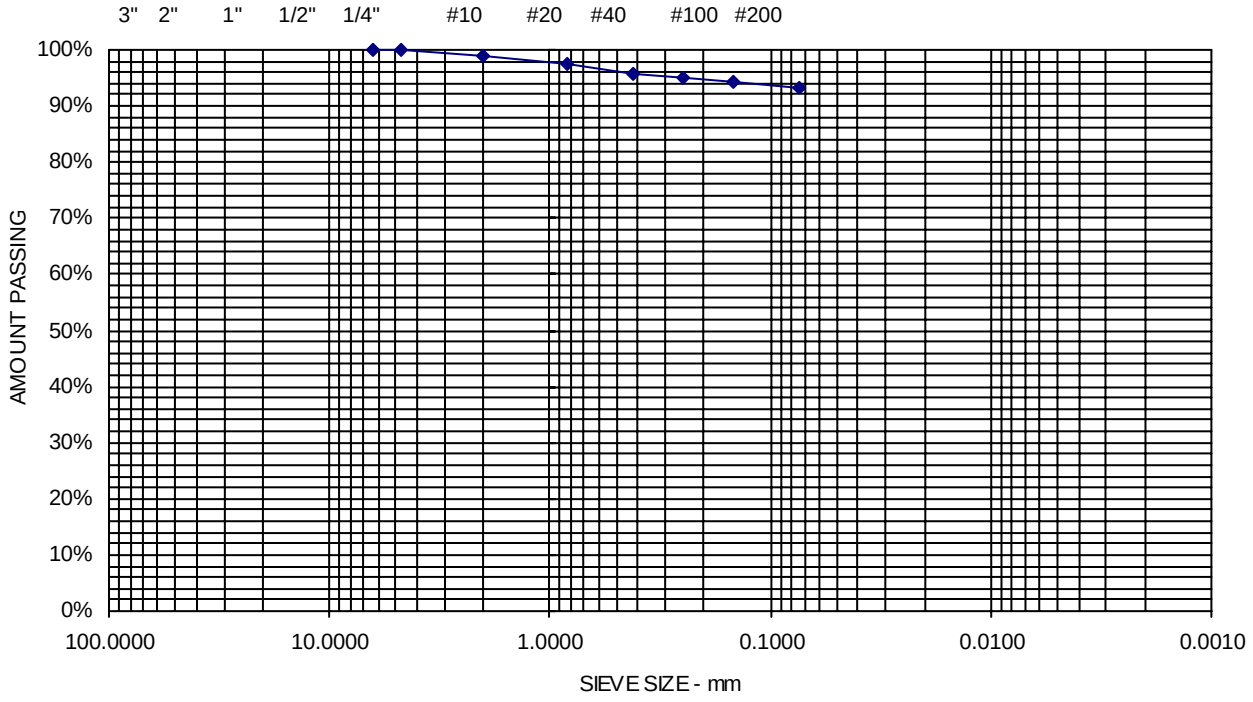
Report of Gradation

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	10449S
Exploration	**B216.4**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 12-13.5 FEET**	Date Completed	12/10/2012
		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**	**99**	
850 um	**No. 20**	**97**	
425 um	**No. 40**	**96**	6.8% Sand
250 um	**No. 60**	**95**	
150 um	**No. 100**	**94**	
75 um	**No. 200**	**93.2**	93.2% Fines

BROWN SILTY CLAY SOME SAND (CL)



Comments: MOISTURE CONTENT = 31.1%

Sheet

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

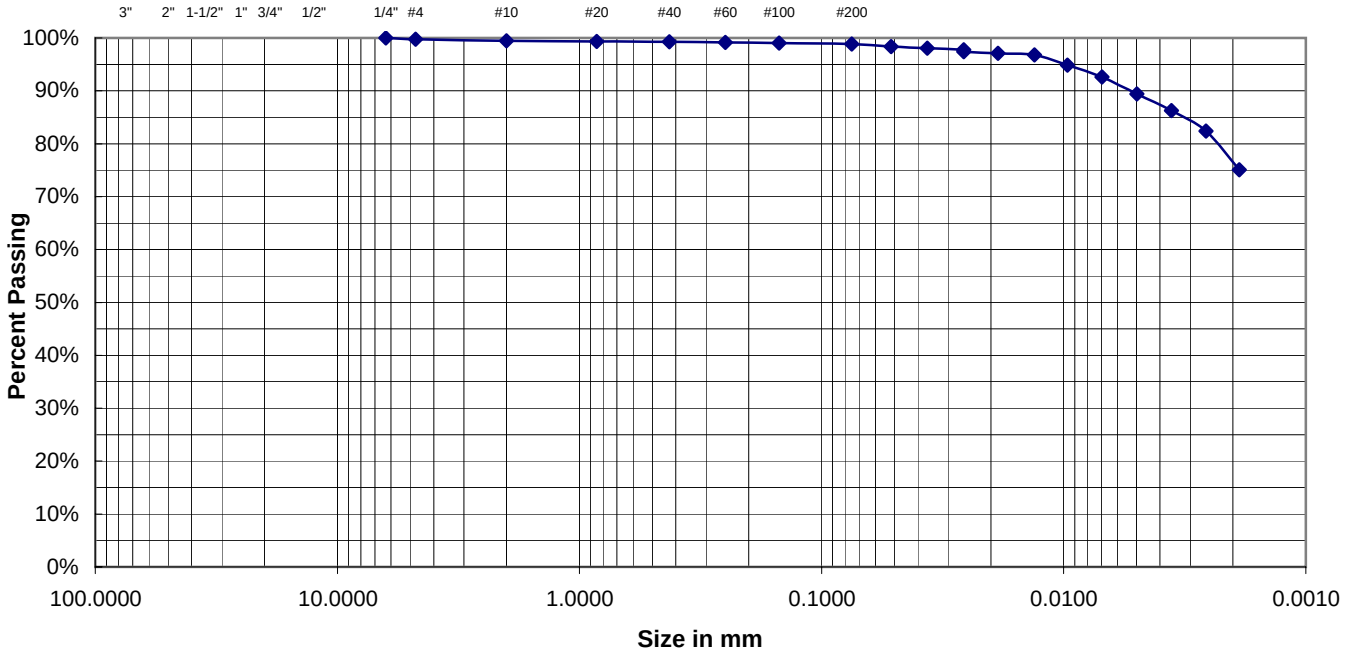
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10450S
Material Type	DK GRAY CLAY SOME SILT TRACE SAND AND GRAVEL (CH)	Date Received	12/5/2012
Material Source	25'-30'	Date Completed	12/14/2012
Exploration	B216.4	Tested By	MJS

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	**100**
No. 10	2	**99**
No. 20	0.85	**99**
No. 40	0.425	**99**
No. 60	0.25	**99**
No. 100	0.15	**99**
No. 200	0.075	**98.8**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.052	98.4
0.037	98.1
0.026	97.4
0.019	97.1
0.013	96.8
0.010	94.9
0.007	92.6
0.005	89.4
0.004	86.2
0.003	82.4
0.002	75.1



Particle Distribution	
Gravel, retained on #4	0.2%
Sand, passing #4 and retained on #200	0.9%
Fines, 0.074 to 0.005	9.4%
Clay Fraction, <0.005	89.5%

Comments: MOISTURE CONTENT = 37.2%

Chad B. Michaud

Reviewed By

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

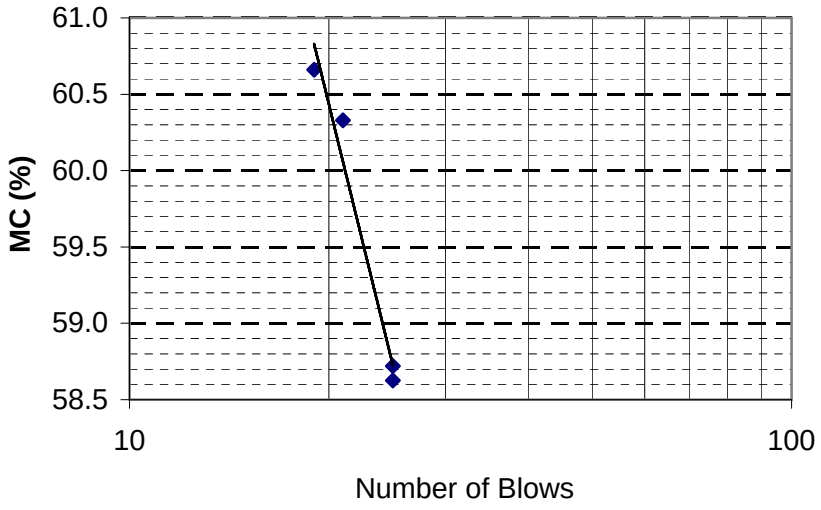
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10450S
Soil Description	DK GR CLAY SOME SILT TRACE SA AND GVL (CH)	Date Received	12/5/2012
Soil Source	B216.4, 25'-30'	Date Completed	12/7/2012
		Tested By	JJR

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
1%	60	28	32

LIQUID LIMIT CURVE



S.W.COLE ENGINEERING, INC.

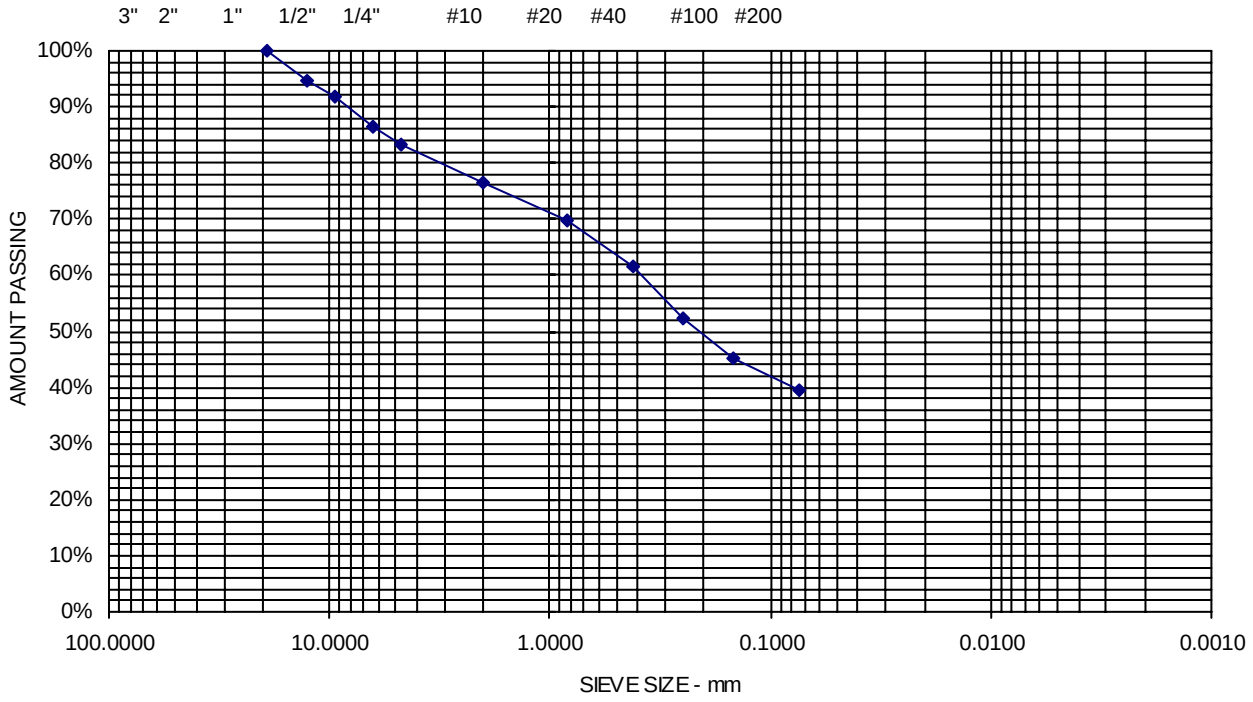
Report of Gradation

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	10451S
Exploration	**B216.6-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 4-6 FEET**	Date Completed	12/10/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**95**	
9.5 mm	**3/8"**	**92**	
6.3 mm	**1/4"**	**86**	
4.75 mm	**No. 4**	**83**	16.7% Gravel
2.00 mm	**No. 10**	**77**	
850 um	**No. 20**	**70**	
425 um	**No. 40**	**62**	43.7% Sand
250 um	**No. 60**	**52**	
150 um	**No. 100**	**45**	
75 um	**No. 200**	**39.6**	39.6% Fines

