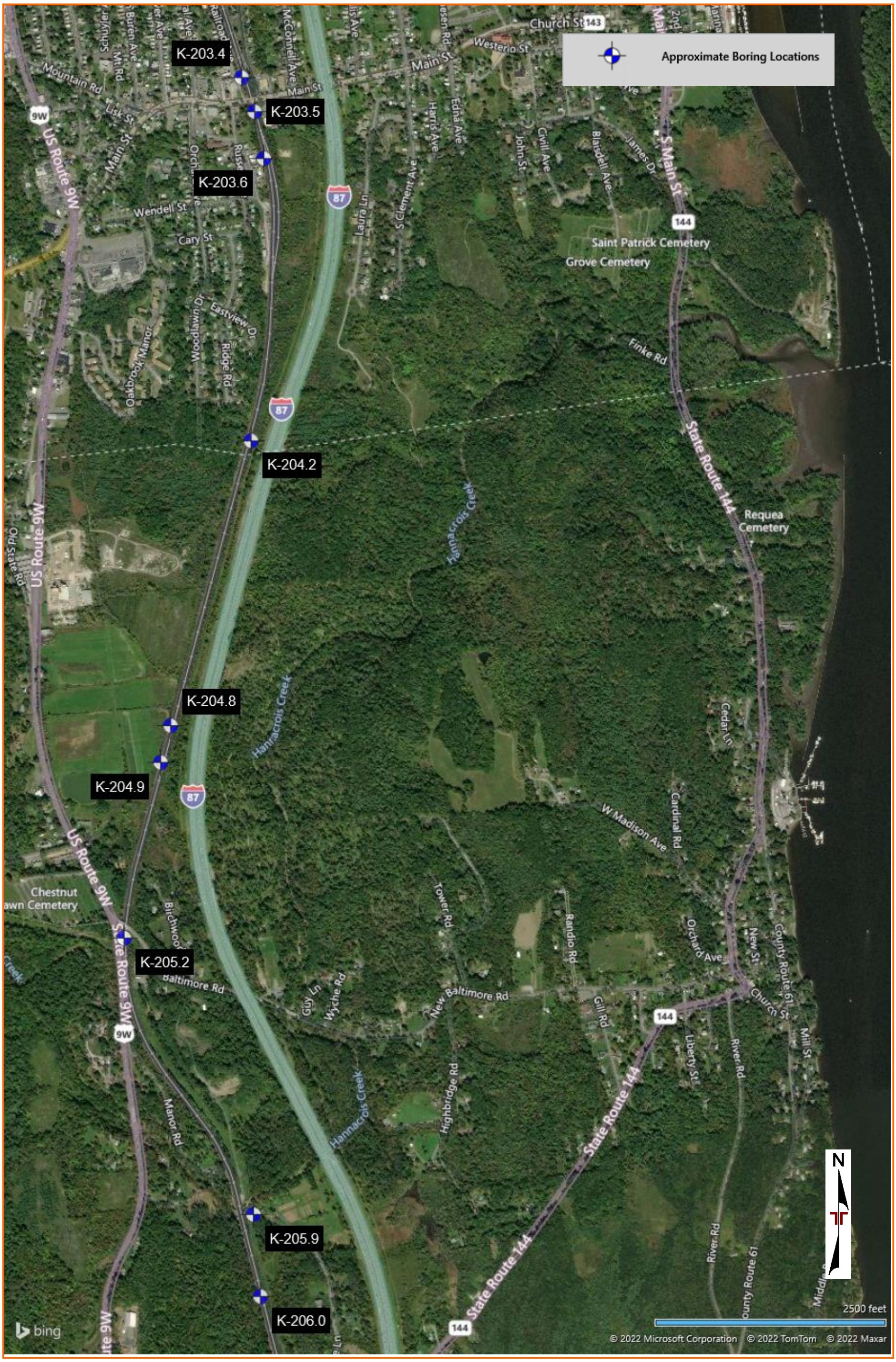


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-204.2

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: 42.4620° Longitude: -73.8092°

Surface Elev.: 194.4 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
		FILL - ASH AND CINDERS, black and brown, loose
2.5	192	
		SILT WITH SAND (ML), brown, soft to stiff
25.0	169.5	
		LEAN CLAY (CL), gray, medium stiff

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	10	3-4-5-3 N=9			
	7	1-2-2-3 N=4			
5	10	2-2-2-3 N=4			
	15	2-4-6-7 N=10			
	15	4-7-8-9 N=15			
10	14	2-5-7-7 N=12	28.0	44-39-5	74
15	14	2-5-7-9 N=12			
20	24	4-6-8-9 N=14			
25	14	1-3-4-4 N=7	34.6	31-21-10	89

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

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-24-2022
Boring Completed: 02-28-2022
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-204.2

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: 42.4620° Longitude: -73.8092°

Surface Elev.: 194.4 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS
28.5	166	**WEATHERED ROCK**, gray	
30.0	164.5	**GRAYWACKE**, slightly weathered, close to moderately fractured, fair RQD, gray	REC = 60% RQD = 60%
35.0	159.5	**GRAYWACKE**, slightly to moderately weathered, extremely close to close fractured, fair RQD, gray	REC = 60% RQD = 55%
40.0	154.5	***Boring Terminated at 40 Feet***	

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

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

Hammer Type: Automatic

Advancement Method:
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

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-24-2022 | Boring Completed: 02-28-2022

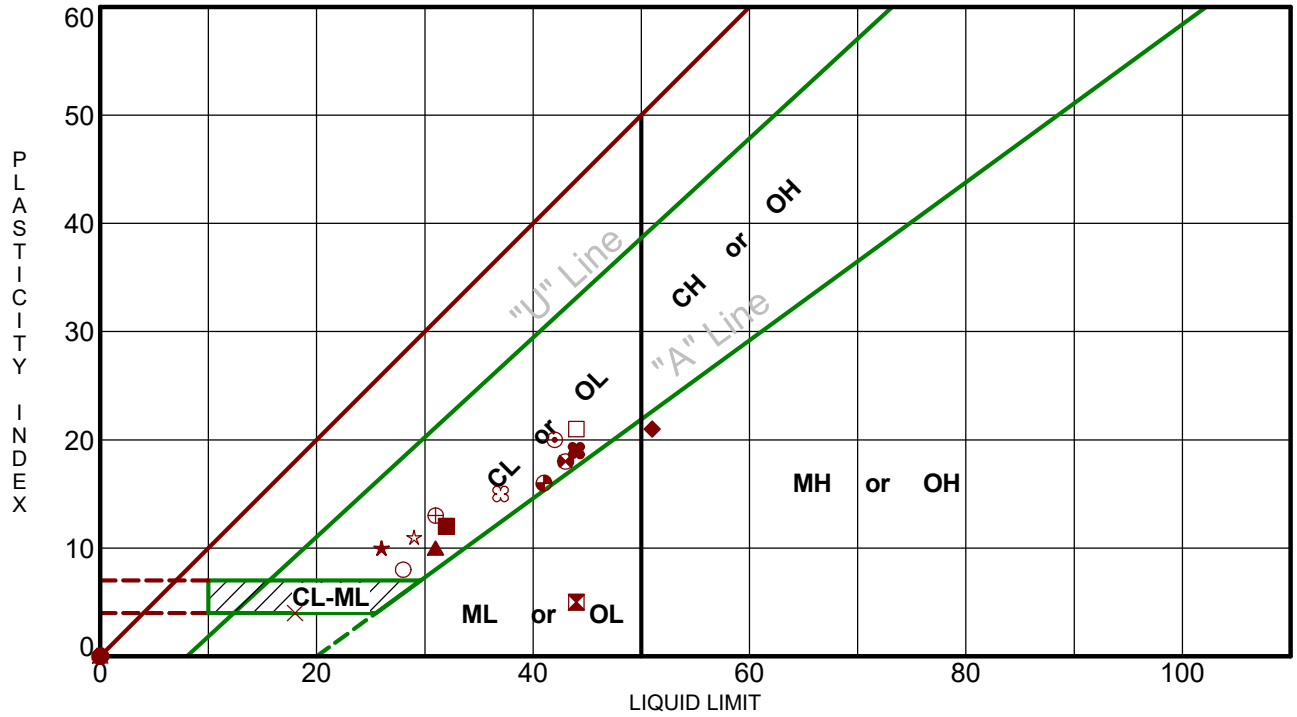
Drill Rig: Mobile B-57 | Driller: B. Duffy

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

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-203.6	20 - 22	NP	NP	NP	14.7	SM	SILTY SAND with GRAVEL
⧗	K-204.2	10 - 12	44	39	5	74.5	ML	SILT with SAND
▲	K-204.2	25 - 27	31	21	10	89.4	CL	LEAN CLAY
★	K-204.8	10 - 12	26	16	10	90.2	CL	LEAN CLAY
⊙	K-204.8	23 - 25	42	22	20	93.8	CL	LEAN CLAY
✿	K-204.9	10 - 12	NP	NP	NP	97.2	ML	SILT
○	K-204.9	18 - 20	28	20	8	95.8	CL	LEAN CLAY
△	K-205.2	20 - 22	NP	NP	NP	41.6	SM	SILTY SAND
⊗	K-205.2	30 - 32	NP	NP	NP	39.8	SM	SILTY SAND
⊕	K-205.9	8 - 10	31	18	13	86.6	CL	LEAN CLAY
□	K-205.9	25 - 26.5	44	23	21	84.5	CL	LEAN CLAY with SAND
⊛	K-206.0	8 - 10	43	25	18	45.2	GC	CLAYEY GRAVEL with SAND
◕	K-206.5	8 - 10	41	25	16	70.6	CL	LEAN CLAY with SAND
☆	K-206.5	15 - 17	29	18	11	97.5	CL	LEAN CLAY
✿	K-206.6	13 - 15	37	22	15	87.0	CL	LEAN CLAY
■	K-206.6	23 - 25	32	20	12	98.5	CL	LEAN CLAY
◆	K-207.6	6 - 8	51	30	21	69.8	MH	SANDY ELASTIC SILT
◇	K-207.6	15 - 17	NP	NP	NP	8.2	GW-GM	WELL-GRADED GRAVEL with SILT and SAND
×	K-207.6	24.7 - 26.3	18	14	4	26.6	SC-SM	SILTY, CLAYEY SAND with GRAVEL
✖	K-207.7	15 - 17	44	25	19	93.0	CL	LEAN 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

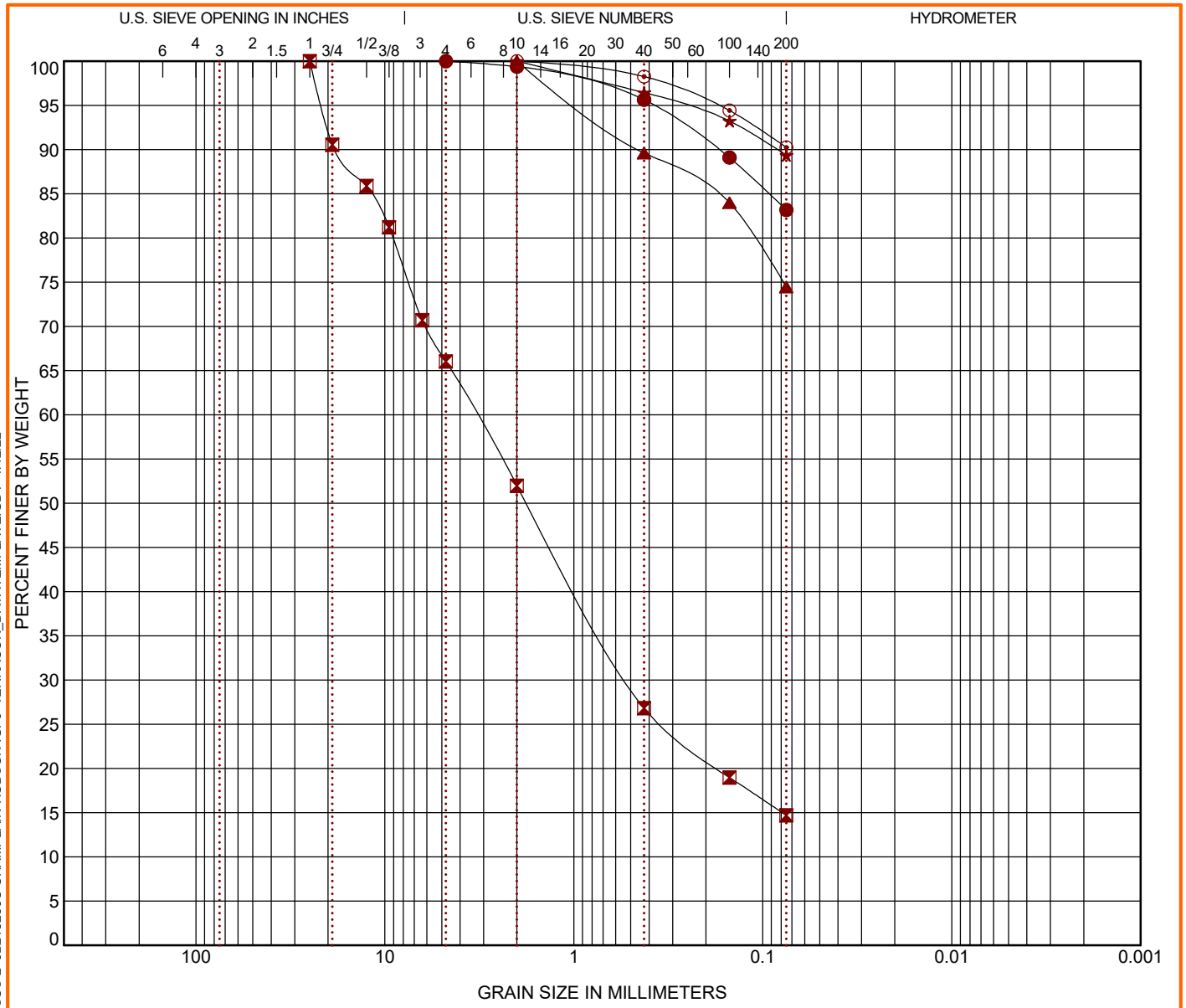
PROJECT NUMBER: JB215256C

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-203.6	10 - 12	LEAN CLAY with SAND (CL)	29.1	41	23	18		
⊠	K-203.6	20 - 22	SILTY SAND with GRAVEL (SM)	9.6	NP	NP	NP		
▲	K-204.2	10 - 12	SILT with SAND (ML)	28.0	44	39	5		
★	K-204.2	25 - 27	LEAN CLAY (CL)	34.6	31	21	10		
⊙	K-204.8	10 - 12	LEAN CLAY (CL)	37.8	26	16	10		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-203.6	10 - 12	4.75				0.0	0.0	16.8		83.2	
⊠	K-203.6	20 - 22	25	3.277	0.517		0.0	34.0	51.3		14.7	
▲	K-204.2	10 - 12	2				0.0	0.0	25.5		74.5	
★	K-204.2	25 - 27	2				0.0	0.0	10.6		89.4	
⊙	K-204.8	10 - 12	2				0.0	0.0	9.8		90.2	

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

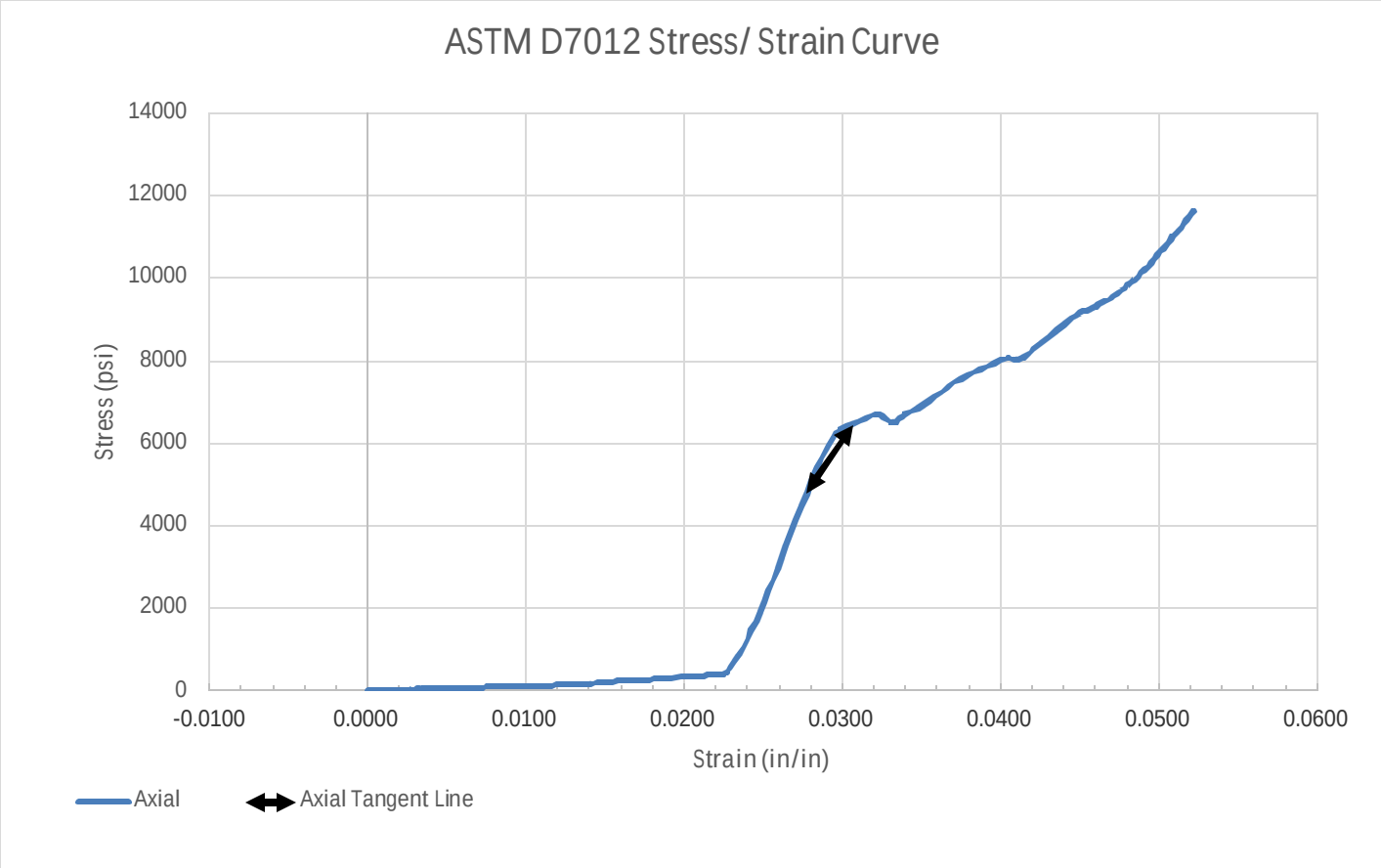
CLIENT: Kiewit Engineering (NY) Corp.

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

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256



SAMPLE LOCATION

Site:	Kiewit Engineering Corp		
Description:	Graywacke		
Boring:	K-204.2	Depth (feet):	30-35

SPECIMEN INFORMATION

Sample No.:		Mass (g):	574.5
Length (in.):	4.17	Diameter (in.):	2.01
L/D Ratio:	2.075	Density (pcf):	165.405

TEST RESULTS

Failure Load (lbs):	36927
Failure Strain (in/in):	0.054
Unconfined Compressive Strength (psi):	11,638
Elastic Modulus, E, (ksi):	577
Time of Failure (min):	03:55
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	0.42%

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

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

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

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

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

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256

Boring	K-204.2	Material Description	Graywacke
Sample No		Equipment Used	Tinius Olsen (120,000lbs)
Depth (ft)	30-35	TICCS ID/Serial No.	C-48999, 118285
Lab No	2685	Calibration Date	11/2/2021

Splitting Tensile Strength of Intact Rock Core Specimens, ASTM D3967

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	1.99	1.99	1.99	2	2
Length (in)	0.54	0.5	0.51	0.68	0.58
Length Diameter Ratio	0.27	0.25	0.26	0.34	0.29
Rate of Loading	0.0054	0.005	0.0051	0.0068	0.0058
Moisture Condition	0.44%	0.44%	0.44%	0.44%	0.44%
Maximum Applied Load (lbf)	3419	3212	3086	5931	4465
Splitting Tensile Strength (psi)	2026.5	2056.1	1936.7	2777.7	2451.7

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	2	2	1.99	2	2
Length (in)	0.64	0.58	0.57	0.61	0.6
Length Diameter Ratio	0.32	0.29	0.29	0.305	0.30
Rate of Loading	0.0064	0.0058	0.0057	0.0061	0.006
Moisture Condition	0.44%	0.44%	0.44%	0.44%	0.44%
Maximum Applied Load (lbf)	2877	4218	2498	4166	4844
Splitting Tensile Strength (psi)	1431.6	2316.1	1402.7	2175.0	2571.1

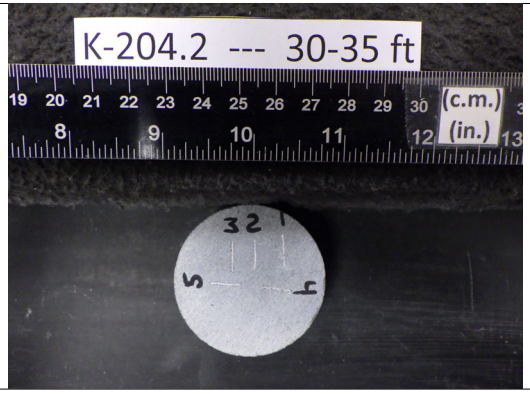
Client:	Terracon Consultants, Inc.		
Project:	Champlain-Hudson Power Express		
Location:		Project No:	GTX-315284
Boring ID: K-204.2	Sample Type: cylinder	Tested By:	tlm
Sample ID: ---	Test Date: 04/28/22	Checked By:	smd
Depth : 30-35 ft	Test Id: 663631		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
K-204.2	---	30-35 ft	1	3.8	3.3	3.55	
			2	2.4	2.2	2.30	
			3	3.7	1.8	2.75	
			4	1.8	0.7	1.25	
			5	2.4	1.7	2.05	
			Average CAIs			2.38	
			Average CAI *			2.84	
CERCHAR Abrasiveness Index Classification						**High abrasiveness**	

Notes

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



Kiewit

MEMORANDUM

DATE: November 11, 2022

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

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

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 96.XX – Revision 1
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 96.XX is STA 60334+00 (42.44968° N, 73.81316° W).

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

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

Contact us if you have questions or require additional information.

HDD 96.XX
Borings A205.2-1, K-205.2
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
	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.

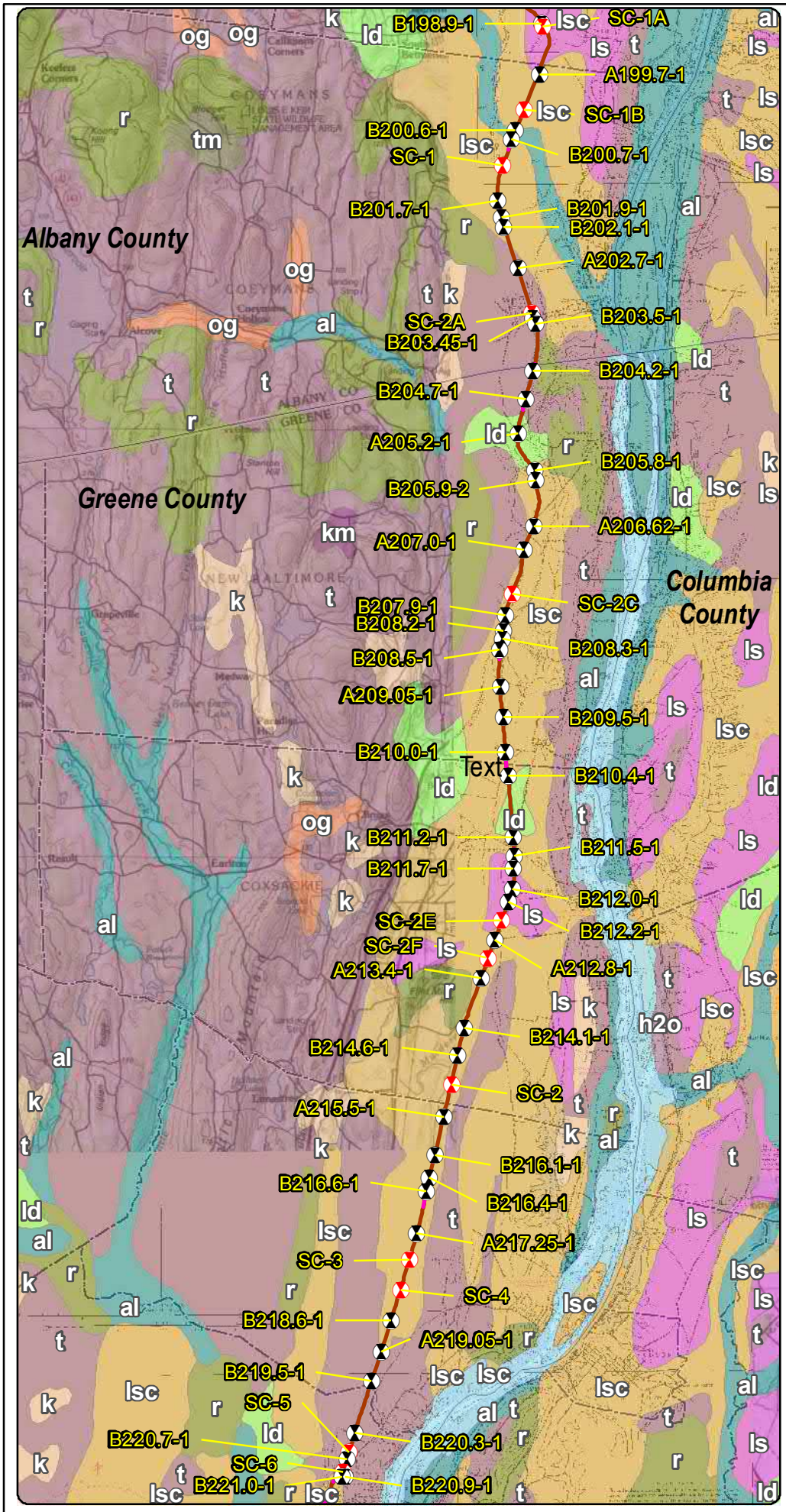
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

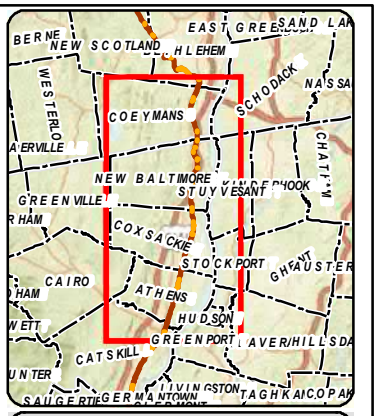
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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.

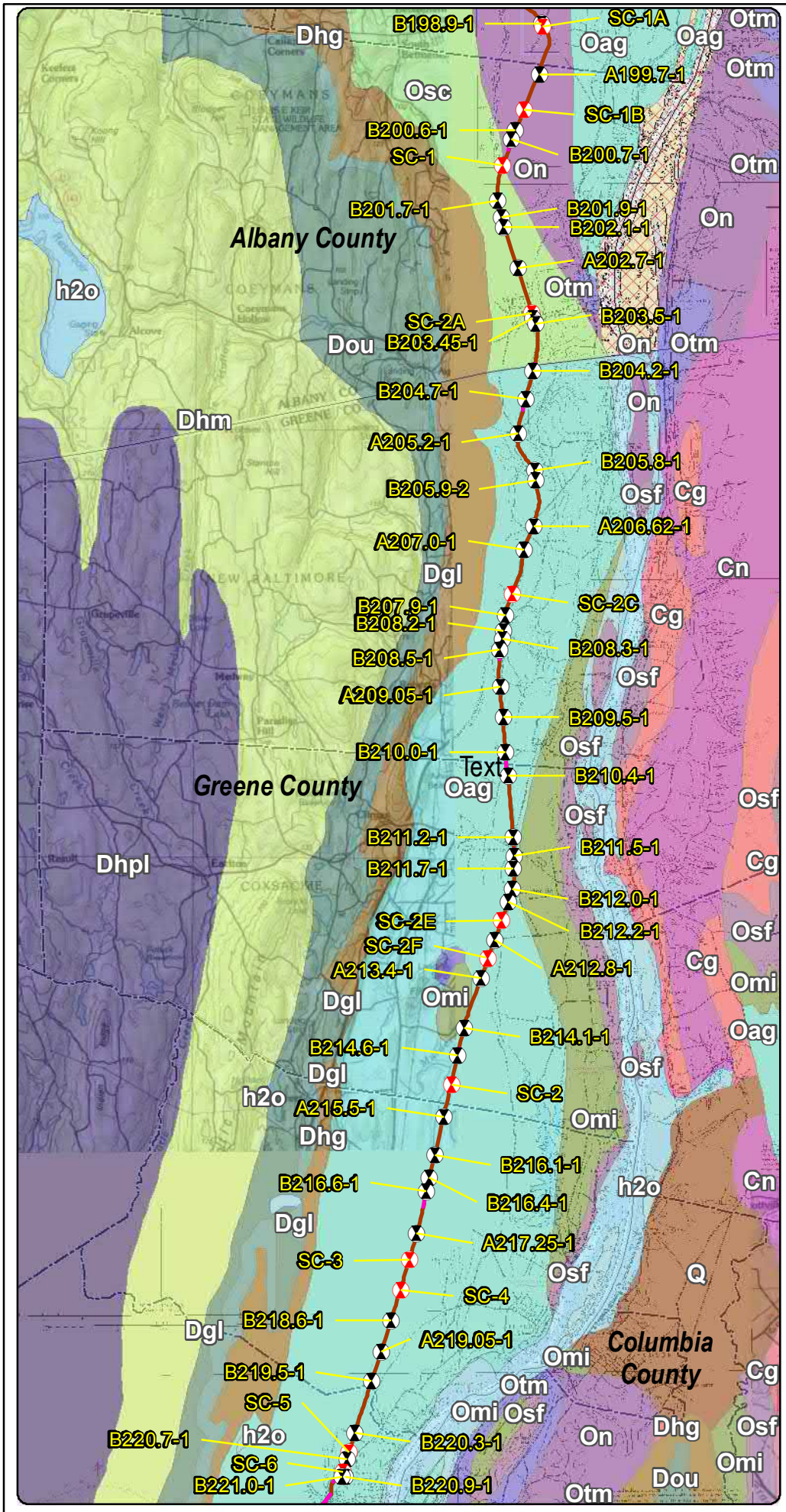
Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

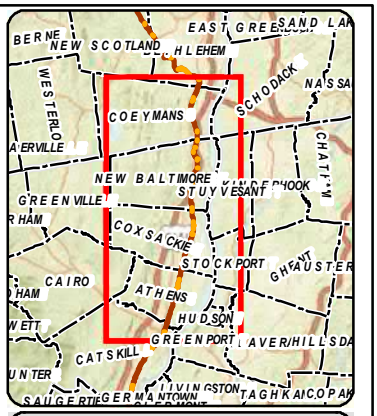
Prepared on 5/3/2021

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

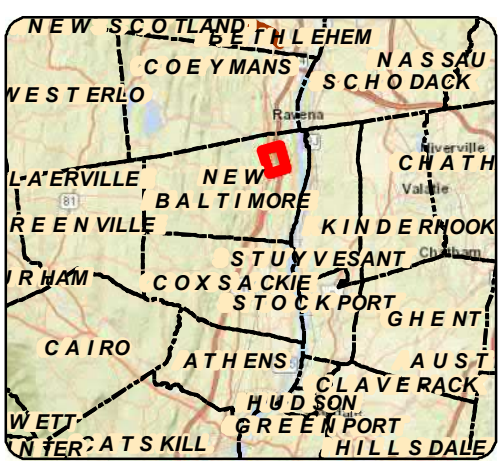
Prepared on 5/18/2021

by: AECOM

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

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

205
205.1
A205.2-1
205.3
205.4
205.5
NEW BALTIMORE
205.6
205.7
205.8
B205.8-1
205.9
B205.9-2
206
206.1
206.2
206.3
Acquetuck Rd
US Route 9W
New Baltimore Rd
Birchwood Ln
Manor Rd
Gov Thomas E Dewey Thruway
New York State Thruway
Guy Ln
Wycoe Rd
Carhart Rd
State Route 9W
Independence 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 6 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	**A205.2-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED 4.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

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

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	N/A
DATE STARTED	11/28/2012
DATE COMPLETED	11/28/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	6 4 4 3		***DARK GRAY F/C GRAVEL SIZED ROCK FRAGMENTS, TR-SM F/M SAND, TR-SM SILT***	11.1	
▽	S-2	3 4 3 2				
5	S-3	4 5 2 4		6.0		
	S-4	4 3 3 2		***DARK BROWN TO DARK GRAY F/M/C SANDY SILT, TR TO SM C/F GRAVEL***		
10	S-5	3 3 3 2			19.6	
				13.5		
15	S-6	4 3 5			21.7	
20	S-7	6 7 9		***DARK BROWN F/ SAND AND SILT***	24.3	
25	S-8	18 12 16		25.0	21.6	
				END OF BORING AT 25'		
30						
35						

DRN.	CMP
CKD.	PWK

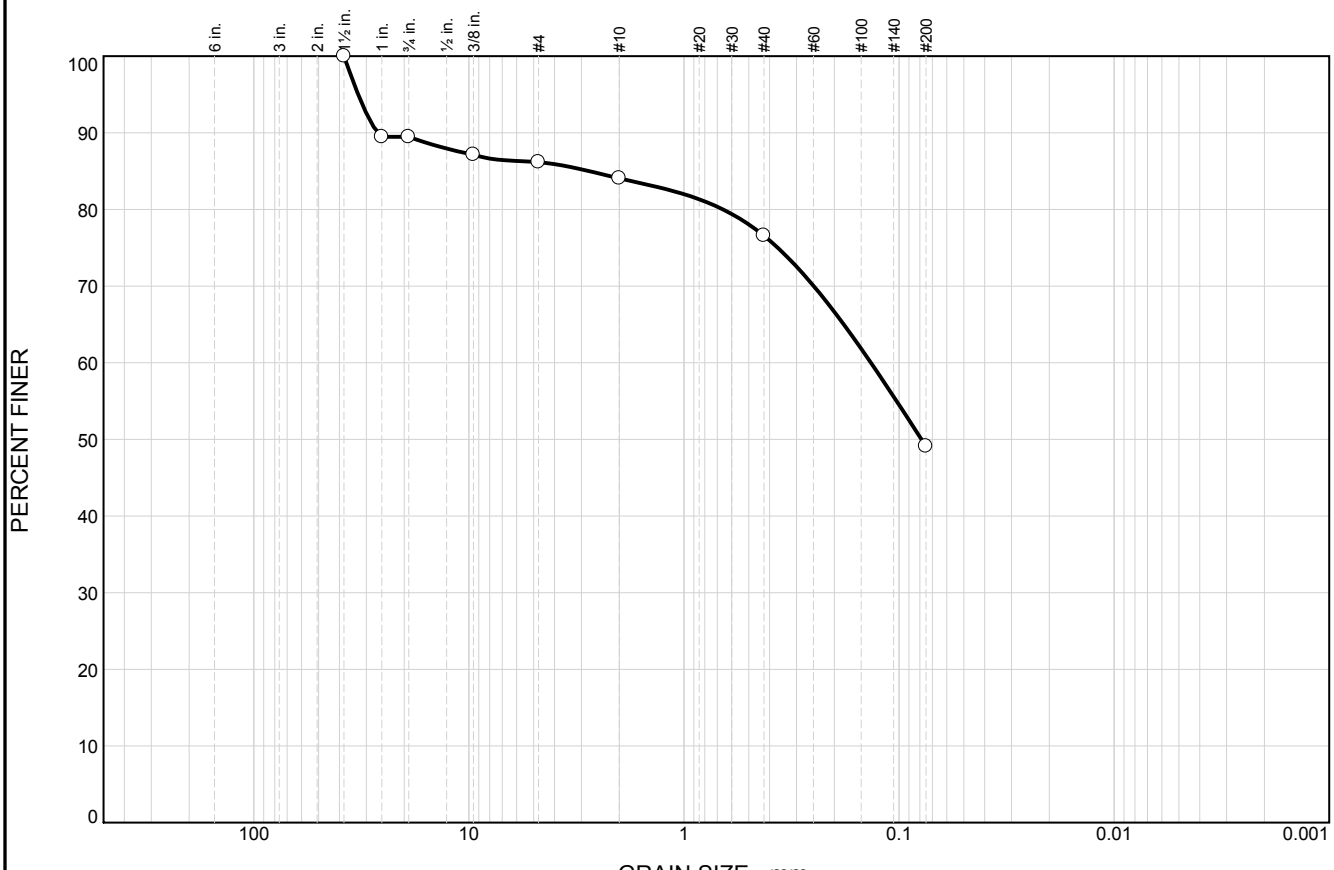
NEW PROJECTS TEST BORING LOG 195651_TDI_CSX.GPJ SITE BLAUVELT.GDT 3/12/13

