HDD Design Summary Report
Crossings HDD 9 to HDD 21A
in Segment 3 – Package 2

Fort Ann to Kingsbury
Washington County, New York

CHA Project Number: 066076

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TABLE OF CONTENTS

LIST OF REFERENCED APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE

The Champlain Hudson Power Express (CHPE) project consists of installing a pair of HVDC electrical transmission cables with an associated telecommunications line from Canada to New York City. The portion of the work addressed herein is located in the upland portion of the route from the south end of Lake Champlain to New York City along the uplands of the Hudson River Valley. This work includes approximately 170 crossings (two crossings at approximately 85 locations) under roads, railroads, wetlands water bodies, and obstructions to be installed using horizontal directional drilling (HDD) methods to minimize interference with use or impacts to the environment. This Design Summary Report addresses the design for the HDD crossings in Segment 3 - Package 2 from Fort Ann to Kingsbury. These crossings are designated HDD 9 through HDD 21, inclusive if A and B designations.

The purposes of this Design Summary Report are to provide the following:

- Review of the existing geological, hydrogeological, and geotechnical conditions for HDD 9 through HDD 21A for a total of 34 crossings (2 per site) in the Segment 3 – Package 2.
- Provide a descriptive narrative of the HDD Crossings in support of the attached design drawings and technical specifications.
- Present stress and inadvertent release analyses that support the proposed designs.
- Evaluate construction considerations including inadvertent return mitigation.

2.0 PROJECT DESCRIPTION

The proposed CHPE route follows the Hudson River Valley of New York. The new transmission line will be approximately 146 miles in length, extending from the south end of Lake Champlain to Astoria, NY. Segment 3 - Package 2 is located in approximately a 14.5-mile section of the route in Washington County, New York.

A Project Locus Map and a plan showing the locations of the HDD 9 through HDD 21A crossings are presented in Appendix B.

The HDD crossings addressed in this report are located as shown in Table 1 below*:*

Table 1: HDD Locations, Lengths, and Description

HDD #	Start Station	End Station	HDD Length, ft	Obstruction Crossed
9	20004+95	20010+50	548/552	Culvert
10	20075+10	20087+40	1210/1240	Road
11	20104+90	20116+90	1200	Culvert & Canal
12	20178+50	20187+70	705/920	RR Crossing
12A	20193+10	20207+90	1490	Rock Face & Culvert
13	20248+75	20263+90	1513/1525	Culvert
13A	20281+00	20290+25	915/925	Bridge
14	20292+00	20300+10	707/819	RR Crossing & Road Crossing (at-grade)
14A	20331+25	20337+40	610/614	RR Crossing
15	20418+25	20424+45	624/627	Wetlands
16	20499+00	20505+40	620/645	Culvert & Wetlands
17	20546+00	20551+60	575/662	Culvert & Wetlands
18	20649+00	20655+10	614/620	Culvert & Water
19	20697+10	20702+90	589/594	Culvert & Wetlands
20	20737+60	20749+50	1200/1203	Road & Water
21	20756+80	20776+50	1975	Wetlands
21A	20780+00	20799+30	1965	Wetlands

3.0 BACKGROUND

The underground construction of two HVDC electrical transmission cables is proposed to be housed in individual 10-inch-diameter DR 9 HDPE conduits spaced a distance dependent on depth and soil thermal resistivity (TR) values provided by NKT and as shown on drawings plans. A third, 2-inch-diameter DR 9 conduit will be bundled with one of the 10-inch diameter conduits for a telecommunications line. Longer and deeper bores may require a larger diameter (i.e., 12-inch and 3 inch) conduits with larger DR, thicker walls, values (i.e., DR 7) to resist tension stresses during installation and collapsing long-term. This is checked and determined on a case-by case basis and design sizes are shown on the design drawings shown in Appendix E. The conduits are to be installed in 16 to 22-inch final ream diameter bore holes. The proposal is to install the cables at least 25 feet below congested areas, roads, railroads, under/around other obstructions, 15 to 25 feet below wetland and small streams, and 35 to 45 feet below open bodies

of water using HDD methods. HDD is a widely used trenchless construction method to install conduits with limited disturbance to the ground around the bore alignment, minimal ground surface impacts above the alignment, and to minimize the potential of inadvertent releases of drilling fluids while boring. The goal for using HDD methods is to install the conduits while controlling and minimizing the amount of impact to congested areas, existing underground obstructions, and to the adjacent wetlands to the extent possible.