BROWN GRAVELLY SILT AND SAND (SM)



Comments: MOISTURE CONTENT = 14.9%

Sheet

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

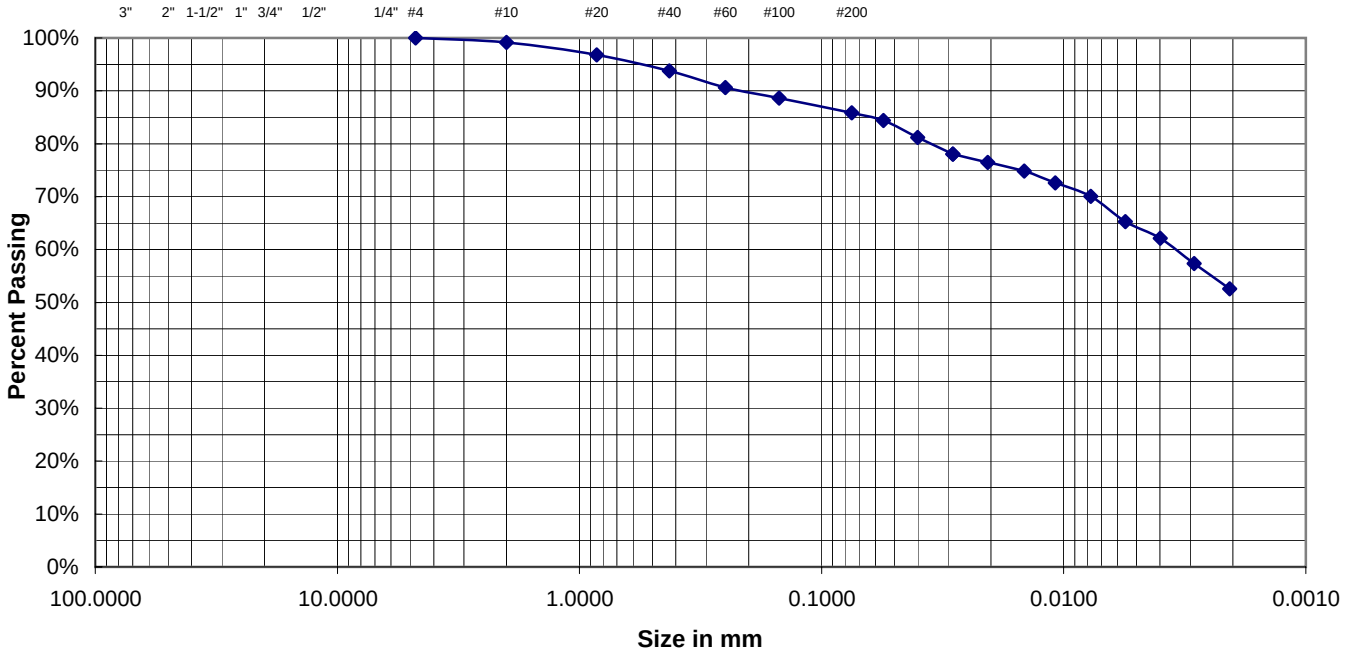
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10452S
Material Type	GRAY SANDY SILTY CLAY (CL)	Date Received	12/5/2012
Material Source	8'-10'	Date Completed	12/17/2012
Exploration	B216.6-1	Tested By	MJS

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	**100**
No. 10	2	**99**
No. 20	0.85	**97**
No. 40	0.425	**94**
No. 60	0.25	**91**
No. 100	0.15	**89**
No. 200	0.075	**85.9**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.056	84.4
0.040	81.2
0.029	78.0
0.021	76.4
0.015	74.8
0.011	72.6
0.008	70.1
0.006	65.3
0.004	62.1
0.003	57.3
0.002	52.6



Particle Distribution	
Gravel, retained on #4	0.0%
Sand, passing #4 and retained on #200	14.1%
Fines, 0.074 to 0.005	21.7%
Clay Fraction, <0.005	64.1%

Comments: MOISTURE CONTENT =23.8%

Chad B. Michaud

Reviewed By

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

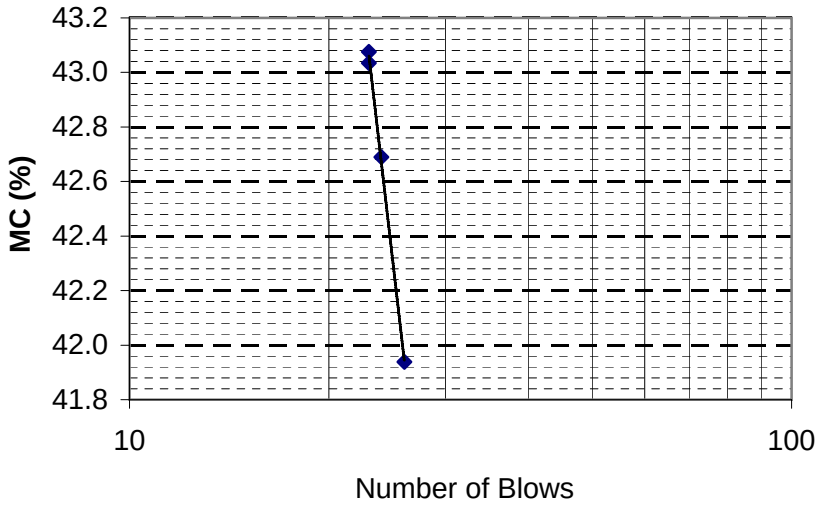
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10452S
Soil Description	GRAY SANDY SILTY CLAY (CL)	Date Received	12/5/2012
Soil Source	B216.6-1, 8'-10'	Date Completed	12/7/2012
		Tested By	JJR

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
6%	43	22	21

LIQUID LIMIT CURVE



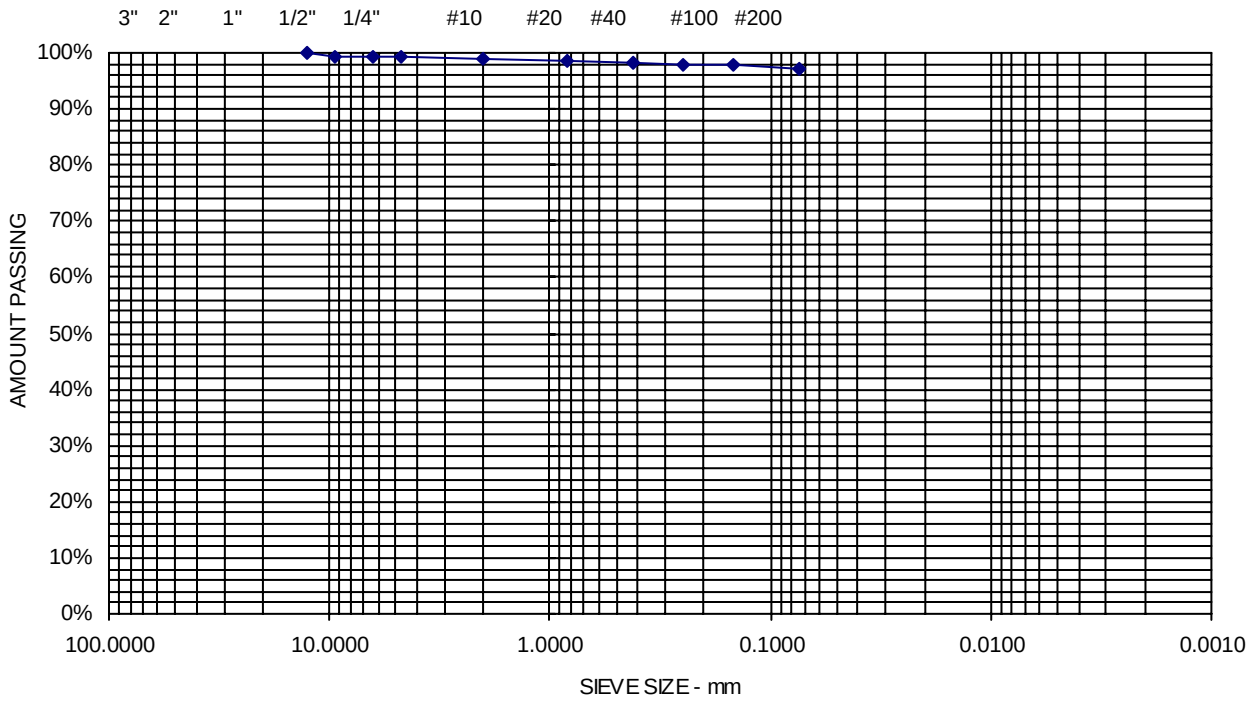
Report of Gradation

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	10453S
Exploration	**B216.6-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 15-18.5 FEET**	Date Completed	12/10/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**99**	
6.3 mm	**1/4"**	**99**	
4.75 mm	**No. 4**	**99**	0.7% Gravel
2.00 mm	**No. 10**	**99**	
850 um	**No. 20**	**99**	
425 um	**No. 40**	**98**	2.2% Sand
250 um	**No. 60**	**98**	
150 um	**No. 100**	**98**	
75 um	**No. 200**	**97.1**	97.1% Fines

BROWN SILTY CLAY TRACE SAND AND GRAVEL (CL)