SUMMARY OF LABORATORY TEST DATA

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

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-5	8.0-10.0												-		
	S-6	13.5-15.0	-	-	-	-		-	-	-	-	-	17.8	-	-	-
	S-8	23.5-25.0	CL	-	-	-		39	25	14	0.0	-	24.3	-	-	-
B205.2-1	S-2	2.0-4.0	-	-	-	-		-	-	-	-	-	11.1	-	-	-
	S-4	6.0-8.0	SM	13.8	37.1	49.1		-	-	-	-	-	19.6	-	-	-
	S-5	8.0-10.0														
	S-6	13.5-15.0	-	-	-	-		-	-	-	-	-	21.7	-	-	-
	S-7	18.5-20.0	ML	0.0	44.2	55.8		-	-	-	-	-	24.3	-	-	-
	S-8	23.5-25.0	-	-	-	-		-	-	-	-	-	21.6	-	-	-
B205.8-1	S-1	0.0-2.0	-	-	-	-		-	-	-	-	-	23.4	-	-	-
	S-3	4.0-6.0	-	5.1	22.5	72.4		-	-	-	-	-	14.8	-	-	-

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	10.5	3.3	2.1	7.5	27.5	49.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.7571	0.1352	0.0786					

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

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

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Sample Source:** B205.2-1 **Depth:** 6.0-10.0 FT **Sample No.:** S-4 & S-5

Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

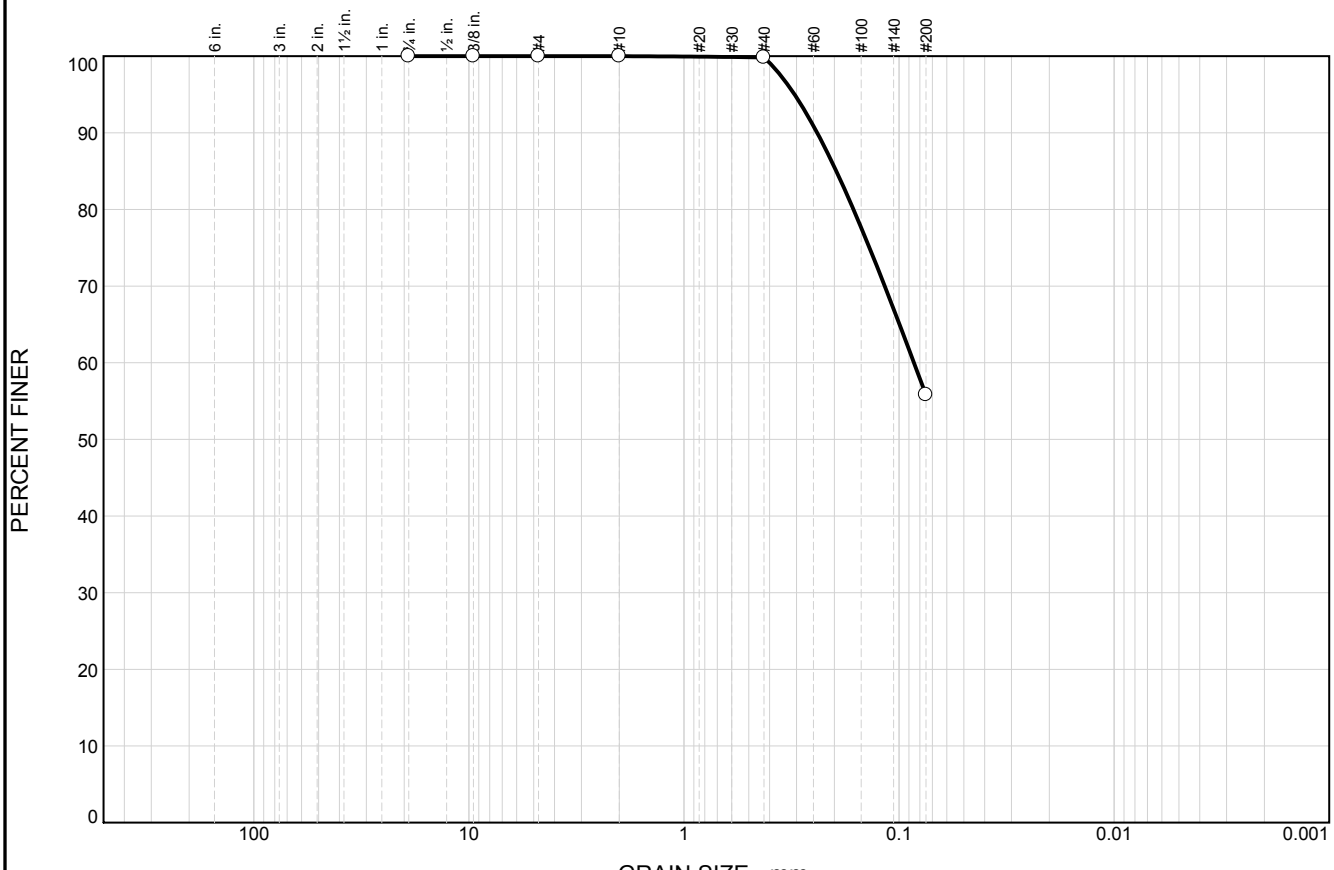
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 83

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	0.2	44.0	55.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1959	0.0853						

Material Description	USCS	AASHTO
○ DARK BROWN F/ SAND AND SILT	ML	

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

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B205.2-1 **Depth:** 18.5-20.0 FT **Sample Number:** S-7

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

TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 84

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

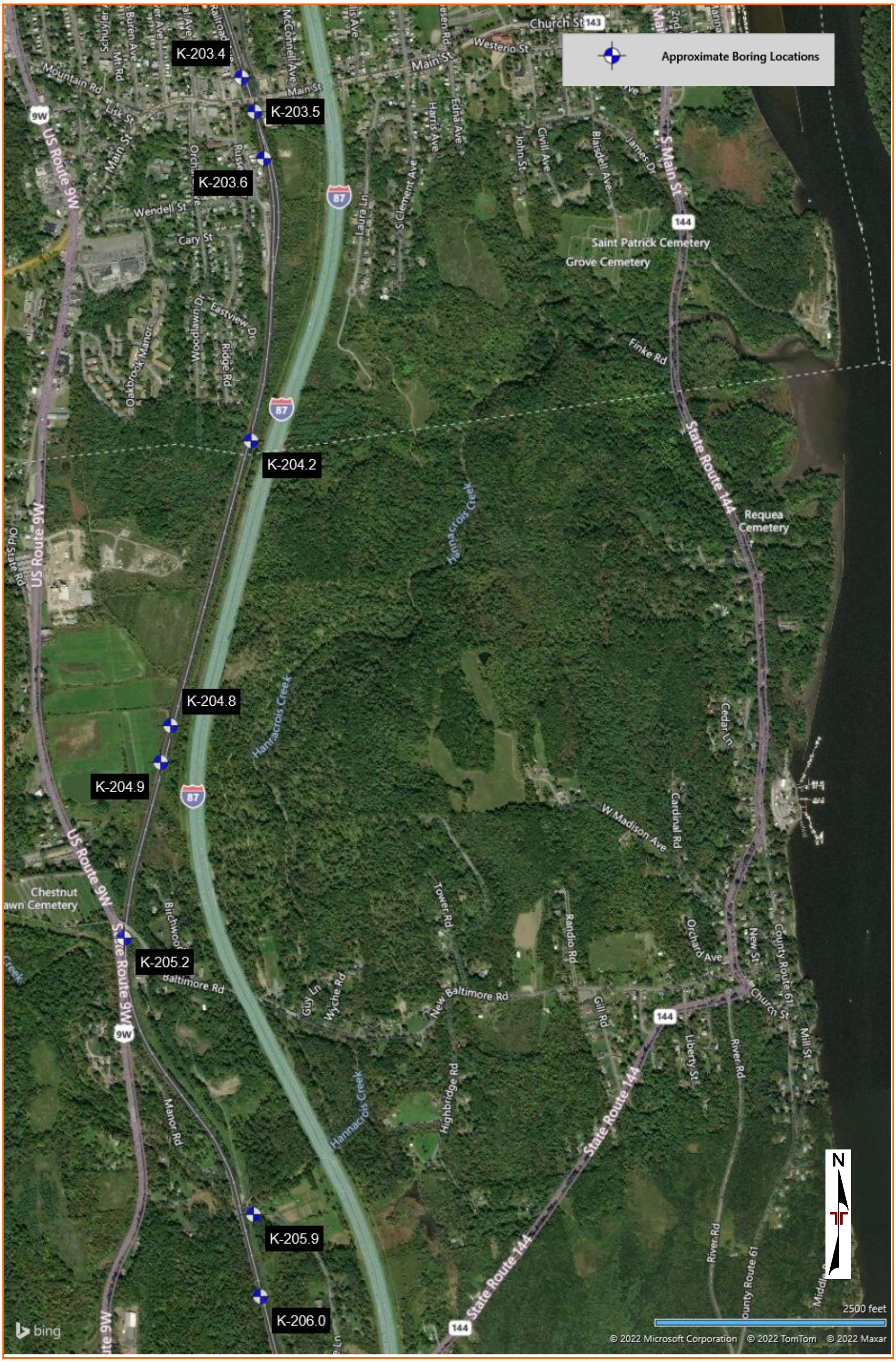


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-205.2

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: 42.4469° Longitude: -73.8139°

Surface Elev.: 212.8 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
2.0	211	**FILL - POORLY GRADED SAND WITH GRAVEL**, brown and black, very loose
18.0	195	**SILTY SAND (SM)**, brown, very loose to loose
20.0	193	**SILT AND CLAY (CL-ML)**, varved with fine sand partings and silty sand seams, brown, very soft
22.0	191	**SILTY SAND (SM)**, brown, loose
		SILT AND CLAY (CL-ML), varved with fine sand partings and silty sand seams, brown, stiff

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	18	3-1-1-1 N=2			
	4	1-1-2-4 N=3			
5	16	2-3-2-3 N=5			
	12	3-3-2-3 N=5			
	8	2-2-2-4 N=4	18.1		25
10					
	6	3-3-3-4 N=6			
15					
	16	WOH-WOH-WOH-3			
20	12	2-4-4-4 N=8	19.7	NP	42
	12	3-6-6-7 N=12			
25					

Stratification lines are approximate. In-situ, the transition may be gradual.
Coring not required per Martin with Kiewit.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

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

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-07-2022
Boring Completed: 03-07-2022
Drill Rig: Mobile B-57
Driller: L. Spicher
Project No.: JB215256C

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

BORING LOG NO. K-205.2

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: 42.4469° Longitude: -73.8139°

Surface Elev.: 212.8 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILT AND CLAY (CL-ML), varved with fine sand partings and silty sand seams, brown, stiff *(continued)*	22	3-6-5-7 N=11			
30.0	183	**SILTY SAND (SM)**, brown	24	3-8-10-12	23.2	NP	40
				3" Split Spoon With Ring Samplers			
33.0	180	**SILT AND CLAY (CL-ML)**, gray, very soft to soft	24	2-1-1-2 N=2			
			24	WOH-1-WOH-2 N=1			
			24	2-1-2-3 N=3	31.0		
			24	WOH-WOH-WOH-WOH			
48.0	165	***Spoon Refusal at 48 Feet***		50/0"			

DEPTH (Ft.): 30, 35, 40, 45

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

Stratification lines are approximate. In-situ, the transition may be gradual.
Coring not required per Martin with Kiewit.

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

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

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

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

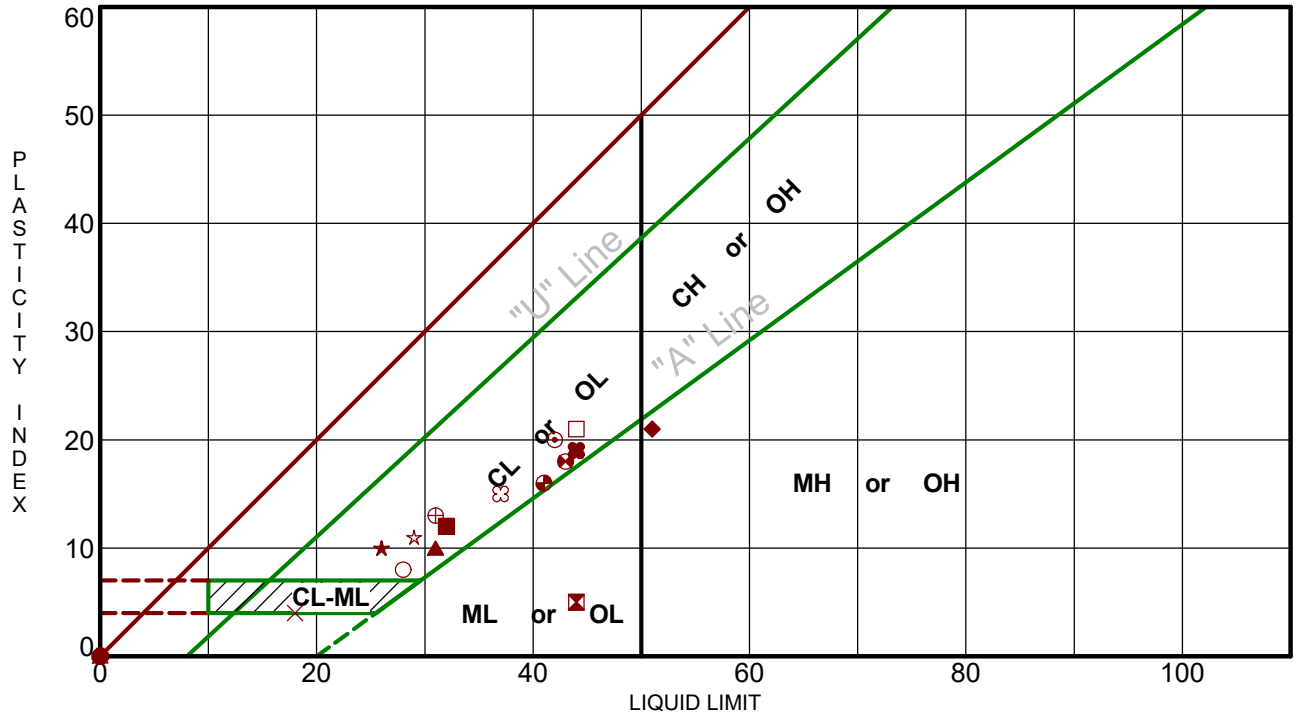
Drill Rig: Mobile B-57 | Driller: L. Spicher

Project No.: JB215256C

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

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-203.6	20 - 22	NP	NP	NP	14.7	SM	SILTY SAND with GRAVEL
⧗	K-204.2	10 - 12	44	39	5	74.5	ML	SILT with SAND
▲	K-204.2	25 - 27	31	21	10	89.4	CL	LEAN CLAY
★	K-204.8	10 - 12	26	16	10	90.2	CL	LEAN CLAY
⊙	K-204.8	23 - 25	42	22	20	93.8	CL	LEAN CLAY
✿	K-204.9	10 - 12	NP	NP	NP	97.2	ML	SILT
○	K-204.9	18 - 20	28	20	8	95.8	CL	LEAN CLAY
△	K-205.2	20 - 22	NP	NP	NP	41.6	SM	SILTY SAND
⊗	K-205.2	30 - 32	NP	NP	NP	39.8	SM	SILTY SAND
⊕	K-205.9	8 - 10	31	18	13	86.6	CL	LEAN CLAY
□	K-205.9	25 - 26.5	44	23	21	84.5	CL	LEAN CLAY with SAND
⊛	K-206.0	8 - 10	43	25	18	45.2	GC	CLAYEY GRAVEL with SAND
◕	K-206.5	8 - 10	41	25	16	70.6	CL	LEAN CLAY with SAND
☆	K-206.5	15 - 17	29	18	11	97.5	CL	LEAN CLAY
✿	K-206.6	13 - 15	37	22	15	87.0	CL	LEAN CLAY
■	K-206.6	23 - 25	32	20	12	98.5	CL	LEAN CLAY
◆	K-207.6	6 - 8	51	30	21	69.8	MH	SANDY ELASTIC SILT
◇	K-207.6	15 - 17	NP	NP	NP	8.2	GW-GM	WELL-GRADED GRAVEL with SILT and SAND
×	K-207.6	24.7 - 26.3	18	14	4	26.6	SC-SM	SILTY, CLAYEY SAND with GRAVEL
✖	K-207.7	15 - 17	44	25	19	93.0	CL	LEAN 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

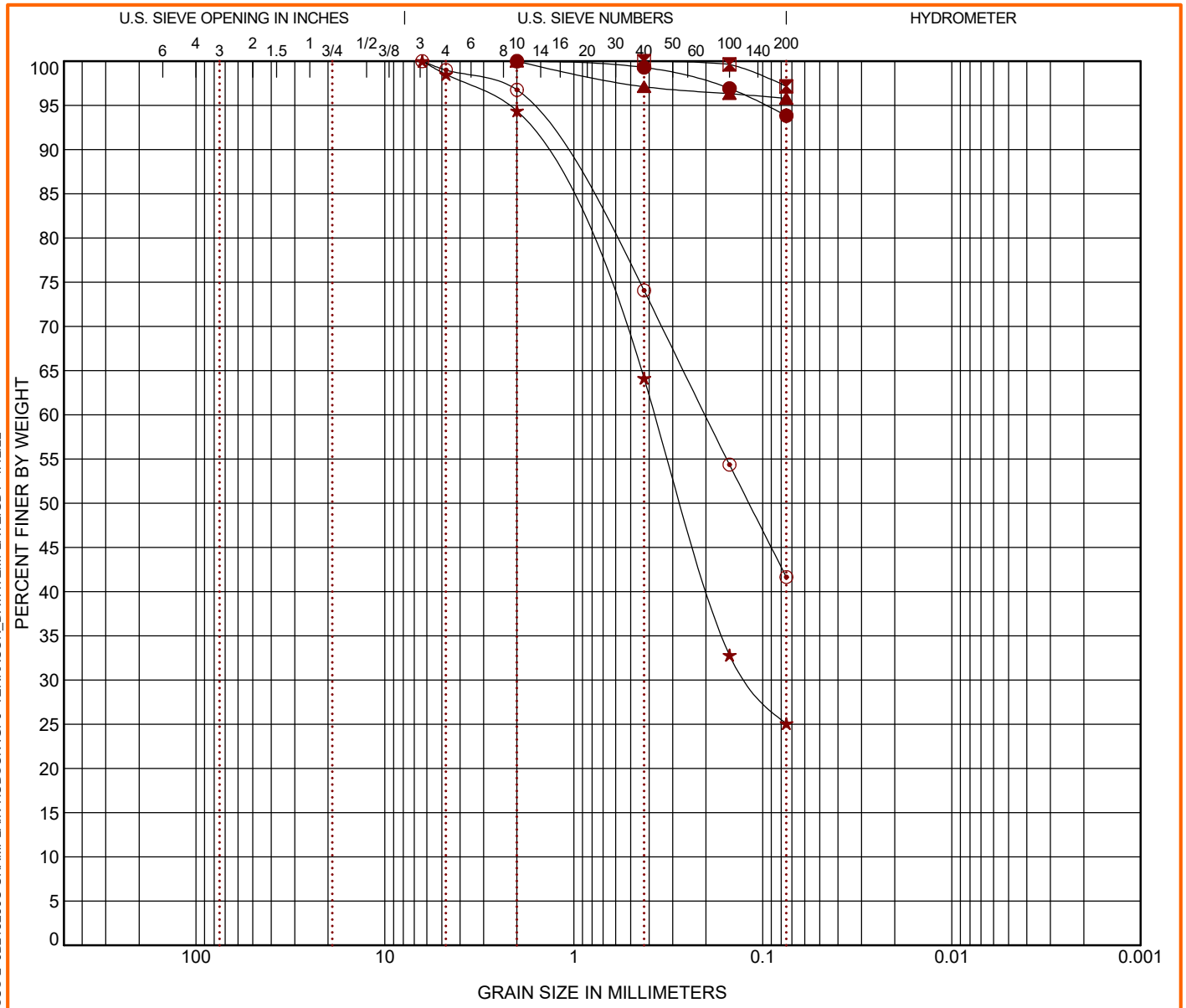
PROJECT NUMBER: JB215256C

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-204.8	23 - 25	LEAN CLAY (CL)	43.2	42	22	20		
⊠	K-204.9	10 - 12	SILT (ML)	26.0	NP	NP	NP		
▲	K-204.9	18 - 20	LEAN CLAY (CL)	34.4	28	20	8		
★	K-205.2	8 - 10	SILTY SAND (SM)	18.1					
⊙	K-205.2	20 - 22	SILTY SAND (SM)	19.7	NP	NP	NP		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-204.8	23 - 25	2				0.0	0.0	6.2		93.8	
⊠	K-204.9	10 - 12	0.425				0.0	0.0	2.8		97.2	
▲	K-204.9	18 - 20	2				0.0	0.0	4.2		95.8	
★	K-205.2	8 - 10	6.35	0.37	0.117		0.0	1.5	73.4		25.1	
⊙	K-205.2	20 - 22	6.35	0.202			0.0	1.0	57.4		41.6	

PROJECT: Champlain-Hudson Power Express Package 6

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

Terracon
30 Corporate Cir Ste 201
Albany, NY

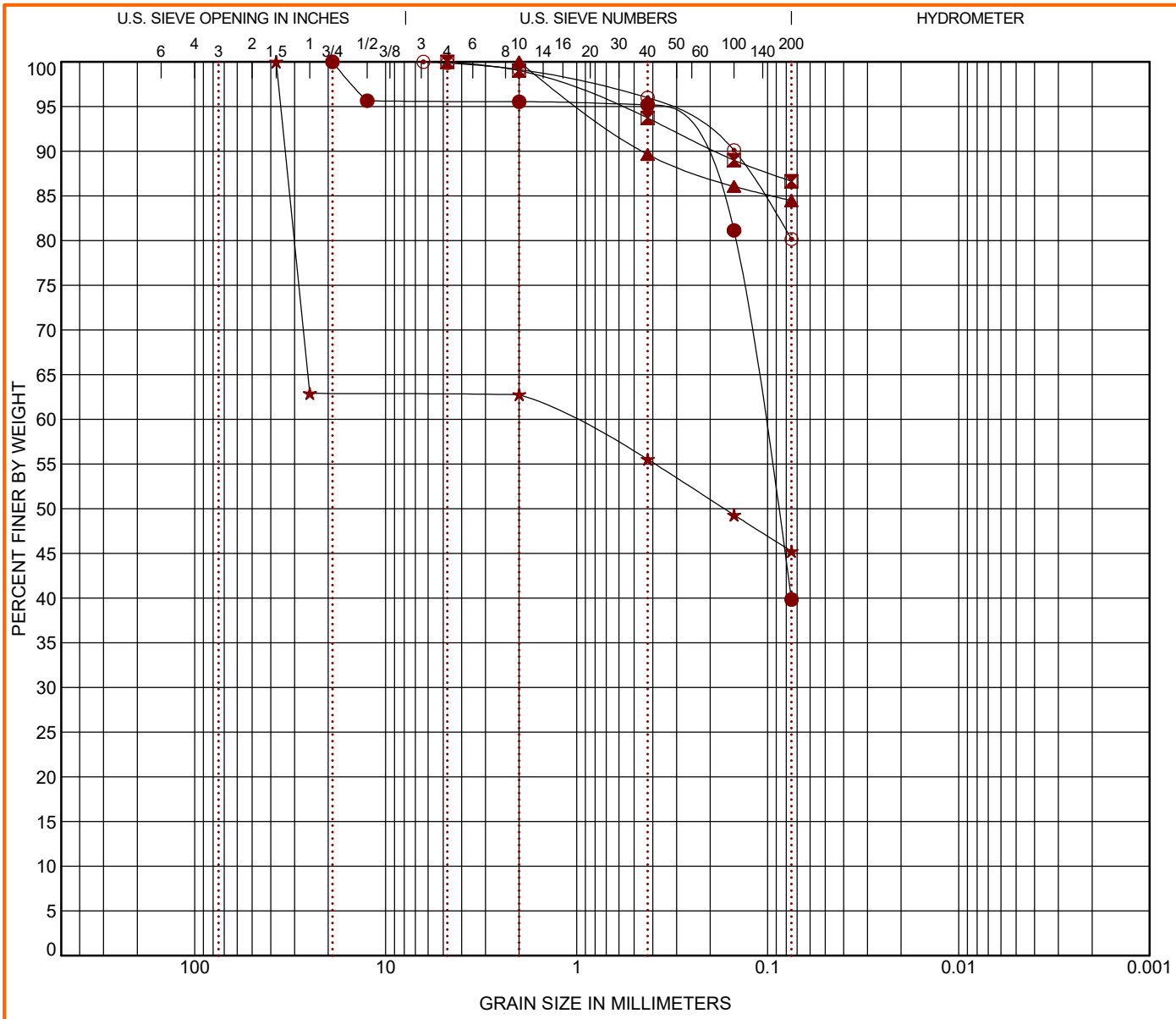
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

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

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-205.2	30 - 32	SILTY SAND (SM)	23.2	NP	NP	NP		
⊠	K-205.9	8 - 10	LEAN CLAY (CL)	31.2	31	18	13		
▲	K-205.9	25 - 26.5	LEAN CLAY with SAND (CL)	43.7	44	23	21		
★	K-206.0	8 - 10	CLAYEY GRAVEL with SAND (GC)	25.9	43	25	18		
⊙	K-206.0	18 - 19.7	SILT with SAND (ML)	16.2					

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-205.2	30 - 32	19	0.105			0.0	4.4	55.7		39.8	
⊠	K-205.9	8 - 10	4.75				0.0	0.0	13.4		86.6	
▲	K-205.9	25 - 26.5	2				0.0	0.0	15.5		84.5	
★	K-206.0	8 - 10	37.5	1.106			0.0	37.2	17.6		45.2	
⊙	K-206.0	18 - 19.7	6.35				0.0	0.1	19.7		80.2	

PROJECT: Champlain-Hudson Power Express Package 6

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

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

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

Kiewit

MEMORANDUM

DATE: April 7, 2023

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

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

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 96.A – Revision 2
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 96.A is STA 60375+00 (42.4398°N, 73.8090°W).

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

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 177.6-228.2, dated March 15, 2013.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Package 6, Selkirk to Catskill, NY, Rev-1, dated June 28, 2022.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express-Additional HDD Borings-Phase 3, Fort Ann to Coxsackie, NY, dated November 3, 2022

Contact us if you have questions or require additional information.

HDD 96.A
Borings B205.8-1, K-205.9,
B205.9-2, K-206.0, KB-205.8
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
	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.

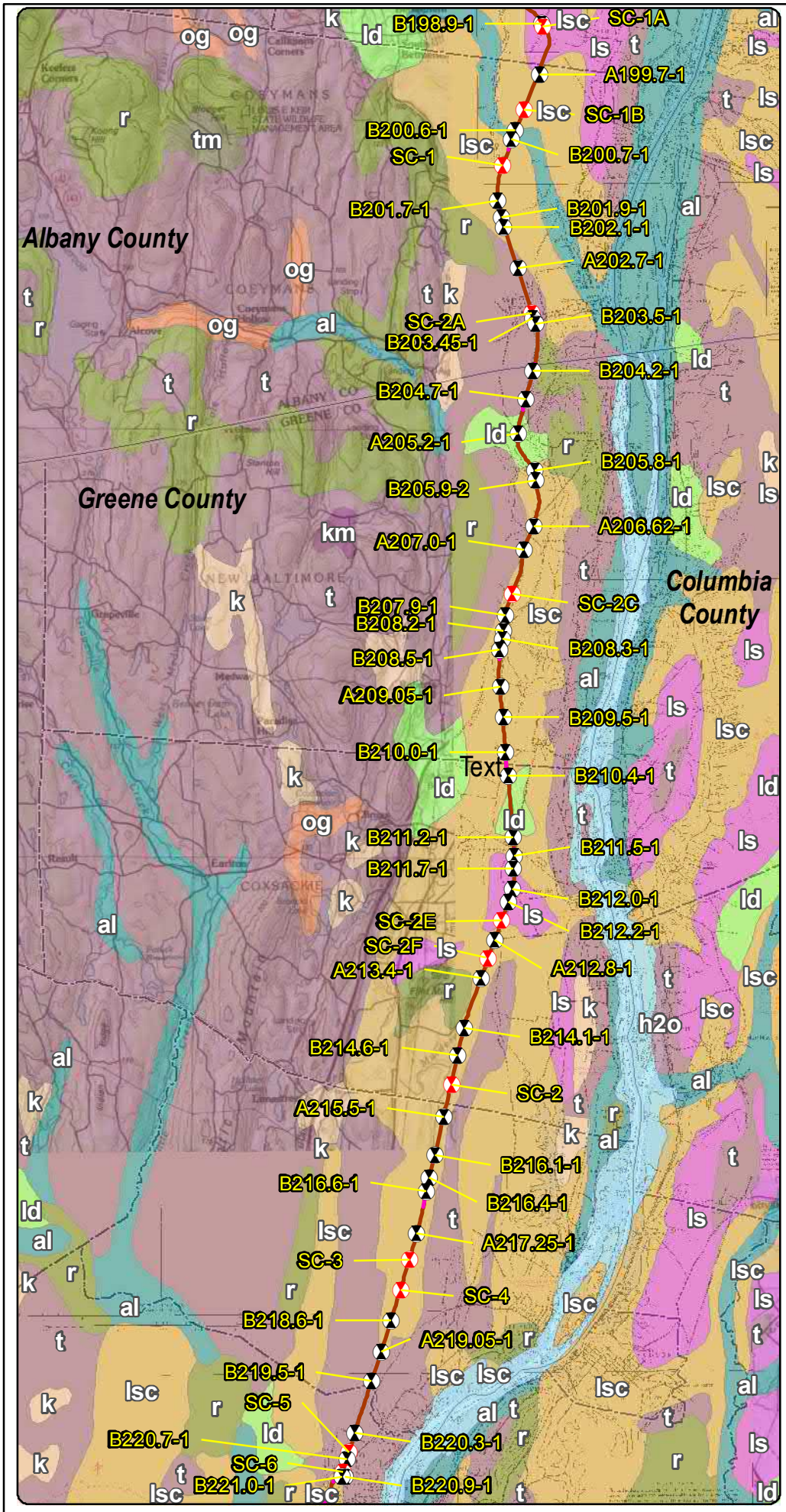
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

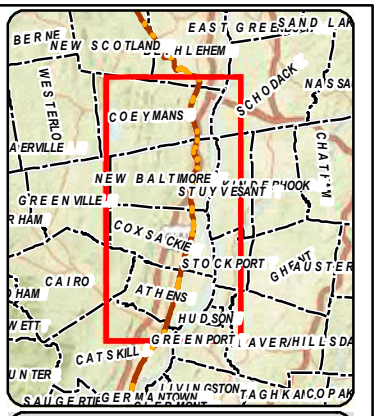
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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.

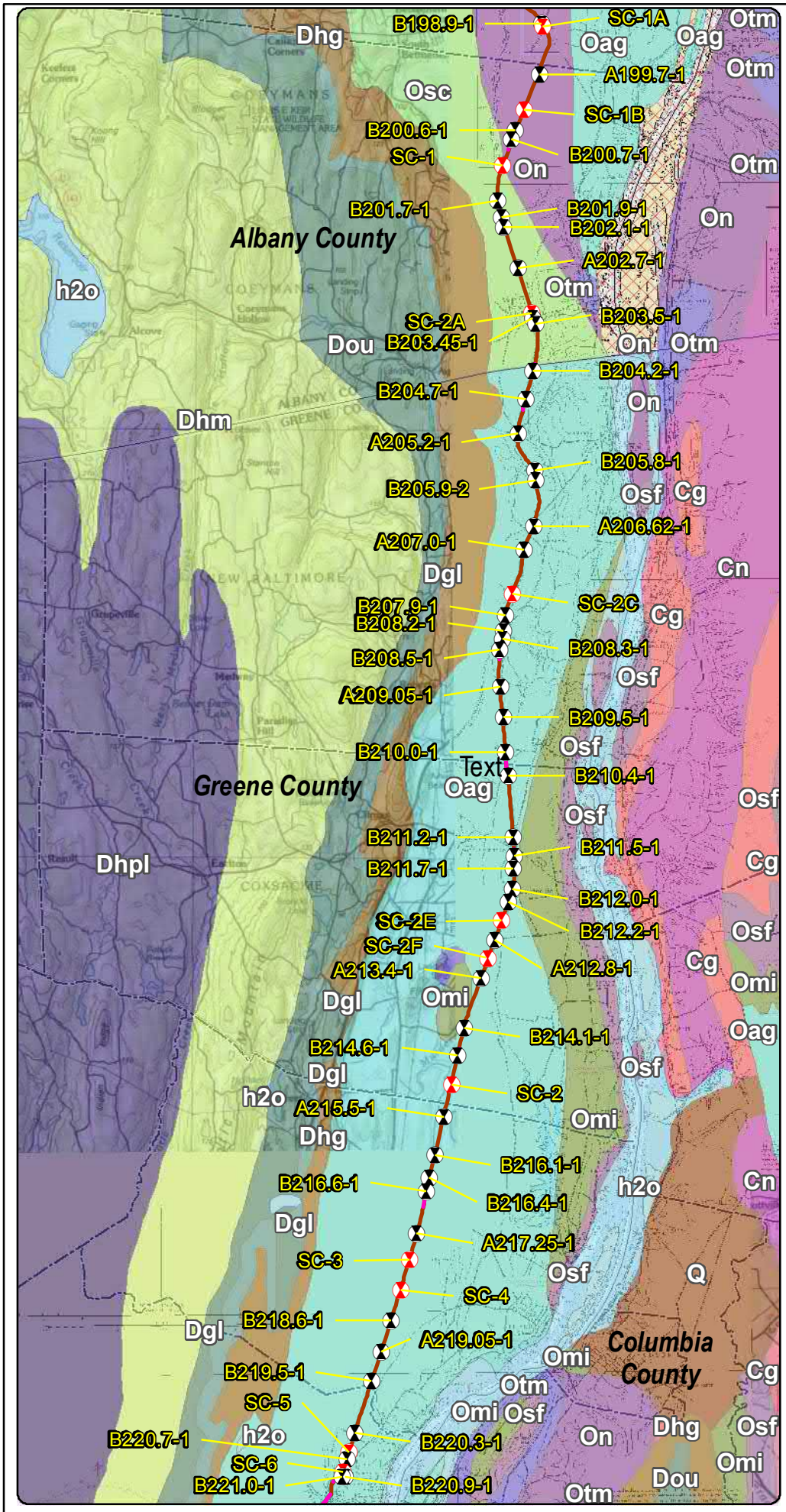
Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

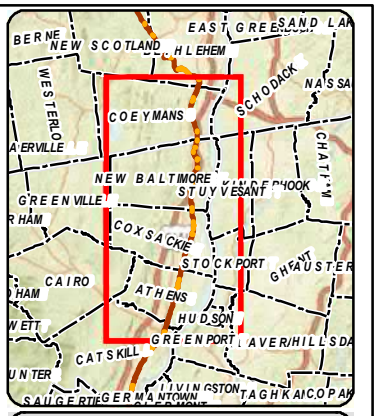
Prepared on 5/3/2021

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

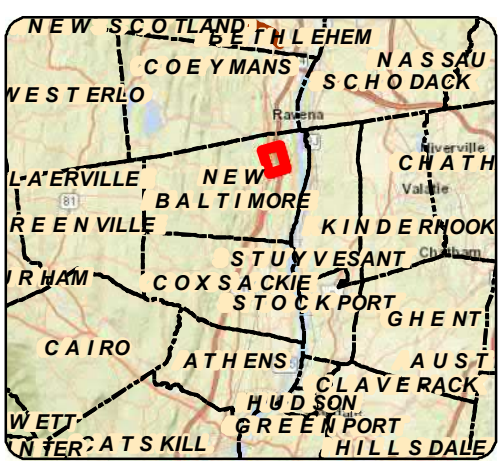
Prepared on 5/18/2021

by: AECOM

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

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

205
205.1
A205.2-1
205.3
205.4
205.5
NEW BALTIMORE
205.6
205.7
205.8
B205.8-1
205.9
B205.9-2
206
206.1
206.2
206.3
Acquetuck Rd
US Route 9W
New Baltimore Rd
Birchwood Ln
Manor Rd
Gov Thomas E Dewey Thruway
New York State Thruway
Guy Ln
Wycoe Rd
Carhart Rd
State Route 9W
Independence 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 6 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	**B205.8-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
12.0'	NR	11/27	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	N/A
DATE STARTED	11/27/2012
DATE COMPLETED	11/27/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	4 3 2 2		***DARK BROWN SILT, SM F/ SAND, TR F/ GRAVEL (FILL)*** 2.0	23.4	
	S-2	3 2 2 4		***LIGHT BROWN SILT, TR F/ SAND*** 4.0		
5	S-3	5 6 4 3		***BROWN SILT, SM M/C SAND, TR F/ GRAVEL***		
	S-4	9 7 6 8		8.0	14.8	
10	S-5	12 14 11 13		***BROWN C/F GRAVEL, SM F/M/C SAND, TR TO SM SILT*** 13.5	9.3	
15	S-6	5 5 4			23.4	
20	S-7	6 4 6		***GRAY SILT***		
25	S-8	5 3 7			30.9	
30	S-9	6 5 6		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	**B205.9-2**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 2