4.0 SITE CONDITIONS

4.1.1 Project Datum and Topography

HDD #9

HDD #9 consists of two straight bores, approximately 548 and 552 feet long and is located on the west side of N. Old Route 4, approximately 100 feet from the Champlain Canal to the east. Both the bores pass 16 feet under an 60" culvert. The ground surface elevations along the HDD path gently undulates between El. 125 and El. 127 (reference datum NAVD 1988).

HDD #10

HDD #10 consists of two curved HDD bores with one approximately 1210 feet long and the other approximately 1240 feet long, located on the west side of N. Old Route 4 and passes under State Route 22.It is approximately 150 feet from the Champlain Canal to the east. The ground surface elevations along the path of HDD #10 ranges from approximately El. 129 at the north end of the bore alignment, to approximately El. 152 at the centerline of NY State 22, to El. 136 at the south end of the bore alignment (reference datum NAVD 1988).

HDD #11

HDD #11 consists of two, curved, HDD bores, approximately 1200 feet long, one on each side of S. Old Route 4 which is located on a narrow piece of land between Kelsey Pond and the Champlain Canal. The road in this area is curved and the bores, one on each side of the road, are curved to follow the road curve. The ground surface elevations along the HDD path gently undulates between El. 127 and El. 130 (reference datum NAVD 1988). Kelsey Pond is located approximately 200 feet west of the HDD alignment and the Champlain Canal is located approximately 50 feet west of the HDD alignment.

HDD #12

HDD #12 consists of two, unparallel, straight HDD bores approximately 705 and 920 feet long Both bores cross from the east side of the CP Rail railroad tracks, crossing underneath the tracks, and exiting at

the west side. The tracks at this location are built up on a hill. Both bore paths start at the base of the hill on the east (approximately El. 132) and then exit at the top of the hill on the west side (approximately El. 141), giving approximately a 9-foot elevation change between exit and entry (reference datum NAVD 1988).

HDD #12A

HDD #12A consists of two HDD bores located underneath a 60" culvert and an existing tight rock face. The bores are approximately 1490 feet long. The bores cross underneath the rock face with approximately 35 to 43 feet depth and underneath the culvert with a 15-foot clearance. The approximate centers of the bores are at latitude 43.4304°N and longitude -73.4641°W, in Fort Ann, NY. The ground surface elevations vary between greatly between El. 161 and El. 130 (which is at the culvert crossing with an approximate invert of El. 125) (reference datum NAVD 1988).

HDD #13

HDD #13 consists of two, curved, HDD bores approximately 1513 and 1525 feet long. The HDD bores cross underneath a waterway at a 12.5 foot by 10.4 foot box culvert for the Champlain Canal at CP Rail railroad tracks at approximately latitude 43.4241°N and longitude -73.4813°W, in Fort Ann, NY. Both bores enter and exit to the west of the tracks and curve along with the tracks. The ground surface elevation at the entry is approximately El. 134 and gently undulates to approximately El. 123 and then rises back up to approximately El. 132 at the exit (reference datum NAVD 1988).

HDD #13A

HDD #13A consists of two straight HDD bores located under a CP Rail railroad bridge over an arm of the Champlain Canal in Fort Ann, NY. The bores are approximately 915 feet and 925 feet long as shown in Appendix D. The HDD bores will pass approximately 40 feet below the estimated mudline (assuming a 5' water depth) and 27 to 28 feet below the bridge wall abutments based on available as-builts shown in Appendix G. The approximate center of the HDD bores the under the CP Railroad are at latitude 43.4166°N and longitude -73.4850°W, in Fort Ann, NY. The ground surface elevations along the path of HDD #13A gently undulates from approximately El. 138 to El. 132 aside from the dip to the water level which is at approximately El. 124 (reference datum NAVD 1988).