Comments: MOISTURE CONTENT = 31.1%

Sheet

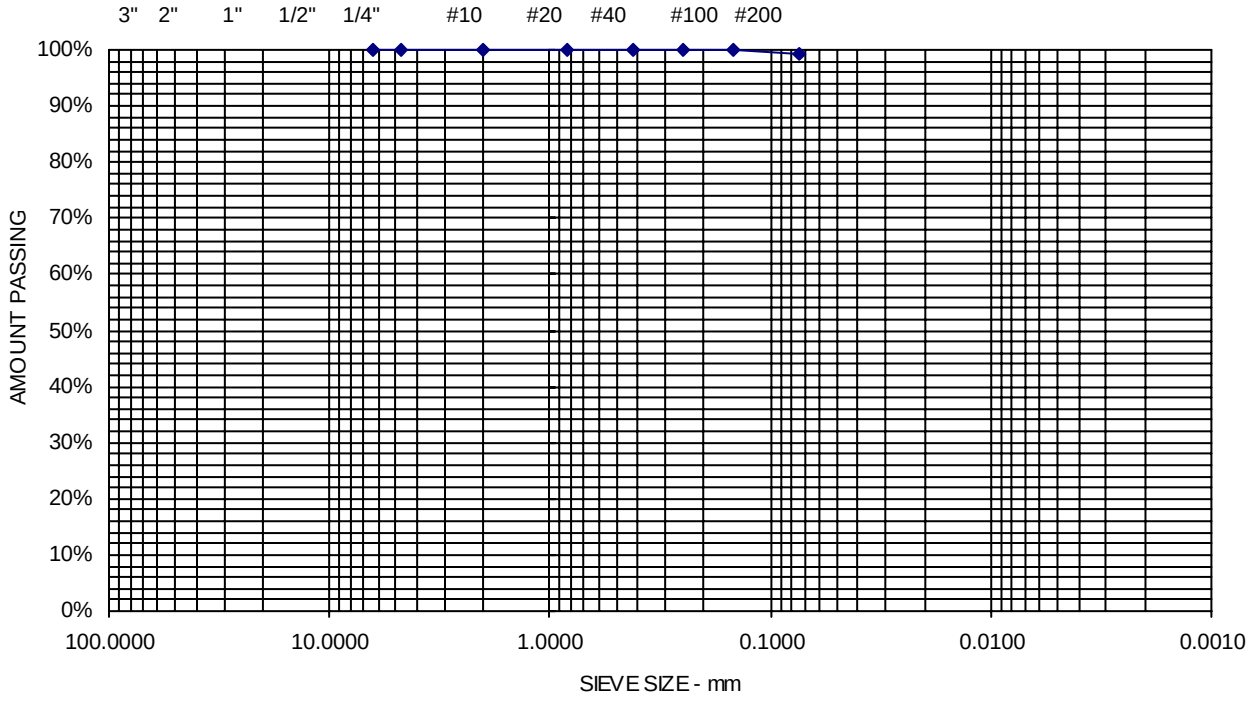
Report of Gradation

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	10454S
Exploration	**B216.6-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 28.5-30 FEET**	Date Completed	12/10/2012
		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**	**100**	0.7% Sand
250 um	**No. 60**	**100**	
150 um	**No. 100**	**100**	
75 um	**No. 200**	**99.3**	99.3% Fines

BROWN SILTY CLAY TRACE SAND (CL)



Comments: MOISTURE CONTENT = 39.3%

Sheet

SUMMARY OF LABORATORY TEST DATA

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

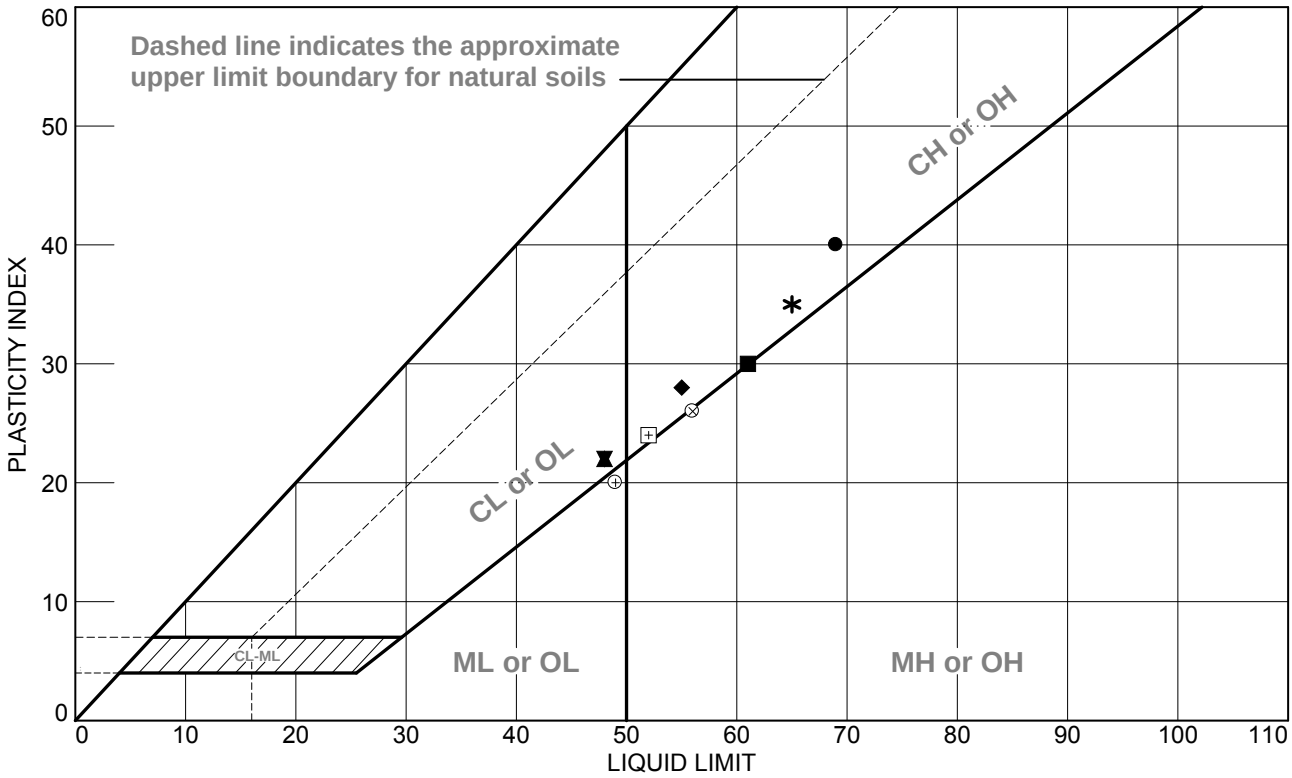
SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
B215.5-1	S-2	2.0-4.0	SM	19.4	55.7	24.9		-	-	-	-	-	18.1	-	-	-
	S-3	4.0-6.0														
	S-5	8.0-10.0	CH	-	-	-		62	29	33	0.2	-	36.9	84.4	-	-
B216.1-1	S-3	4.0-6.0	SM	16.7	66.9	16.4		-	-	-	-	-	7.6	-	-	-
	S-4	6.0-8.0	-	-	-	-		-	-	-	-	-	43.7	-	-	-
	S-5	8.0-10.0	-	-	-	-		-	-	-	-	-	40.9	86.1	-	-
	S-7	18.5-20.0	CH	0.0	6.7	4.7	88.6	58	28	30	0.1	2.80	32.2	-	-	-
B216.4-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	7.5	-	-	-
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	16.3	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	41.4	-	-	-
	S-5	8.0-10.0	CH	-	-	-	-	69	29	40	-0.1	-	25.4	-	-	-

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	-	-	-	-	-	-	-	-	-	-	25.2	-	-	-
	S-7	18.5-20.0	CH	-	-	-	-	61	31	30	0.5	-	45.4	77.3	-	-
	S-8	23.5-25.0	CL	-	-	-	-	48	26	22	0.5	-	36.4	90.9	-	-
B216.6-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-		15.6	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	29.5	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	24.7	-	-	-
	S-6	13.5-15.0	CH	-	-	-	-	55	27	28	0.2	-	32.9	89.7	-	-
	S-7	18.5-20.0	CL	-	-	-	-	48	26	22	0.3	-	33.1	89.8	-	-
	S-8	23.5-25.0	CH	-	-	-	-	65	30	35	0.4	-	45.4	78.4	-	-
A217.25-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	27.8	-	-	-
	S-3	4.0-6.0	ML	9.9		16.1	74.0	49	29	20	0.1	2.74	31.3	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B216.4-1	S-5	8.0-10.0 FT	25.4	29	69	40	CH
■	B216.4-1	S-7	18.5-20.0 FT	45.4	31	61	30	CH
▲	B216.4-1	S-8	23.5-25.0 FT	36.4	26	48	22	CL
◆	B216.6-1	S-6	13.5-15.0 FT	32.9	27	55	28	CH
▼	B216.6-1	S-7	18.5-20.0 FT	33.1	26	48	22	CL
*	B216.6-1	S-8	23.5-25.0 FT	45.4	30	65	35	CH
⊕	A217.25-1	S-3, S-4, & S-5	4.0-10.0 FT	31.3	29	49	20	ML
⊞	B218.6-1	S-2, S-3, & S-5	2.0-10.0 FT	17.4	28	52	24	CH

TRC Engineers, Inc.
Mt. Laurel, NJ

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

Project No.: 195651 **Figure** 7

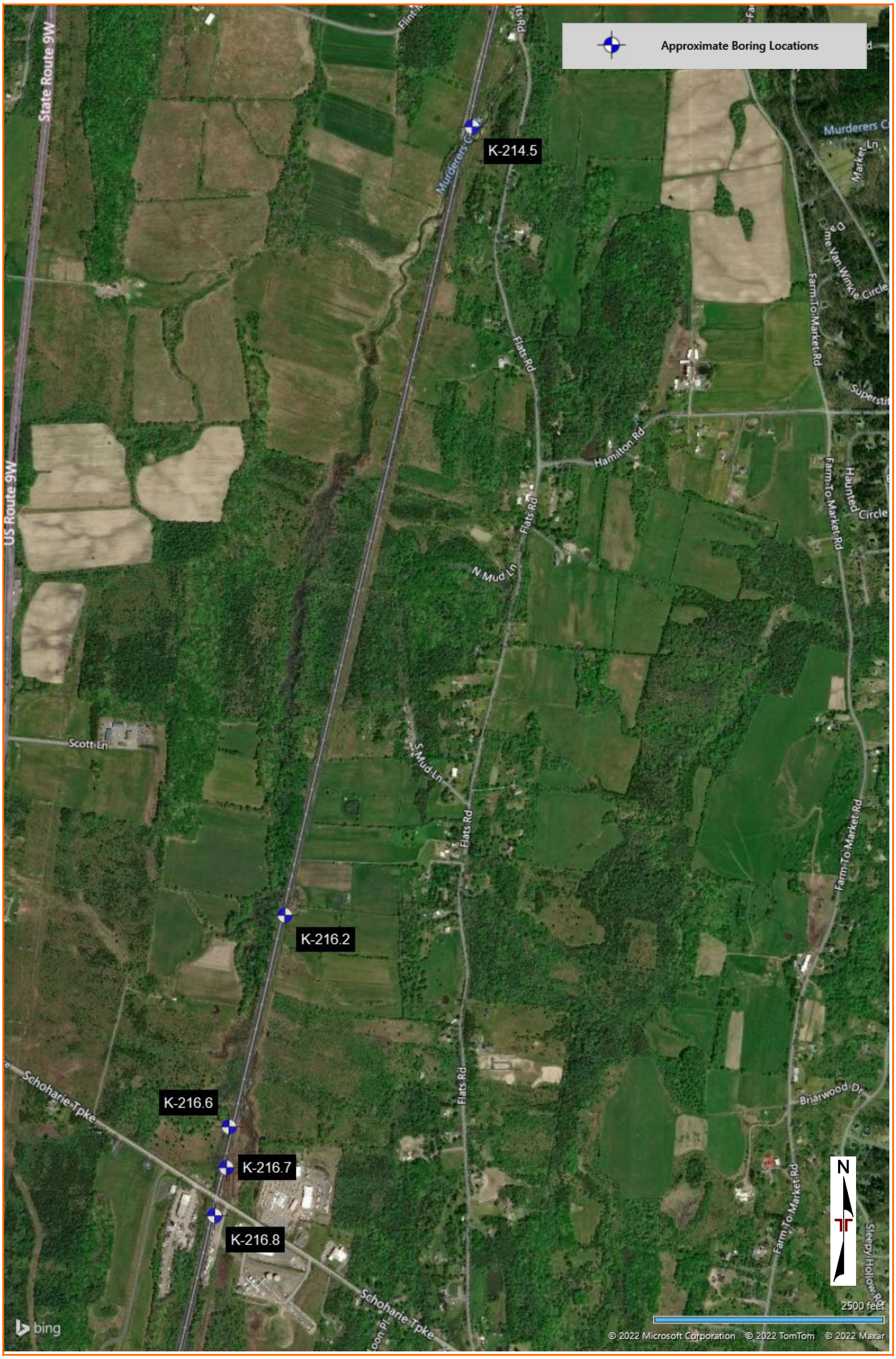


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-216.6

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: 42.2885° Longitude: -73.8416°