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
DRY	NR	11/29	NR

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	32.0 '
c_2	FROM	32.0 '	TO	38.0 '

DRILLER	R. CARUSO
HELPER	C. SMART
INSPECTOR	C. POPPE
DATE STARTED	11/28/2012
DATE COMPLETED	11/29/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	4 4 3 3		***BLACK M/C SAND, TR TO SM SILT, TR TO SM F/ GRAVEL-SIZED ROCK FRAGMENTS (FILL)*** 2.0		
	S-2	4 4 7 7			22.9	
5	S-3	6 9 9 15				
	S-4	5 5 6 5			35.4	
10	S-5	7 9 9 10		***BROWN CLAY, SM SILT, TR TO SM F/M SAND***		
15	S-6	6 7 10			26.9	
				18.5		
20	S-7	7 7 7			26.9	
				DARK GRAY CLAY, SM SILT, TR M/F SAND		
25	S-8	4 4 4			36.1	
				28.5		
30	S-9	12 27 50/0.4		***LIGHT BROWN F/ SAND***		
				32.0		
	R-1	REC =100% RQD =100%		***BOULDERS & COBBLES (GLACIAL TILL)***		AUGER REFUSAL AT 32 FT
35						

DRN.	TBT
CKD.	PWK

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

TEST BORING LOG

BORING	**B205.9-2**
G.S. ELEV.	N/A
FILE	195651
SHEET	2 OF 2

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CSX RAILROAD ROW, NY

DEPTH		A	B	C	DESCRIPTION	Wn	REMARKS
		R-2	REC =54% RQD =12%		***BOULDERS & COBBLES (GLACIAL TILL)*** 38.0		
					END OF BORING AT 38'		
40							
45							
50							
55							
60							
65							
70							
75							

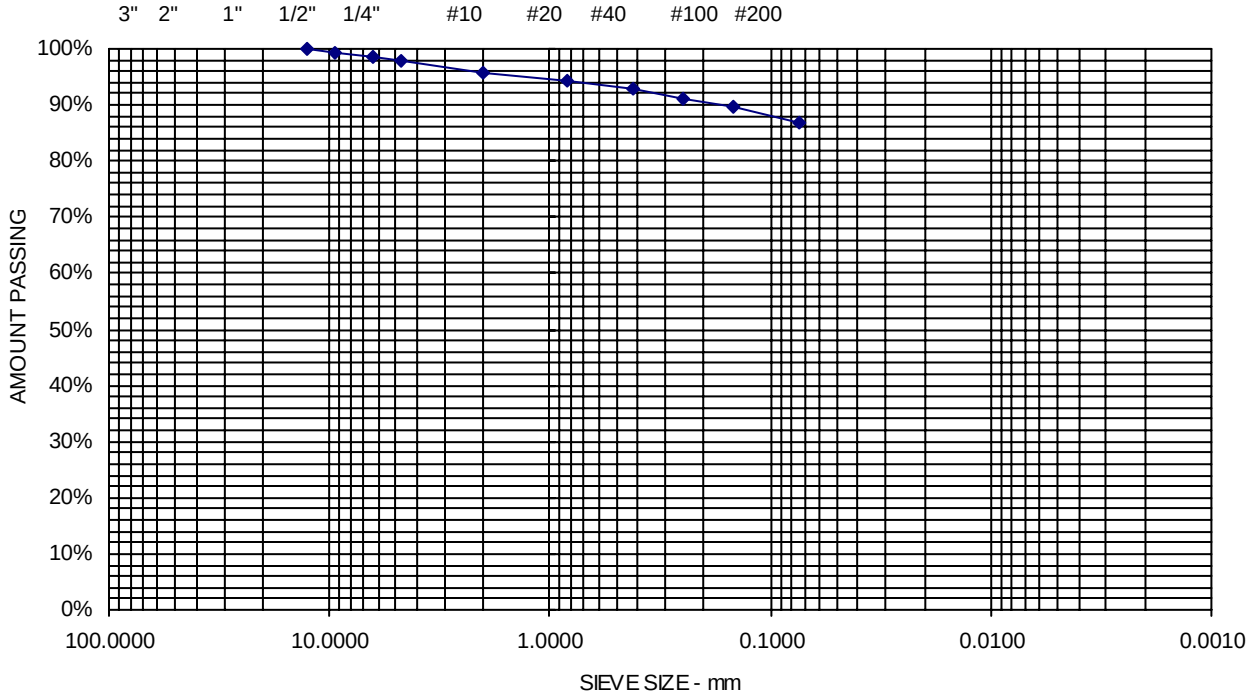
Report of Gradation

ASTM C-117 & C-136

Project Name	EASTERN NY - CHAMPLAIN HUDSON POWER EXPRESS PROJECT - GEOTECHNICAL EXPLORATIONS, SOIL THERMAL CONDUCTIVITY,	Project Number	10-1256
Client	TRC COMPANIES, INC.	Lab ID	10427S
Exploration	**B205.8-1**	Date Received	12/5/2012
Material Source	**SAMPLE FROM 15-20FEET**	Date Completed	12/7/2012
		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"**	**98**	
4.75 mm	**No. 4**	**98**	2.2% Gravel
2.00 mm	**No. 10**	**96**	
850 um	**No. 20**	**94**	
425 um	**No. 40**	**93**	11% Sand
250 um	**No. 60**	**91**	
150 um	**No. 100**	**90**	
75 um	**No. 200**	**86.8**	86.8% Fines

BROWN-GRAY SILTY CLAY SOME SAND TRACE GRAVEL (CL)



Comments: MOISTURE CONTENT = 30.2%

Sheet

S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D-422

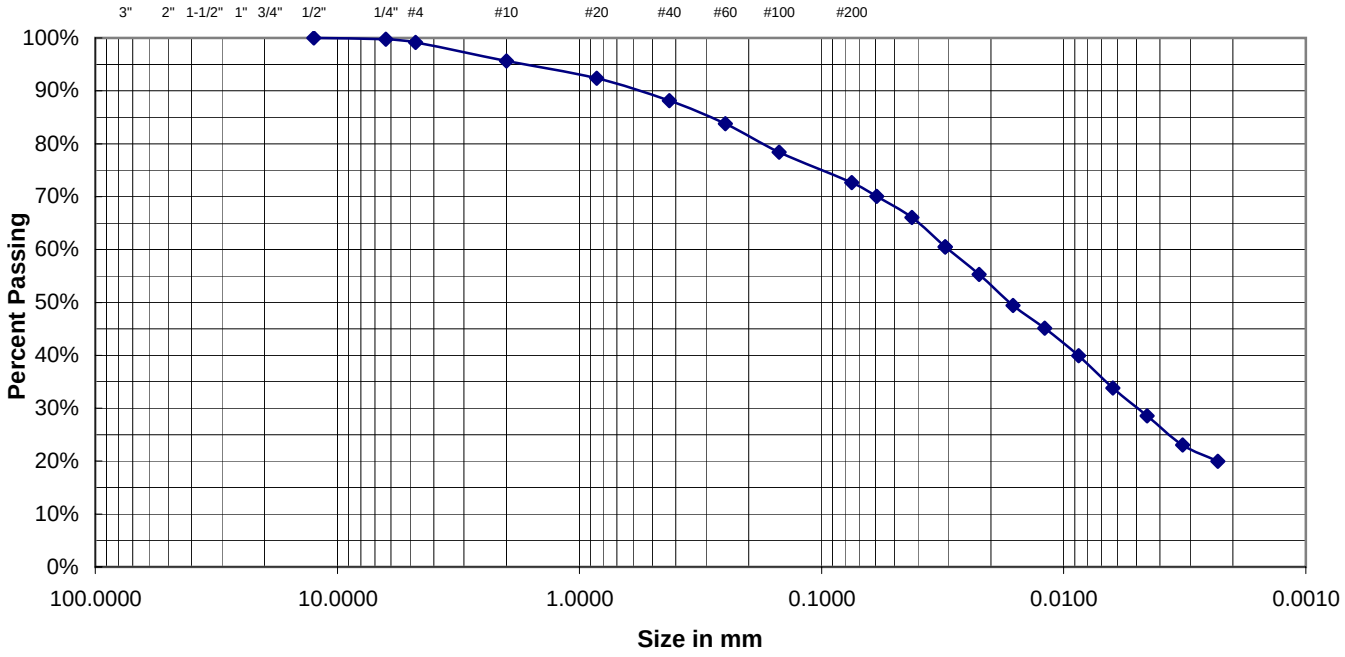
Project Name	CHAMPLAIN HUDSON POWER EXPRESS PROJECT	Project Number	10-1256
Client	TRC COMPANIES, INC	Lab ID	10428S
Material Type	BROWN SANDY CLAYEY SILT TRACE GRAVEL (CL)	Date Received	12/5/2012
Material Source	20'-30'	Date Completed	12/11/2012
Exploration	B-205.8-1	Tested By	MJS

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	**96**
No. 20	0.85	**92**
No. 40	0.425	**88**
No. 60	0.25	**84**
No. 100	0.15	**78**
No. 200	0.075	**72.7**

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.059	70.0
0.042	66.0
0.031	60.5
0.022	55.3
0.016	49.5
0.012	45.2
0.009	39.9
0.006	33.8
0.005	28.6
0.003	23.0
0.002	20.0



Particle Distribution	
Gravel, retained on #4	0.9%
Sand, passing #4 and retained on #200	26.4%
Fines, 0.074 to 0.005	42.6%
Clay Fraction, <0.005	30.1%

Comments: MOISTURE CONTENT = 29.3%

Chad B. Michaud

Reviewed By

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

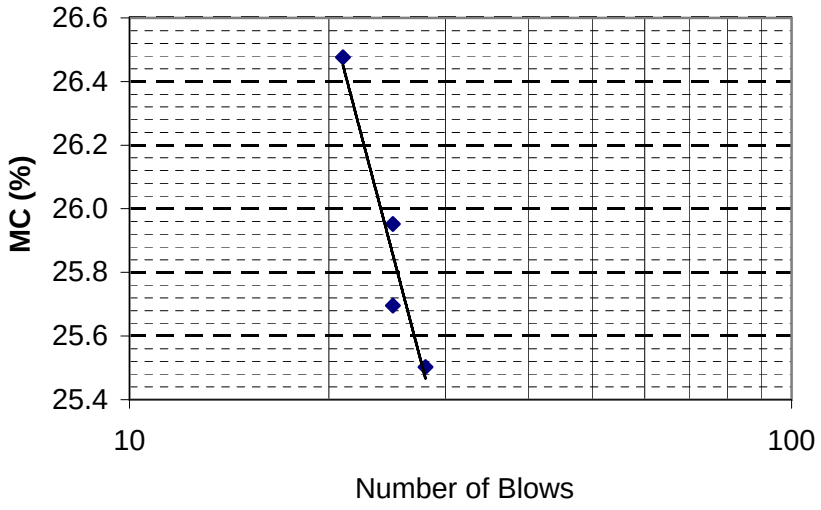
REPORT OF ATTERBERG LIMITS
ASTM D4318

Project Name	CHAMPLAIN HUDSON POWER EXPRESS	Project Number	10-1256
Client	TRC COMPANIES, INC	Laboratory ID	10428S
Soil Description	BROWN SANDY CLAYEY SILT TRACE GRAVEL (CL)	Date Received	12/5/2012
Soil Source	B-205.8-1, 20'-30'	Date Completed	12/10/2012
		Tested By	JJR

TEST RESULTS

Estimate of Material Retained On the No. 40 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
12%	26	18	8

LIQUID LIMIT CURVE



SUMMARY OF LABORATORY TEST DATA

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

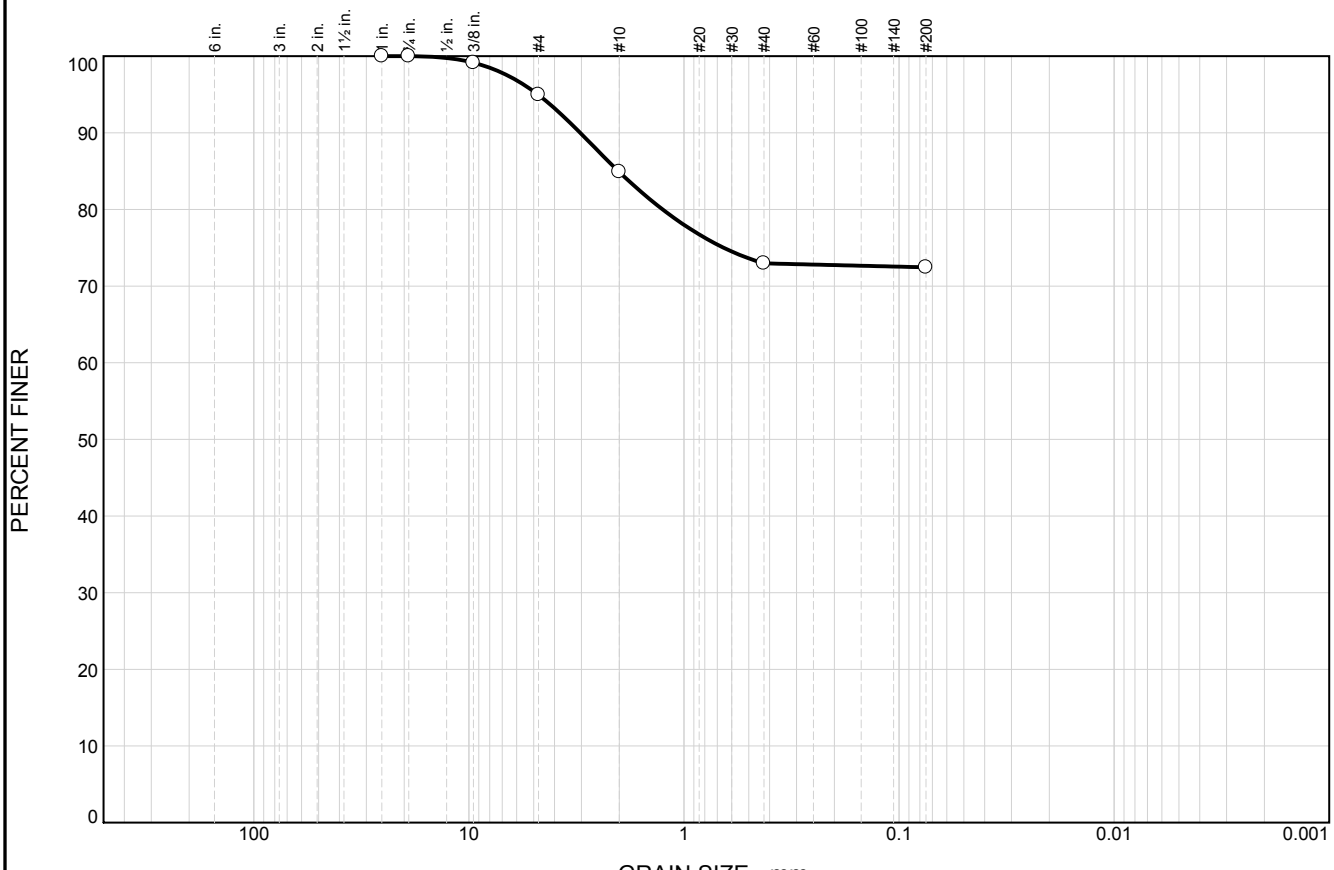
SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-5	8.0-10.0												-		
	S-6	13.5-15.0	-	-	-	-		-	-	-	-	-	17.8	-	-	-
	S-8	23.5-25.0	CL	-	-	-		39	25	14	0.0	-	24.3	-	-	-
B205.2-1	S-2	2.0-4.0	-	-	-	-		-	-	-	-	-	11.1	-	-	-
	S-4	6.0-8.0	SM	13.8	37.1	49.1		-	-	-	-	-	19.6	-	-	-
	S-5	8.0-10.0														
	S-6	13.5-15.0	-	-	-	-		-	-	-	-	-	21.7	-	-	-
	S-7	18.5-20.0	ML	0.0	44.2	55.8		-	-	-	-	-	24.3	-	-	-
	S-8	23.5-25.0	-	-	-	-		-	-	-	-	-	21.6	-	-	-
B205.8-1	S-1	0.0-2.0	-	-	-	-		-	-	-	-	-	23.4	-	-	-
	S-3	4.0-6.0	-	5.1	22.5	72.4		-	-	-	-	-	14.8	-	-	-

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-4	6.0-8.0														
	S-5	8.0-10.0	GW-GM	63.7	25.5	10.8		-	-	-	-	-	9.3	-	-	-
	S-6	13.5-15.0	-	-	-	-		-	-	-	-	-	23.4	-	-	3.6
	S-8	23.5-25.0	-	-	-	-		-	-	-	-	-	30.9	92.6	-	-
B205.9-1	S-2	2.0-4.0	-	-	-	-		-	-	-	-	-	22.9	-	-	-
	S-3	4.0-6.0	CL-ML	0.0	14.6	28.1	57.3	-	-	-	-	2.77	-	-	-	-
	S-4	6.0-8.0											35.4	86.1		
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	26.9	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	26.9	-	-	-
	S-8	23.5-25.0	-	0.0	7.2	23.3	69.5	-	-	-	-	2.73	36.1	-	-	-
A206.62-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	14.3	-	-	-

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	5.1	10.0	11.9	0.6	72.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.0189							

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

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

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B205.8-1 **Depth:** 4.0-8.0 FT **Sample Number:** S-3 & S-4

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

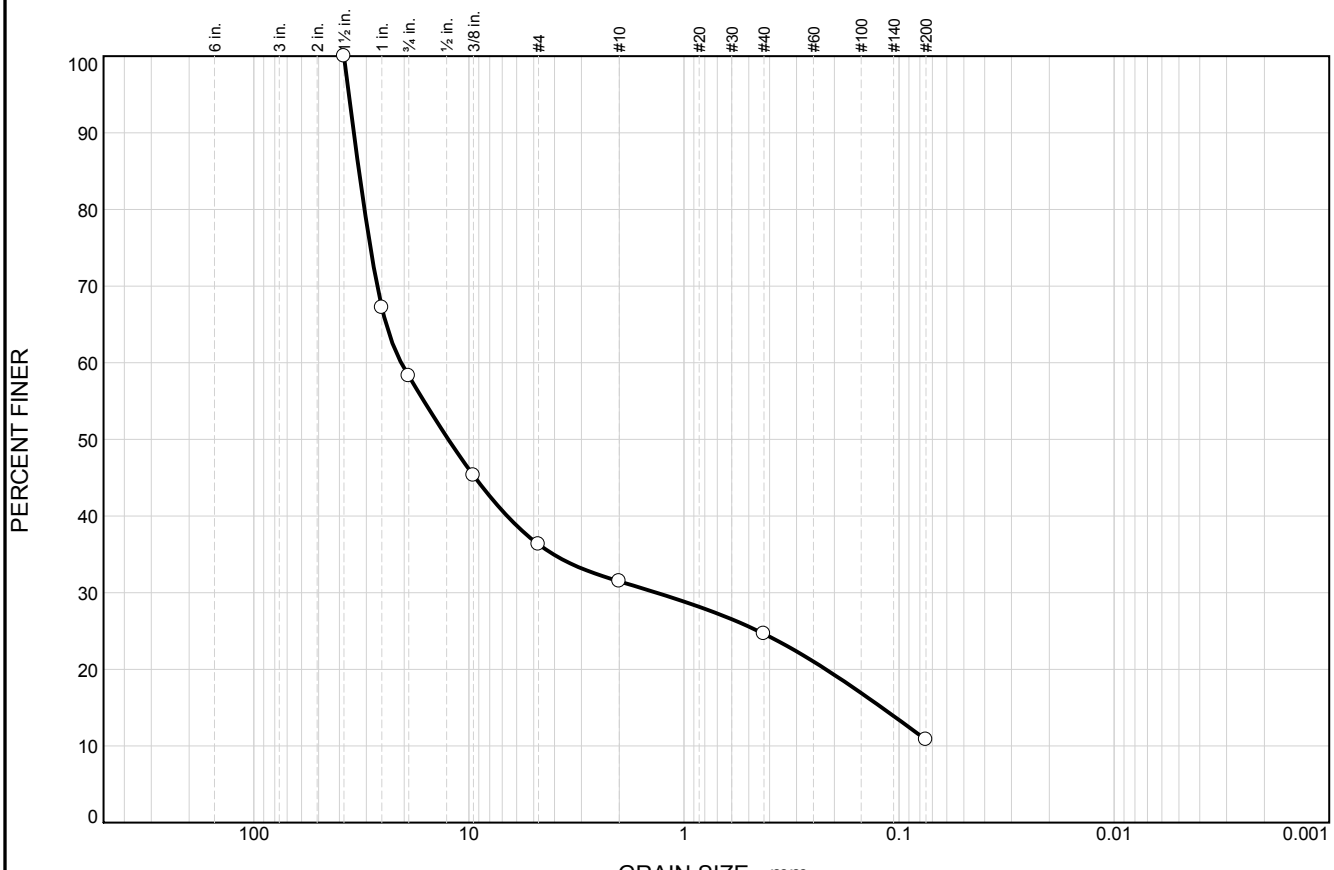
TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 85

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	41.7	22.0	4.8	6.9	13.8	10.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			32.4346	20.6473	12.4669	1.3459	0.1201			

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

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

Project: TDI CHAMPLAIN HUDSON POWER EXPRESS - CSX

○ **Source of Sample:** B205.8-1 **Depth:** 8.0-10.0 FT **Sample Number:** S-5

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

TRC Engineers, Inc.

Mt. Laurel, NJ

Figure 86

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

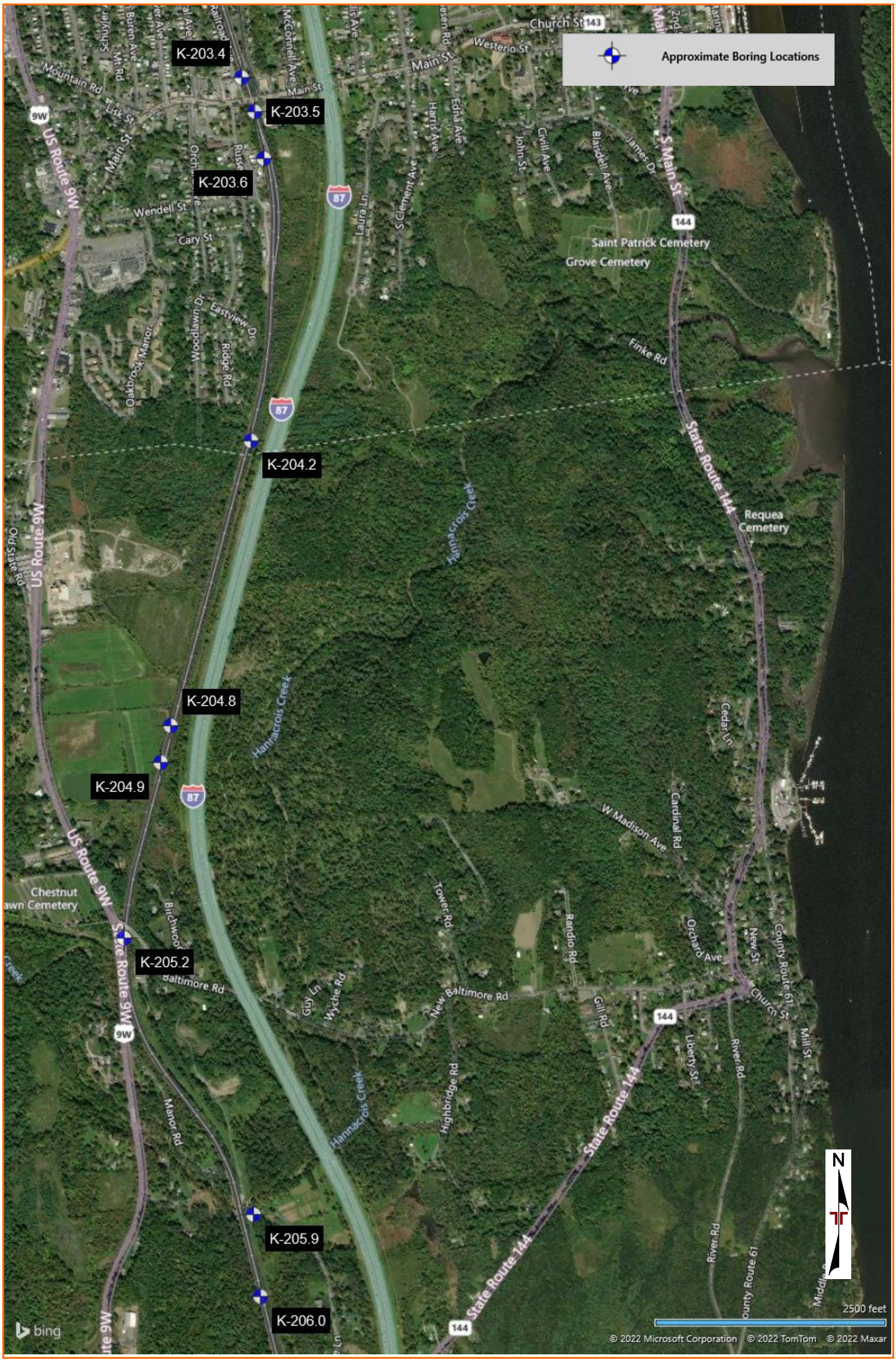


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-205.9

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: 42.4387° Longitude: -73.8091°

Surface Elev.: 173.1 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
2.0	171	**FILL - SILT AND CLAY**, rootlets noted, brown, medium stiff
8.0	165	**SILT AND CLAY (CL-ML)**, occasional fine sand partings, brown, stiff
25.0	148	**LEAN CLAY (CL)**, brown, medium stiff to 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
		12	1-4-4-5 N=8			
		23	4-4-5-6 N=9			
5		24	3-3-5-5 N=8			
		24	5-7-7-8 N=14			
		24	2-2-3-4 N=5	31.2	31-18-13	87
10		24	4-4-5-5 N=9			
		16	2-3-3 N=6			
15						
20		16	2-2-2 N=4			
25		14	WOH/12"-1 N=1	43.7	44-23-21	84

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: JCH
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

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-22-2022 | Boring Completed: 03-22-2022

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-205.9

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: 42.4387° Longitude: -73.8091°

Surface Elev.: 173.1 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
		LEAN CLAY WITH SAND (CL), gray, very soft to soft *(continued)*	30			
					18	WOH-1-3 N=4
35.0	138		35			
		WEATHERED ROCK, gray, very dense			10	16-41-37 N=78
40.0	133		40		0	50/1"
		GRAYWACKE, moderatley weathered, moderate fractured, fair RQD, gray				REC = 98% RQD = 73%
44.5	128.5		45			
		GRAYWACKE, highly weathered, close to moderate fractured, fair RQD, gray				REC = 100% RQD = 58%
46.5	126.5					
		GRAYWACKE, moderatley weathered, very close to moderate fractured, fair RQD, gray				REC = 96% RQD = 63%
			50			
51.5	121.5					
		GRAYWACKE, highly weathered, close to moderate fractured, fair RQD, gray				REC = 61% RQD = 61%
55.1	118		55			
		Boring Terminated at 55.1 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: JCH
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

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-22-2022 | Boring Completed: 03-22-2022

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-206.0

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: 42.4366° Longitude: -73.8084°

Surface Elev.: 178.6 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
		FILL - SILT AND CLAY, trace sand, rootlets noted, brown, medium stiff to stiff
4.0	174.5	
		SILT AND CLAY (CL-ML), varved with occasional find sand partings and dropstones, brown, stiff to very stiff
8.0	170.5	
		CLAYEY GRAVEL WITH SAND (GC), brown, loose
10.0	168.5	
		SILT AND CLAY (CL-ML), varved with occasional fine sand partings, brown, very stiff
12.0	166.5	
		SILT WITH SAND AND GRAVEL (ML), brown, medium stiff to hard, (GLACIAL TILL)
		Difficult augering from 12'-15'
		grades to Silt with Sand, trace gravel
19.7	159	
		WEATHERED ROCK, gray, very dense
21.0	157.5	
		GRAYWACKE, unweathered, very close to moderate fractured, excellent RQD, gray
25.0	153.5	
		GRAYWACKE, unweathered, moderate fractured, excellent RQD, gray

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	12	2-3-3-3 N=6			
	12	3-5-7-7 N=12			
5	18	3-5-7-7 N=12			
	24	9-9-10-10 N=19			
	18	3-4-5-5 N=9	25.9	43-25-18	45
10	22	8-9-9-9 N=18			
15	3	3-5-2 N=7			
	23	51-71-91-130/2" N=162	16.2		80
20	0	50/2"			
		REC = 100% RQD = 91%			
25		REC = 100% RQD = 100%			

Stratification lines are approximate. In-situ, the transition may be gradual.
Attempted to take TR sample from 18-20' with back to back spoons however weathered rock was encountered and coring was required. This was discussed with James McGirl of Kiewit.

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: JCH
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52

WATER LEVEL OBSERVATIONS

- *While drilling*
- *Artesian water encountered*
- *After 15 to 16.5 foot sample, Artesian water encountered*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-23-2022 | Boring Completed: 03-23-2022
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-206.0

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: 42.4366° Longitude: -73.8084°

Surface Elev.: 178.6 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		GRAYWACKE, unweathered, moderate fractured, excellent RQD, gray *(continued)*								
30.0	148.5	**GRAYWACKE**, unweathered, very close to moderate fractured, good RQD, gray	30				REC = 100% RQD = 85%			
35.0	143.5	***Boring Terminated at 35 Feet***	35							

Stratification lines are approximate. In-situ, the transition may be gradual.
Attempted to take TR sample from 18-20' with back to back spoons however weathered rock was encountered and coring was required. This was discussed with James McGirl of Kiewit.

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: JCH
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52

WATER LEVEL OBSERVATIONS

While drilling

Artesian water encountered

After 15 to 16.5 foot sample, Artesian water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-23-2022 | Boring Completed: 03-23-2022

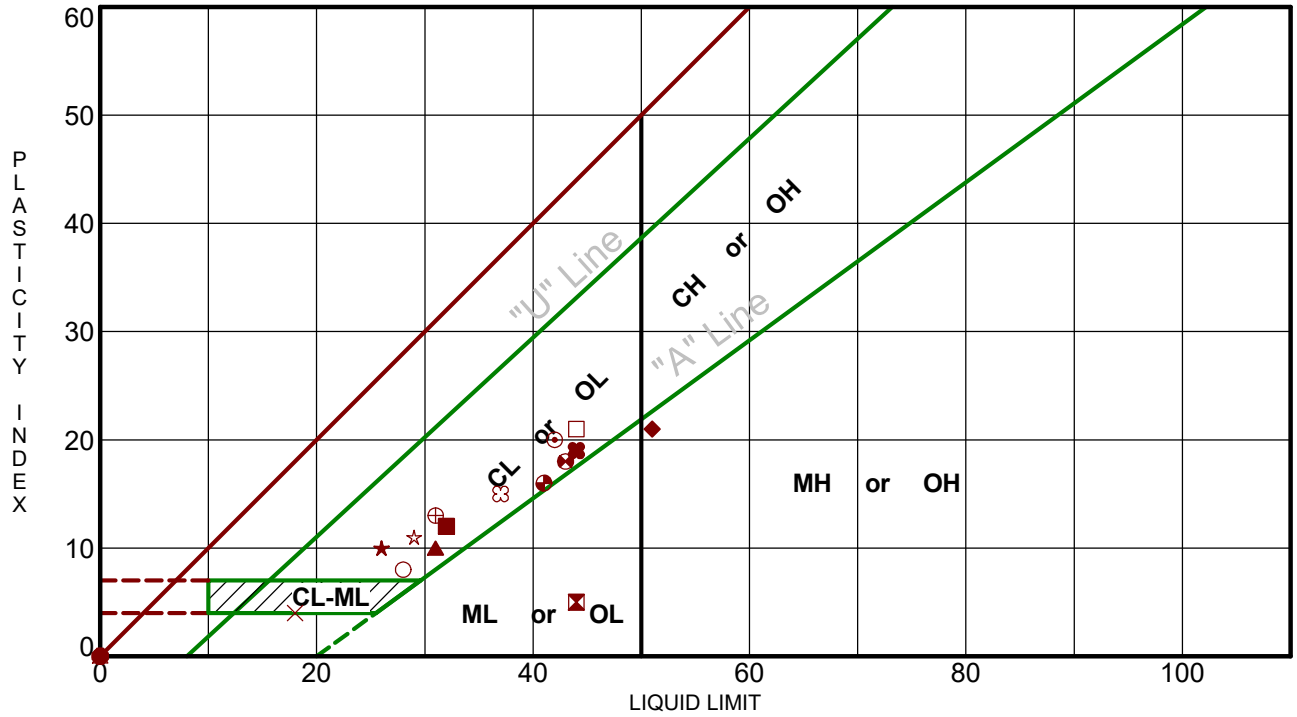
Drill Rig: CME 750x | Driller: J. Lamm

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-203.6	20 - 22	NP	NP	NP	14.7	SM	SILTY SAND with GRAVEL
⧗	K-204.2	10 - 12	44	39	5	74.5	ML	SILT with SAND
▲	K-204.2	25 - 27	31	21	10	89.4	CL	LEAN CLAY
★	K-204.8	10 - 12	26	16	10	90.2	CL	LEAN CLAY
⊙	K-204.8	23 - 25	42	22	20	93.8	CL	LEAN CLAY
✿	K-204.9	10 - 12	NP	NP	NP	97.2	ML	SILT
○	K-204.9	18 - 20	28	20	8	95.8	CL	LEAN CLAY
△	K-205.2	20 - 22	NP	NP	NP	41.6	SM	SILTY SAND
⊗	K-205.2	30 - 32	NP	NP	NP	39.8	SM	SILTY SAND
⊕	K-205.9	8 - 10	31	18	13	86.6	CL	LEAN CLAY
□	K-205.9	25 - 26.5	44	23	21	84.5	CL	LEAN CLAY with SAND
⊛	K-206.0	8 - 10	43	25	18	45.2	GC	CLAYEY GRAVEL with SAND
◕	K-206.5	8 - 10	41	25	16	70.6	CL	LEAN CLAY with SAND
☆	K-206.5	15 - 17	29	18	11	97.5	CL	LEAN CLAY
✿	K-206.6	13 - 15	37	22	15	87.0	CL	LEAN CLAY
■	K-206.6	23 - 25	32	20	12	98.5	CL	LEAN CLAY
◆	K-207.6	6 - 8	51	30	21	69.8	MH	SANDY ELASTIC SILT
◇	K-207.6	15 - 17	NP	NP	NP	8.2	GW-GM	WELL-GRADED GRAVEL with SILT and SAND
×	K-207.6	24.7 - 26.3	18	14	4	26.6	SC-SM	SILTY, CLAYEY SAND with GRAVEL
✖	K-207.7	15 - 17	44	25	19	93.0	CL	LEAN 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