Surface Elev.: 124.2 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - POORLY GRADED SAND, organics noted, black, very loose		6	3-1-1-1 N=2			
2.0	122	**FILL - LEAN CLAY**, organics noted, brown, medium stiff		14	WOH-3-5-7 N=8			
4.0	120	**ELASTIC SILT WITH SAND (MH)**, brown, very soft to very stiff	5	16	6-8-9-12 N=17			
				15	12-13-14-15 N=27			
				20	4-7-7-8 N=14	33.2	54-31-23	74
			10	22	11-11-8-8 N=19			
			15	16	1-3-5 N=8			
		grades gray		24	3-3-4	45.5	58-32-26	78
			20	24	3" Split Spoon With Ring Samplers WOH-2-2-2 N=4			
			25	24	1-1-2 N=3			

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: 03-04-2022	Boring Completed: 03-04-2022
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-216.6

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: 42.2885° Longitude: -73.8416°

Surface Elev.: 124.2 (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), brown, very soft to very stiff *(continued)*							
		30						
				24	WOH-WOH -WOH	46.4	52-30-22	72
		35						
				20	WOH-WOH -WOH			
		40						
41.5	82.5			22	WOH-WOH -WOH			
	Boring Terminated at 41.5 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: 03-04-2022 | Boring Completed: 03-04-2022

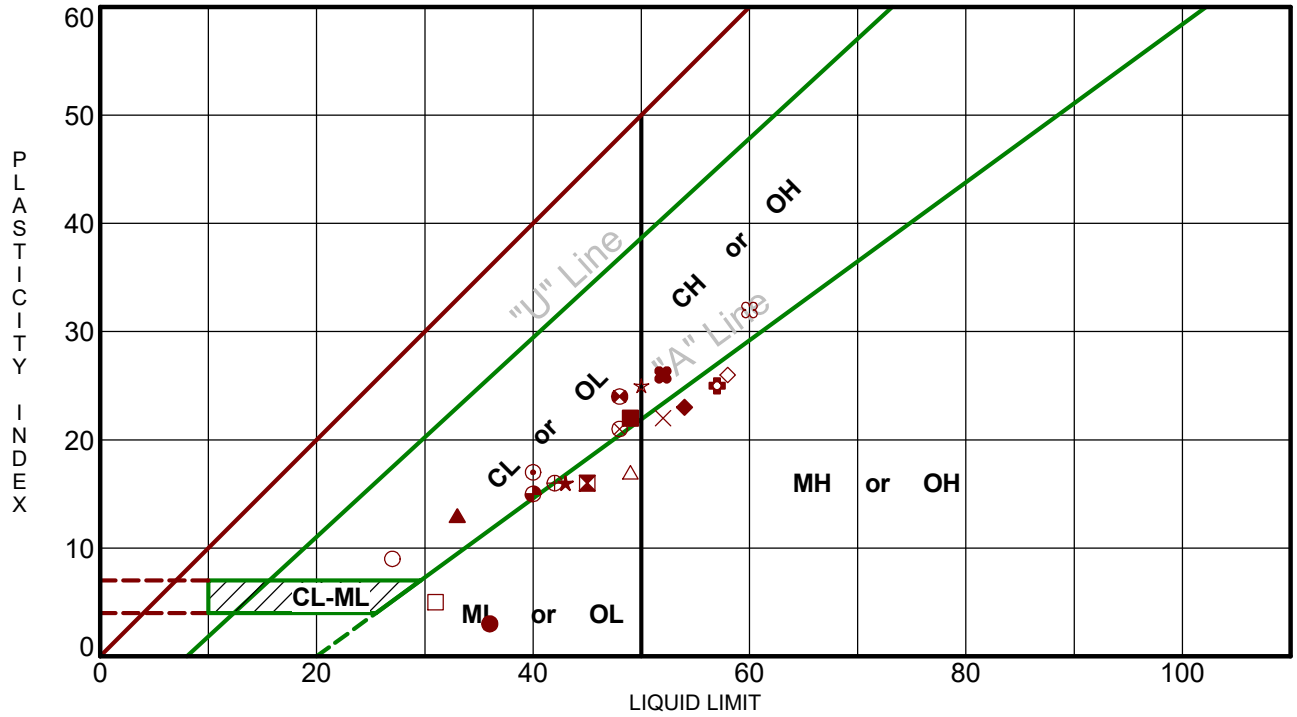
Drill Rig: CME 750X | Driller: J. Lamm

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-211.6	20 - 22	36	33	3	91.8	ML	SILT
⊠	K-211.7	6 - 8	45	29	16	83.1	ML	SILT with SAND
▲	K-211.7	21 - 23	33	20	13	95.0	CL	LEAN CLAY
★	K-211.8	6 - 8	43	27	16	88.3	ML	SILT
⊙	K-211.8	21 - 23	40	23	17	56.9	CL	GRAVELLY LEAN CLAY
✿	K-212.1	6 - 8	57	32	25	49.5	SM	SILTY SAND
○	K-212.1	25 - 27	27	18	9	97.2	CL	LEAN CLAY
△	K-212.2	10 - 12	49	32	17	70.5	ML	SILT with SAND
⊗	K-212.2	23 - 25	48	27	21	83.9	CL	LEAN CLAY with SAND
⊕	K-212.3	10 - 12	42	26	16	37.7	SM	SILTY SAND
□	K-212.3	23 - 25	31	26	5	73.3	ML	SILT with SAND
⊛	K-214.5	28 - 30	48	24	24	74.1	CL	LEAN CLAY with SAND
◕	K-214.5	35 - 37	40	25	15	90.9	CL	LEAN CLAY
☆	K-216.2	10 - 12	50	25	25	75.9	CH	FAT CLAY with SAND
✿	K-216.2	18 - 20	60	28	32	71.7	CH	FAT CLAY with SAND
■	K-216.2	30 - 31.5	49	27	22	96.0	CL	LEAN CLAY
◆	K-216.6	8 - 10	54	31	23	74.1	MH	ELASTIC SILT with SAND
◇	K-216.6	18 - 20	58	32	26	78.2	MH	ELASTIC SILT with SAND
×	K-216.6	30 - 31.5	52	30	22	72.3	MH	ELASTIC SILT with SAND
✖	K-216.7	10 - 12	52	26	26	64.0	CH	SANDY FAT CLAY

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

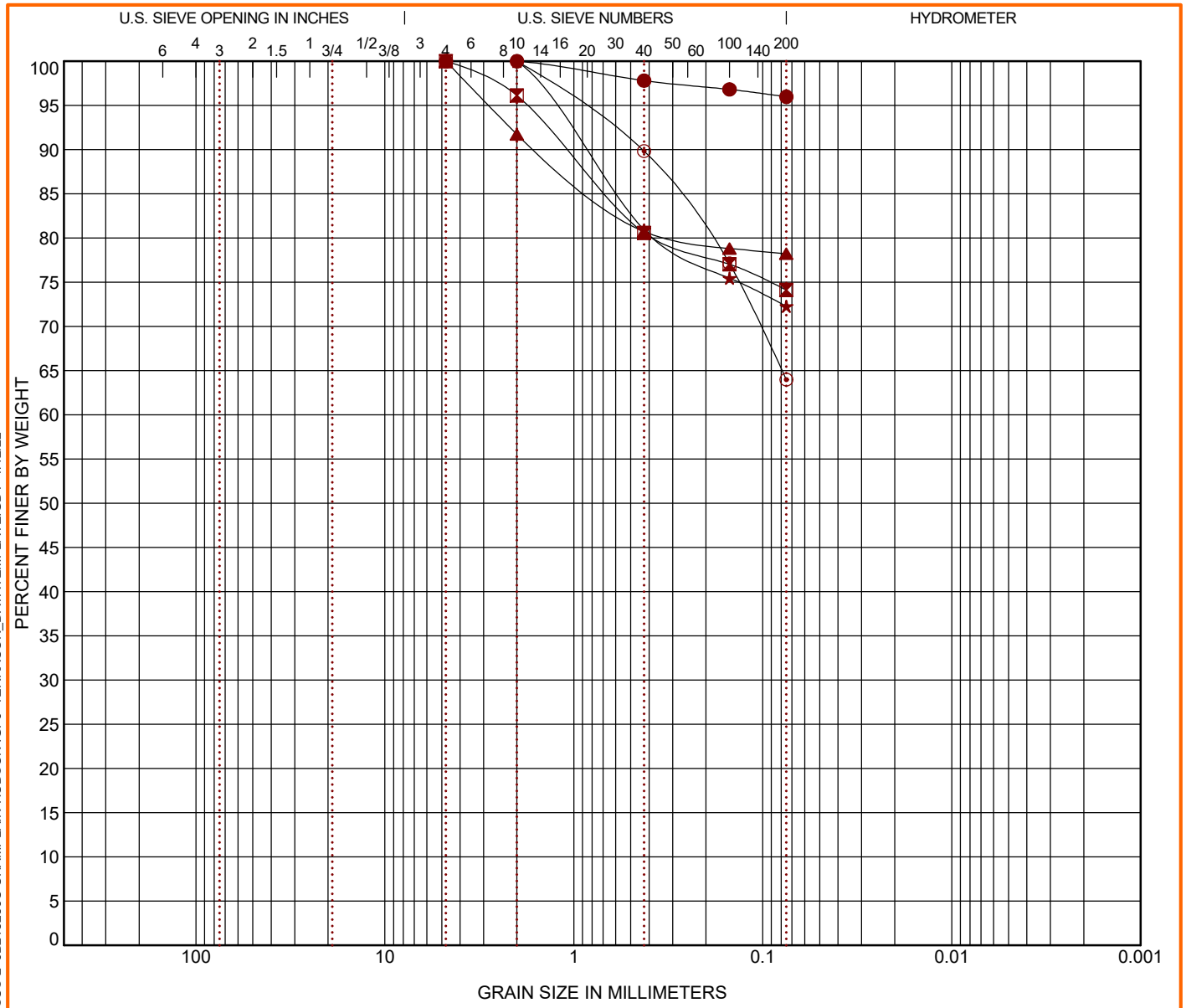
PROJECT NUMBER: JB215256C

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-216.2	30 - 31.5	LEAN CLAY (CL)	40.9	49	27	22		
⊠	K-216.6	8 - 10	ELASTIC SILT with SAND (MH)	33.2	54	31	23		
▲	K-216.6	18 - 20	ELASTIC SILT with SAND (MH)	45.5	58	32	26		
★	K-216.6	30 - 31.5	ELASTIC SILT with SAND (MH)	46.4	52	30	22		
⊙	K-216.7	10 - 12	SANDY FAT CLAY (CH)	32.1	52	26	26		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-216.2	30 - 31.5	4.75				0.0	0.0	4.0		96.0	
⊠	K-216.6	8 - 10	4.75				0.0	0.0	25.9		74.1	
▲	K-216.6	18 - 20	4.75				0.0	0.0	21.8		78.2	
★	K-216.6	30 - 31.5	4.75				0.0	0.0	27.7		72.3	
⊙	K-216.7	10 - 12	2				0.0	0.0	36.0		64.0	

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

Summary of Laboratory Results

BORING ID	Depth (Ft.)	Organic Content (%)
K-200.7	4-6	0.4
K-216.6	2-4	8.1

PROJECT: Champlain-Hudson Power Express Package 6

SITE: Champlain to Hudson HDD Crossings Selkrik 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. SMART LAB SUMMARY-PORTRAIT JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/26/22

Kiewit

MEMORANDUM

DATE: November 12, 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 111 – 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 south of Coxsackie, New York. The approximate station for the start of HDD crossing number 111 is STA 60952+50 (42.28635° N, 73.8413° W).