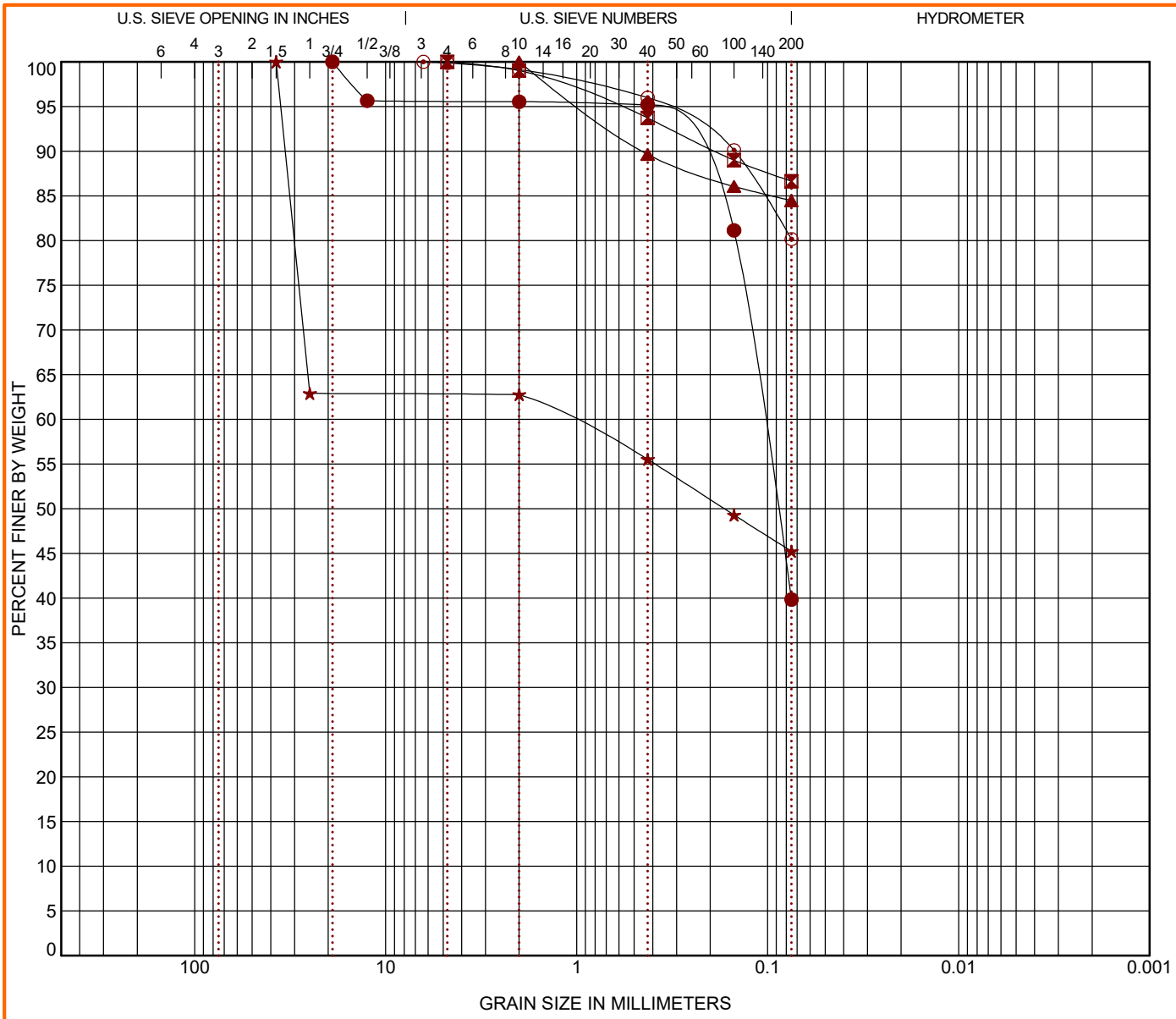
PROJECT NUMBER: JB215256C

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-205.2	30 - 32	SILTY SAND (SM)	23.2	NP	NP	NP		
⊠	K-205.9	8 - 10	LEAN CLAY (CL)	31.2	31	18	13		
▲	K-205.9	25 - 26.5	LEAN CLAY with SAND (CL)	43.7	44	23	21		
★	K-206.0	8 - 10	CLAYEY GRAVEL with SAND (GC)	25.9	43	25	18		
⊙	K-206.0	18 - 19.7	SILT with SAND (ML)	16.2					

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-205.2	30 - 32	19	0.105			0.0	4.4	55.7		39.8	
⊠	K-205.9	8 - 10	4.75				0.0	0.0	13.4		86.6	
▲	K-205.9	25 - 26.5	2				0.0	0.0	15.5		84.5	
★	K-206.0	8 - 10	37.5	1.106			0.0	37.2	17.6		45.2	
⊙	K-206.0	18 - 19.7	6.35				0.0	0.1	19.7		80.2	

PROJECT: Champlain-Hudson Power Express Package 6

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

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

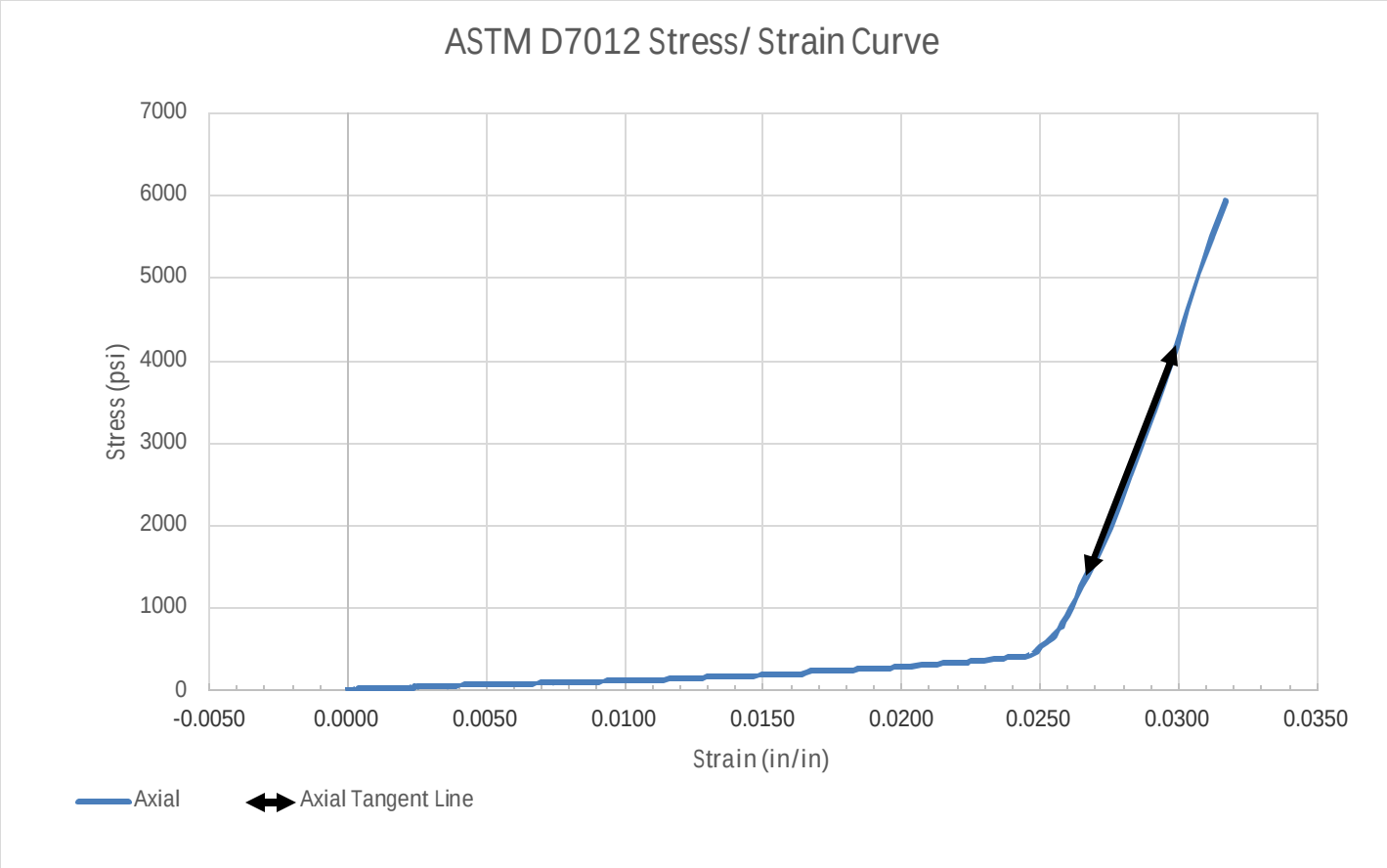
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

Rock Core D7012 Method C

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256



SAMPLE LOCATION			
Site:	Kiewit Engineering Power Express		
Description:	Graywacke		
Boring:	K-205.9	Depth (feet):	40-44.5

SPECIMEN INFORMATION			
Sample No.:		Mass (g):	565.88
Length (in.):	4.19	Diameter (in.):	1.98
L/D Ratio:	2.116	Density (pcf):	167.097

TEST RESULTS	
Failure Load (lbs):	18289
Failure Strain (in/in):	0.034
Unconfined Compressive Strength (psi):	5,940
Elastic Modulus, E, (ksi):	862
Time of Failure (min):	03:18
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	0.86%

Rock Core D7012 Method C

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

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

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

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

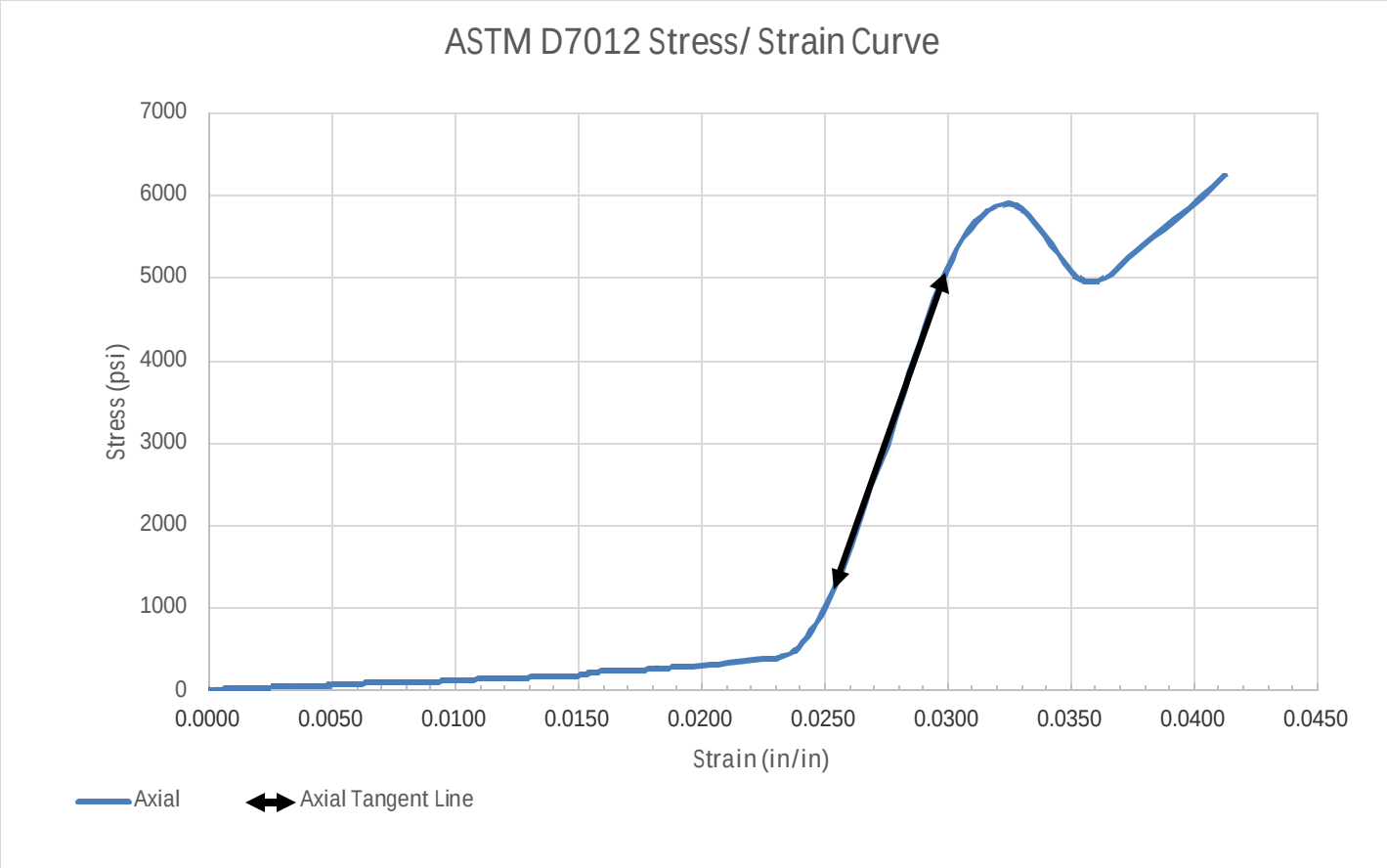
According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.

Rock Core D7012 Method C

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256



SAMPLE LOCATION

Site:	Kiewit Engineering Power Express		
Description:	Graywacke		
Boring:	K-206	Depth (feet):	25-30

SPECIMEN INFORMATION

Sample No.:		Mass (g):	574.55
Length (in.):	4.19	Diameter (in.):	1.98
L/D Ratio:	2.116	Density (pcf):	169.657

TEST RESULTS

Failure Load (lbs):	19233
Failure Strain (in/in):	0.049
Unconfined Compressive Strength (psi):	6,246
Elastic Modulus, E, (ksi):	846
Time of Failure (min):	03:39
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	0.67%

Rock Core D7012 Method C

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

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

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

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

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

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256

Boring	K-206	**Material Description**	Graywacke
Sample No		**Equipment Used**	Tinius Olsen (120,000lbs)
Depth (ft)	25-30	**TICCS ID/Serial No.**	C-48999, 118285
Lab No	2978	**Calibration Date**	11/2/2021

Splitting Tensile Strength of Intact Rock Core Specimens, ASTM D3967

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	1.97	1.98	1.98	1.97	1.98
Length (in)	0.58	0.61	0.6	0.64	0.57
Length Diameter Ratio	0.29	0.31	0.30	0.32	0.29
Rate of Loading	0.0058	0.0061	0.006	0.0064	0.0057
Moisture Condition	0.53%	0.53%	0.53%	0.53%	0.53%
Maximum Applied Load (lbf)	3660	5011	3517	4063	3385
Splitting Tensile Strength (psi)	2040.3	2642.6	1885.6	2052.6	1910.4

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	1.98	1.98	1.98	1.97	1.98
Length (in)	0.6	0.5	0.62	0.67	0.58
Length Diameter Ratio	0.30	0.25	0.31	0.34	0.29
Rate of Loading	0.006	0.005	0.0062	0.0067	0.0058
Moisture Condition	0.53%	0.53%	0.53%	0.53%	0.53%
Maximum Applied Load (lbf)	3781	3385	4161	4379	2976
Splitting Tensile Strength (psi)	2027.2	2177.8	2158.9	2113.2	1650.6

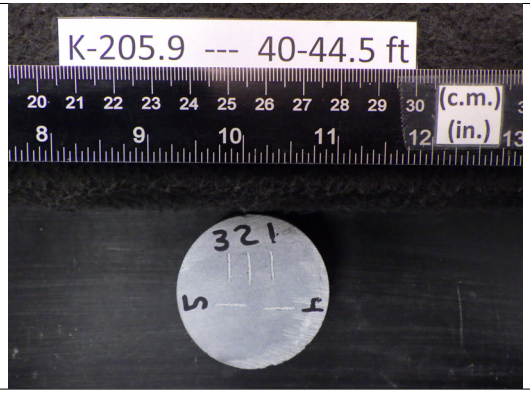
Client:	Terracon Consultants, Inc.		
Project:	Champlain-Hudson Power Express		
Location:		Project No:	GTX-315284
Boring ID: K-205.9	Sample Type: cylinder	Tested By:	tlm
Sample ID: ---	Test Date: 04/29/22	Checked By:	smd
Depth : 40-44.5 ft	Test Id: 664265		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
K-205.9	---	40-44.5 ft	1	1.4	0.5	0.95	
			2	0.7	1.5	1.10	
			3	0.9	0.6	0.75	
			4	0.3	0.4	0.35	
			5	0.2	0.7	0.45	
			Average CAIs			0.72	
			Average CAI *			1.19	
					CERCHAR Abrasiveness Index Classification	**Medium abrasiveness**	

Notes

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



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

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

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

Notes

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

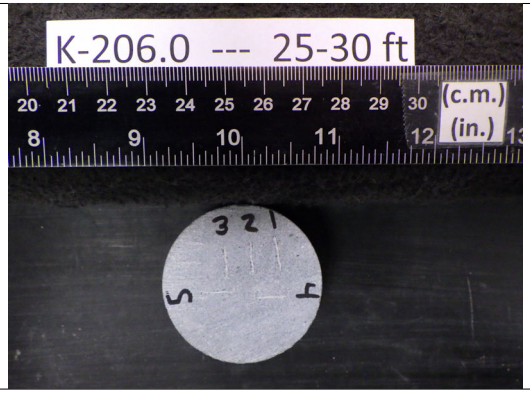


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. KB-205.8

PROJECT: CHPE - Additional HDD Borings - Phase 3

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

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.439818° Longitude: -73.809367°

Surface Elev.: 145.6911 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.0	145.7	**Crushed Stone**, gray
2.0	143.7	**FILL - SILTY SAND**, organics noted, brown
5.0	140.7	**FILL - SILTY SAND**, black
6.5	139.2	**SILTY SAND WITH GRAVEL (SM)**, brown, loose to medium dense
15.0	130.7	**LEAN CLAY (CL)**, varved silt and clay, occasional fine sand partings, gray, very soft to soft

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	24	39-28-28-16 N=56			
	24	6-5-5-8 N=10	33.3		39
5	17	10-9-5-8 N=14			
	18	7-5-4-4 N=9			
	18	3-6-10-7 N=16			
10	24	5-9-18-42 N=27	7.9		16
15	24	1-2-2-2 N=4			
20	24	1-1-1-2 N=2	42.1	46-26-20	100
25	24	WH-WH-WH-WH			

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 were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-15-2022
Boring Completed: 08-19-2022
Drill Rig: Diedrich D-50
Driller: C. Johnston
Project No.: JB215256G

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

BORING LOG NO. KB-205.8

PROJECT: CHPE - Additional HDD Borings - Phase 3

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

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.439818° Longitude: -73.809367°

Surface Elev.: 145.6911 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), varved silt and clay, occasional fine sand partings, gray, very soft to soft *(continued)*	30		24	WH-WH-WH-WH			
35.0	110.7		35		14	5-5-15-23 N=20	15.3		39
		SILTY SAND (SM), occasional cobbles and boulders, brown and gray, medium dense to very dense, (GLACIAL TILL)	40		12	13-26-29-43 3" Split spoon Bulk Sample			
42.3	103.4				4	50/4" 3" Split Spoon Bulk Sample			
		WEATHERED SHALE, gray							
45.0	100.7		45			REC = 100% RQD = 83%			
		SHALE, slightly weathered, close to wide fractured, good RQD, gray							
50.0	95.7		50			REC = 100% RQD = 97%			
		SHALE, slightly weathered, close to wide fractured, excellent RQD, gray							
55.0	90.7		55						

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 were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-15-2022	Boring Completed: 08-19-2022
Drill Rig: Diedrich D-50	Driller: C. Johnston
Project No.: JB215256G	

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

BORING LOG NO. KB-205.8

PROJECT: CHPE - Additional HDD Borings - Phase 3

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

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 42.439818° Longitude: -73.809367°

Surface Elev.: 145.6911 (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
SHALE, slightly weathered, close to wide fractured, good RQD, gray *(continued)*						REC = 100% RQD = 89%				
60.0	85.7	60								
SHALE, slightly weathered, very close to moderate fractured, good RQD, gray						REC = 100% RQD = 87%				
65.0	80.7	65								
Boring Terminated at 65 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 were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-15-2022 | Boring Completed: 08-19-2022
Drill Rig: Diedrich D-50 | Driller: C. Johnston
Project No.: JB215256G

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

Summary of Laboratory Results

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

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

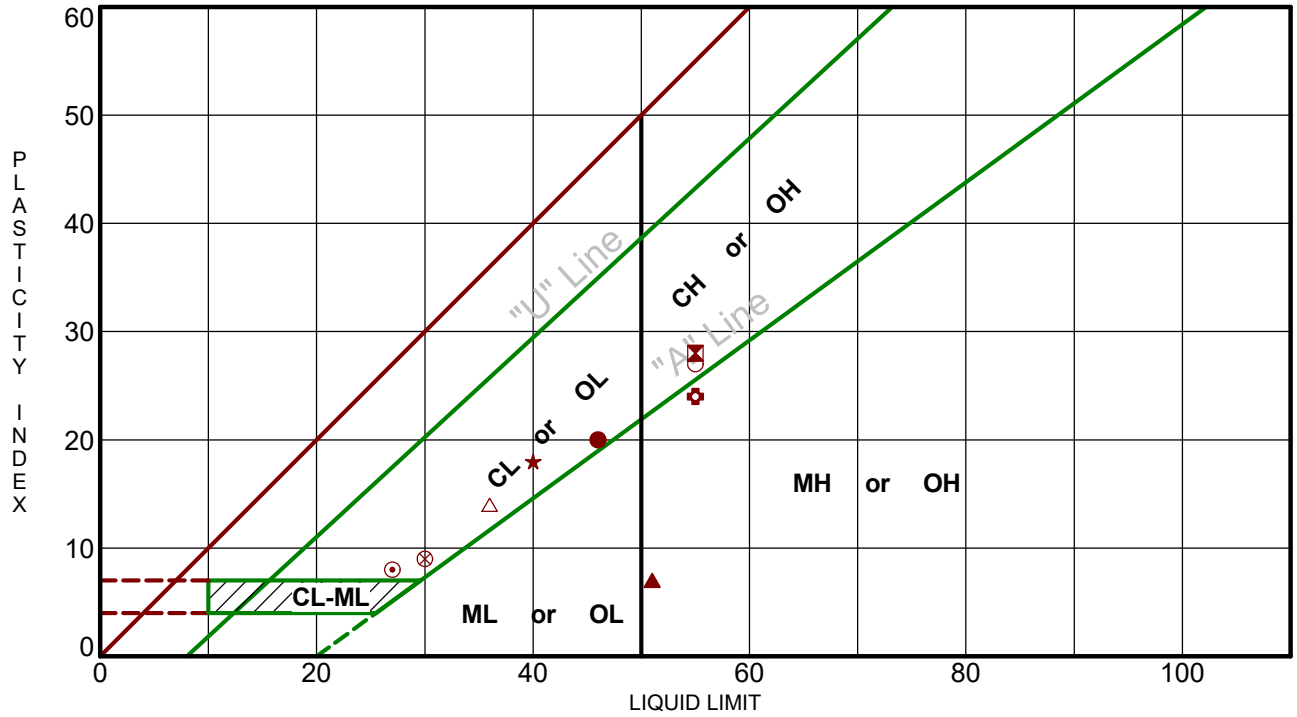
PROJECT NUMBER: JB215256G

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

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

ATTERBERG LIMITS RESULTS

ASTM D4318



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

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

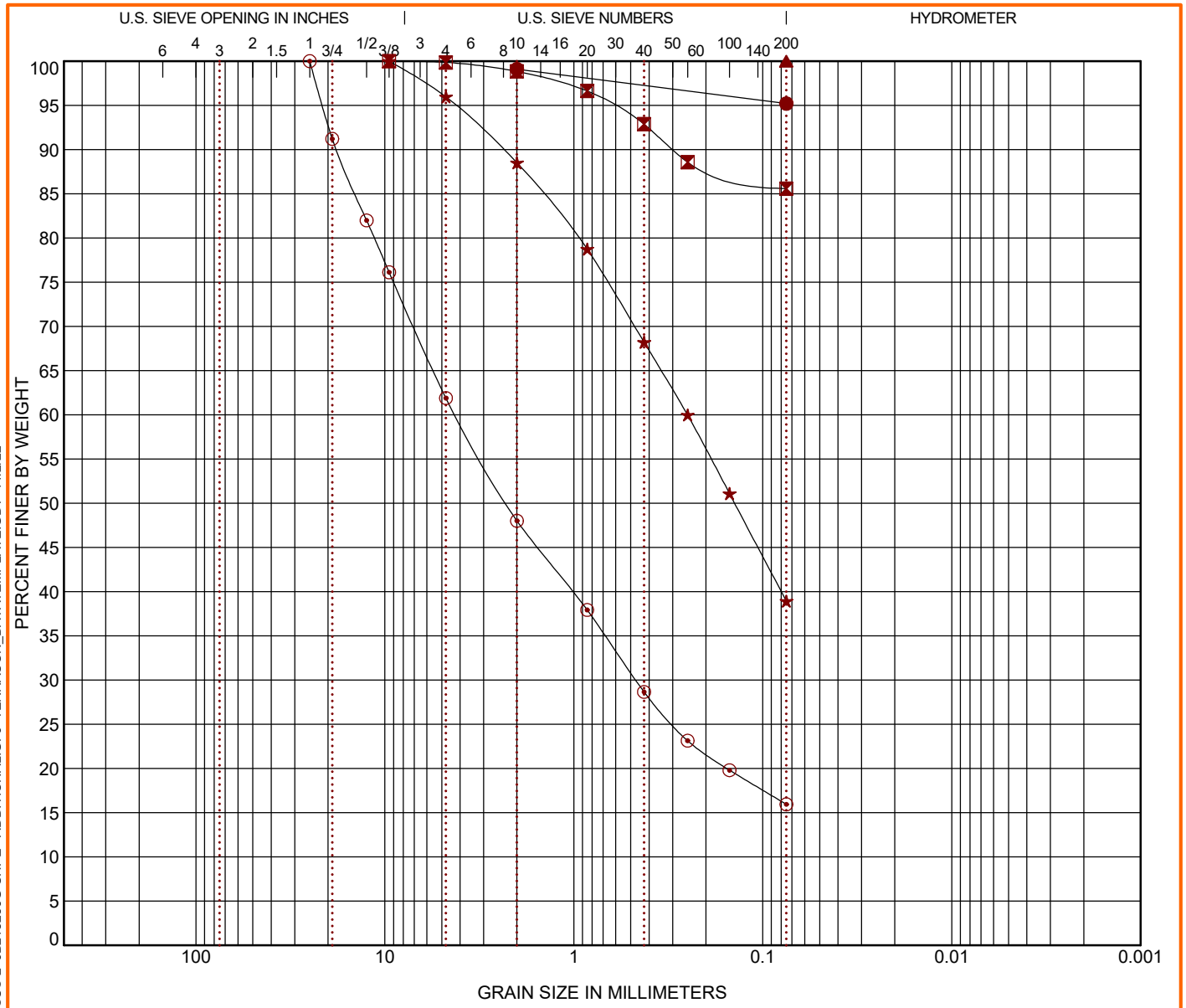
PROJECT NUMBER: JB215256G

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

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

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-200.8A	85 - 86.5	LEAN CLAY (CL)	32.4	24	16	8		
⊠	KB-200.8A	100 - 102	SILT (ML)	16.4	NP	NP	NP		
▲	KB-200.8A	120 - 122	LEAN CLAY (CL)	30.5	37	22	15		
★	KB-205.8	2 - 4	SILTY SAND (SM)	33.3					
⊙	KB-205.8	10 - 12	SILTY SAND with GRAVEL (SM)	7.9					

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-200.8A	85 - 86.5	2						3.9		95.2	
⊠	KB-200.8A	100 - 102	9.5				0.0	0.1	14.3		85.6	
▲	KB-200.8A	120 - 122	0.075				0.0	0.0	0.0		100.0	
★	KB-205.8	2 - 4	9.5	0.25			0.0	4.0	57.0		38.9	
⊙	KB-205.8	10 - 12	25	4.222	0.47		0.0	38.1	46.0		15.9	

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

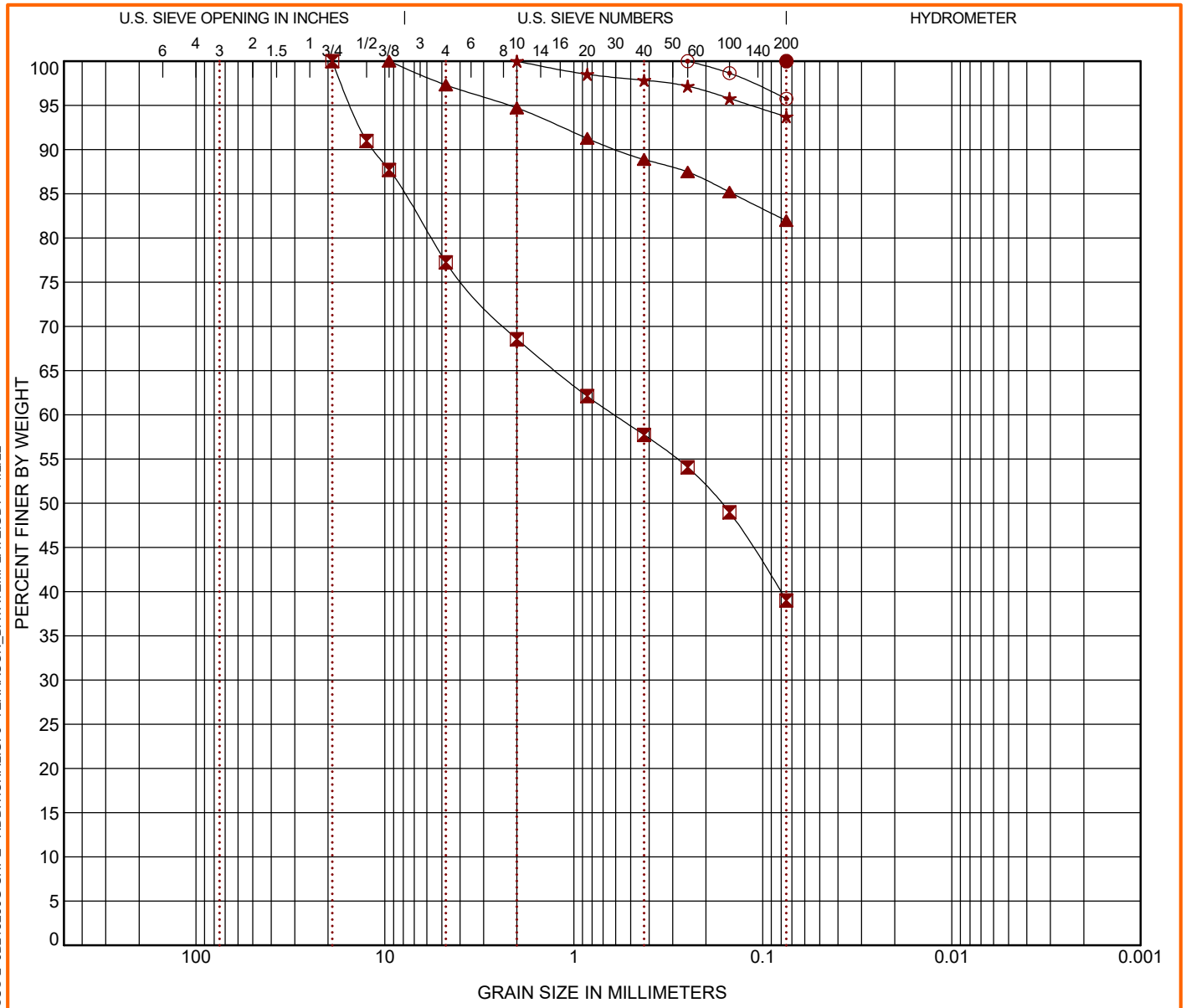
PROJECT NUMBER: JB215256G

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

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

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

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

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

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256G

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

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

Rock Core – Boring KB-205.8

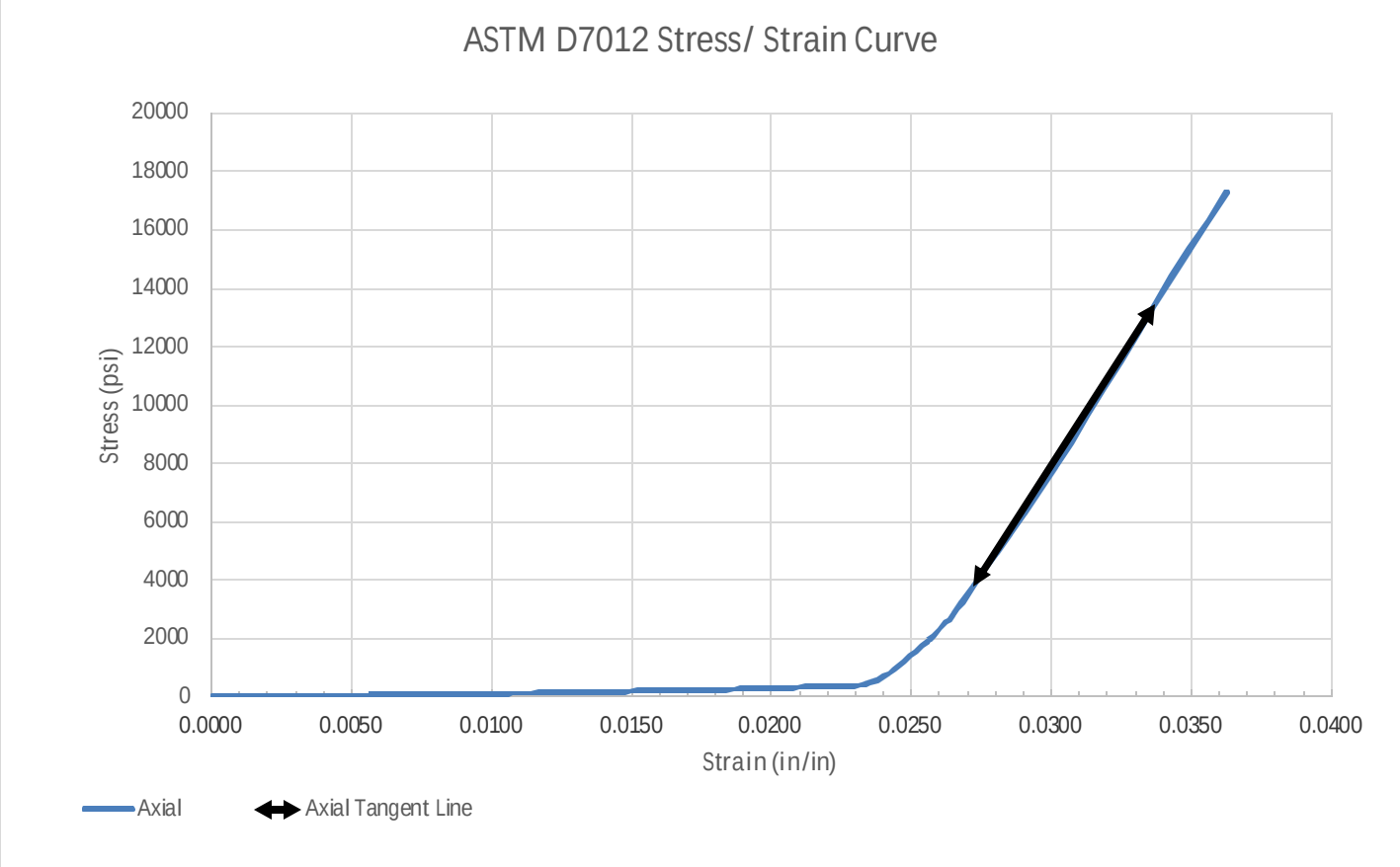
Rock Core – Boring KB-208.8

Rock Core D7012 Method C

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JB215256



SAMPLE LOCATION			
Site:	Champlain-Hudson Power Express Project		
Description:	Shale		
Boring:	KB-205.8	Depth (feet):	50.0-55.0
SPECIMEN INFORMATION			
Sample No.:		Mass (g):	569.53
Length (in.):	4.10	Diameter (in.):	2.00
L/D Ratio:	2.05	Density (pcf):	168.446
TEST RESULTS			
Failure Load (lbs):			54904
Failure Strain (in/in):			0.040
Unconfined Compressive Strength (psi):			17,303
Elastic Modulus, E, (ksi):			1487
Time of Failure (min):			01:47
Rate of Loading (in/sec):			0.04
Moisture Content Post-break:			0.05%

Rock Core D7012 Method C

Client	Project
Kiewit Engineering Corp	Champlain-Hudson Power Express Project
	Project No. JB215256

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

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

Per ASTM D4543, this specimen has not met the requirements for perpendicularity, by exceeding 0.250º.
Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches.
Per ASTM D4543, this specimen has not met the requirements for parallelism, by exceeding 0.25º.
Per ASTM D4543, this specimen has not met the requirements for flatness, by exceeding 0.001 inches.
Per ASTM D4543 and ASTM D7012, the desired specimen length to diameter are between 2.0:1 and 2.5:1.

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

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JB215256

Splitting Tensile Strength of Intact Rock Core Specimens, ASTM D3967

Boring	KB-205.8	**Material Description**	Shale
Sample No		**Equipment Used**	Tinius Olsen (120,000lbs)
Depth (ft)	50.0-55.0	**TICCS ID/Serial No.**	C-48999, 118285
Lab No	8003	**Calibration Date**	11/2/2021

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	1.98	1.99	1.98	1.98	1.98
Length (in)	0.55	0.64	0.62	0.65	0.64
Length Diameter Ratio	0.28	0.32	0.31	0.33	0.32
Rate of Loading	0.055	0.064	0.062	0.065	0.064
Moisture Condition	0.61%	0.61%	0.61%	0.61%	0.61%
Maximum Applied Load (lbf)	3615	3425	3086	2731	3215
Splitting Tensile Strength (psi)	2114.4	1712.9	1601.2	1351.6	1616.0

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	1.98	1.98	1.98	1.98	1.98
Length (in)	0.63	0.60	0.63	0.67	0.62
Length Diameter Ratio	0.32	0.30	0.32	0.34	0.31
Rate of Loading	0.063	0.06	0.063	0.067	0.062
Moisture Condition	0.61%	0.61%	0.61%	0.61%	0.61%
Maximum Applied Load (lbf)	2696	2516	1827	4040	3511
Splitting Tensile Strength (psi)	1376.6	1348.9	932.9	1939.7	1821.7

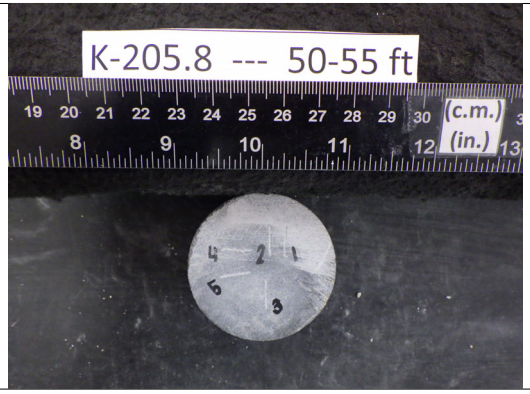
Client:	Terracon Consultants, Inc.		
Project:	Champlain-Hudson Power Express		
Location:		Project No:	GTX-315284
Boring ID: KB-205.8	Sample Type: cylinder	Tested By:	tlm
Sample ID: ---	Test Date: 09/14/22	Checked By:	smd
Depth : 50-55 ft	Test Id: 684384		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
K-205.8	---	50-55 ft	1	3.6	2.5	3.05	
			2	4.3	3.8	4.05	
			3	4.4	3.8	4.10	
			4	2.3	3.8	3.05	
			5	4.3	3.1	3.70	
			Average CAIs			3.59	
			Average CAI *			4.03	
					CERCHAR Abrasiveness Index Classification	**Extreme abrasiveness**	

Notes

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



Kiewit

MEMORANDUM

DATE: November 11, 2022

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

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

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 97 – Revision 1
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 97 is STA 60414+00 (42.42929° N, 73.80933° W).

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

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

Contact us if you have questions or require additional information.

HDD 97
Borings K- 206.5, K-206.6,
A206.62-1
Segment 10 - Design Package 6

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

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	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.

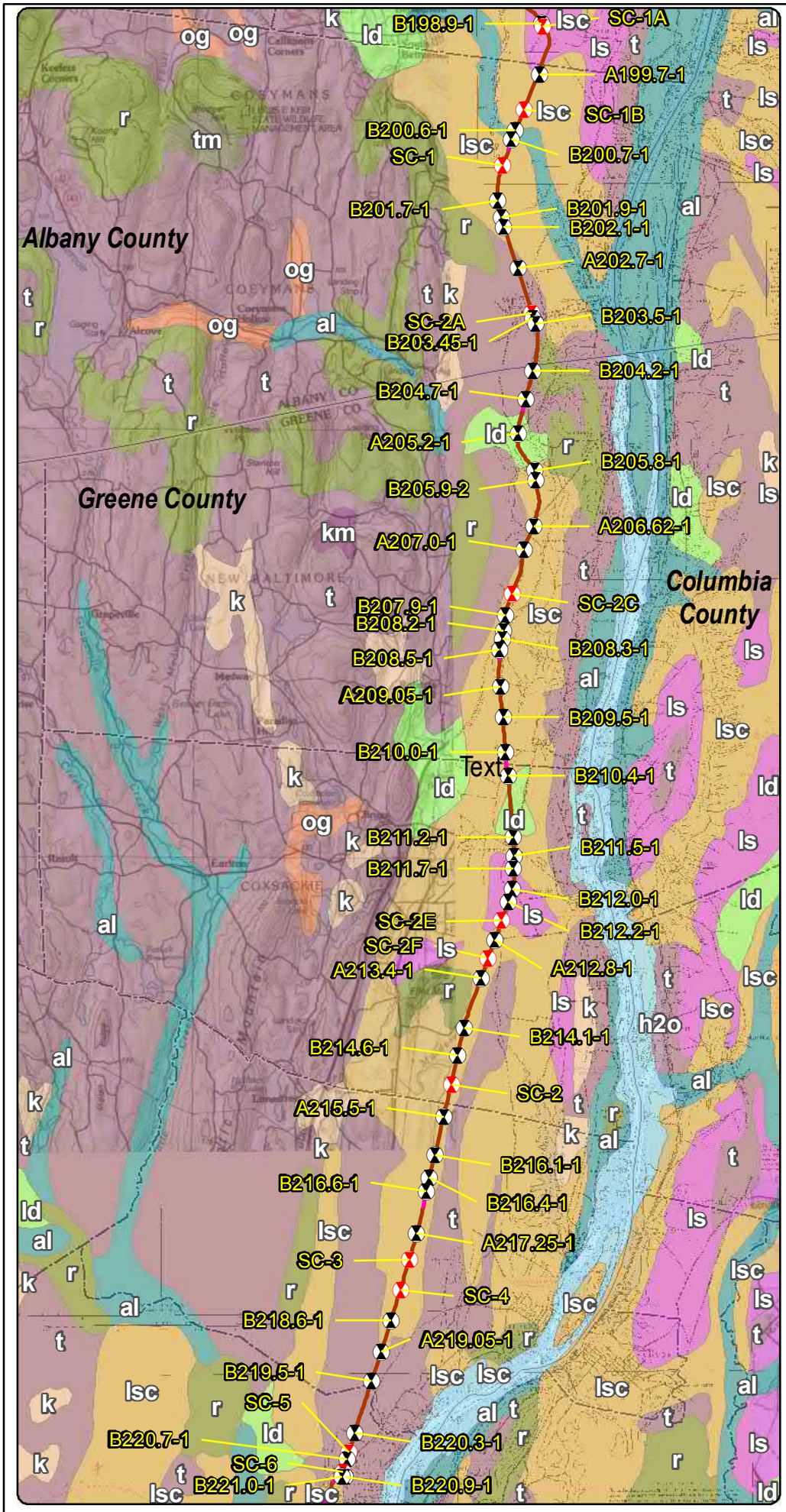
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

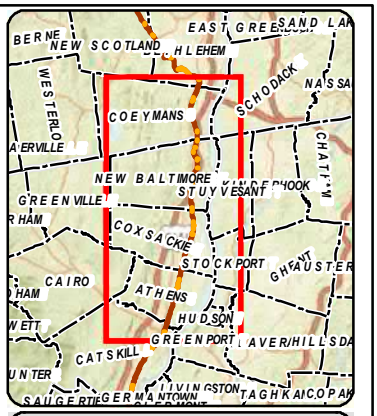
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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.

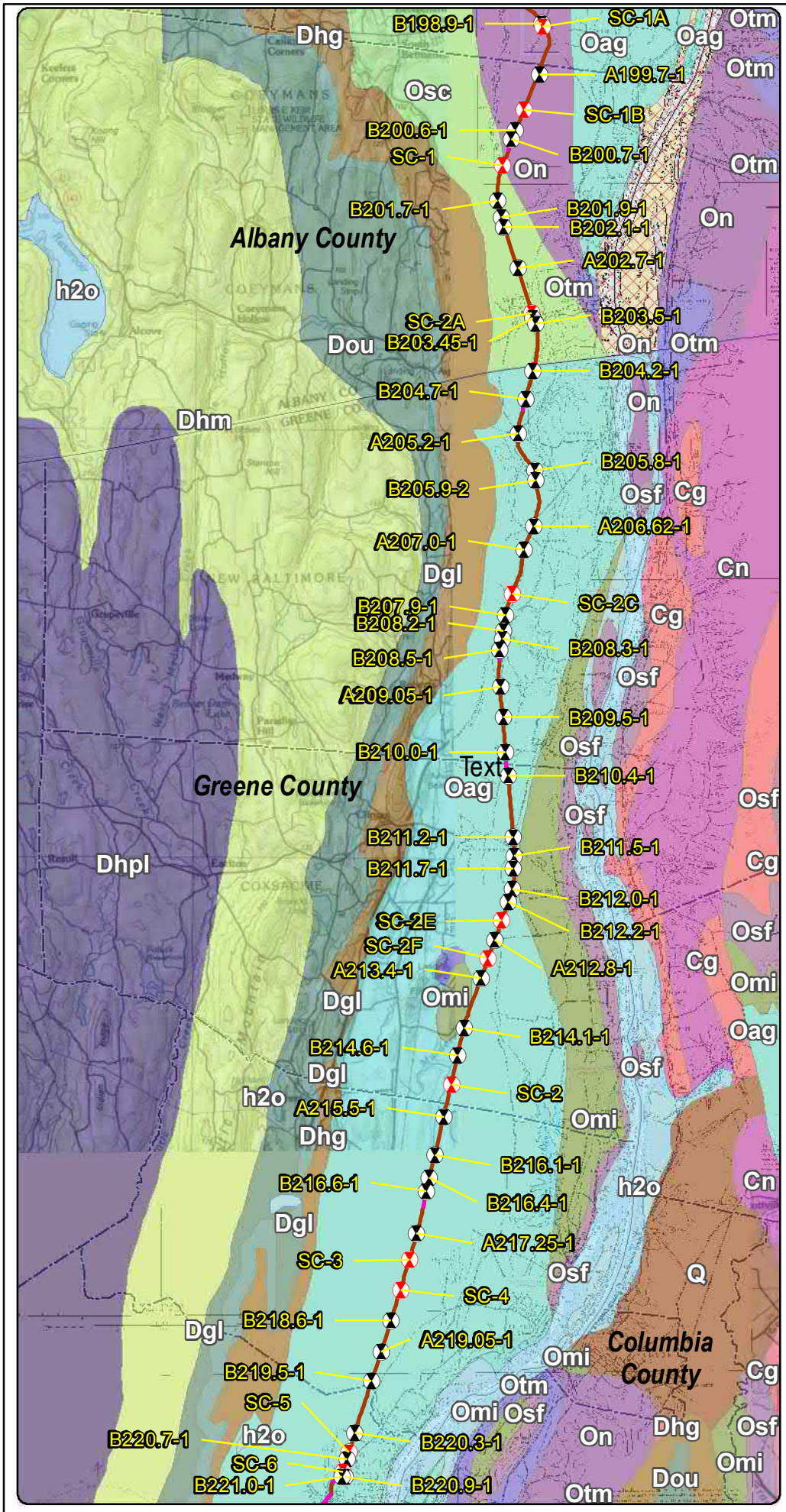
Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

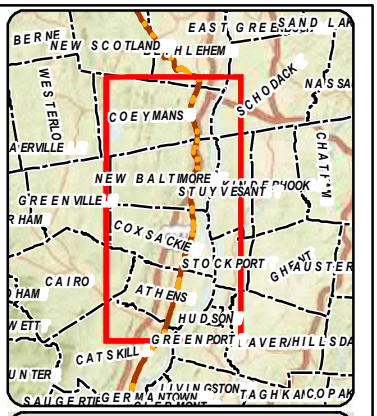
Prepared on 5/3/2021

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

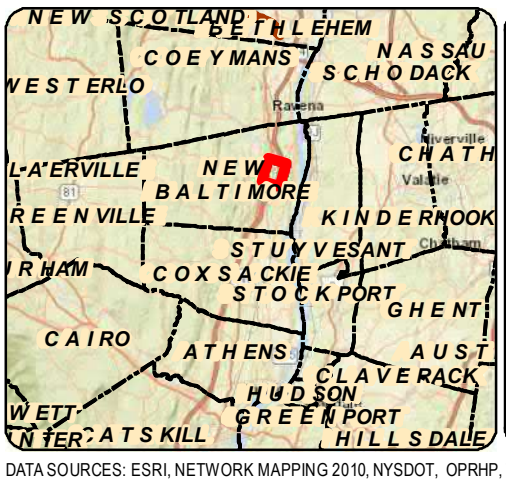
by: AECOM

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

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

206.3
206.4
206.5
206.6
A206.62-1
206.7
206.8
206.9
NEW BALTIMORE
A207.0-1
207.1
207.2
207.3
207.4
207.5

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 7 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	**A206.62-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
20.0'	NR	11/28	0 HR

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	23.8 '

DRILLER	R.CARUSO
HELPER	C. SMART
INSPECTOR	C. POPPE
DATE STARTED	11/28/2012
DATE COMPLETED	11/28/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	6 4 3 3		***BLACK M/C SAND, SM F/ GRAVEL-SIZED ROCK FRAGMENTS, TR SILT (FILL)***		
	S-2	3 3 8 5	4.0		14.3	
5	S-3	3 4 7 11			31.0	
	S-4	5 7 7 6		***LIGHT BROWN/TAN SILT, TR CLAY***		
10	S-5	6 13 10 7	13.5			
15	S-6	9 16 18		***GRAY CLAYEY SILT, TR TO SM F/ GRAVEL SIZED ROCK FRAGMENTS***	22.3	
			18.5			
20	S-7	6 6 6		***LIGHT BROWN CLAYEY SILT***	33.1	
	S-8	50/0.3	23.5			
			23.8	***GRAY CLAYEY SILT, TR TO SM F/ GRAVEL-SIZED ROCK FRAGMENTS***		
25				***END OF BORING AT 23.8'***		
30						
35						

DRN.	TBT
CKD.	PWK

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

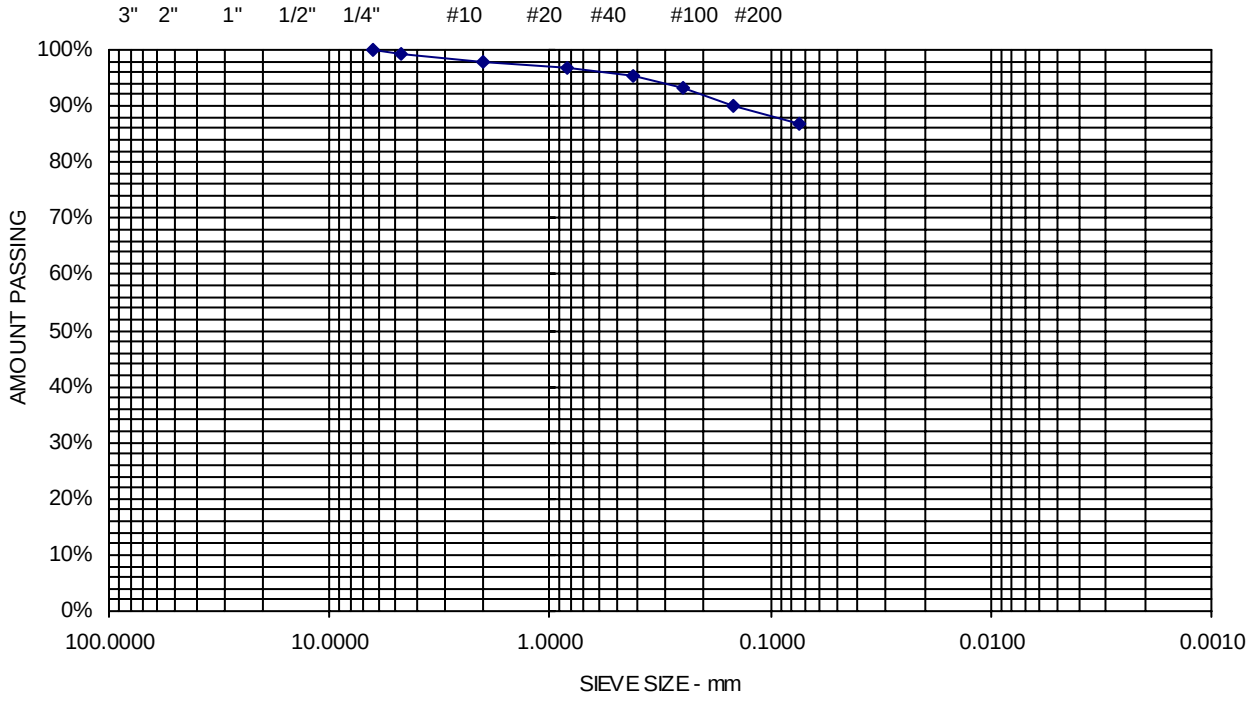
Report of Gradation

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	10558S
Exploration	**B206.62-1**	Date Received	1/4/2013
Material Source	**BULK SAMPLE**	Date Completed	1/7/2013
		Tested By	JASON REDMOND

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**99**	0.5% Gravel
2.00 mm	**No. 10**	**98**	
850 um	**No. 20**	**97**	
425 um	**No. 40**	**95**	12.5% Sand
250 um	**No. 60**	**93**	
150 um	**No. 100**	**90**	
75 um	**No. 200**	**87.0**	87% Fines

GRAY SANDY SILTY CLAY TRACE GRAVEL (CL)



Comments:

Sheet

S.W.COLE ENGINEERING, INC.

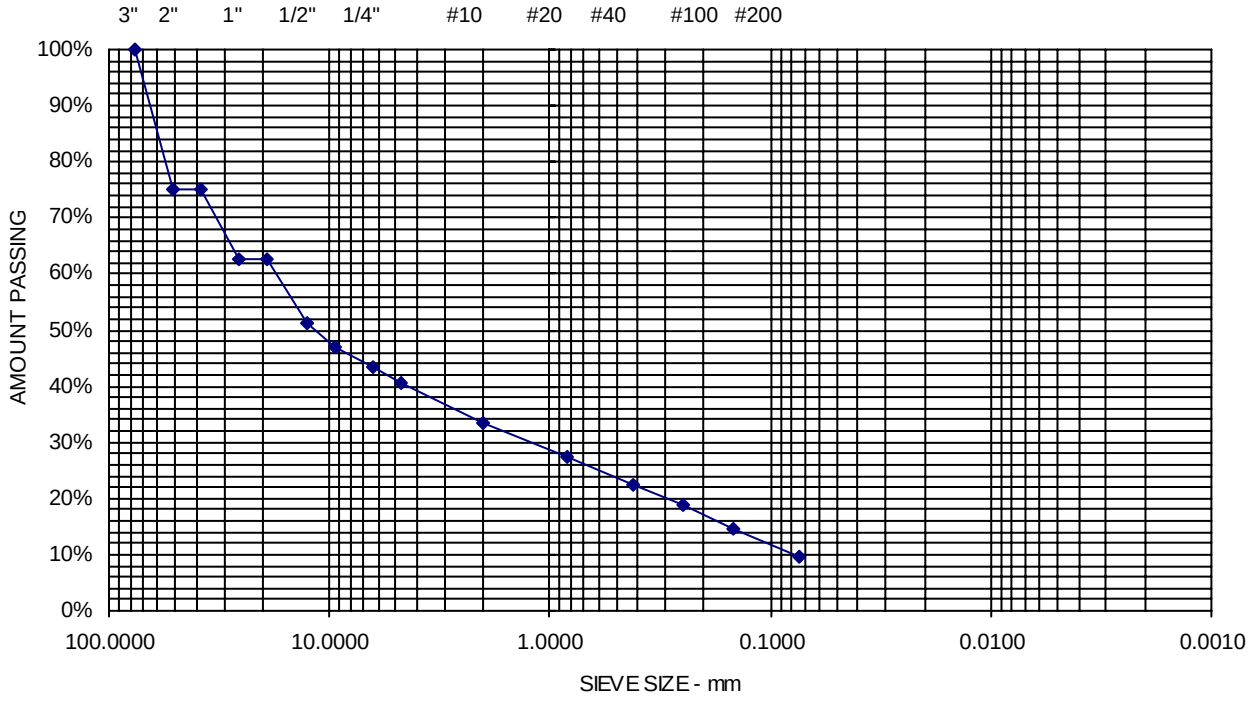
Report of Gradation

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	10404S
Exploration	**B206.62-1**	Date Received	11/29/2012
Material Source	**SAMPLE FROM 2-4 FEET**	Date Completed	12/4/2012
		Tested By	SHAWN BENOIT

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
75 mm	**3"**	**100**	
50 mm	**2"**	**75**	
38.1 mm	**1-1/2"**	**75**	
25.0 mm	**1"**	**63**	
19.0 mm	**3/4"**	**63**	
12.5 mm	**1/2"**	**51**	
9.5 mm	**3/8"**	**47**	
6.3 mm	**1/4"**	**43**	
4.75 mm	**No. 4**	**41**	59.4% Gravel
2.00 mm	**No. 10**	**34**	
850 um	**No. 20**	**27**	
425 um	**No. 40**	**22**	31.1% Sand
250 um	**No. 60**	**19**	
150 um	**No. 100**	**15**	
75 um	**No. 200**	**9.5**	9.5% Fines

BLACK SANDY GRAVEL SOME SILT (GW-GM)



Comments: MOISTURE CONTENT = 14.1%

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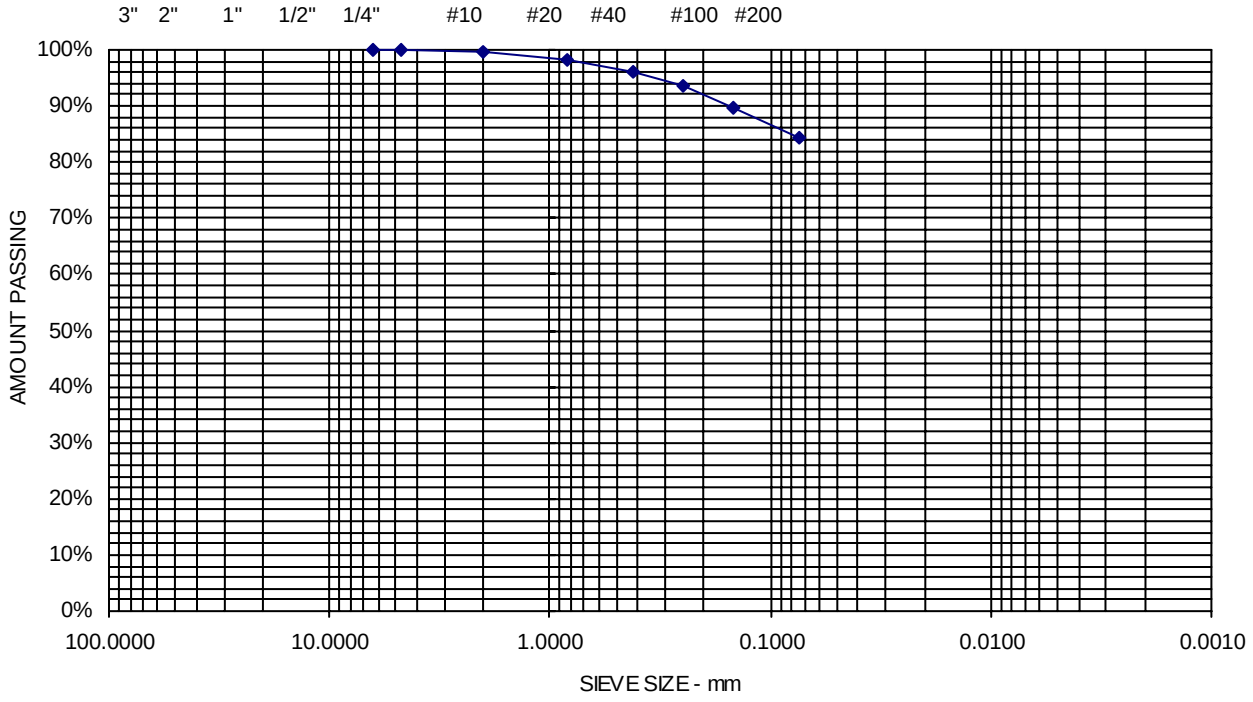
Report of Gradation

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	10405S
Exploration	**B206.62-1**	Date Received	11/29/2012
Material Source	**SAMPLE FROM 8-10 FEET**	Date Completed	12/4/2012
		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**	**98**	
425 um	**No. 40**	**96**	15.6% Sand
250 um	**No. 60**	**93**	
150 um	**No. 100**	**90**	
75 um	**No. 200**	**84.4**	84.4% Fines

BROWN SANDY SILT AND CLAY (CL)



Comments: MOISTURE CONTENT = 29.9%

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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-4	6.0-8.0														
	S-5	8.0-10.0	GW-GM	63.7	25.5	10.8		-	-	-	-	-	9.3	-	-	-
	S-6	13.5-15.0	-	-	-	-		-	-	-	-	-	23.4	-	-	3.6
	S-8	23.5-25.0	-	-	-	-		-	-	-	-	-	30.9	92.6	-	-
B205.9-1	S-2	2.0-4.0	-	-	-	-		-	-	-	-	-	22.9	-	-	-
	S-3	4.0-6.0	CL-ML	0.0	14.6	28.1	57.3	-	-	-	-	2.77	-	-	-	-
	S-4	6.0-8.0											35.4	86.1		
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	26.9	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	26.9	-	-	-
	S-8	23.5-25.0	-	0.0	7.2	23.3	69.5	-	-	-	-	2.73	36.1	-	-	-
A206.62-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	14.3	-	-	-

SUMMARY OF LABORATORY TEST DATA

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

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

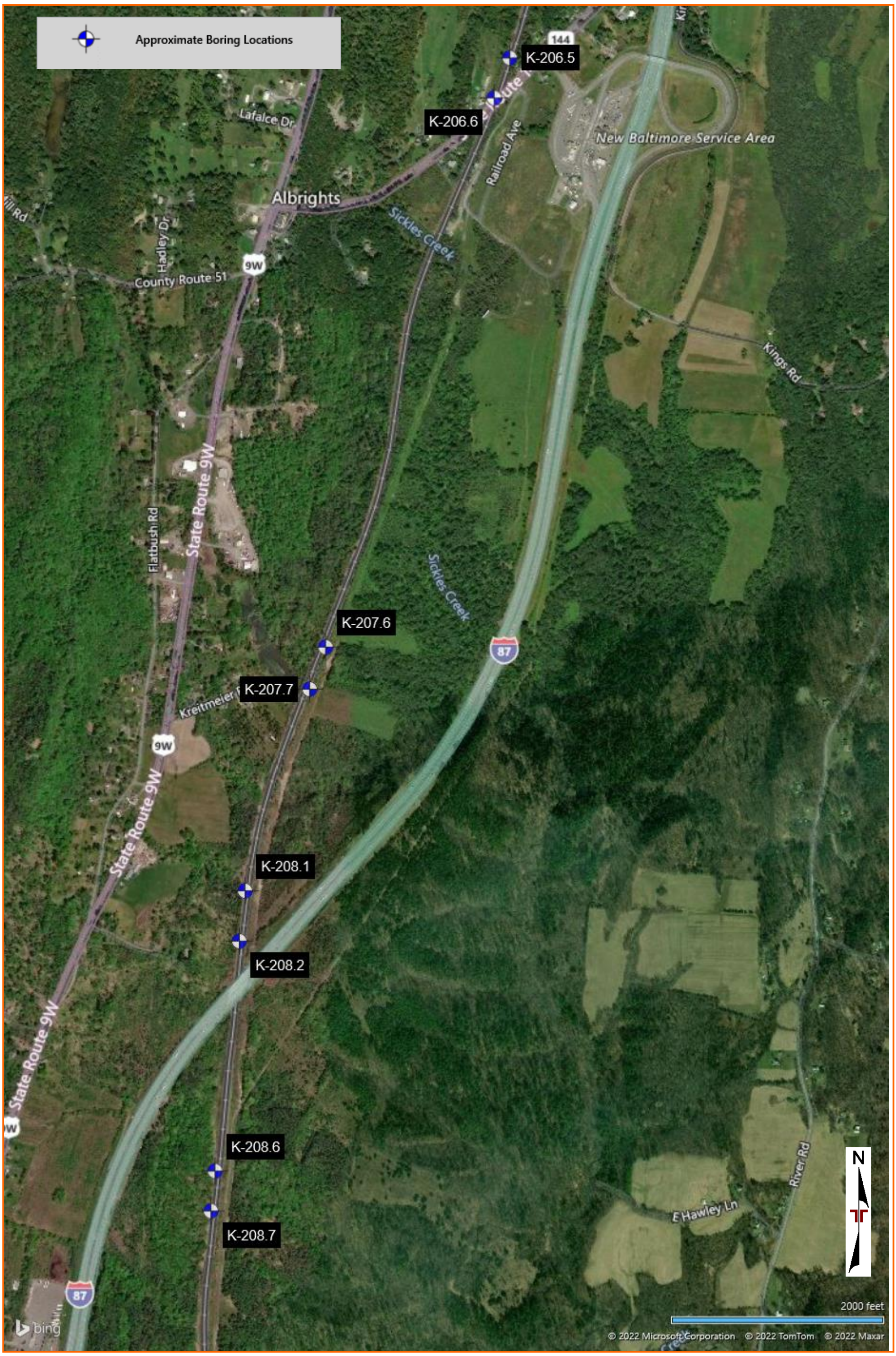


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-206.5

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: 42.4300° Longitude: -73.8090°

Surface Elev.: 189.5 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.0	189.5	
2.0	187.5	**FILL - ASH AND CINDERS**, black, loose
4.3	185	**FILL - SILT AND CLAY**, black and brown, medium stiff
15.0	174.5	**LEAN CLAY WITH SAND (CL)**, brown, medium stiff to very stiff
23.0	166.5	**LEAN CLAY (CL)**, gray, soft to stiff
24.6	165	**SILTY GRAVEL WITH SAND (GM)**, gray, (GLACIAL TILL)
26.0	163.5	**WEATHERED ROCK**, gray, very dense
		SHALE, slightly weathered, close fractured, fair RQD, gray

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		10	3-3-3-3 N=6			
		10	3-3-5-5 N=8			
5		17	3-5-6-9 N=11			
		19	9-11-11-10 N=22			
		20	2-2-4-6 N=6	33.3	41-25-16	71
10		24	4-5-5-6 N=10			
15		18	WOH-2-2 N=4	30.3	29-18-11	98
20		18	3-5-8 N=13			
		18	53-35-67-50/1"	8.9		17
25		2	3" Split Spoon With RIng Samplers 50/2"			

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

WATER LEVEL OBSERVATIONS

While drilling

After 20-21.5 foot sample

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-24-2022	Boring Completed: 02-25-2022
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-206.5

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: 42.4300° Longitude: -73.8090°

Surface Elev.: 189.5 (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
		SHALE, slightly weathered, close fractured, fair RQD, gray *(continued)*					REC = 90% RQD = 61%			
30.5	159		30							
		SHALE, slightly weathered, close fractured, fair RQD, gray					REC = 100% RQD = 66%			
35.5	154		35							
		SHALE, slightly weathered, close fractured, good RQD, gray					REC = 100% RQD = 83%			
40.5	149		40							
		Boring Terminated at 40.5 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

WATER LEVEL OBSERVATIONS

While drilling

After 20-21.5 foot sample

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-24-2022	Boring Completed: 02-25-2022
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-206.6

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: 42.4286° Longitude: -73.8097°

Surface Elev.: 185.7 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0	185.7	
2.0	183.5	**FILL - BALLAST**, black, loose
6.0	179.5	**SILT AND CLAY**, with sand, brown, soft
		LEAN CLAY (CL), varved with fine sand partings, brown, very soft to very stiff
		grades gray

Sample	Recovery (In.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
SS	14	3-5-2-2 N=7			
SS	3	1-3-WOH-3 N=3			
SS	6	2-1-3-4 N=4			
SS	6	5-9-9-12 N=18	32.0		
SS	22	2-5-6-8 N=11			
SS	2	5-6-6-7 N=12			
SS	24	4-5-6-7 N=11	29.8	37-22-15	87
SS	24	3-3-3-4 N=6			
SS	24	WOH-WOH -WOH-5 3" Split Spoon With Ring Samplers	30.6	32-20-12	98

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 LC
WOH = Weight of Hammer
Hammer Efficiency Summary:
Energy Transfer Ratio: 89.1% +/- 4.4%
Hammer Efficiency Correction (CE): 1.49

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-25-2022 | Boring Completed: 02-28-2022

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

Project No.: JB215256C

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

BORING LOG NO. K-206.6

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: 42.4286° Longitude: -73.8097°

Surface Elev.: 185.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), varved with fine sand partings, brown, very soft to very stiff *(continued)*		30		24	WOH-WOH -WOH-2			
		35		24	WOH-WOH-1-1 N=1	31.9		
				24	4-5-7-3 N=12			
40.0	145.5	40						
Boring Terminated at 40 Feet								

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

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

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

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-25-2022 | Boring Completed: 02-28-2022

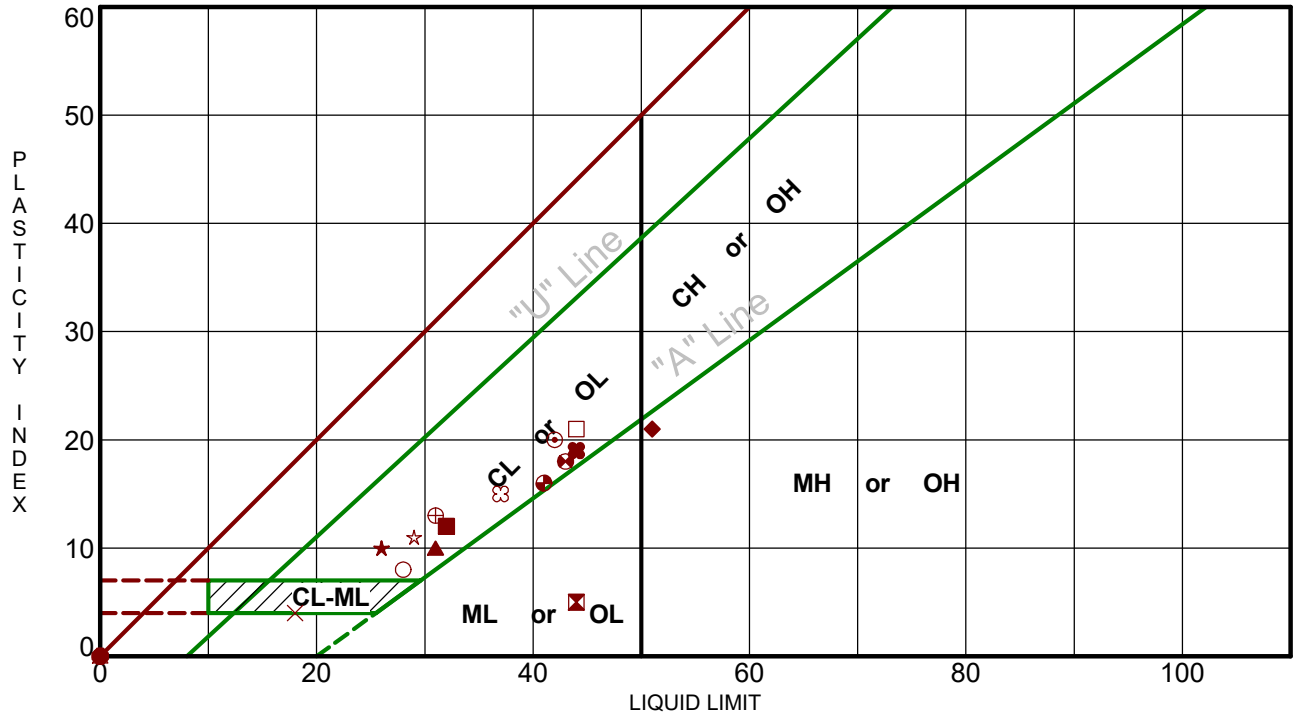
Drill Rig: Mobile B-57 | Driller: L. Spicher

Project No.: JB215256C

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

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-203.6	20 - 22	NP	NP	NP	14.7	SM	SILTY SAND with GRAVEL
⧗	K-204.2	10 - 12	44	39	5	74.5	ML	SILT with SAND
▲	K-204.2	25 - 27	31	21	10	89.4	CL	LEAN CLAY
★	K-204.8	10 - 12	26	16	10	90.2	CL	LEAN CLAY
⊙	K-204.8	23 - 25	42	22	20	93.8	CL	LEAN CLAY
✿	K-204.9	10 - 12	NP	NP	NP	97.2	ML	SILT
○	K-204.9	18 - 20	28	20	8	95.8	CL	LEAN CLAY
△	K-205.2	20 - 22	NP	NP	NP	41.6	SM	SILTY SAND
⊗	K-205.2	30 - 32	NP	NP	NP	39.8	SM	SILTY SAND
⊕	K-205.9	8 - 10	31	18	13	86.6	CL	LEAN CLAY
□	K-205.9	25 - 26.5	44	23	21	84.5	CL	LEAN CLAY with SAND
⊛	K-206.0	8 - 10	43	25	18	45.2	GC	CLAYEY GRAVEL with SAND
◕	K-206.5	8 - 10	41	25	16	70.6	CL	LEAN CLAY with SAND
☆	K-206.5	15 - 17	29	18	11	97.5	CL	LEAN CLAY
✿	K-206.6	13 - 15	37	22	15	87.0	CL	LEAN CLAY
■	K-206.6	23 - 25	32	20	12	98.5	CL	LEAN CLAY
◆	K-207.6	6 - 8	51	30	21	69.8	MH	SANDY ELASTIC SILT
◇	K-207.6	15 - 17	NP	NP	NP	8.2	GW-GM	WELL-GRADED GRAVEL with SILT and SAND
×	K-207.6	24.7 - 26.3	18	14	4	26.6	SC-SM	SILTY, CLAYEY SAND with GRAVEL
✖	K-207.7	15 - 17	44	25	19	93.0	CL	LEAN 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