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

- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Package 6, Selkirk to Catskill, NY, Rev-1, dated June 28, 2022.

Contact us if you have questions or require additional information.

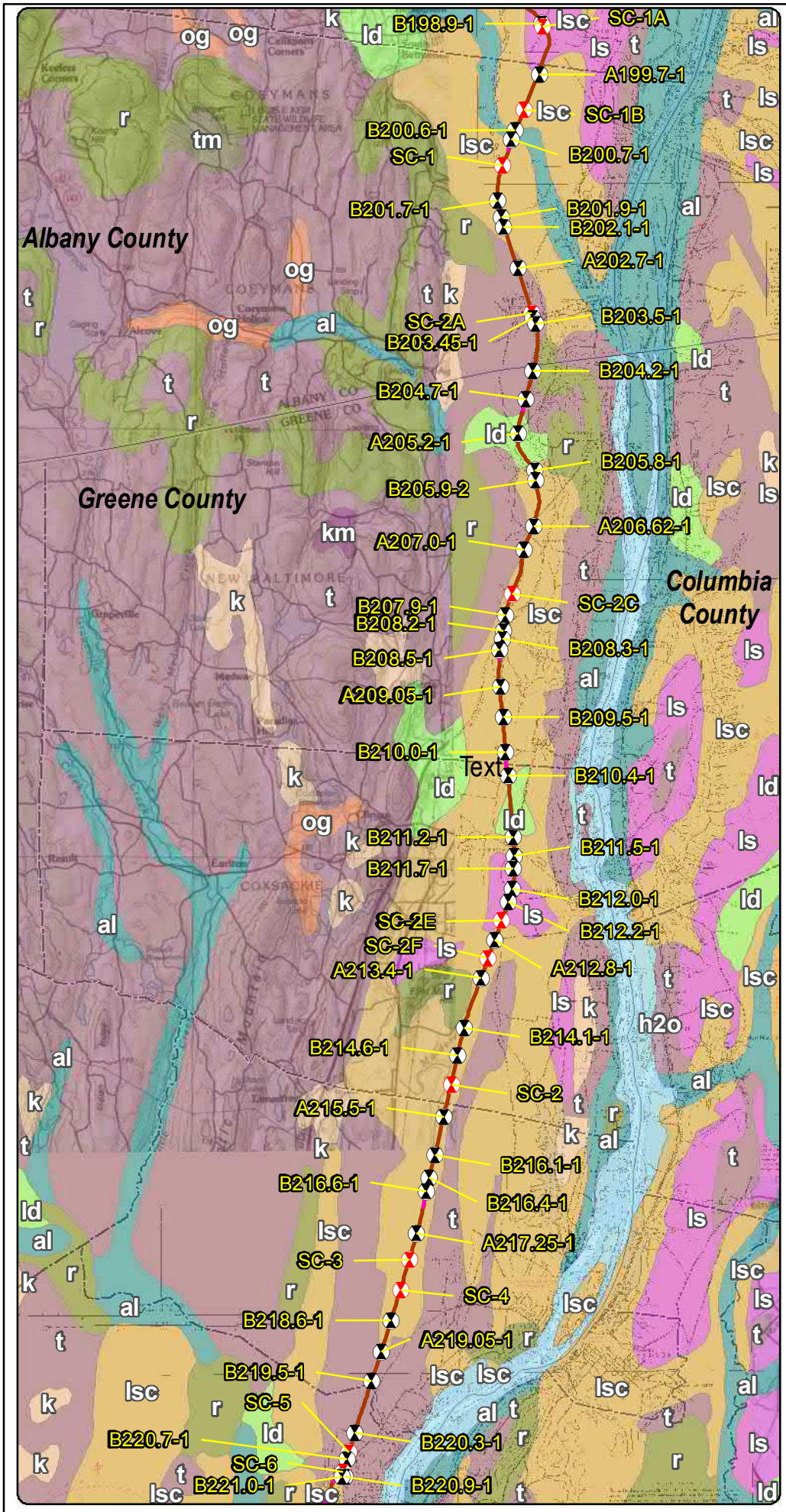
HDD 111
Borings K-216.7, K-216.8
Segment 10 - Design Package 6

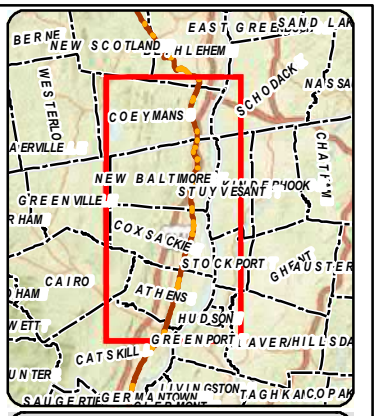
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

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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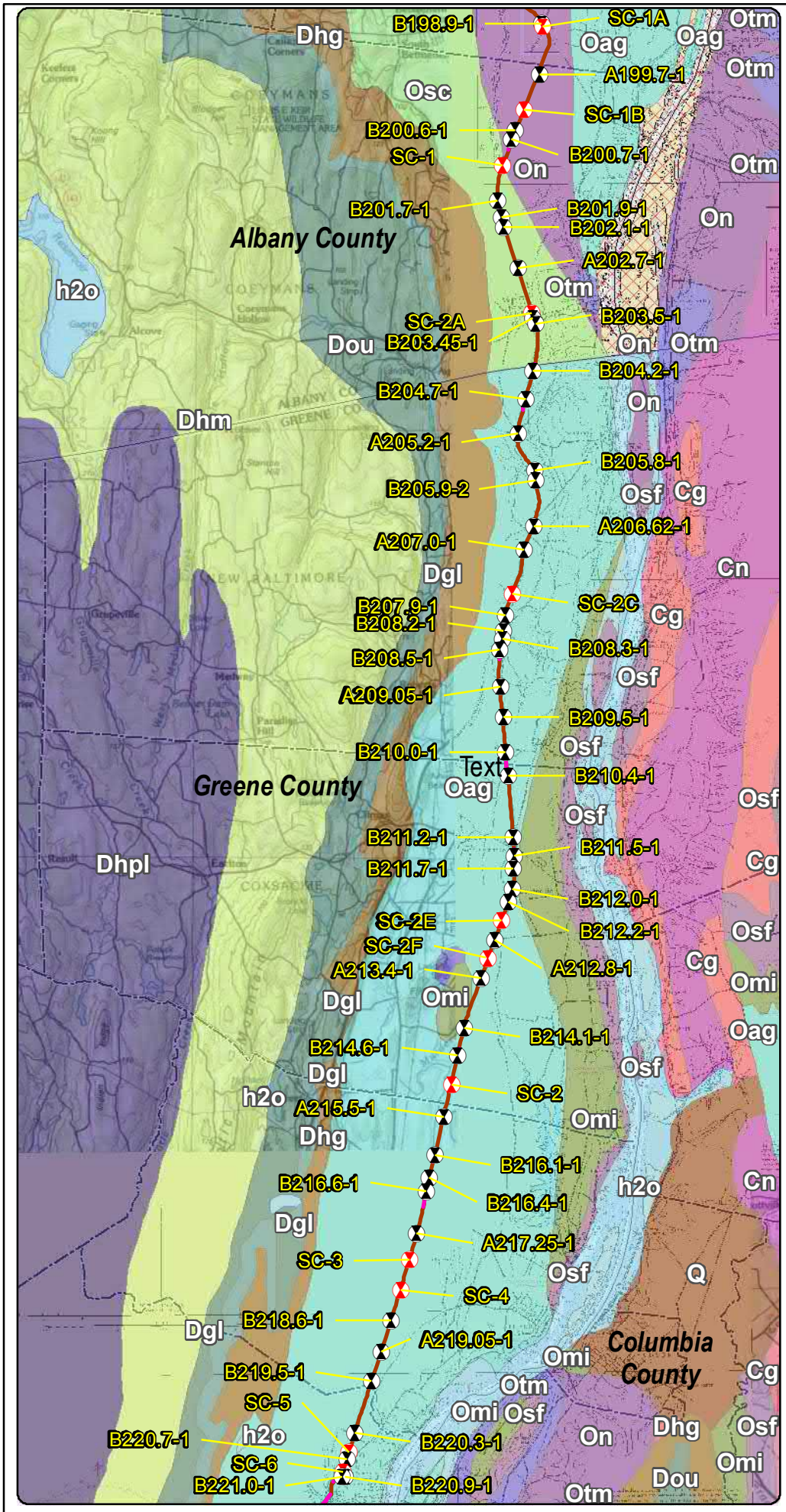