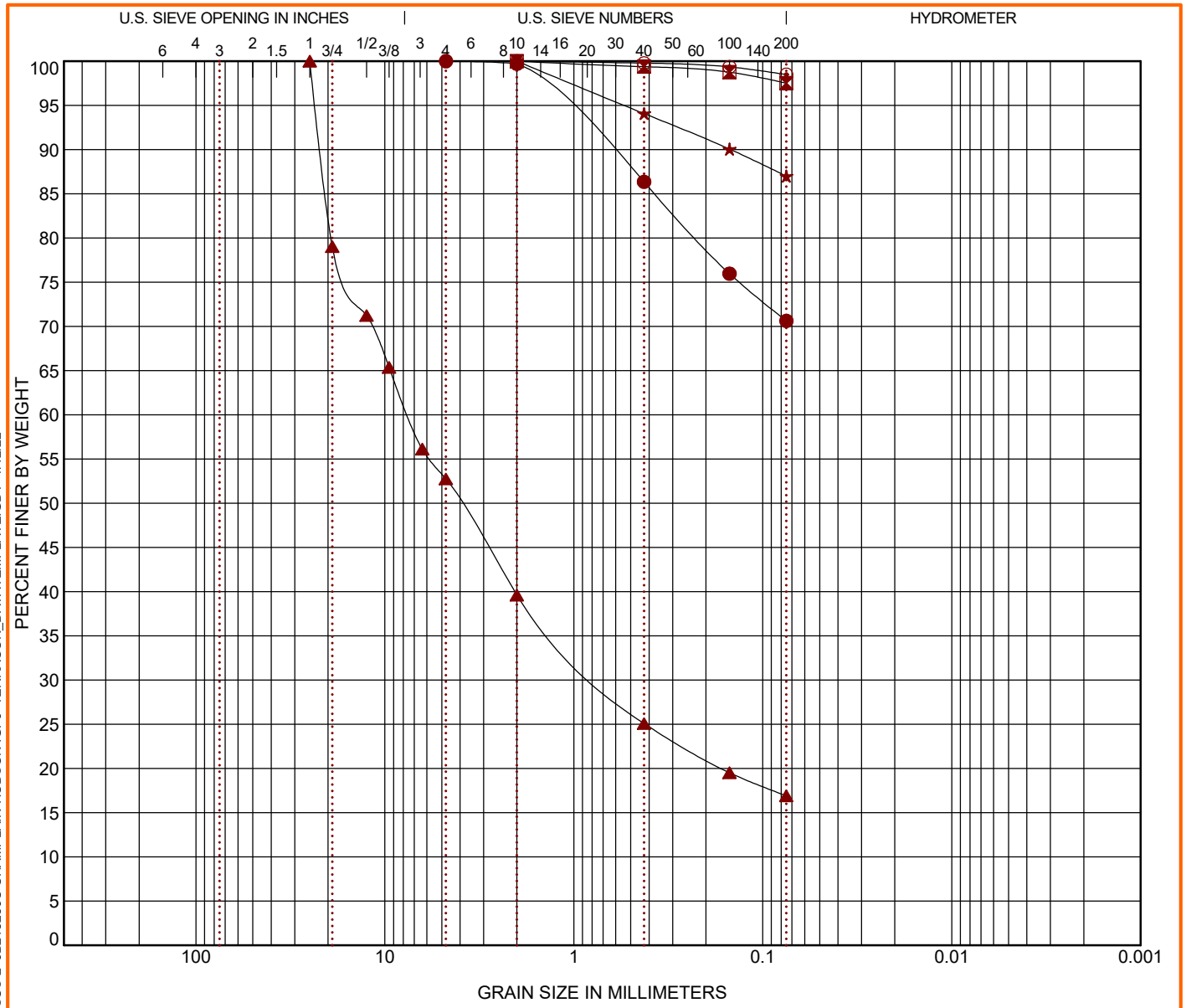
PROJECT NUMBER: JB215256C

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-206.5	8 - 10	LEAN CLAY with SAND (CL)	33.3	41	25	16		
⊠	K-206.5	15 - 17	LEAN CLAY (CL)	30.3	29	18	11		
▲	K-206.5	23 - 24.6	SILTY GRAVEL with SAND (GM)	8.9					
★	K-206.6	13 - 15	LEAN CLAY (CL)	29.8	37	22	15		
⊙	K-206.6	23 - 25	LEAN CLAY (CL)	30.6	32	20	12		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-206.5	8 - 10	4.75				0.0	0.0	29.4		70.6	
⊠	K-206.5	15 - 17	2				0.0	0.0	2.5		97.5	
▲	K-206.5	23 - 24.6	25	7.521	0.718		0.0	47.3	35.8		16.9	
★	K-206.6	13 - 15	2				0.0	0.0	13.0		87.0	
⊙	K-206.6	23 - 25	2				0.0	0.0	1.5		98.5	

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

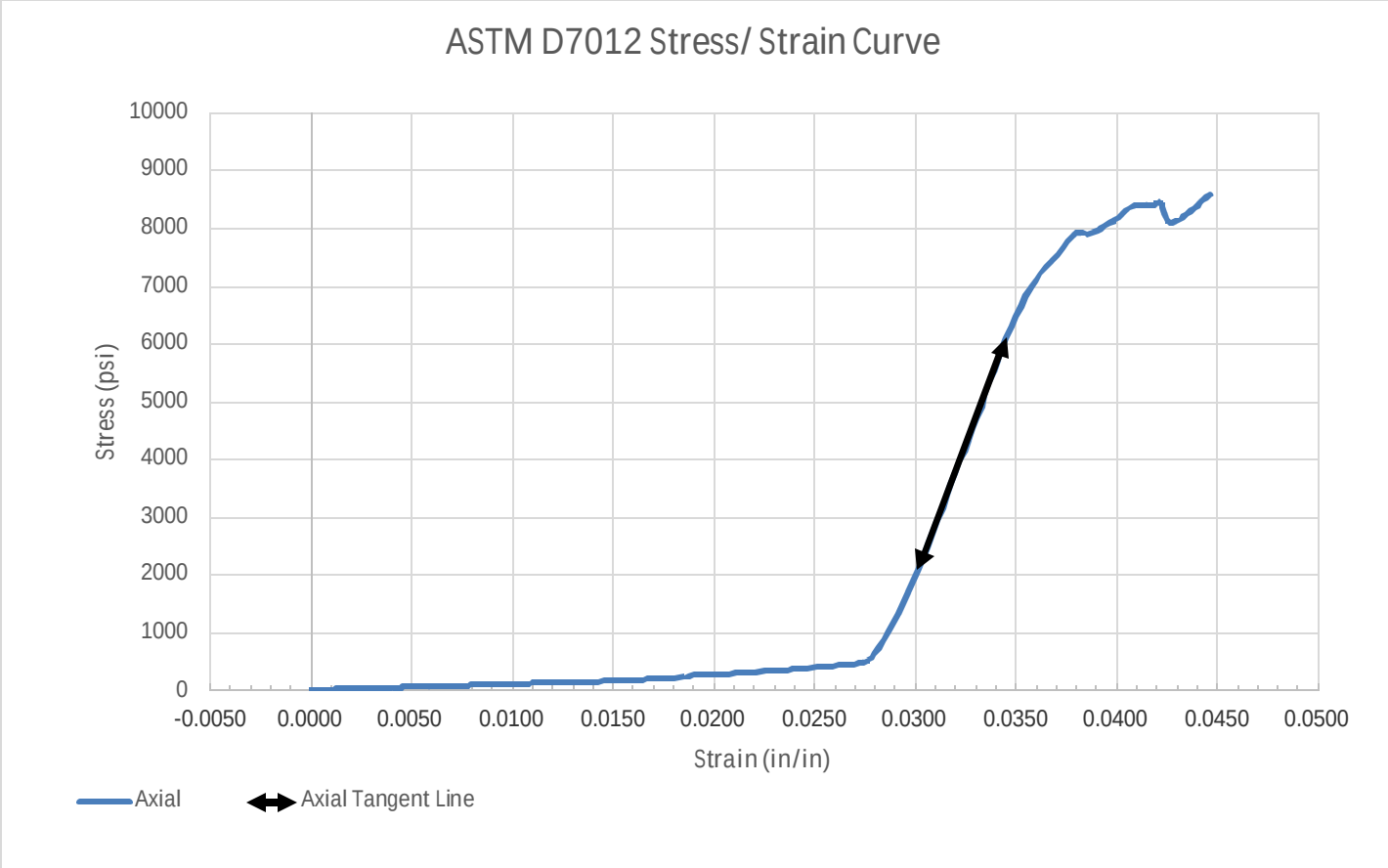
CLIENT: Kiewit Engineering (NY) Corp.

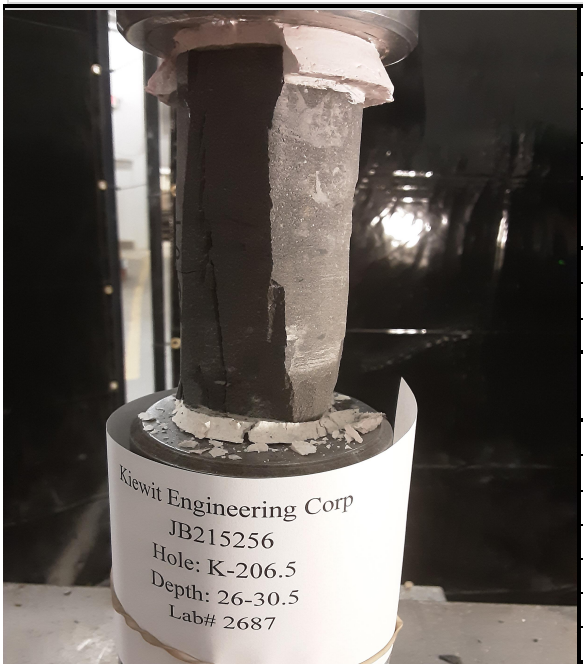
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256C CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 4/12/22

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256





SAMPLE LOCATION

Site:	Kiewit Engineering Corp		
Description:	Graywacke		
Boring:	K-206.5	Depth (feet):	26-30.5

SPECIMEN INFORMATION

Sample No.:		Mass (g):	563.51
Length (in.):	4.12	Diameter (in.):	1.99
L/D Ratio:	2.070	Density (pcf):	167.527

TEST RESULTS

Failure Load (lbs):	26440
Failure Strain (in/in):	0.047
Unconfined Compressive Strength (psi):	8,587
Elastic Modulus, E, (ksi):	917
Time of Failure (min):	03:21
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	0.74%

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

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

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

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

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

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JD215256

Boring	K-206.5	Material Description	Grwaywacke
Sample No		Equipment Used	Tinius Olsen (120,000lbs)
Depth (ft)	26-30.5	TICCS ID/Serial No.	C-48999, 118285
Lab No	2687	Calibration Date	11/2/2021

Splitting Tensile Strength of Intact Rock Core Specimens, ASTM D3967

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	1.98	1.98	1.98	1.98	1.98
Length (in)	0.5	0.5	0.64	0.52	0.65
Length Diameter Ratio	0.25	0.25	0.32	0.26	0.33
Rate of Loading	0.005	0.005	0.0064	0.0064	0.0065
Moisture Condition	0.57%	0.57%	0.57%	0.57%	0.57%
Maximum Applied Load (lbf)	2906	2626	3379	3281	4569
Splitting Tensile Strength (psi)	1869.7	1689.5	1698.4	2029.7	2261.2

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	1.98	1.99	1.98	1.98	1.99
Length (in)	0.52	0.5	0.64	0.69	0.58
Length Diameter Ratio	0.26	0.25	0.32	0.35	0.29
Rate of Loading	0.0052	0.005	0.0064	0.0069	0.0058
Moisture Condition	0.57%	0.57%	0.57%	0.57%	0.57%
Maximum Applied Load (lbf)	2329	2486	4327	4569	3994
Splitting Tensile Strength (psi)	1440.8	1591.4	2174.9	2130.1	2204.1

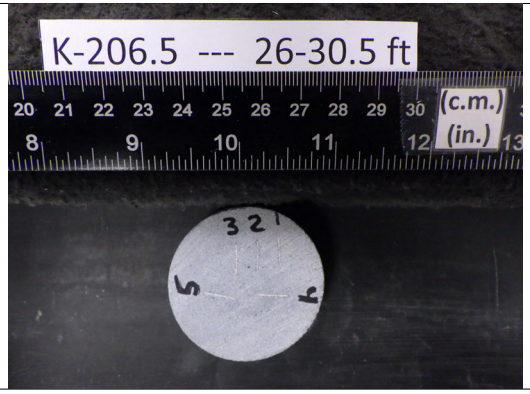
Client:	Terracon Consultants, Inc.		
Project:	Champlain-Hudson Power Express		
Location:		Project No:	GTX-315284
Boring ID: K-206.5	Sample Type: cylinder	Tested By:	tlm
Sample ID: ---	Test Date: 04/28/22	Checked By:	smd
Depth : 26-30.5 ft	Test Id: 663629		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
K-206.5	---	26-30.5 ft	1	1.5	1.3	1.40	
			2	2.0	1.9	1.95	
			3	1.5	1.5	1.50	
			4	1.0	1.5	1.25	
			5	1.1	1.9	1.50	
			Average CAIs			1.52	
			Average CAI *			1.98	
					CERCHAR Abrasiveness Index Classification	**Medium abrasiveness**	

Notes

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



Client

Kiewit Engineering (NY) Corp
Lone Tree, CO

Project

Champlain-Hudson Power Express Project
JB215256

Date Received: 5/31/2022

Results from Corrosion Testing

Sample Location	K-206.5
Sample Depth (ft.)	2'-6'
pH Analysis, ASTM G 51	8.52
Water Soluble Sulfate (SO4), ASTM C 1580 (ppm)	10
Sulfides, AWWA 4500-S D, (mg/kg)	Nil
Chlorides, ASTM D 512, (ppm)	19
Red-Ox, ASTM G 200, (mV)	+469
Total Salts, AWWA 2520 B, (mg/kg)	418
Resistivity (Saturated), ASTM G 57, (ohm-cm)	1860

Analyzed By: Kyle Lemcke
Laboratory Supervisor

The tests were performed in general accordance with applicable ASTM and AWWA 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: 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 97A
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 97A is STA 60429+00 (42.4253° N, 73.8111° W).

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

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

Contact us if you have questions or require additional information.

HDD 97A
Boring A207.0-1, KB-206.8,
KB-207.0, KB-207.1
Segment 10 - Design Package 6

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

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	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.

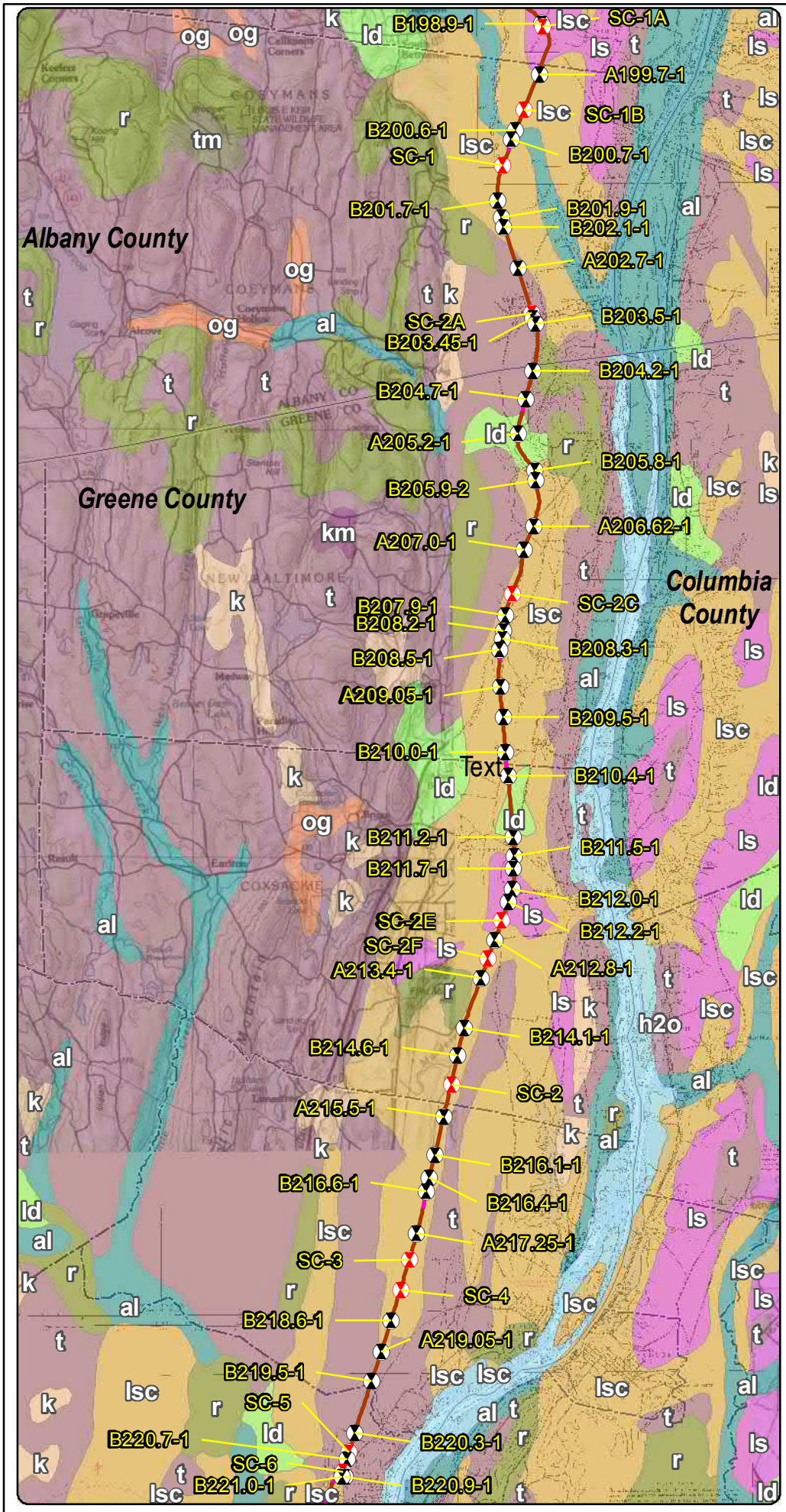
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

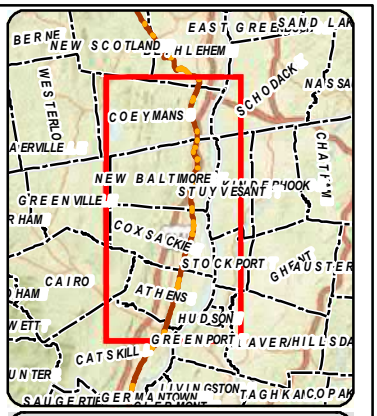
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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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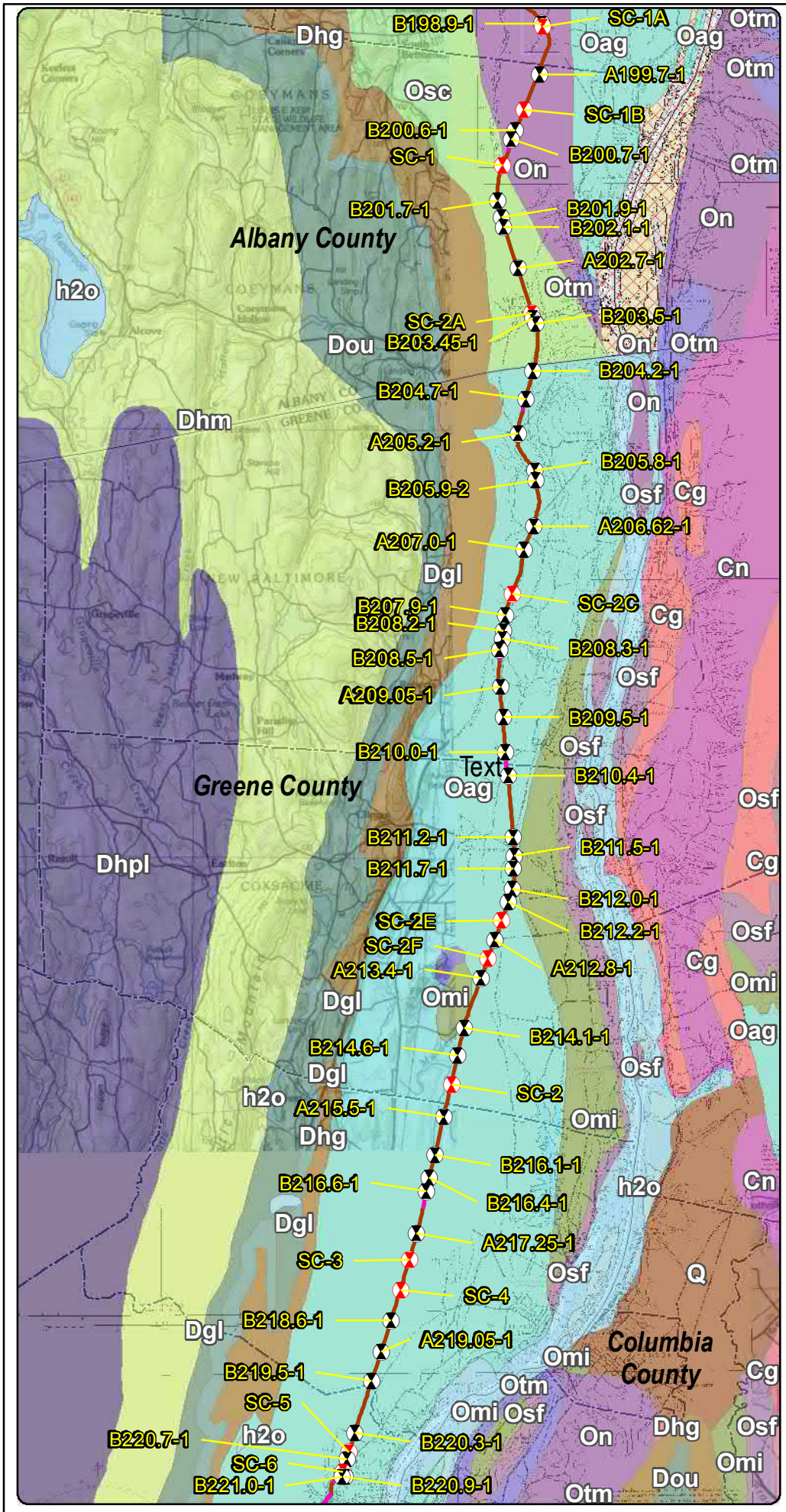

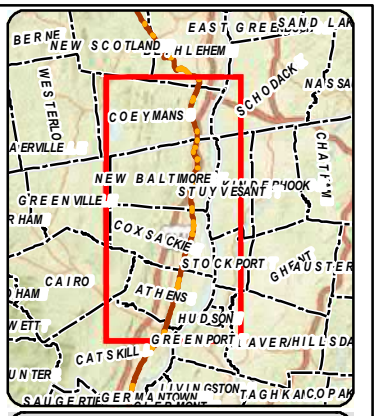

LEGEND

- 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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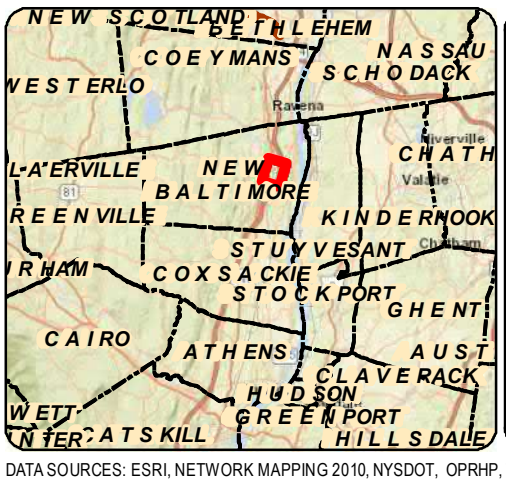
206.3
206.4
206.5
206.6
A206.62-1
206.7
206.8
206.9
NEW BALTIMORE
A207.0-1
207.1
207.2
207.3
207.4
207.5

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 7 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	**A207.0-1**
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	4.0 '
d	FROM	4.0 '	TO	23.6 '

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

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	3 25 7 11		***BLACK SILTY F/M/C SAND (FILL)*** 2.0		
	S-2	5 5 6 5		***BROWN CLAY, SM M/C SAND, TR TO SM SILT***	23.7	
5	S-3	3 4 5 5		6.0		
	S-4	13 15 13 14			31.5	
10	S-5	4 7 4 5		***BROWN CLAY, SM SILT*** 13.5		
15	S-6	4 7 9		***BROWN CLAY, TR TO SM ROCK FRAGMENTS (GLACIAL TILL)*** 18.5		CHEMICAL ODOR IN SAMPLE S-6
20	S-7	23 15 17		***BROWN SILT AND GRAVEL-SIZED ROCK FRAGMENTS, TR TO SM F/M/C SAND (GLACIAL TILL)***		
	S-8	50/0.1		23.6		
25				***END OF BORING AT 23.6'***		
30						
35						

DRN.	JPB
CKD.	PWK

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

SUMMARY OF LABORATORY TEST DATA

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

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

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

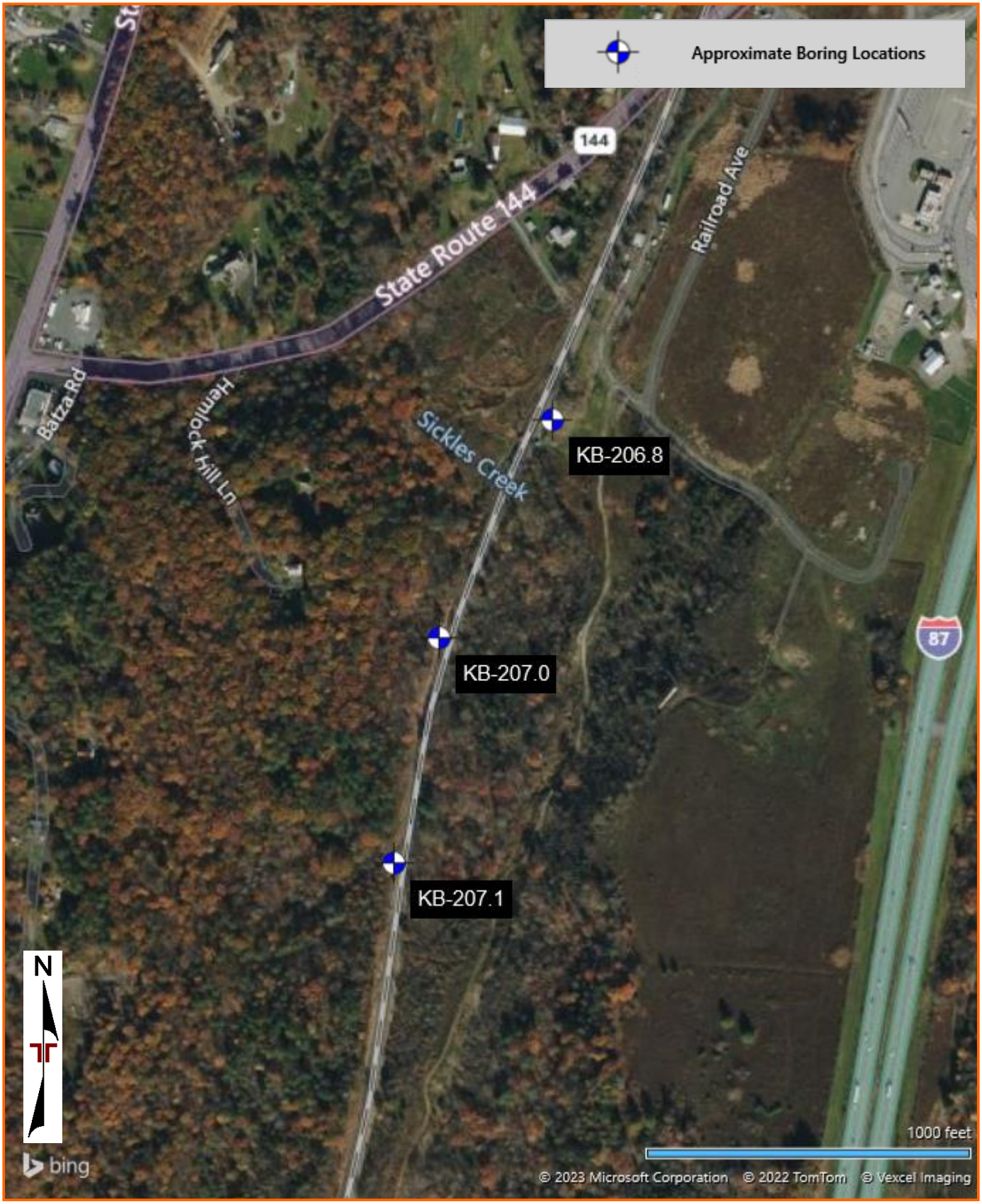


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. KB-206.8

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4256° Longitude: -73.8111°

Surface Elev.: 177.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.2	177.6						
TOPSOIL							
FAT CLAY (CH), varved silt and clay, brown, stiff to very stiff			3	5-6-5-6 N=11			
			18	5-9-12-12 N=21			
		5	24	5-7-8-10 N=15	29.4	50-26-24	88
			24	10-10-8-9 N=18			
			18	4-5-5-6 N=10			
		10	24	4-5-3-3 N=8			
15.0	162.8						
LEAN CLAY (CL), varved silt and clay, gray, very soft to medium stiff		15	24	2-2-3-4 N=5	32.9	40-23-17	99
		20	24	WH/24"			
		25					

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

Hammer Type: Automatic

Advancement Method:
0-10' 4" HSA
10'-15' 3" Casing
15'-45' Tricone Roller bit

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
WR = Weight of rod

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 11-03-2022	Boring Completed: 11-03-2022
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-206.8

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4256° Longitude: -73.8111°

Surface Elev.: 177.8 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), varved silt and clay, gray, very soft to medium stiff *(continued)*			24	WR-WH/18"			
			30		24	WH/18"-2			
35.0	142.8		35		24	3-3-5-6 N=8 Back To Back 2" SS for TR Sample	11.0	17-13-4	38
		SILTY, CLAYEY SAND WITH GRAVEL (SC-SM), occasional cobbles and boulders, gray, loose to very dense, (GLACIAL TILL)			6	5-5-3-5 N=8 Back To Back 2" SS for TR Sample			
			40		15	6-8-7-4 N=15 Back To Back 2" SS for TR Sample			
					18	5-17-34-42 N=51 Back To Back 2" SS for TR Sample			
43.2	134.6				0	100/2"			
		Weathered Sandstone							
45.0	132.8		45						
		SANDSTONE, slightly weathered, close to moderate fracture spacing, excellent RQD, gray				REC = 100% RQD = 98%			
			50						

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

Hammer Type: Automatic

Advancement Method:
0-10' 4" HSA
10'-15' 3" Casing
15'-45' Tricone Roller bit

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
WR = Weight of rod

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 11-03-2022	Boring Completed: 11-03-2022
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-206.8

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4256° Longitude: -73.8111°

Surface Elev.: 177.8 (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
	SANDSTONE, slightly weathered, close to moderate fracture spacing, excellent RQD, gray *(continued)*									
	51.5	126.3								
	Boring Terminated at 51.5 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10' 4" HSA
10'-15' 3" Casing
15'-45' Tricone Roller bit

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
WR = Weight of rod

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

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

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-207.0

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4238° Longitude: -73.8124°

Surface Elev.: 176.3 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	176	**TOPSOIL**					
		FILL - SILTY CLAY, trace fine sand, rootlets noted, gray and orange	16	WH-2-4-3 N=6			
			20	5-7-10-9 N=17			
4.0	172.3	**SILT (ML)**, varved silt and clay, occasional fine sand partings, brown, stiff to very stiff	18	10-11-10-14 N=21	23.7	42-30-12	87
			3	20-27-27-27 N=54			
8.0	168.3	**SILTY SAND WITH GRAVEL (SM)**, brown, very dense, (GLACIAL TILL)		50/4"			
10.0	166.3	**WEATHERED ROCK**					
		Advanced tricone roller bit to 15'					
15.0	161.3	**SHALE**, moderately weathered, very close fractured, very poor RQD		REC=36% RQD=15%			
20.0	156.3	**SHALE**, occasional calcite veins, high angle fractures, moderately weathered, very close to moderate fractured, poor RQD		REC=100% RQD=47%			
25.0	151.3						

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

WATER LEVEL OBSERVATIONS: ▽

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

Advancement Method:
0-5' 4" Casing
5'-15' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

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

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-09-2022 | Boring Completed: 12-13-2022

Drill Rig: Acker Renegade | Driller: L. Spicher

Project No.: JB215256J

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

BORING LOG NO. KB-207.0

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4238° Longitude: -73.8124°

Surface Elev.: 176.3 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS
		SHALE, interbeded with sandstone, geodes noted at 29', moderately weathered, very close to moderate fractured, fair RQD	REC=100% RQD=52%
30.0	146.3		
		SHALE, interbeded with sandstone, high angle fractures, moderately weathered, very close to moderate fractured, fair RQD	REC=100% RQD=60%
35.0	141.3		
		SHALE, interbeded with sandstone, high angle fractures, moderately weathered, very close to moderate fractured, excellent RQD	REC=100% RQD=93%
40.0	136.3		
		SHALE, interbeded with sandstone, high angle fractures, moderately weathered, very close to moderate fractured, excellent RQD	REC=100% RQD=92%
45.0	131.3		
		SHALE, high angle fractures, moderately weathered, very close to moderate fractured, fair RQD	REC=100% RQD=53%
50.0	126.3		

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

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

Advancement Method:
0-5' 4" Casing
5'-15' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

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

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-09-2022 | Boring Completed: 12-13-2022
Drill Rig: Acker Renegade | Driller: L. Spicher
Project No.: JB215256J

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

BORING LOG NO. KB-207.0

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4238° Longitude: -73.8124°

Surface Elev.: 176.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS
			SHALE, occasional calcite veins, high angle fractures, moderately weathered, very close to moderate fractured, fair RQD
55.0	121.3	55	REC=100% RQD=63%
			SANDSTONE, interbeded shale at 59.5 feet, high angle fractures, moderately weathered, close to wide fractured, excellent RQD
60.0	116.3	60	REC=100% RQD=97%
			SANDSTONE, frequent calcite veins, high angle fractures, moderately weathered, close to wide fractured, excellent RQD
65.0	111.3	65	REC=100% RQD=98%
			SANDSTONE, interbeded with shale, frequent calcite veins, high angle fractures, moderately weathered, close to wide fractured, good RQD
70.0	106.3	70	REC=100% RQD=86%
			SANDSTONE, occasional calcite veins, high angle fractures, moderately weathered, very close to wide fractured, excellent RQD
75.0	101.3	75	REC=100% RQD=98%

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

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

Advancement Method:
0-5' 4" Casing
5'-15' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

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

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-09-2022 | Boring Completed: 12-13-2022

Drill Rig: Acker Renegade | Driller: L. Spicher

Project No.: JB215256J

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

BORING LOG NO. KB-207.0

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4238° Longitude: -73.8124°

Surface Elev.: 176.3 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS
80.0	96.3	**SANDSTONE**, interbeded with shale, frequent calcite veins, high angle fractures, moderately weathered, very close fractured, fair RQD	REC=100% RQD=72%
85.0	91.3	**SANDSTONE**, interbeded with shale, occasional calcite veins, high angle fractures, moderately weathered, very close to wide fractured, excellent RQD	REC=100% RQD=93%
		Boring Terminated at 85 Feet	

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

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

Advancement Method:
0-5' 4" Casing
5'-15' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

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

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-09-2022 | Boring Completed: 12-13-2022
Drill Rig: Acker Renegade | Driller: L. Spicher
Project No.: JB215256J

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

BORING LOG NO. KB-207.1

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4219° Longitude: -73.8129°

Surface Elev.: 174.7 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0.2	174.5	**TOPSOIL**
		FILL - LEAN CLAY, trace gravel and cobbles, mottled gray and brown
4.0	170.7	
		FILL - SILTY GRAVEL WITH SAND, occasional cobbles and boulders, brown
8.0	166.7	
		SILTY SAND WITH GRAVEL (SM), occasional cobbles and boulders, brown, medium dense, (GLACIAL TILL)
12.0	162.7	
		WEATHERED ROCK
		cored through highly weathered rock
18.0	156.7	
		SHALE, interbeded with sandstone, occasional calcite veins, high angle fractures, slightly weathered, moderate fractured, good RQD
23.0	151.7	
		SHALE, interbeded with sandstone, occasional calcite veins, high angle fractures, unweathered, moderate fractured, excellent RQD

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		10	WH-2-2-4 N=4			
		14	5-7-6-6 N=13			
5		8	11-6-6-8 N=12	15.1		30
		6	7-4-4-5 N=8			
		18	10-11-10-13 N=21			
10						
15			REC=72% RQD=0%			
20			REC=85% RQD=85%			
25						

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

Advancement Method:
0-5' 4" Casing
5'-15' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

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

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-06-2022	Boring Completed: 12-07-2022
Drill Rig: Acker Renegade	Driller: L. Spicher
Project No.: JB215256J	

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

BORING LOG NO. KB-207.1

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4219° Longitude: -73.8129°

Surface Elev.: 174.7 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS
		SHALE, interbeded with sandstone, occasional calcite veins, high angle fractures, unweathered, moderate fractured, excellent RQD *(continued)*	REC=100% RQD=100%
28.0	146.7		
		SHALE, interbeded with sandstone, occasional calcite veins, high angle fractures, unweathered, moderate to wide fractured, excellent RQD	REC=98% RQD=98%
33.0	141.7		
		SHALE, interbeded with sandstone, occasional calcite veins, high angle fractures, unweathered, extremely close to wide fractured, good RQD Near vertical joints from 35.6' to 36.1' and from 37.2' to 38'	REC=100% RQD=75%
38.0	136.7		
		SHALE, frequent calcite veins, unweathered, very close to moderate spacing, good RQD	REC=100% RQD=83%
43.0	131.7		
		SHALE, frequent calcite veins, unweathered, very close to moderate spacing, fair RQD	REC=100% RQD=72%
48.0	126.7		
		SANDSTONE, occasional calcite veins, unweathered, close to wide fractured, good RQD weathered zone 48.6' to 48.8'	

DEPTH (Ft.): 30, 35, 40, 45, 50

WATER LEVEL OBSERVATIONS | SAMPLE TYPE | RECOVERY (In.) | WATER CONTENT (%) | ATTERBERG LIMITS LL-PL-PI | PERCENT FINES

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

Advancement Method:
0-5' 4" Casing
5'-15' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

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

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-06-2022 | Boring Completed: 12-07-2022
Drill Rig: Acker Renegade | Driller: L. Spicher
Project No.: JB215256J

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

BORING LOG NO. KB-207.1

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4219° Longitude: -73.8129°

Surface Elev.: 174.7 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS
53.0	121.7	**SANDSTONE**, occasional calcite veins, unweathered, close to wide fractured, good RQD *(continued)*	REC=100% RQD=88%
58.0	116.7	**SHALE**, interbeded with sandstone, occasional calcite veins, high angle fractures, unweathered, extremely close to moderate fractured, good RQD	REC=98% RQD=81%
63.0	111.7	**SHALE**, interbeded with sandstone, occasional calcite veins, high angle fractures, unweathered, very close to moderate fractured, good RQD	REC=100% RQD=85%
68.0	106.7	**SHALE**, occasional calcite veins, high angle fractures,unweathered, extremely close to moderate fractured, good RQD	REC=100% RQD=78%
73.0	101.7	**SHALE**, interbeded with sandstone, occasional calcite veins, unweathered, very close to wide fractured, excellent RQD	REC=98% RQD=98%
		SHALE, interbeded with sandstone, occasional calcite veins, unweathered, very close to wide fractured, fair RQD	

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

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

Advancement Method:
0-5' 4" Casing
5'-15' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

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

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-06-2022 | Boring Completed: 12-07-2022
Drill Rig: Acker Renegade | Driller: L. Spicher
Project No.: JB215256J

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

BORING LOG NO. KB-207.1

PROJECT: Phase 4 Borings

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

SITE: Champlain to Hudson HDD Crossings

LOCATION See Exploration Plan

Latitude: 42.4219° Longitude: -73.8129°

Surface Elev.: 174.7 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	FIELD TEST RESULTS
78.0	96.7	**SHALE**, interbeded with sandstone, occasional calcite veins, unweathered, very close to wide fractured, fair RQD *(continued)* quartz geodes @76.1 feet	REC=100% RQD=73%
83.0	91.7	**SHALE**, interbeded with sandstone, occasional calcite veins, unweathered, very close to wide fractured, good RQD	REC=100% RQD=88%
85.5	89.2	**SHALE**, interbeded with sandstone, occasional calcite veins, unweathered, very close to wide fractured, fair RQD	REC=100% RQD=70%
		Boring Terminated at 85.5 Feet	

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

80

85

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

Advancement Method:
0-5' 4" Casing
5'-15' Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

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

WATER LEVEL OBSERVATIONS

No free water encountered

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 12-06-2022 | Boring Completed: 12-07-2022

Drill Rig: Acker Renegade | Driller: L. Spicher

Project No.: JB215256J

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

Summary of Laboratory Results

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

PROJECT: Phase 4 Borings

SITE: Champlain to Hudson HDD Crossings

Terracon
30 Corporate Cir Ste 201
Albany, NY

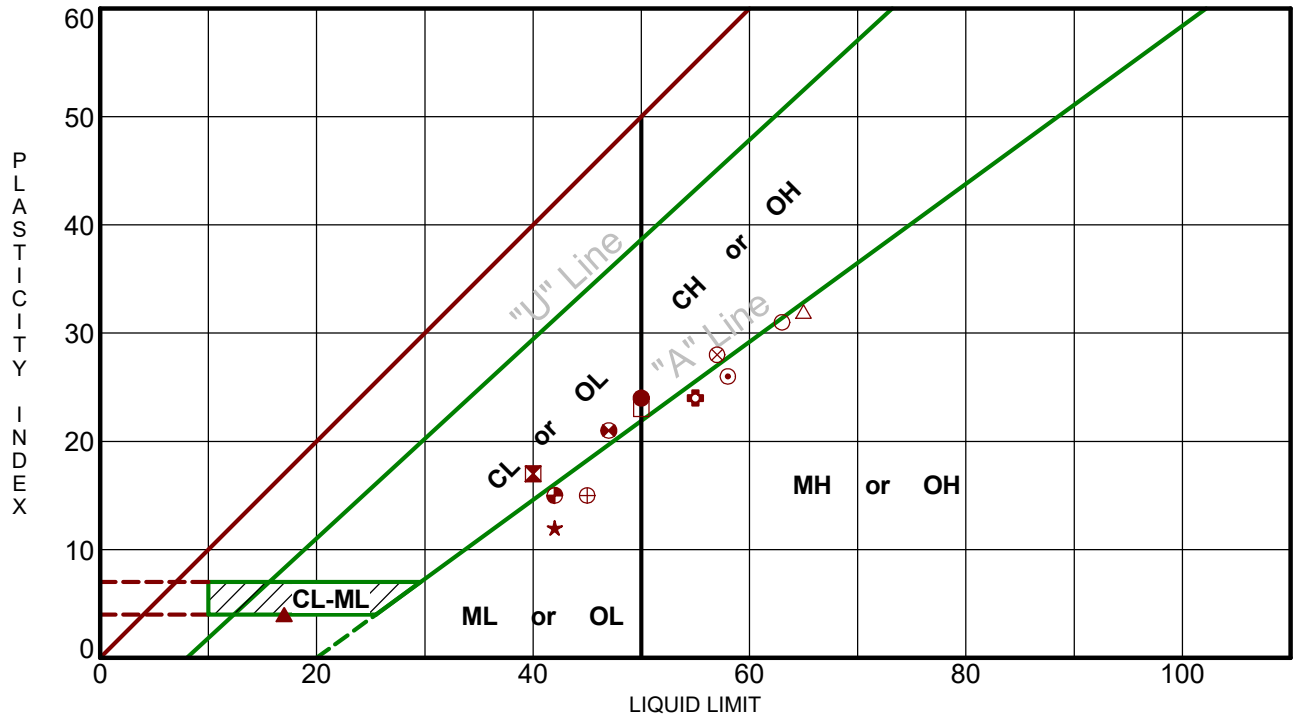
PROJECT NUMBER: JB215256J

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

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

ATTERBERG LIMITS RESULTS

ASTM D4318



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

PROJECT: Phase 4 Borings

SITE: Champlain to Hudson HDD Crossings

Terracon
30 Corporate Cir Ste 201
Albany, NY

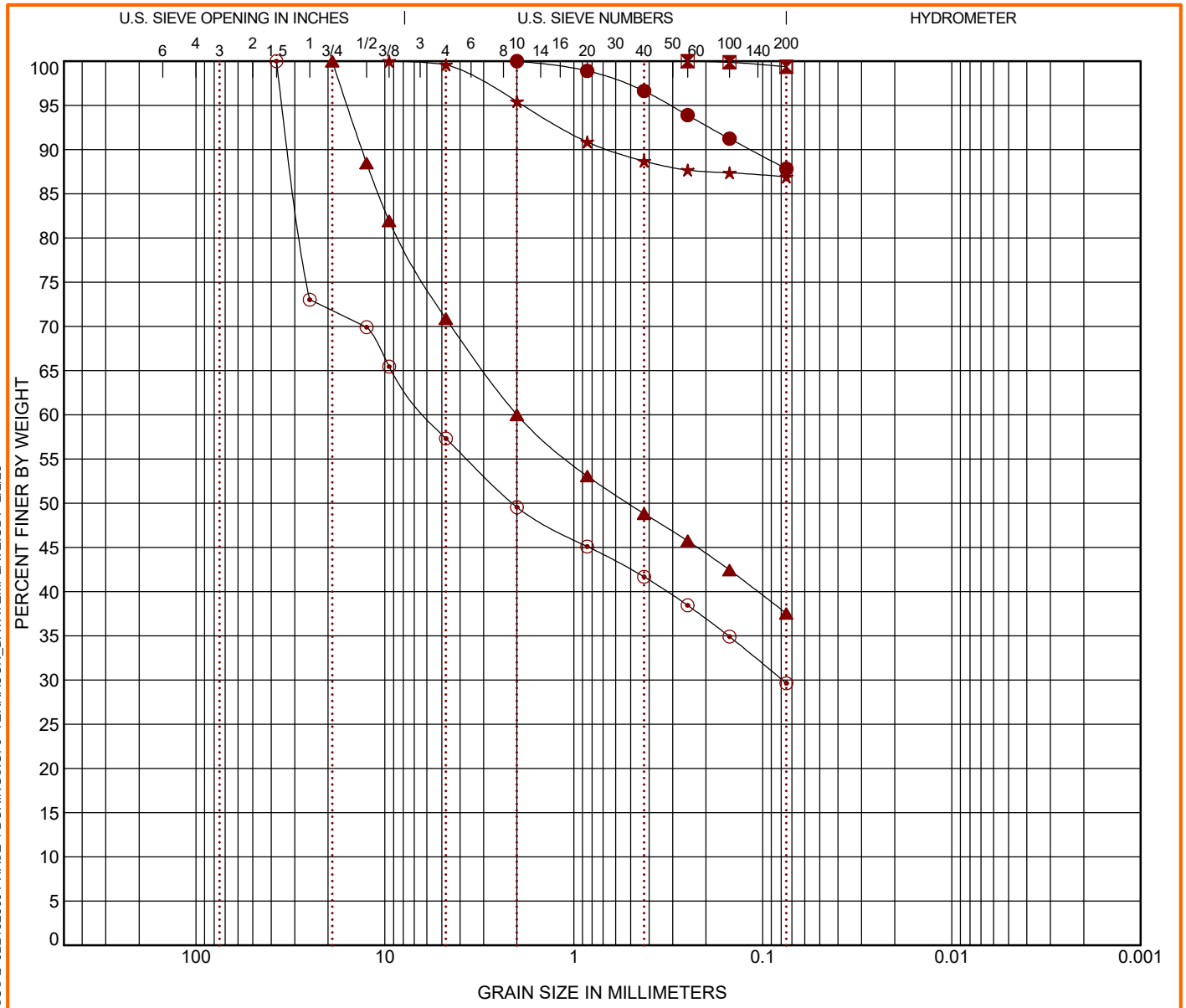
PROJECT NUMBER: JB215256J

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

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

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-206.8	4 - 6	FAT CLAY (CH)	29.4	50	26	24		
⊠	KB-206.8	15 - 17	LEAN CLAY (CL)	32.9	40	23	17		
▲	KB-206.8	35 - 37	SILTY, CLAYEY SAND with GRAVEL (SC-SM)	11.0	17	13	4		
★	KB-207.0	4 - 6	SILT (ML)	23.7	42	30	12		
⊙	KB-207.1	4 - 6	SILTY GRAVEL with SAND (GM)	15.1					

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-206.8	4 - 6	2				0.0	0.0	12.2		87.8	
⊠	KB-206.8	15 - 17	0.25				0.0	0.0	0.6		99.4	
▲	KB-206.8	35 - 37	19	1.999			0.0	29.1	33.3		37.5	
★	KB-207.0	4 - 6	9.5				0.0	0.4	12.7		86.9	
⊙	KB-207.1	4 - 6	37.5	5.97	0.079		0.0	42.7	27.7		29.6	

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

PHOTOGRAPHY LOG

Rock Core – Boring KB-206.8 Run 1

Rock Core – Boring KB-207.0 Run 1 through Run 4

Rock Core – Boring KB-207.0 Run 5 through Run 8

Rock Core – Boring KB-207.0 Run 9 through Run 12

Rock Core – Boring KB-207.0 Run 13 and Run14

Rock Core – Boring KB-207.1 Run 1 through Run 4

Rock Core – Boring KB-207.1 Run 4 through Run 8

Rock Core – Boring KB-207.1 Run 9 through Run 12

Rock Core – Boring KB-207.1 Run 13 through Run 15

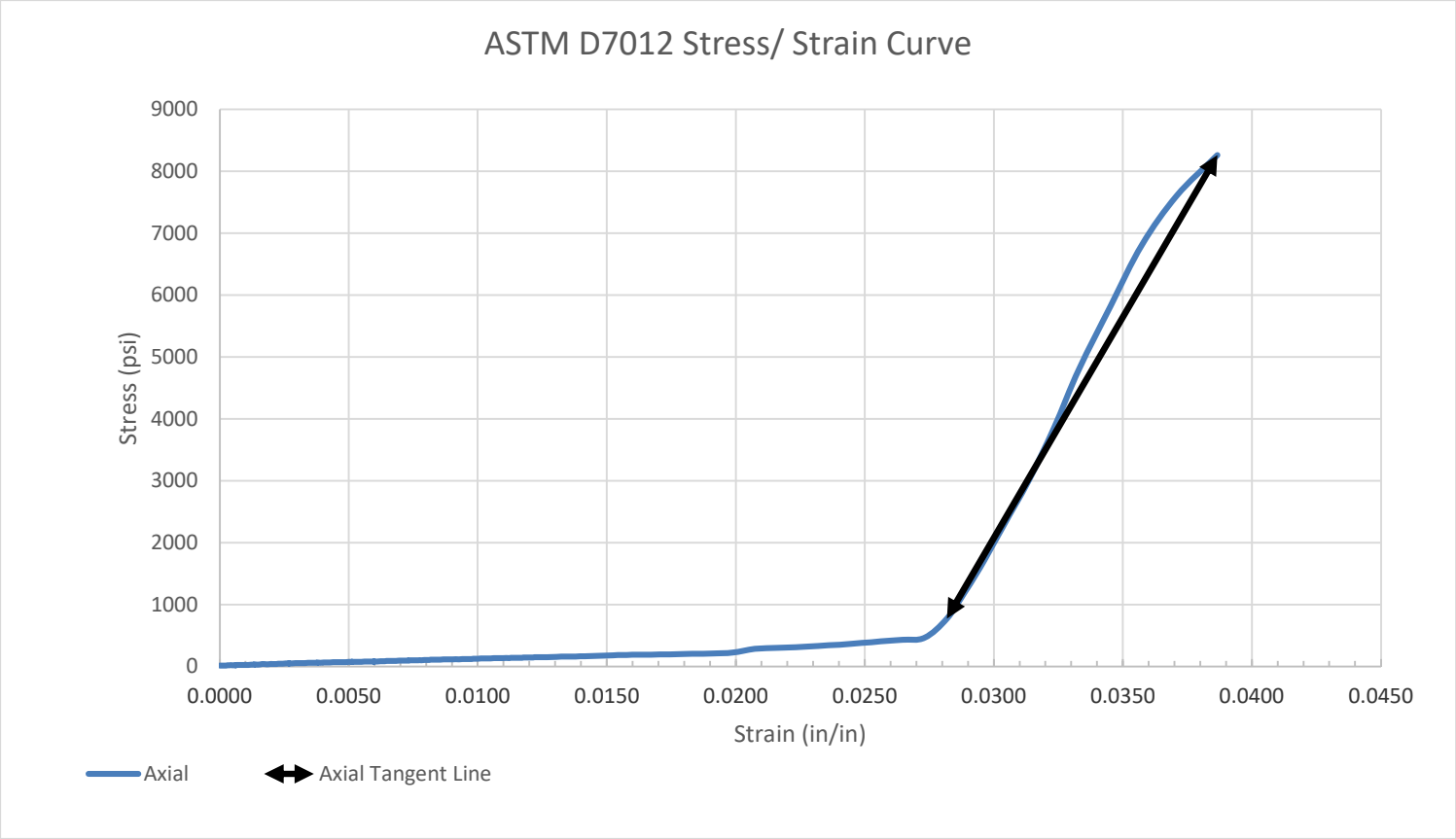
Rock Core D7012 Method C

Terracon
Explore with us

Client
Kiewit

Project
Champlain-Hudson Power Express Project - Phase 4

Project No. JB215256



SAMPLE LOCATION

Site:	JB215256J		
Description:	Sandstone		
Boring:	KB-207.0	Depth (feet):	60.0-65.0

SPECIMEN INFORMATION

Sample No.:	C-10	Mass (g):	559.51
Length (in.):	4.12	Diameter (in.):	1.99
L/D Ratio:	2.070	Density (pcf):	166.338

TEST RESULTS

Failure Load (lbs):	25698
Failure Strain (in/in):	0.050
Unconfined Compressive Strength (psi):	8,263
Elastic Modulus, E, (ksi):	714
Time of Failure (min):	02:23
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	0.77%

Rock Core D7012 Method C

Client	Project
Kiewit	Champlain-Hudson Power Express Project - Phase 4
	Project No. JB215256

Equipment:

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

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

Notes:

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

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

Per ASTM D4543 and ASTM D7012, the desired specimen length to diameter are between 2.0:1 and 2.5:1. According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project - Phase 4

Project No. JD215256

Splitting Tensile Strength of Intact Rock Core Specimens, ASTM D3967

Boring	KB-207.0	**Material Description**	Sandstone
Sample No	C-10	**Equipment Used**	Tinius Olsen (120,000lbs)
Depth (ft)	60.0-65.0	**TICCS ID/Serial No.**	C-48999, 118285
Lab No	L# 6	**Calibration Date**	11/2/2021

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	1.97	1.97	1.97	1.97	1.97
Length (in)	0.65	0.61	0.6	0.6	0.59
Length Diameter Ratio	0.33	0.31	0.30	0.30	0.30
Rate of Loading	0.0065	0.0061	0.006	0.006	0.0059
Moisture Condition	0.78%	0.78%	0.78%	0.78%	0.78%
Maximum Applied Load (lbf)	3727	3554	3168	2664	3058
Splitting Tensile Strength (psi)	1853.9	1883.7	1707.1	1435.5	1675.8

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	1.97	1.97	1.97	1.97	1.97
Length (in)	0.67	0.59	0.58	0.58	0.58
Length Diameter Ratio	0.34	0.30	0.29	0.29	0.29
Rate of Loading	0.0067	0.0059	0.0058	0.0058	0.0058
Moisture Condition	0.78%	0.78%	0.78%	0.78%	0.78%
Maximum Applied Load (lbf)	3145	3727	2844	3969	4200
Splitting Tensile Strength (psi)	1517.7	2042.4	1585.4	2212.5	2341.3

Rock Core D7012 Method C

Terracon
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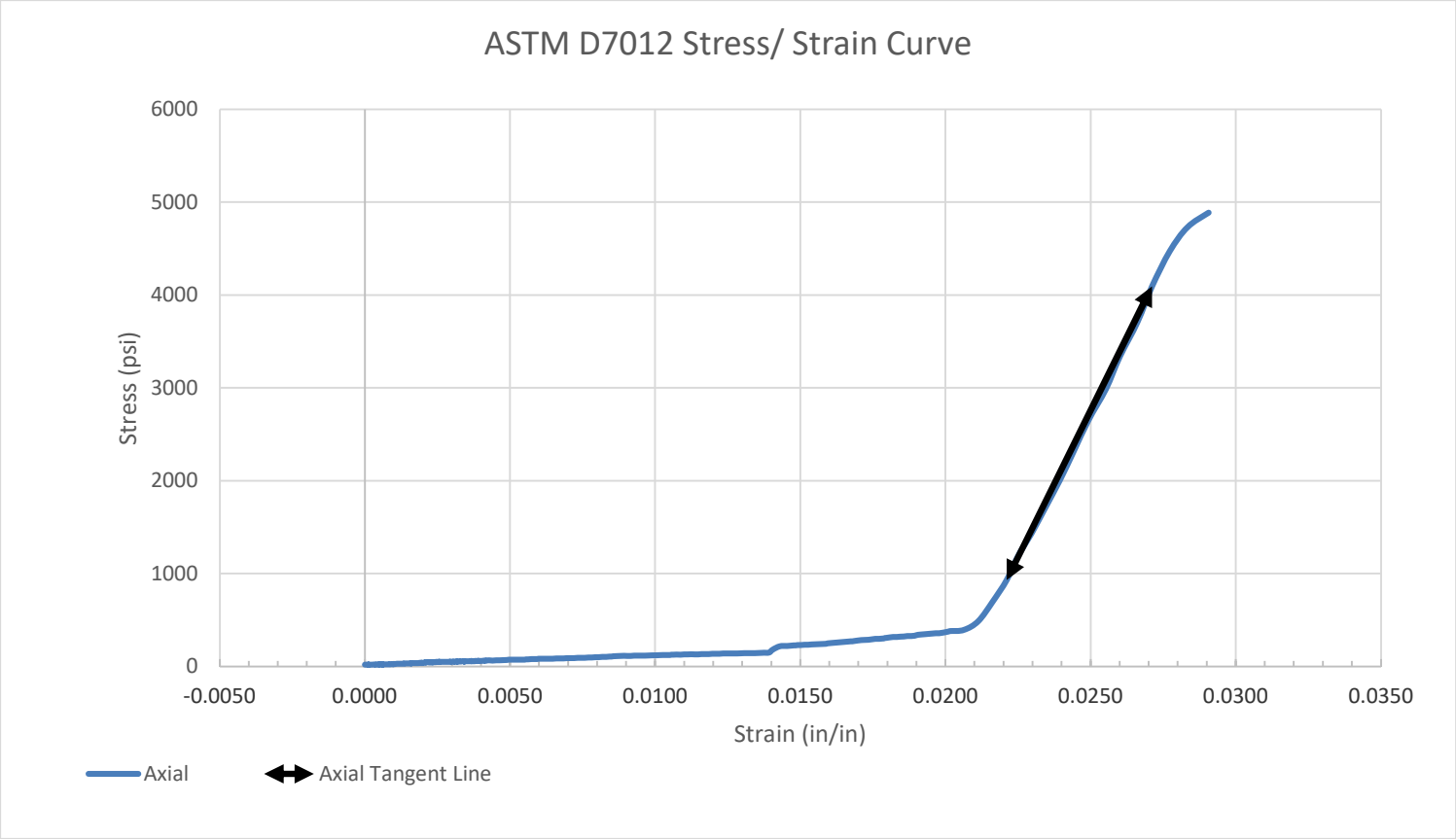
Client
Kiewit

Project
Champlain-Hudson Power Express Project - Phase 4

Project No. JB215256



SAMPLE LOCATION

Site:	JB215256J		
Description:	Shale		
Boring:	KB-207.1	Depth (feet):	58.0-63.0

SPECIMEN INFORMATION

Sample No.:	C-10	Mass (g):	566.71
Length (in.):	4.12	Diameter (in.):	1.99
L/D Ratio:	2.070	Density (pcf):	168.479

TEST RESULTS

Failure Load (lbs):	15056
Failure Strain (in/in):	0.032
Unconfined Compressive Strength (psi):	4,890
Elastic Modulus, E, (ksi):	632
Time of Failure (min):	03:18
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	1.38%

Rock Core D7012 Method C

Client	Project
Kiewit	Champlain-Hudson Power Express Project - Phase 4
	Project No. JB215256

Equipment:

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

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

Notes:

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

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

Per ASTM D4543 and ASTM D7012, the desired specimen length to diameter are between 2.0:1 and 2.5:1. According to ASTM D7012 Section 8.2.1, this specimen, although not meeting all requirements of ASTM D4543 is acceptable for testing. However, the results reported may differ from results obtained from a test specimen that meets the requirements of D4543.

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project - Phase 4

Project No. JD215256

Splitting Tensile Strength of Intact Rock Core Specimens, ASTM D3967

Boring	KB-207.1	**Material Description**	Shale
Sample No	C-10	**Equipment Used**	Tinius Olsen (120,000lbs)
Depth (ft)	58.0-63.0	**TICCS ID/Serial No.**	C-48999, 118285
Lab No	L# 7	**Calibration Date**	11/2/2021

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	1.97	1.97	1.97	1.97	1.97
Length (in)	0.69	0.69	0.63	0.59	0.6
Length Diameter Ratio	0.35	0.35	0.32	0.30	0.30
Rate of Loading	0.069	0.069	0.063	0.059	0.06
Moisture Condition	1.01%	1.01%	1.01%	1.01%	1.01%
Maximum Applied Load (lbf)	392	443	2038	1215	944
Splitting Tensile Strength (psi)	183.7	207.6	1045.9	665.8	508.7

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	1.97	1.97	1.97	1.97	1.97
Length (in)	0.61	0.6	0.6	0.62	0.64
Length Diameter Ratio	0.31	0.30	0.30	0.31	0.32
Rate of Loading	0.061	0.06	0.06	0.062	0.064
Moisture Condition	1.01%	1.01%	1.01%	1.01%	1.01%
Maximum Applied Load (lbf)	1482	1870	1130	1047	1569
Splitting Tensile Strength (psi)	785.5	1007.7	608.9	546.0	792.6

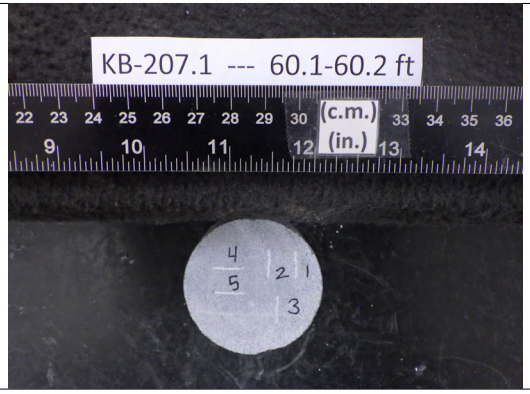
Client:	Terracon Consultants, Inc.		
Project:	Champlain-Hudson Power Express		
Location:		Project No:	GTX-315284
Boring ID: KB-207.0	Sample Type: cylinder	Tested By:	BxP
Sample ID: ---	Test Date: 12/30/22	Checked By:	jsc
Depth : 60 ft	Test Id: 700802		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
KB-207.0	---	60.1-60.2 ft	1	2.5	2.8	2.65	
			2	2.9	3.8	3.35	
			3	2.2	2.8	2.50	
			4	2.0	1.9	1.95	
			5	1.1	1.6	1.35	
			Average CAIs			2.36	
			Average CAI *			2.82	
CERCHAR Abrasiveness Index Classification						**High abrasiveness**	

Notes

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



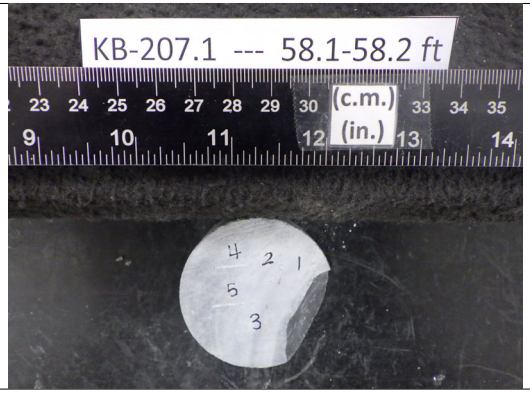
Client:	Terracon Consultants, Inc.		
Project:	Champlain-Hudson Power Express		
Location:		Project No:	GTX-315284
Boring ID: KB-207.1	Sample Type: cylinder	Tested By:	BxP
Sample ID: ---	Test Date: 12/30/22	Checked By:	jsc
Depth : 58 ft	Test Id: 700803		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
KB-207.1	---	58.1-58.2 ft	1	1.3	1.2	1.25	
			2	1.6	1.9	1.75	
			3	0.7	0.8	0.75	
			4	1.4	1.1	1.25	
			5	1.9	1.7	1.80	
			Average CAIs			1.36	
			Average CAI *			1.83	
					CERCHAR Abrasiveness Index Classification	**Medium abrasiveness**	

Notes

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



Kiewit

MEMORANDUM

DATE: November 11, 2022

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

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

SUBJECT: Geotechnical Data: Segment 10 – Package 6 – HDD Crossing 98 – Revision 1
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 98 is STA 60468+00 (42.41524° N, 73.8148° W).

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

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- Terracon Consultants-NY, Inc., Results of Field Exploration, Champlain-Hudson Power Express – Package 6, Catskill, NY, Rev-1, dated June 28, 2022.

Contact us if you have questions or require additional information.

HDD 98
Borings K-207.6, SC-2C, K-207.7
Segment 10 - Design Package 6

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

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

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

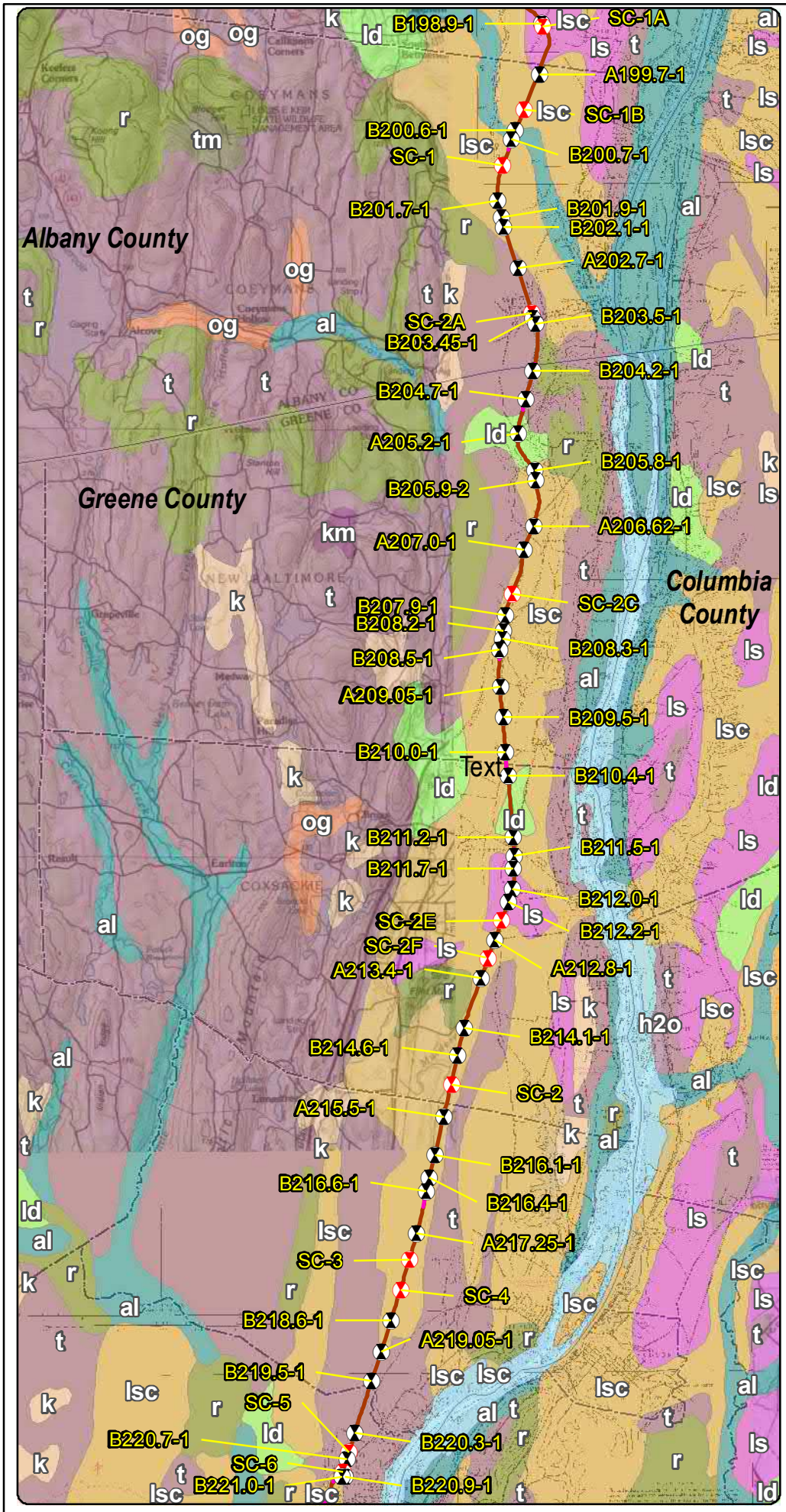
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

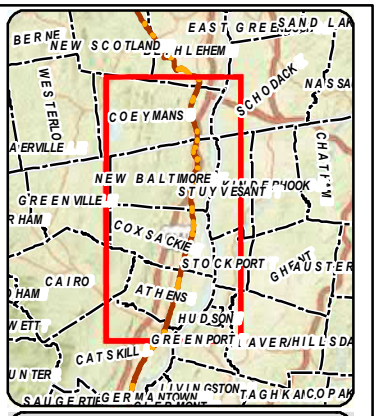
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

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

Reference:

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





LEGEND

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

Surficial Geology

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

1 0.5 0 1 Miles

Transmission

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

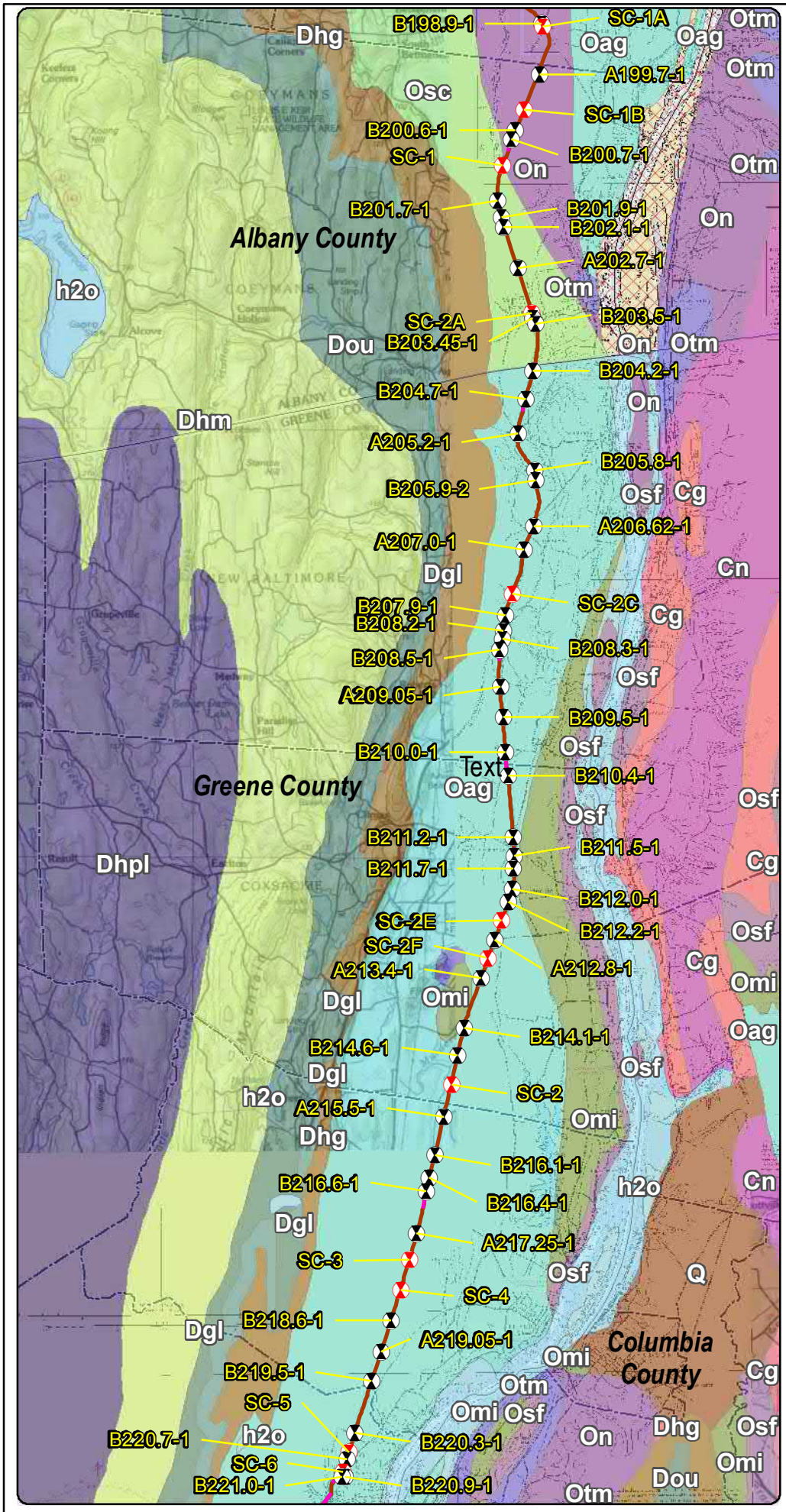
Surficial Geology and Geotechnical Borings Selkirk to Catskill Figure 3-10