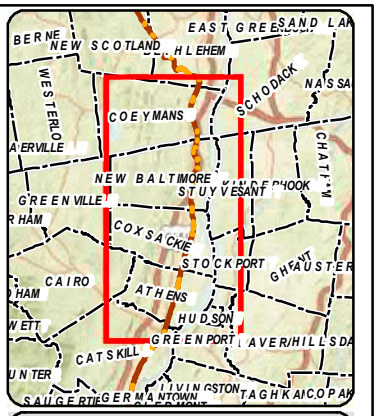

LEGEND

- 2021 Boring Location
- 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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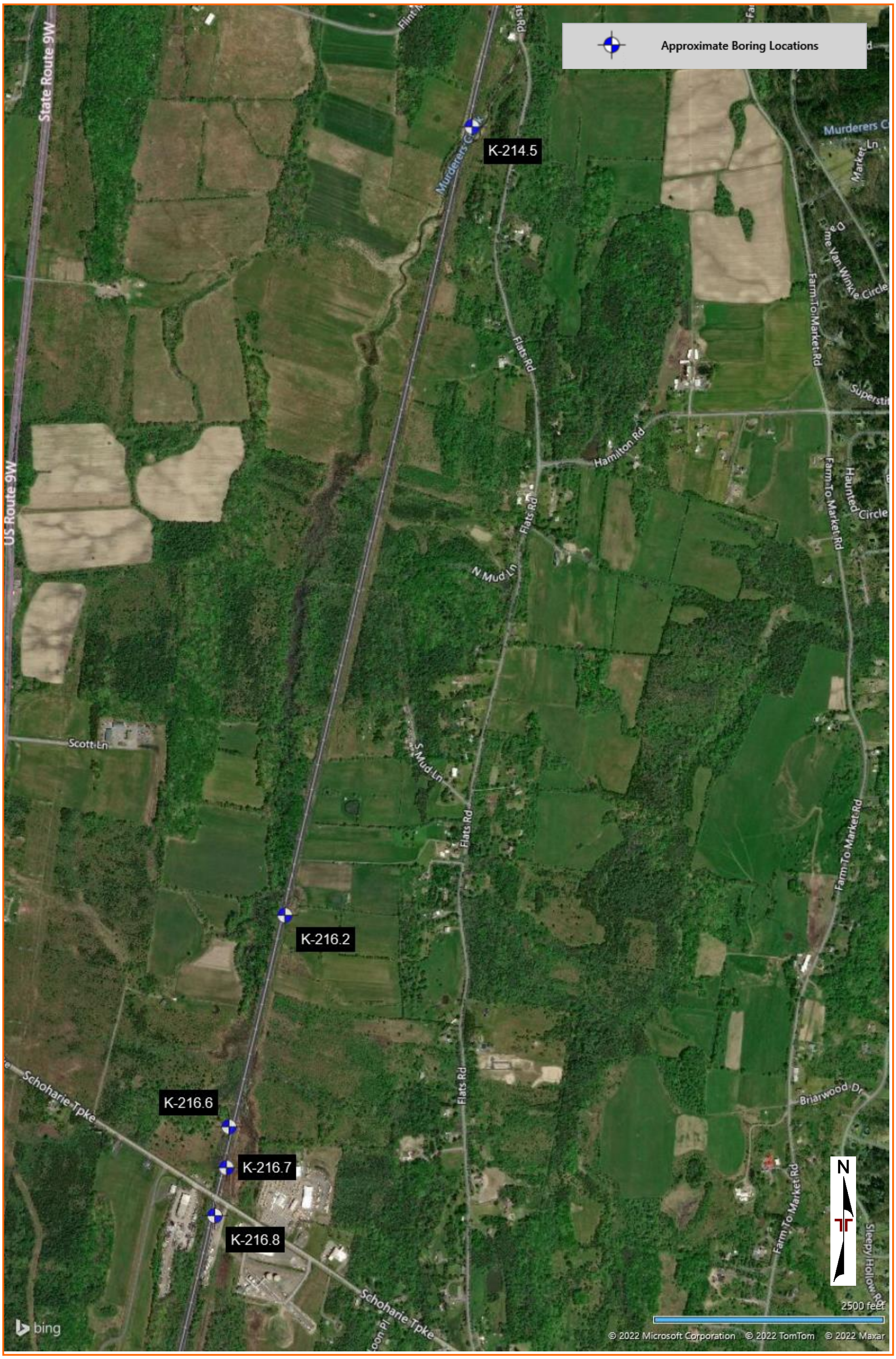


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-216.7

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: 42.2873° Longitude: -73.8418°

Surface Elev.: 130.0 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0		**FILL - BALLAST**, black, medium dense
1.5	128.5	**FILL - SILT AND CLAY**, organics noted, black and brown, soft
6.0	124	**FILL - SILTY SAND WITH GRAVEL (SM)**, black and brown, loose
8.0	122	**SILT AND CLAY (CL-ML)**, mottled brown and gray, stiff
10.0	120	**SANDY FAT CLAY (CH)**, brown, stiff to very stiff
20.0	110	**FAT CLAY WITH SAND (CH)**, gray, very soft to medium stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		1.5	8-10-12-20 N=22			
		3	2-2-1-2 N=3			
5		5	2-2-1-2 N=3			
		6	7-4-2-2 N=6			
		17	2-4-9-9 N=13			
10		18	14-14-16-15 N=30	32.1	52-26-26	64
15		18	3-5-7 N=12			
20		18	1-2-3 N=5	36.6		
25		18	WOH-1-2 N=3			
		24	2-3-5-6 3" Split Spoon	43.8	50-25-25	76

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: AB
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

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-22-2022 | Boring Completed: 02-22-2022

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-216.7

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: 42.2873° Longitude: -73.8418°

Surface Elev.: 130.0 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	FAT CLAY WITH SAND (CH), gray, very soft to medium stiff *(continued)*					With RIng Samplers			
		30			18	WOH/18"			
		35			18	WOH/18"	37.5		
		40			18	WOR/18"			
41.5	88.5								
	Boring Terminated at 41.5 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: AB
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

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-22-2022 | Boring Completed: 02-22-2022

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-216.8

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: 42.2859° Longitude: -73.8421°

Surface Elev.: 130.1 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
		FILL - SAND AND GRAVEL, trace clay, gray, loose to medium dense
4.0	126	
		FAT CLAY WITH SAND (CH), brown and gray, medium stiff to hard
24.0	106	
		LEAN CLAY WITH SAND (CL), gray, very soft to soft

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		8	8-12-16-11 N=28			
		11	8-5-3-2 N=8			
5		15	1-2-3-5 N=5			
		20	8-9-12-17 N=21			
		15	3-5-8-12 N=13	23.4		
10			14-18-18-17 N=36			
15		15	3-5-7-5 N=12	33.8	51-25-26	81
20		15	1-3-4 N=7			
25		15	WOH-2-2 N=4			
		24	2-3-2-3 3" Split Spoon	42.2	42-25-17	75

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

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-21-2022 | Boring Completed: 02-21-2022

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-216.8

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: 42.2859° Longitude: -73.8421°

Surface Elev.: 130.1 (Ft.)

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 WITH SAND (CL), gray, very soft to soft *(continued)*					Wth Ring Samplers			
		30		X	24	WOR-WOH-WOH-WOH			
		35		X	24	WOH-WOH-WOH-WOH	49.7		
		40		X	24	WOH-WOH-WOH-WOH			
42.0	88								
	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

No measurable groundwater prior to grouting

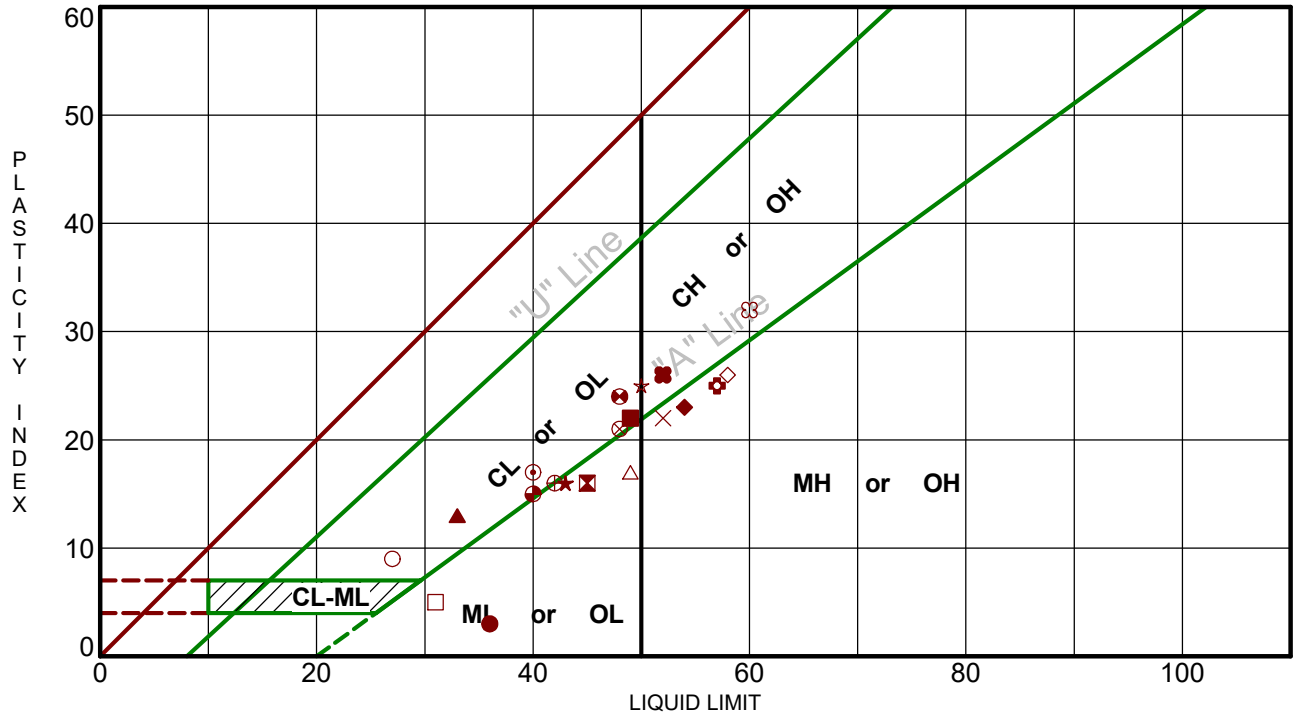
Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-21-2022	Boring Completed: 02-21-2022
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-211.6	20 - 22	36	33	3	91.8	ML	SILT
⊠	K-211.7	6 - 8	45	29	16	83.1	ML	SILT with SAND
▲	K-211.7	21 - 23	33	20	13	95.0	CL	LEAN CLAY
★	K-211.8	6 - 8	43	27	16	88.3	ML	SILT
⊙	K-211.8	21 - 23	40	23	17	56.9	CL	GRAVELLY LEAN CLAY
✿	K-212.1	6 - 8	57	32	25	49.5	SM	SILTY SAND
○	K-212.1	25 - 27	27	18	9	97.2	CL	LEAN CLAY
△	K-212.2	10 - 12	49	32	17	70.5	ML	SILT with SAND
⊗	K-212.2	23 - 25	48	27	21	83.9	CL	LEAN CLAY with SAND
⊕	K-212.3	10 - 12	42	26	16	37.7	SM	SILTY SAND
□	K-212.3	23 - 25	31	26	5	73.3	ML	SILT with SAND
⊛	K-214.5	28 - 30	48	24	24	74.1	CL	LEAN CLAY with SAND
◕	K-214.5	35 - 37	40	25	15	90.9	CL	LEAN CLAY
☆	K-216.2	10 - 12	50	25	25	75.9	CH	FAT CLAY with SAND
✿	K-216.2	18 - 20	60	28	32	71.7	CH	FAT CLAY with SAND
■	K-216.2	30 - 31.5	49	27	22	96.0	CL	LEAN CLAY
◆	K-216.6	8 - 10	54	31	23	74.1	MH	ELASTIC SILT with SAND
◇	K-216.6	18 - 20	58	32	26	78.2	MH	ELASTIC SILT with SAND
×	K-216.6	30 - 31.5	52	30	22	72.3	MH	ELASTIC SILT with SAND
✖	K-216.7	10 - 12	52	26	26	64.0	CH	SANDY FAT CLAY