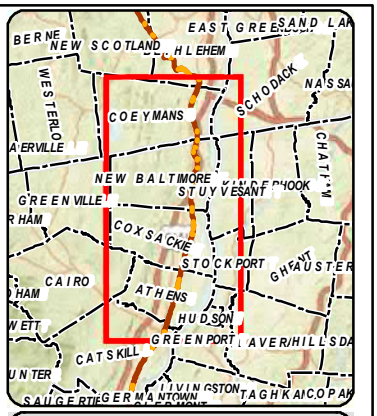
Prepared on 5/3/2021

by: AECOM

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

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





LEGEND

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

Bedrock Geology

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

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

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

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

Prepared on 5/18/2021

by: AECOM

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

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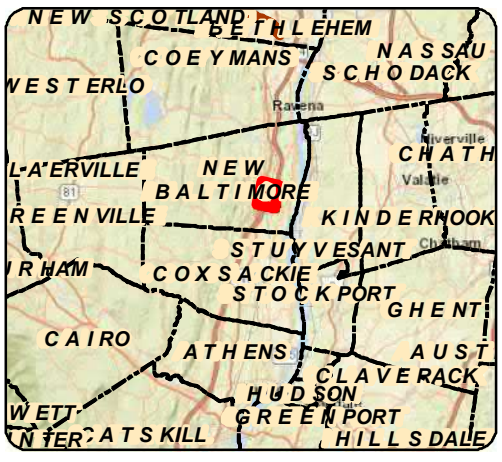
207.5
207.6
SC-2C
207.7
207.8
207.9
B207.9-1
208.1
NEW BALTIMORE
208.2
B208.2-1
208.3
B208.3-1
208.4
B208.5-1
208.6
208.7
Flat Bush Rd
US-9W
State Route 9W
Kreimer Rd
Conrail
Taylor Rd
Hawley Ln W
Gov Thomas E Dewey Thruway
New York State Thruway
Thruway
0
1,000
Feet



LEGEND

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

Parcel Ownership: TOWN NAME

Road Name: Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Selkirk to Catskill

Figure A-10

Sheet 8 of 18

Prepared by: AECOM 5/19/2021

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

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BORING CONTRACTOR: ADT	AECOM	SHEET 1 OF 2
DRILLER: Chris Chaillou		PROJECT NAME: CHPE -
		PROJECT NO.: 60323056
		HOLE NO.: **SC-2C**
SOILS ENGINEER/GEOLOGIST: Chris French		START DATE: 2/8/21
	BORING LOG	FINISH DATE: 2/8/21
LOCATION: Hannacroix, NY MP - 207.66 (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		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							0.0': Gray angular-subangular GRAVEL, little fine-coarse sand, little angular cobbles; loose, moist
1.0													
2.0													
3.0													
		3'-5'	S-1										
4.0													
5.0													
		5'-7'	S-2	24"	13"	8	14	17	22	20	GW	Sandy GRAVEL	Dark gray angular-subangular GRAVEL, some fine-coarse sand, little silt; medium dense, moist
6.0													
7.0													
		7'-9'	S-3	24"	4"	47	28	13	16	8	GW		SAA
8.0													
9.0													
		9'-11'	S-4	24"	0"	6	4	8	11	8	-		No recovery
10.0													
11.0													
		11'-'13'	S-5	24"	4"	3	7	8	12	10	ML	Sandy SILT	Light brown SILT and fine sand, trace subrounded gravel; medium stiff, moist
12.0													
13.0													
		13'-15'	S-6	24"	10"	15	20	20	17	26	ML		Light brown clayey SILT and fine sand; stiff, moist
14.0													
15.0													
		15'-17'	S-7	24"	18"	19	21	45	36	43	SM/GM	Silty SAND & GRAVEL (dense till)	Brown clayey SILT and fine sand, little medium to coarse sand, little subrounded gravel; stiff, moist (till)
16.0													
17.0													TR-1; (16.0'-16.5'
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 2 OF 2
DRILLER: Chris Chaillou		PROJECT NAME: CHPE -
		PROJECT NO.: 60323056
		HOLE NO.: **SC-2C**
SOILS ENGINEER: Chris French		START DATE: 2/8/21
	BORING LOG	FINISH DATE: 2/8/21
LOCATION: Hannacroix, NY MP - 207.66 (CSX Rail)		OFFSET: N/A

DEPTH	CORING RATE MIN/FT	DEPTHS FROM - TO (FEET)	TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		20'-22'	S-8	12.5"	12"	17	87	30/0.5"	-	-	SM/GM	Silty SAND & GRAVEL (dense till)	SAA
21.0													TR-2; (20.0'-20.5')
													Split spoon refusal, setting casing at 24.0'
22.0													
23.0													
24.0													
		24'-29'	S-9	60"	22"					-	SM/GM		Gray fine sandy SILT, little gravel, little cobbles (cored) (till)
25.0													
													4" casing set to 20', cleaned out to 30'
26.0													
27.0													
28.0													
29.0													
30.0													
		30'-32'	S-10	1"	1"	50/1"				-	SM/GM		Gray clayey SILT and fine sand, little subrounded gravel; hard, moist (till)
31.0													
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	2"	1.8"	85/2"				-	SM/GM		SAA
36.0													
37.0													
38.0													
		38'-40'	S-12	0"	0"	63/0"				-	-		No recovery
39.0													
40.0													
41.0													SC-2C terminated at 38' (split spoon refusal), grouted to surface
42.0													
43.0													
44.0													
45.0													

NOTES:

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

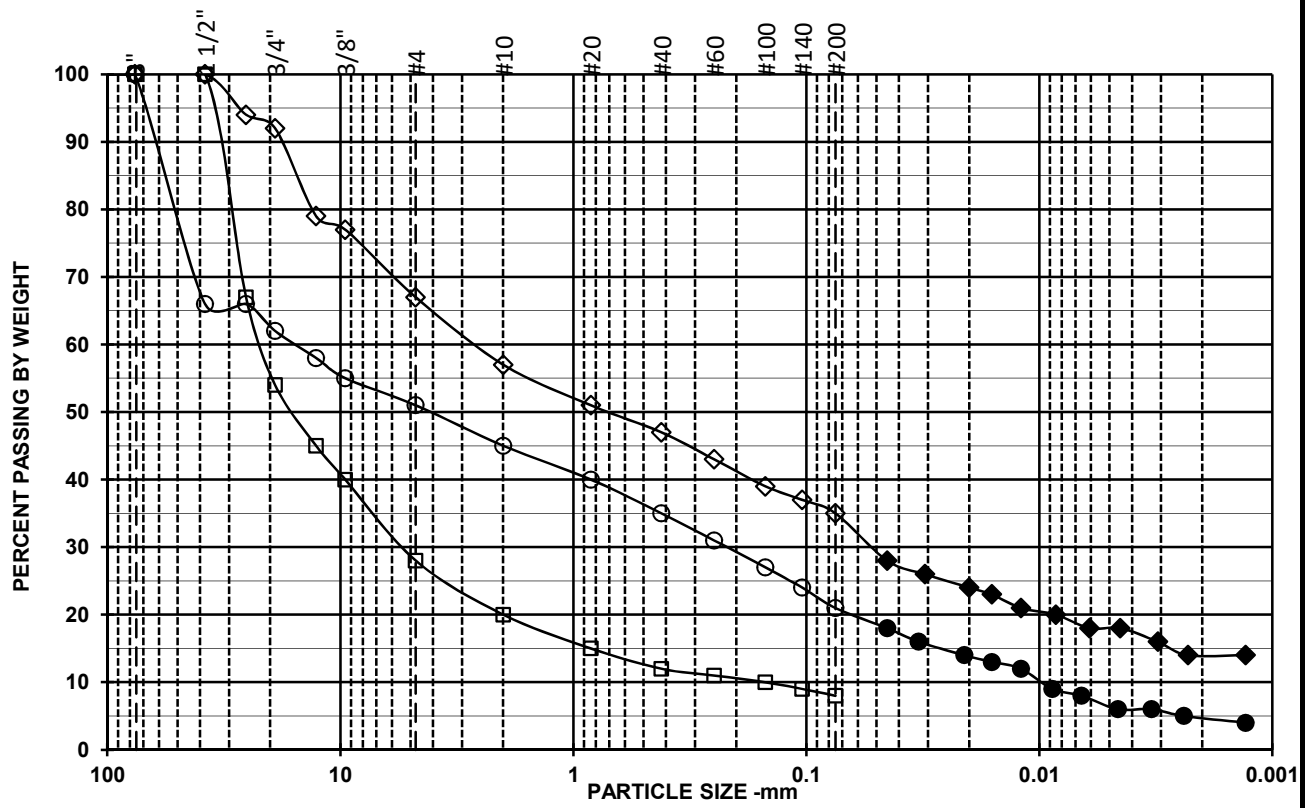
The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

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
□	5.8				GP-GM		Gray, Poorly graded gravel with silt and sand, Insufficient sample size	04/08/21
◇	19.1	36	19	17	GC		Brown, Clayey gravel with sand, Insufficient sample size	04/08/21
○	5.0	15	10	5	GC-GM		Gray, Silty, clayey gravel with sand, Insufficient sample size	04/08/21

Symbol	□	◇	○
Boring	SC-2C	SC-2C	SC-2C
Sample	S-2	S-7	S-9
Depth	5-7	15-17	24-29
% +3"	0	0	0
% Gravel	72	33	49
% SAND	20	32	30
%C SAND	8	10	6
%M SAND	8	10	10
%F SAND	4	12	14
% FINES	8	35	21
D_{100} (mm)	38.1	38.1	76.2
D_{60} (mm)	21.8	2.59	15.6
D_{30} (mm)	5.3	0.052	0.22
D_{10} (mm)	0.15		0.010
Cc	8.6		0.3
Cu	145.3		1591.8

Sieve Size/ID #	Percent Finer Data		
6"	100	100	100
4"	100	100	100
3"	100	100	100
1 1/2"	100	100	66
1"	67	94	66
3/4"	54	92	62
1/2"	45	79	58
3/8"	40	77	55
#4	28	67	51
#10	20	57	45
#20	15	51	40
#40	12	47	35
#60	11	43	31
#100	10	39	27
#140	9	37	24
#200	8	35	21
5μ m		18	6
2μ m		14	5
1μ m		14	4

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Aquifer #602201207

TerraSense, LLC #7853-21008

CHPE - Selkirk Catskill Borings PO

TerraSense Analysis File: GrainSizeV6Rev1a14

Siev1c.xlsx 4/26/2021

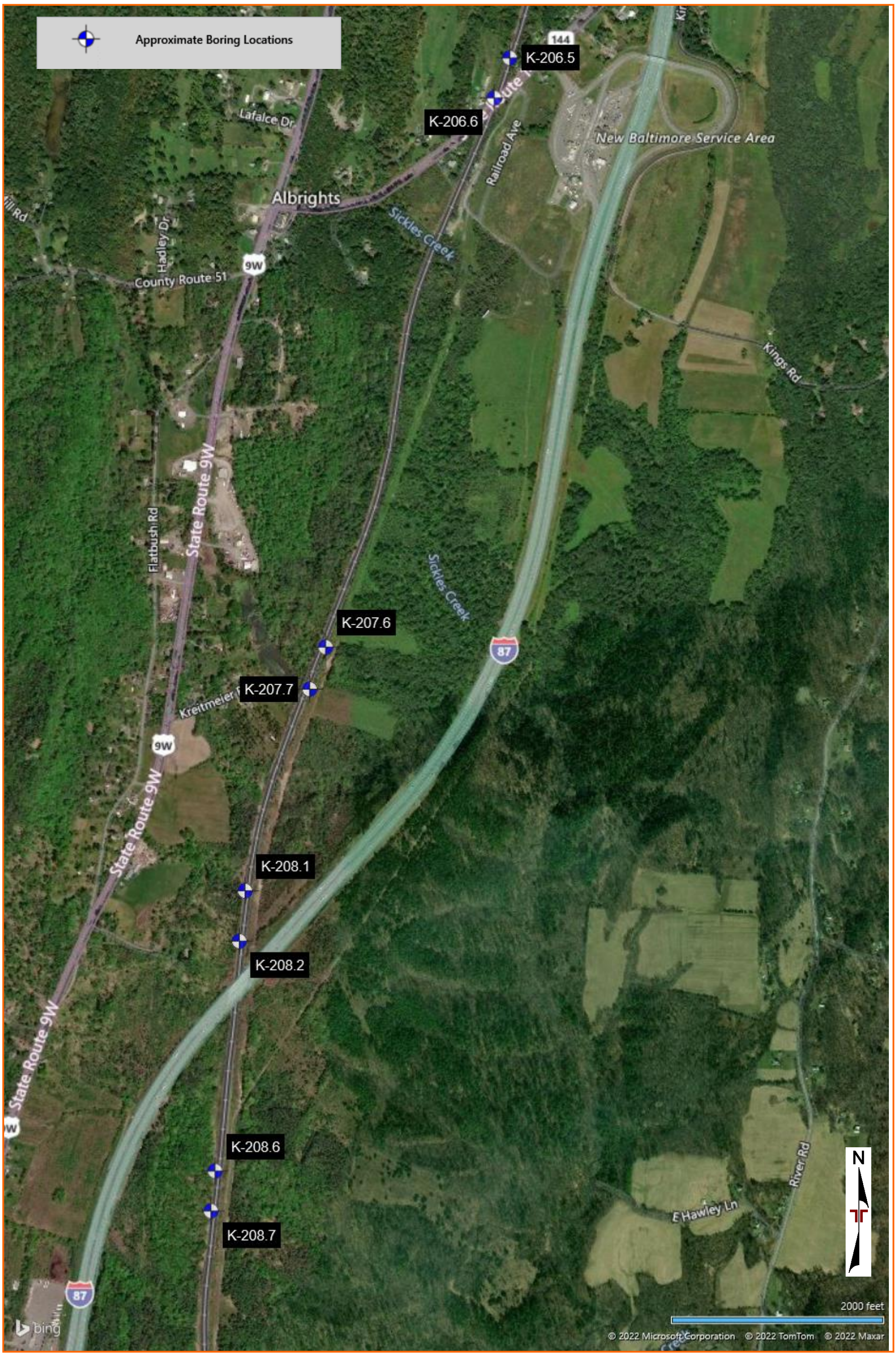


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. K-207.6

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: 42.4147° Longitude: -73.8154°

Surface Elev.: 161.3 (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
		FILL - LEAN CLAY, organics noted, brown, medium stiff				12	4-3-2-3 N=5			
2.0	159.5	**SILT AND CLAY (CL-ML)**, brown, stiff				12	6-7-8-10 N=15			
			5			20	3-5-6-9 N=11			
6.0	155.5	**SANDY ELASTIC SILT (MH)**, brown, very stiff				20	9-10-9-8 N=19	33.2	51-30-21	70
8.0	153.5	**SILT AND CLAY (CL-ML)**, brown, stiff				20	3-3-5-6 N=8			
			10			18	8-8-7-19 N=15			
15.0	146.5	**WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM)**, cobbles and boulders noted, brown, loose to very dense, (GLACIAL TILL)	15	▽		12	6-4-5-4 N=9	8.6	NP	8
		augers grinding from 17 to 25								
			20			4	50/4"			
		grades to gray				0	50/1"			
						2	50/2"			
24.7	136.5	**SILTY CLAYEY SAND WITH GRAVEL (SC-SM)**, cobbles and boulders noted, gray, very dense, (GLACIAL TILL)	25			2	170/2"			
						18	3" Split Spoon With RIng Samplers	4.1	18-14-4	27
						3	50/4"			

Stratification lines are approximate. In-situ, the transition may be gradual.
Attempted to take TR Sample at 22', no recovery.18" recovery for TR sample was obtained with three full sampler rings at 24.7'.Results acceptable per Jaren Knighton of Kiewit.

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

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-08-2022 | Boring Completed: 03-08-2022

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-207.6

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: 42.4147° Longitude: -73.8154°

Surface Elev.: 161.3 (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
	SILTY CLAYEY SAND WITH GRAVEL (SC-SM), cobbles and boulders noted, gray, very dense, (GLACIAL TILL) *(continued)*								
30.0	131.5								
	SILTY SAND WITH GRAVEL (SM), cobbles and boulders noted, gray, very dense, (GLACIAL TILL)	30			13	29-37-50/2"	7.9		42
		35			4	50/4"			
40.2	121	40			2	50/2"			
	Boring Terminated at 40.2 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.
Attempted to take TR Sample at 22', no recovery.18" recovery for TR sample was obtained with three full sampler rings at 24.7'.Results acceptable per Jaren Knighton of Kiewit.

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

WATER LEVEL OBSERVATIONS

While drilling

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-08-2022 | Boring Completed: 03-08-2022

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-207.7

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: 42.4136° Longitude: -73.8160°

Surface Elev.: 161.7 (Ft.)

DEPTH	ELEVATION (Ft.)	Description
0	161.7	
2.0	159.5	**FILL - SAND AND GRAVEL**, trace clay, brown and gray, medium dense
4.0	157.5	**FILL - SILT AND CLAY**, mottled brown and gray, medium dense
21.5	140	**LEAN CLAY (CL)**, varved, gray and brown, medium stiff to very stiff
		SILTY SAND WITH GRAVEL (SM), brown, medium dense to very dense, (GLACIAL TILL)
		grades to gray

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		18	12-15-5-5 N=20			
		17	4-8-8-8 N=16			
5		20	1-4-8-8 N=12			
		6	4-6-6-6 N=12			
		24	3-4-6-6 N=10	31.5		
10		24	5-8-8-7 N=16			
15		24	2-3-4-3 N=7	34.3	44-25-19	93
20		20	2-4-14-17 N=18			
25		9	29-50/4"	4.2	NP	21

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

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

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

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 03-10-2022
Boring Completed: 03-10-2022
Drill Rig: CME 750x
Driller: S. Morey
Project No.: JB215256C

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

BORING LOG NO. K-207.7

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: 42.4136° Longitude: -73.8160°

Surface Elev.: 161.7 (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
	SILTY SAND WITH GRAVEL (SM), brown, medium dense to very dense, (GLACIAL TILL) *(continued)*								
		30			0	50/0"			
					8	260-174/3" 3" Split Spoon With Ring Sampler See notes			
		35			1	50/1"			
40.3	121.5	40			3	50/3"			
	Boring Terminated at 40.3 Feet								

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

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA

Abandonment Method:
Boring backfilled with bentonite grout upon completion

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

See Supporting Information for explanation of symbols and abbreviations.

Elevations provided by Kiewit

Notes:

Logged by: SL
Hammer Efficiency Summary:
Energy Transfer Ratio: 91.3% +/-2.7%
Hammer Efficiency Correction (CE):1.52
Bulk sample obtained from cuttings and spoon @ 33-35' total of 10 lbs

WATER LEVEL OBSERVATIONS

No measurable groundwater prior to grouting

Terracon
30 Corporate Cir Ste 201
Albany, NY

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

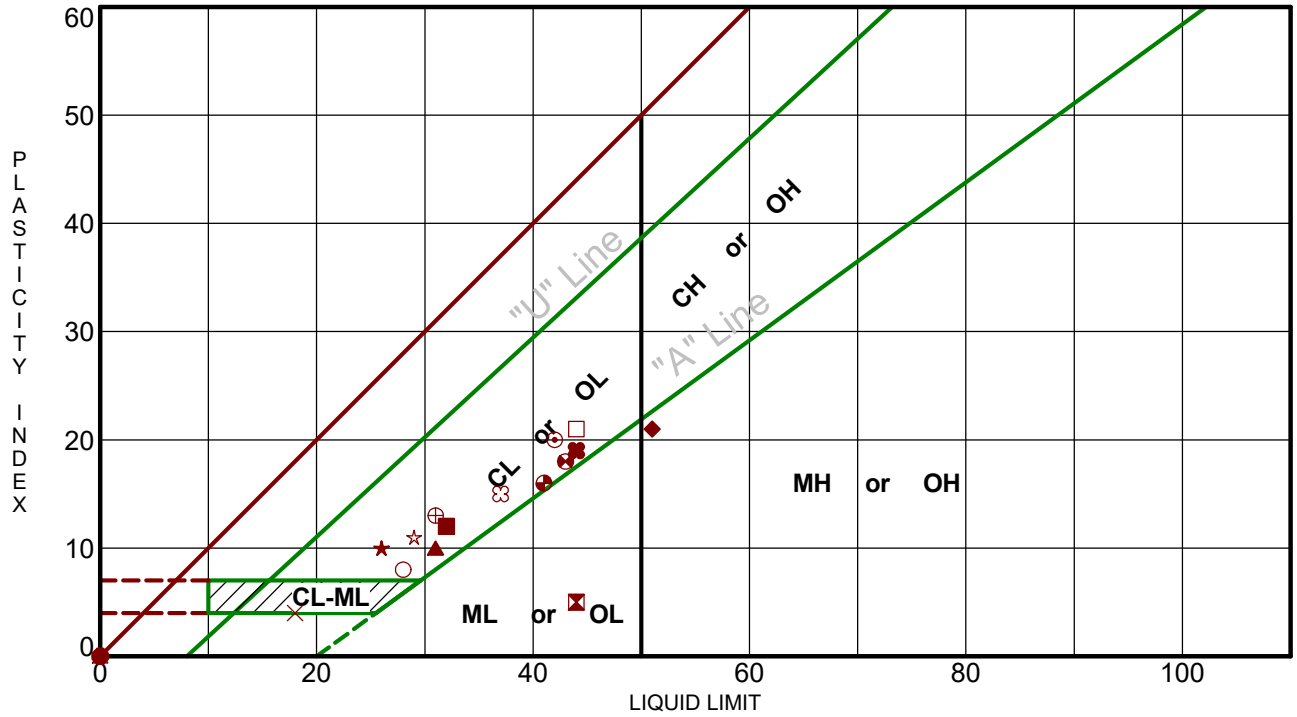
Drill Rig: CME 750x | Driller: S. Morey

Project No.: JB215256C

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

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	K-203.6	20 - 22	NP	NP	NP	14.7	SM	SILTY SAND with GRAVEL
⧗	K-204.2	10 - 12	44	39	5	74.5	ML	SILT with SAND
▲	K-204.2	25 - 27	31	21	10	89.4	CL	LEAN CLAY
★	K-204.8	10 - 12	26	16	10	90.2	CL	LEAN CLAY
⊙	K-204.8	23 - 25	42	22	20	93.8	CL	LEAN CLAY
✿	K-204.9	10 - 12	NP	NP	NP	97.2	ML	SILT
○	K-204.9	18 - 20	28	20	8	95.8	CL	LEAN CLAY
△	K-205.2	20 - 22	NP	NP	NP	41.6	SM	SILTY SAND
⊗	K-205.2	30 - 32	NP	NP	NP	39.8	SM	SILTY SAND
⊕	K-205.9	8 - 10	31	18	13	86.6	CL	LEAN CLAY
□	K-205.9	25 - 26.5	44	23	21	84.5	CL	LEAN CLAY with SAND
⊛	K-206.0	8 - 10	43	25	18	45.2	GC	CLAYEY GRAVEL with SAND
◕	K-206.5	8 - 10	41	25	16	70.6	CL	LEAN CLAY with SAND
☆	K-206.5	15 - 17	29	18	11	97.5	CL	LEAN CLAY
✿	K-206.6	13 - 15	37	22	15	87.0	CL	LEAN CLAY
■	K-206.6	23 - 25	32	20	12	98.5	CL	LEAN CLAY
◆	K-207.6	6 - 8	51	30	21	69.8	MH	SANDY ELASTIC SILT
◇	K-207.6	15 - 17	NP	NP	NP	8.2	GW-GM	WELL-GRADED GRAVEL with SILT and SAND
×	K-207.6	24.7 - 26.3	18	14	4	26.6	SC-SM	SILTY, CLAYEY SAND with GRAVEL
✖	K-207.7	15 - 17	44	25	19	93.0	CL	LEAN 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

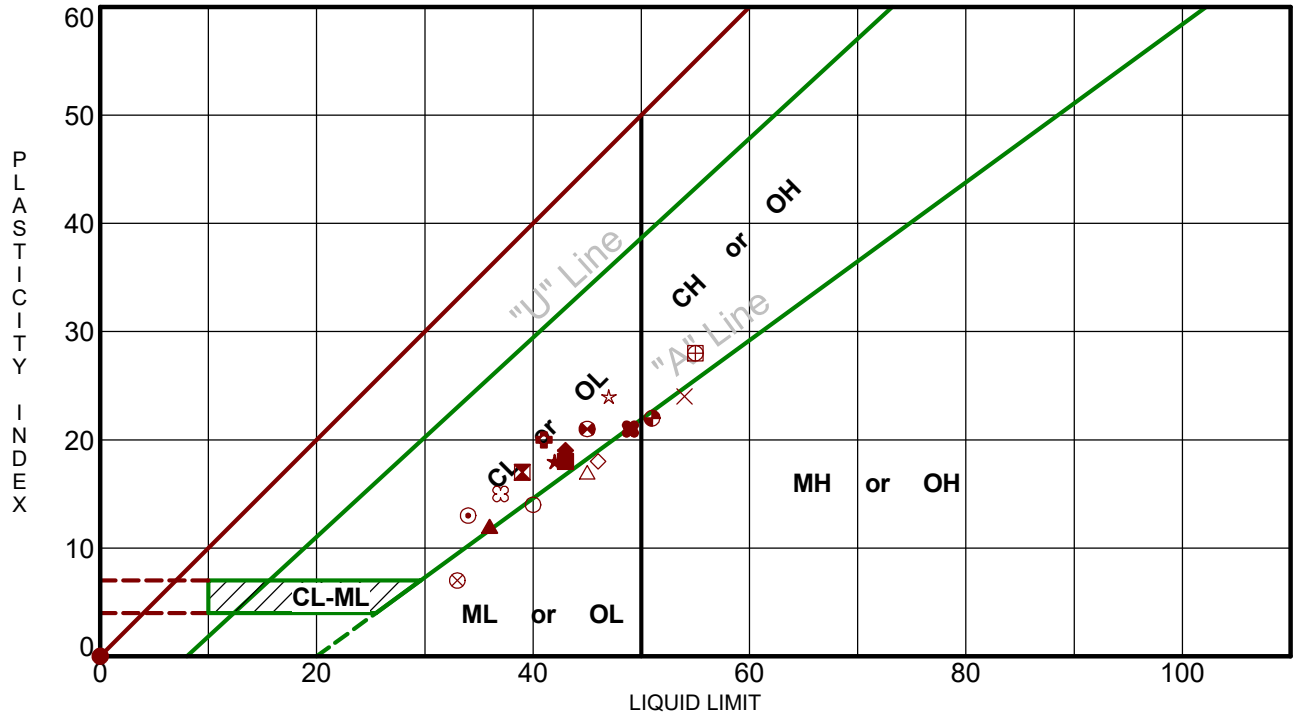
PROJECT NUMBER: JB215256C

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

PROJECT: Champlain-Hudson Power Express Package 6

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

Terracon
30 Corporate Cir Ste 201
Albany, NY

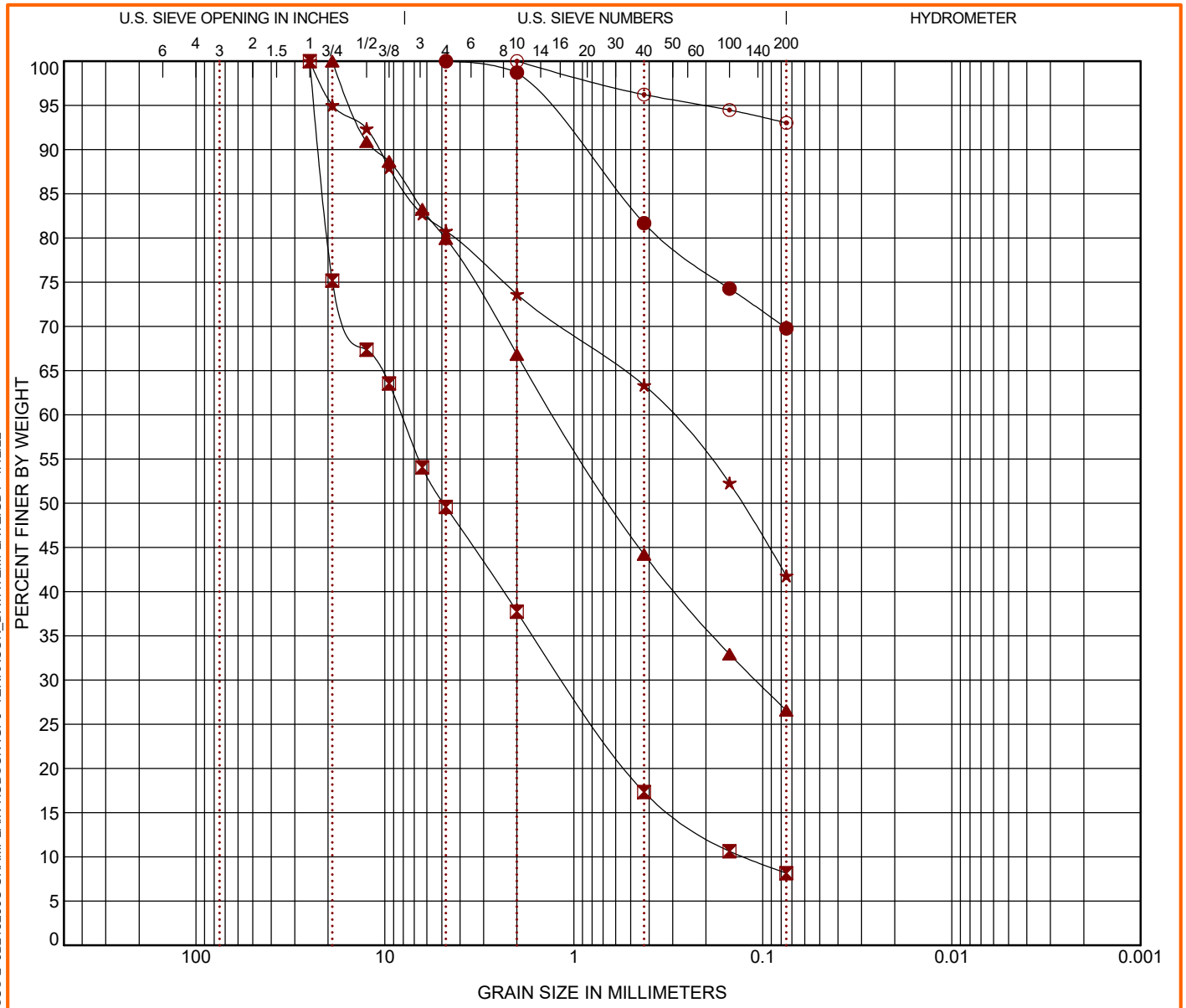
PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

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

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	K-207.6	6 - 8	SANDY ELASTIC SILT (MH)	33.2	51	30	21		
⊠	K-207.6	15 - 17	WELL-GRADED GRAVEL with SILT and SAND (GW-GM)	8.6	NP	NP	NP	1.21	65.11
▲	K-207.6	24.7 - 26.3	SILTY, CLAYEY SAND with GRAVEL (SC-SM)	4.1	18	14	4		
★	K-207.6	30 - 31.2	SILTY SAND with GRAVEL (SM)	7.9					
⊙	K-207.7	15 - 17	LEAN CLAY (CL)	34.3	44	25	19		

	Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	K-207.6	6 - 8	4.75				0.0	0.0	30.2		69.8	
⊠	K-207.6	15 - 17	25	8.174	1.113	0.126	0.0	50.4	41.4		8.2	
▲	K-207.6	24.7 - 26.3	19	1.254	0.109		0.0	20.1	53.4		26.6	
★	K-207.6	30 - 31.2	25	0.31			0.0	19.2	39.0		41.8	
⊙	K-207.7	15 - 17	2				0.0	0.0	7.0		93.0	

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

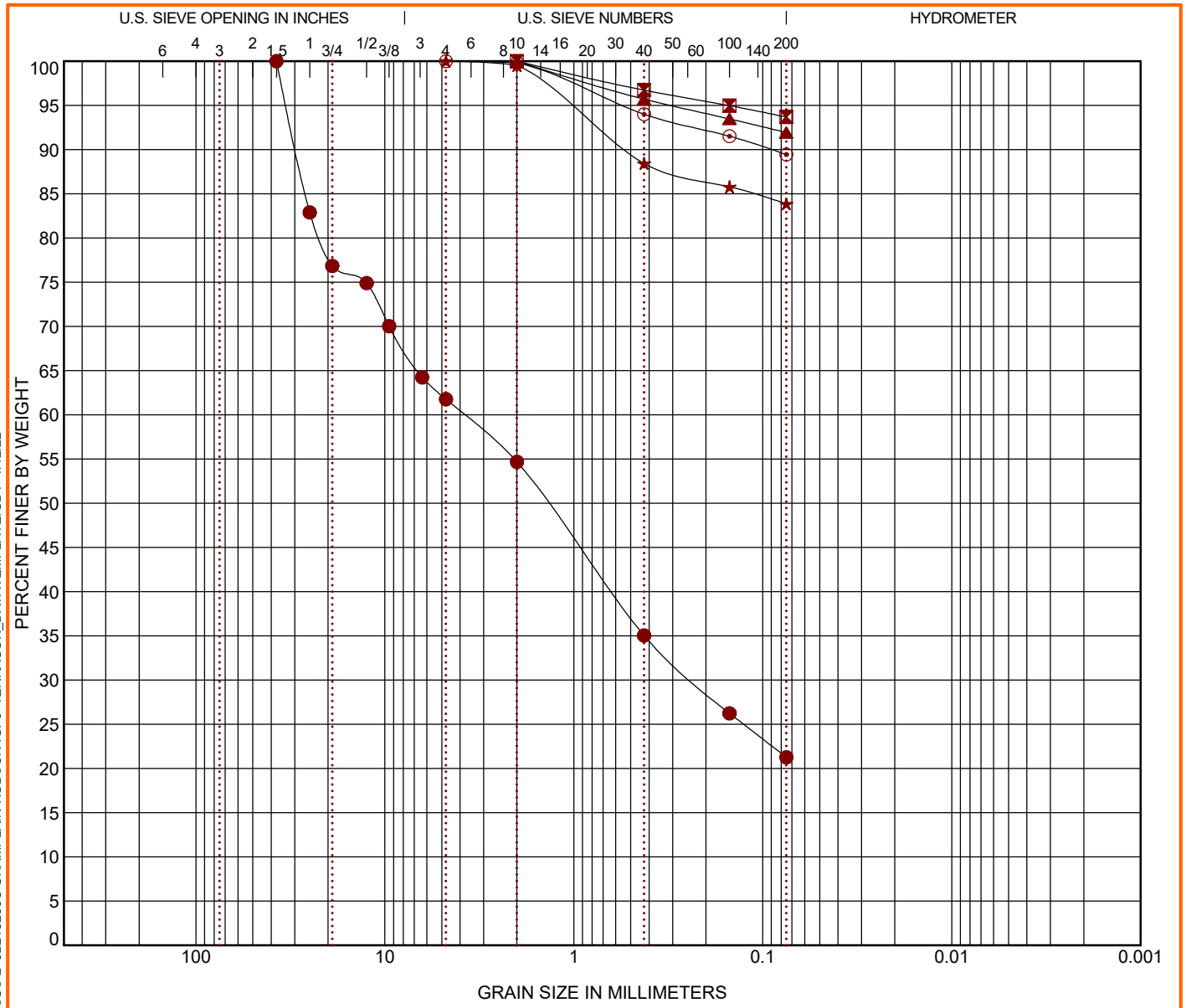
PROJECT NUMBER: JB215256C

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-207.7	25 - 25.8	SILTY SAND with GRAVEL (SM)	4.2	NP	NP	NP		
⊠	K-208.1	25 - 27	LEAN CLAY (CL)	35.6	39	22	17		
▲	K-208.1	35 - 37	LEAN CLAY (CL)	29.5	36	24	12		
★	K-208.2	15 - 17	LEAN CLAY with SAND (CL)	33.4	42	24	18		
⊙	K-208.2	25 - 27	LEAN CLAY (CL)	35.3	34	21	13		

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

PROJECT: Champlain-Hudson Power Express Package 6

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

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256C

CLIENT: Kiewit Engineering (NY) Corp.

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

Kiewit

MEMORANDUM

DATE: November 11, 2022

TO: Todd Kilduff; Kilduff Underground Engineering, Inc.

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 99 – Revision 1
Champlain Hudson Power Express Project
Coeymans, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Coeymans, New York. The approximate station for the start of HDD crossing number 99 is STA 60482+00 (42.41171° N, 73.81622° W)

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

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

Contact us if you have questions or require additional information.

HDD 99
Borings B207.9-1, K-208.1
Segment 10 - Design Package 6

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

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A199.7-1	1344990.8	678939.9	159.0
	A205.2-1	1317487.9	677289.6	204.6
	A206.62-1	1310345.7	678496.2	186.8
	A207.0-1	1308517.7	677770.1	179.6
	A209.05-1	1298062.1	675944.3	148.6
	A219.05-1	1247052.0	666820.5	128.8
	B198.9-1	1348887.4	679090.7	173.5
	B200.6-1	1340723.0	677093.4	96.3
	B200.7-1	1340001.8	676794.4	128.5
	B201.7-1	1335310.5	675758.1	162.1
	B201.9-1	1334029.9	676014.8	173.3
	B202.1-1	1333294.3	676182.6	168.3
	B203.45-1	1326328.9	678471.9	171.2
	B203.5-1	1325831.2	678645.3	183.2
	B204.2-1	1322268.4	678463.0	198.8
	B204.7-1	1320048.9	677891.8	207.1
	B205.8-1	1314638.7	678588.0	141.5
	B205.9-2	1313866.7	678637.8	190.3
	B207.9-1	1303512.5	676338.7	156.2
	B208.2-1	1302277.3	676188.9	152.0
	B208.3-1	1301673.4	676120.2	150.0
	B208.5-1	1300907.6	675929.0	116.7
	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.