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

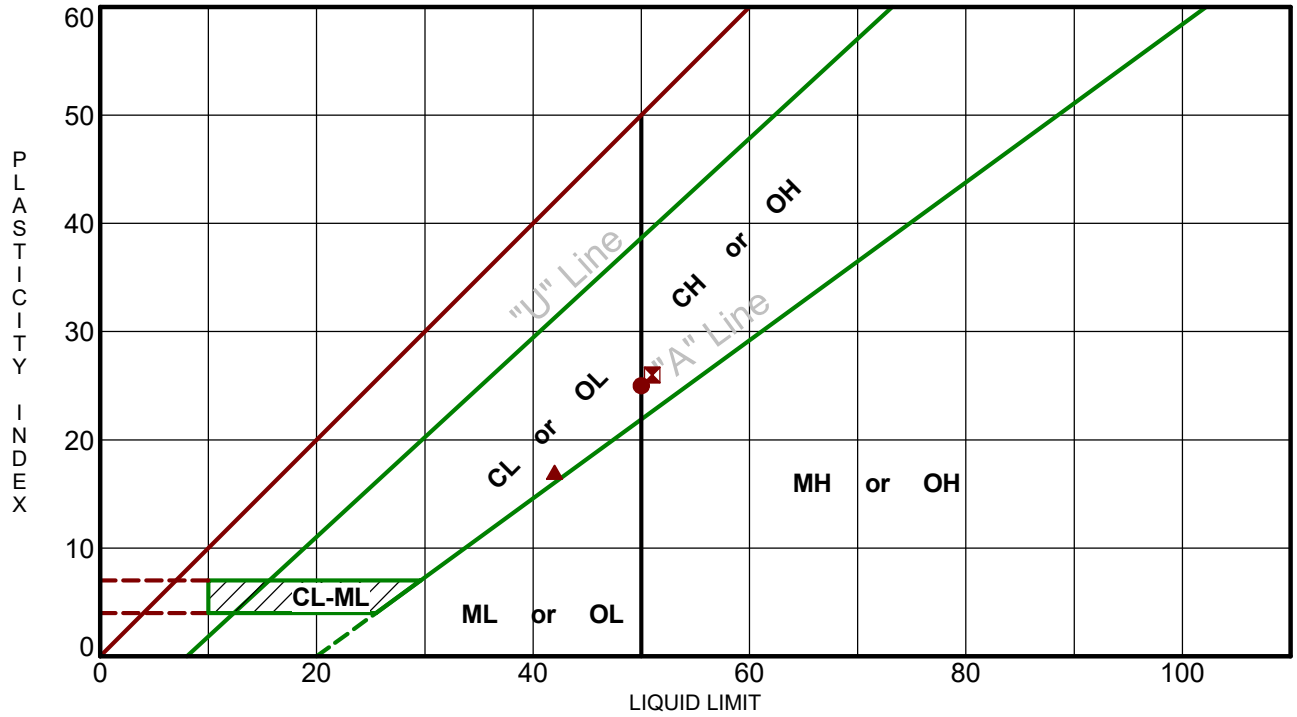
PROJECT NUMBER: JB215256C

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

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-216.7	26 - 28	50	25	25	75.5	CH	FAT CLAY with SAND
⊠	K-216.8	15 - 17	51	25	26	81.1	CH	FAT CLAY with SAND
▲	K-216.8	26 - 28	42	25	17	75.4	CL	LEAN CLAY with SAND

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

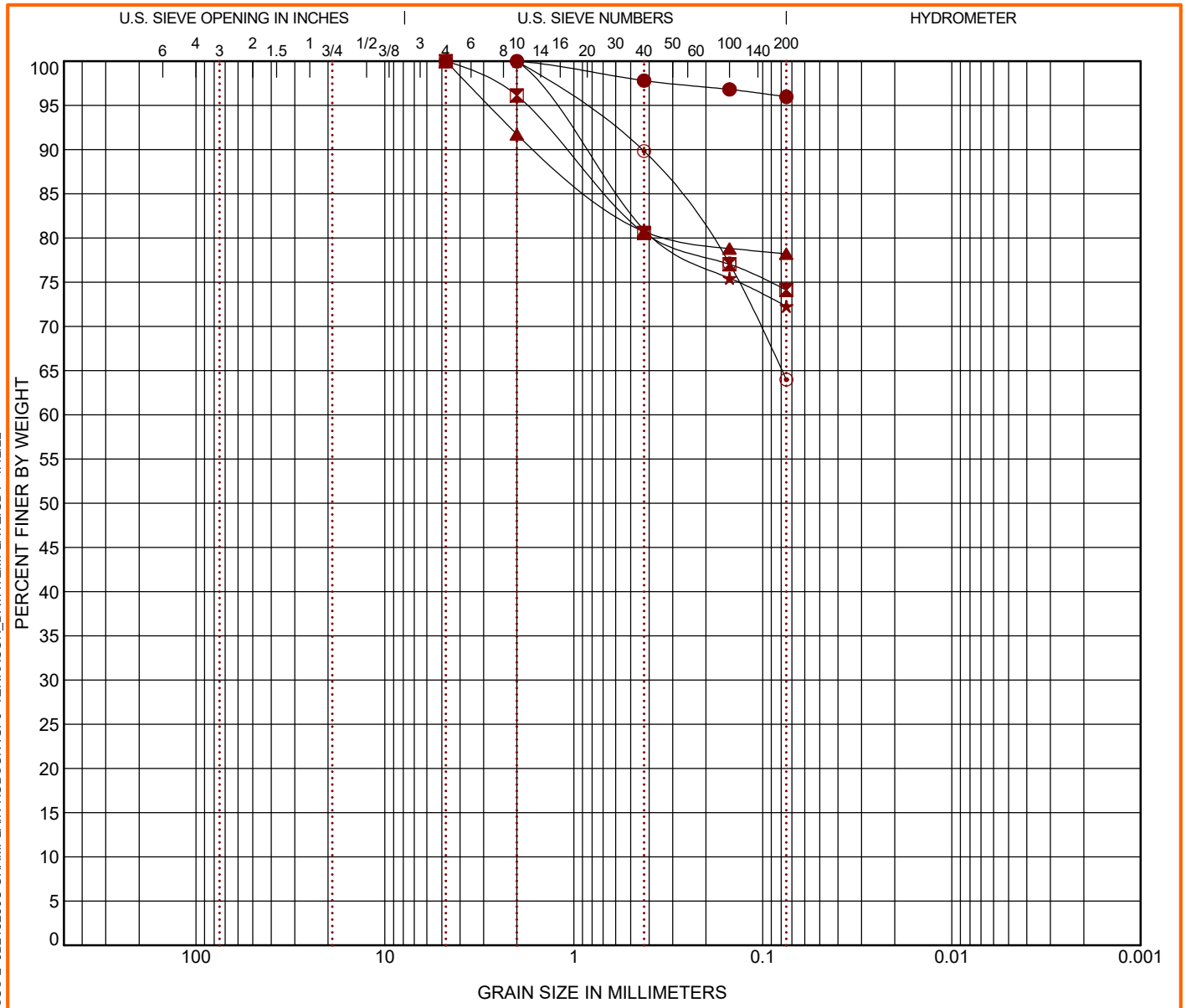
PROJECT NUMBER: JB215256C

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-216.2	30 - 31.5	LEAN CLAY (CL)	40.9	49	27	22		
⊠	K-216.6	8 - 10	ELASTIC SILT with SAND (MH)	33.2	54	31	23		
▲	K-216.6	18 - 20	ELASTIC SILT with SAND (MH)	45.5	58	32	26		
★	K-216.6	30 - 31.5	ELASTIC SILT with SAND (MH)	46.4	52	30	22		
⊙	K-216.7	10 - 12	SANDY FAT CLAY (CH)	32.1	52	26	26		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-216.2	30 - 31.5	4.75				0.0	0.0	4.0		96.0	
⊠	K-216.6	8 - 10	4.75				0.0	0.0	25.9		74.1	
▲	K-216.6	18 - 20	4.75				0.0	0.0	21.8		78.2	
★	K-216.6	30 - 31.5	4.75				0.0	0.0	27.7		72.3	
⊙	K-216.7	10 - 12	2				0.0	0.0	36.0		64.0	

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

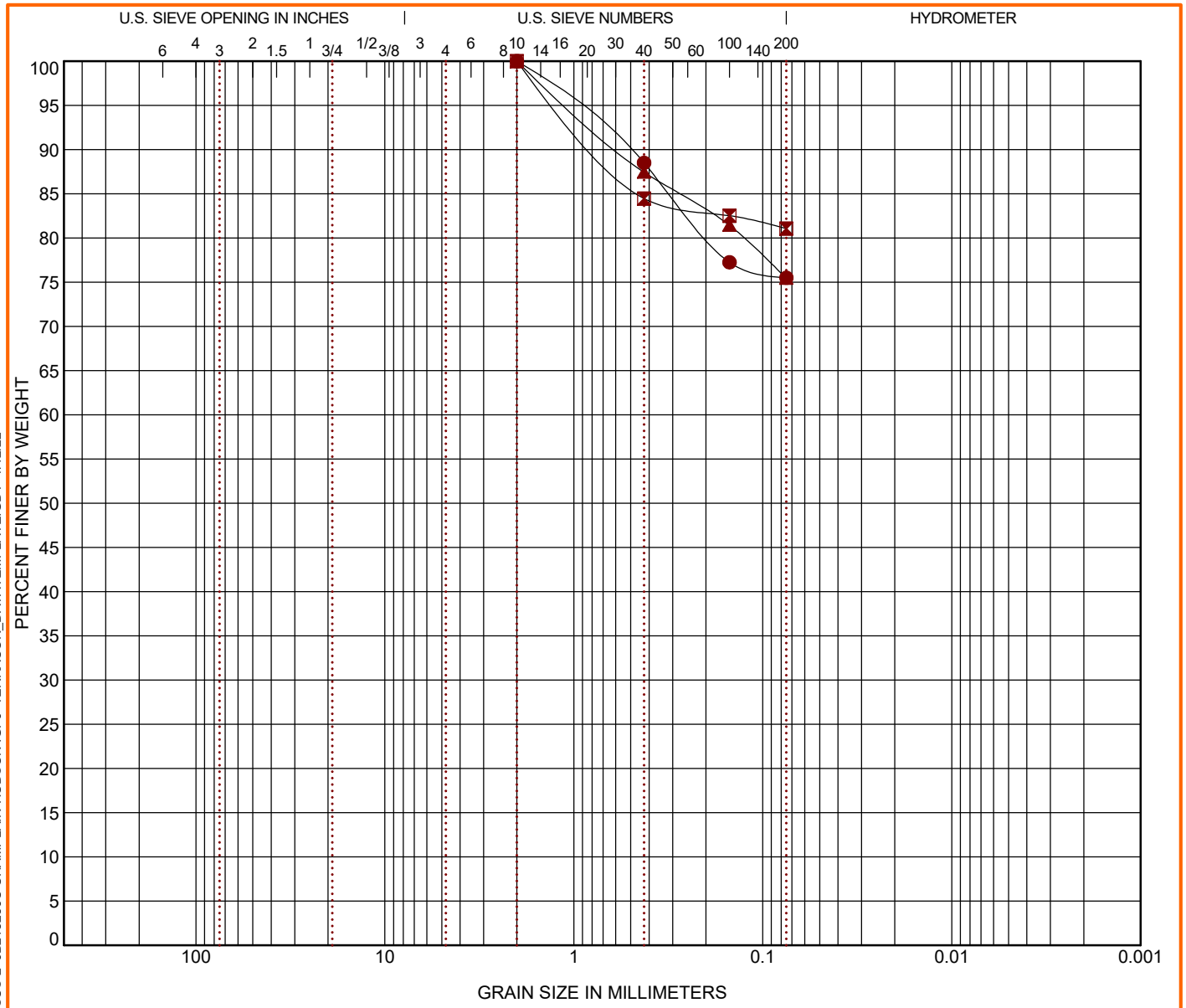
PROJECT NUMBER: JB215256C

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

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-216.7	26 - 28	FAT CLAY with SAND (CH)	43.8	50	25	25		
⊠	K-216.8	15 - 17	FAT CLAY with SAND (CH)	33.8	51	25	26		
▲	K-216.8	26 - 28	LEAN CLAY with SAND (CL)	42.2	42	25	17		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-216.7	26 - 28	2				0.0	0.0	24.5		75.5	
⊠	K-216.8	15 - 17	2				0.0	0.0	18.9		81.1	
▲	K-216.8	26 - 28	2				0.0	0.0	24.6		75.4	

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

CHEMICAL LABORATORY TEST REPORT

Project Number: JB215256
Service Date: 04/05/22
Report Date: 04/06/22

Terracon
10400 State Highway 191
Midland, Texas 79707
432-684-9600

Client

Kiewit Engineering (NY) Corp
1055 Trainstation Cicle
Lone Tree, CO 80124

Project

Champlain-Hudson Power Express Project
Champlain to Hudson HDD Crossings
Schenectady, NY

Sample Location	K-203.6	K-216.8
Sample Depth (ft.)	2-6	2-6
pH Analysis, ASTM - G51-18	7.6	7.7
Water Soluble Sulfate (SO4), ASTM C 1580 (mg/kg)	7	335
Sulfides, ASTM - D4658-15, (mg/kg)	nil	nil
Chlorides, ASTM D 512 , (mg/kg)	31	50
RedOx, ASTM D-1498, (mV)	+490	+430
Total Salts, ASTM D1125-14, (mg/kg)	340	1,270
Resistivity, ASTM G187, (ohm-cm)	6,505	1,755

Analyzed By: Zach Robertson

Zach Robertson
Engineering Technician III

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

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 111A
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 south of Coxsackie, New York. The approximate station for the start of HDD crossing number 111A is STA 61085+00 (42.2519°N, 73.8554°W).

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

- 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, NY, dated April 25, 2023.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Phase 4 HDD Borings – Package 6 and 7A – Rev 2, Schenectady through Selkirk, NY, dated May 31, 2023.

Contact us if you have questions or require additional information.

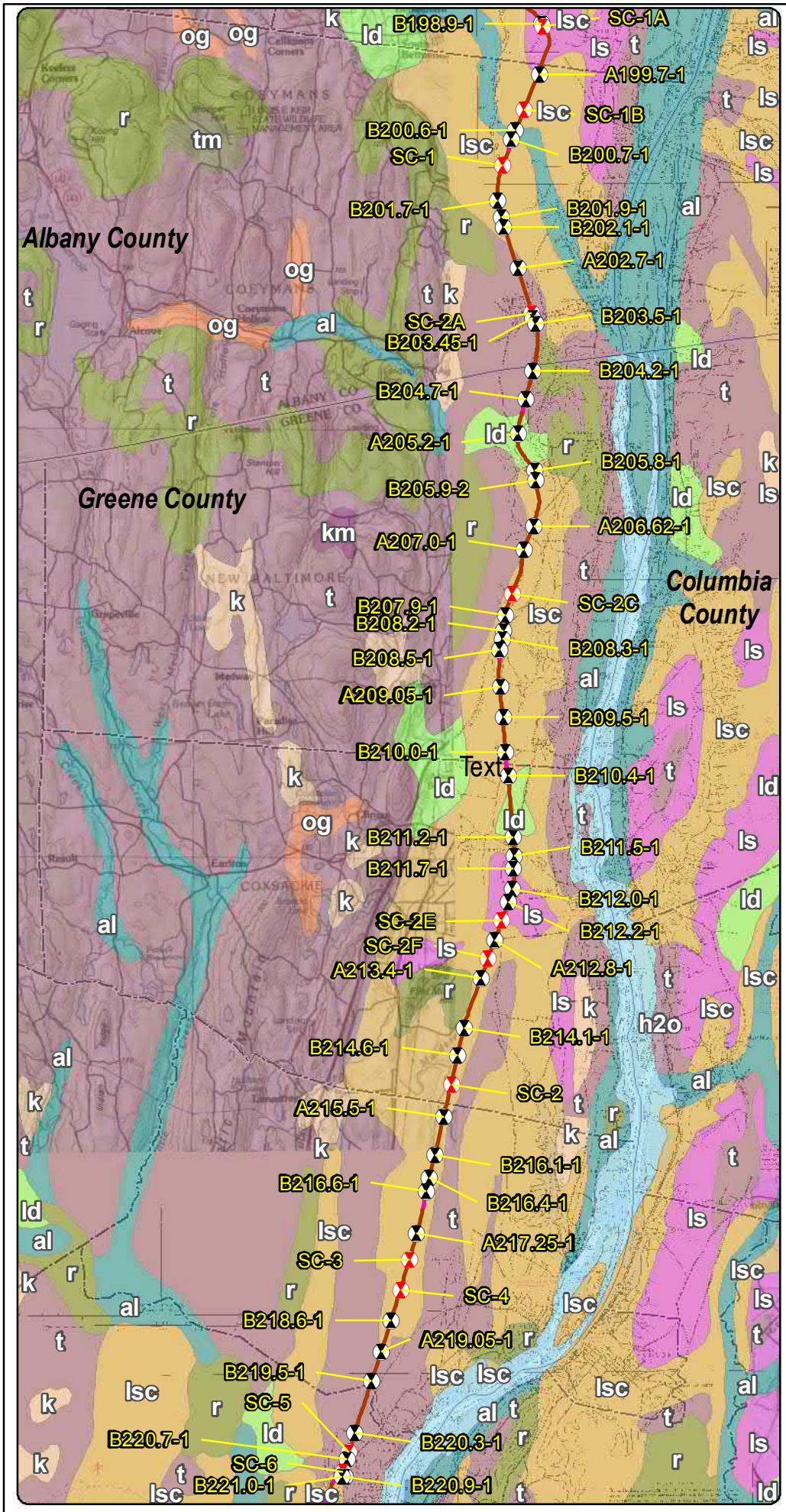
HDD 111A
Borings B219.5-1, KB-219.2,
KB-219.3, KB-219.4
Segment 10 - Design Package 6

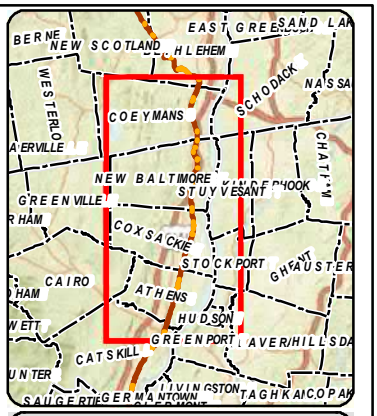
CHPE Segment 10 - Package 6
HDD Soil Boring Coordinates and Elevations

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

N

1 0.5 0 1 Miles

Transmission Developers Inc.

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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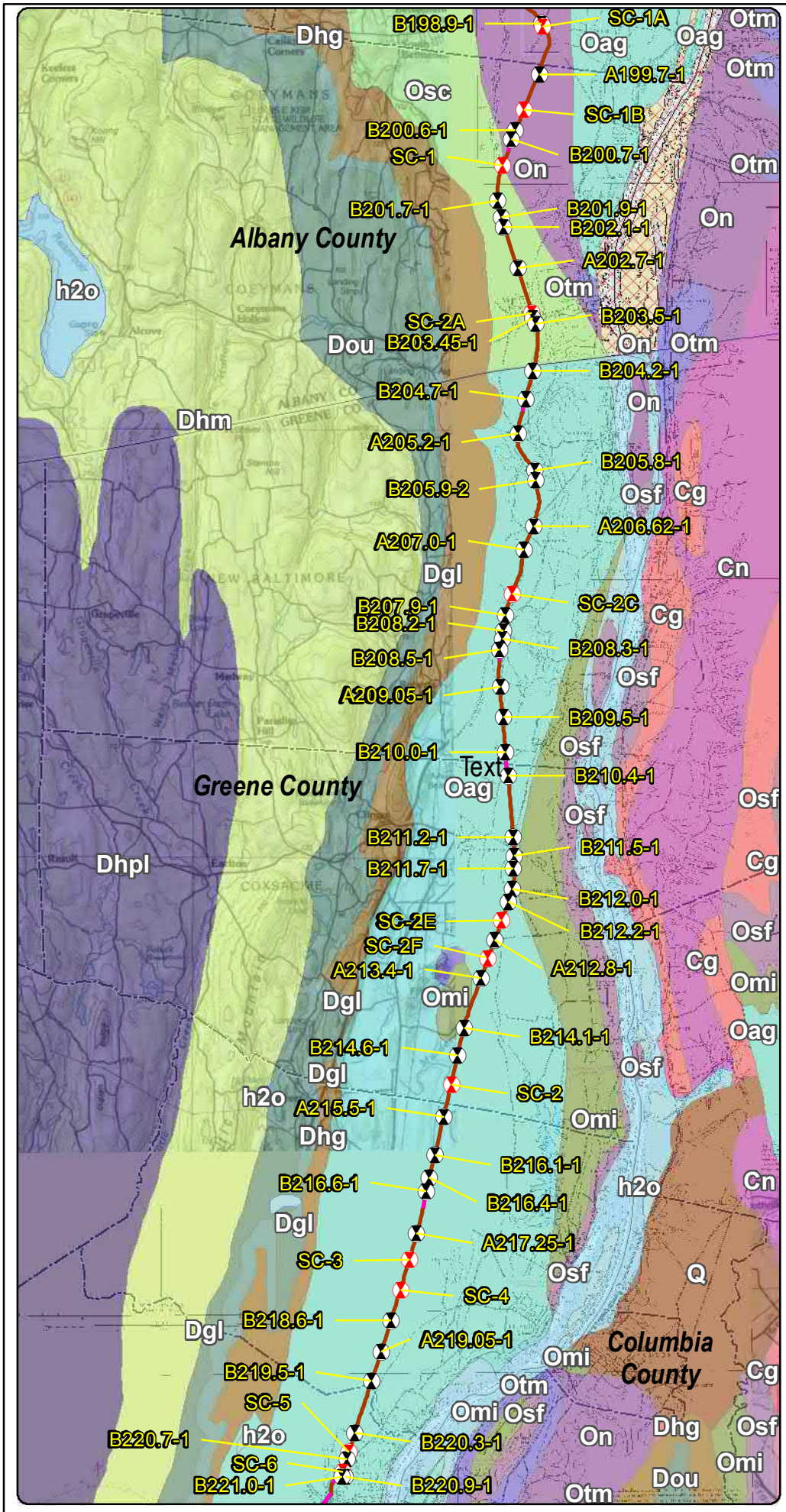

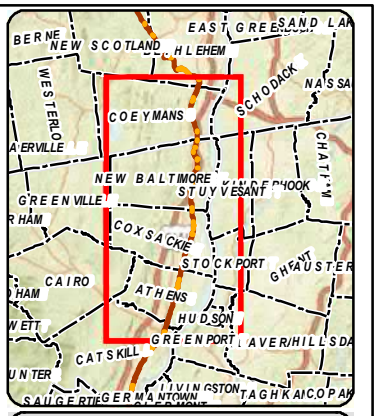

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- Previous (2013) Boring Location
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- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

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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