HDD #14

HDD #14 consists of two straight) HDD bores located under CP Rail railroad tracks at Ann St (an at-grade crossing). The bores are approximately 707 and 819 feet as shown in Appendix D. The HDD bores will pass approximately 27 to 28 feet below tracks at Ann St. The approximate center of the HDD bores

the under the CP Railroad are at latitude 43.4138°N and longitude -73.4855°W, in Fort Ann, NY. The ground surface elevations along the path of HDD #14 gently undulates from approximately El. 126 (at the entry) to El. 137 (at the exit) (reference datum NAVD 1988).

HDD #14A

HDD #14A consists of two straight HDD bores approximately 610 and 614 feet long. Both bores cross from the east side of CP Rail railroad tracks to west side. The approximate centers of the bores, where they cross the CP Rail railroad tracks, are at latitude 43.4032°N and longitude -73.4863°W, in Fort Ann, NY. The ground surface elevations along the HDD path gently undulates between El. 139 and El. 136 (reference datum NAVD 1988).

HDD #15

HDD #15 consists of two straight HDD bores with one approximately 624 feet and another approximately 627 feet long that cross underneath water at an 8' RCP for the Champlain Canal at approximately latitude 43.3798°N and longitude -73.4896°W west of CP Rail railroad tracks in Fort Ann, NY. Both bores run on the west side of the railroad tracks. The ground surface elevation hovers between El. 131 to El. 134 for the majority of the bore path aside from where the assumed water level is approximately El. 125 (reference datum NAVD 1988).

HDD #16

HDD #16 consists of two straight HDD bores approximately 620 and 645 feet long. Both bores are on the west side of CP Rail railroad tracks in Fort Ann, NY. They cross underneath water from a culvert for the Champlain Canal as well as an at-grade road crossing (NY ROUTE 149) located at approximately 43.3583°N and longitude -73.4953°W in Fort Ann, NY. The ground surface elevation hovers between El. 138 to El. 144 for the majority of the bore path aside from where the assumed water level is approximately El. 129 (reference datum NAVD 1988).

HDD #17

HDD #17 consists of two straight HDD bores approximately 575 and 662 feet long that cross underneath water and two 48" RCPs to the west side of CP Rail railroad tracks at approximately 43.3475°N and longitude -73.4975°W in Fort Ann, NY. Both bores remain on west side of the tracks for the entire run. The ground surface elevation gently undulates between El. 142 to El. 147, aside from at the standing water where the water level is at approximately El. 137 (reference datum NAVD 1988).

HDD #18

HDD #18 consists of two straight HDD bores approximately 614 and 620 feet long that cross underneath water just outside of a culvert with a size currently unknown on the west side of the CP Rail railroad tracks in at approximately 43.3232°N and longitude -73.5231°W in Fort Ann, NY. Both bores remain on

west side of the tracks for the entire run. The ground surface elevation gently undulates between El. 140 to El. 145 (reference datum NAVD 1988).

HDD #19

HDD #19 consists of two straight HDD bores approximately 589 and 594 feet long that cross underneath water and a 48" Conc. Box storm line at the west side of the CP Rail railroad tracks at approximately 43.313°N and longitude -73.5347°W in Fort Ann, NY. Both bores remain on west side of the tracks for the entire run. The ground surface elevation gently undulates between El. 140 to El. 144, aside from at the standing water where the water level is at approximately El. 139 (reference datum NAVD 1988). East and west work zones for both conduits are on gently undulating topography.

HDD #20

HDD #20 consists of two straight HDD bores approximately 1200 feet long that pass under NY route 196 (at approximately 43.3048°N, -73.5445°W) and bond creek (at approximately 43.3036°N, -73.5456°W) on the west side of the CP Rail railroad tracks. Both bores remain on west side of the tracks for the entire run. The ground surface elevations along the path of HDD #20 gently undulates between El. 146 and El. 140 with a gradual downward slope aside from the elevation peak at Ny route 196 approximately EL. 173. It also dips at Bond creek at approximately El. 138 (reference datum NAVD 1988).

HDD #21

HDD #21 consists of two straight bores approximately 1975 feet long and located westerly of the CP Rail railroad tracks in Kingsbury, NY. Both the bores from entry pit to exit pit of bore alignment, remains on the west side of the tracks. The ground surface elevation gently undulates between El. 133 to El. 138 (reference datum NAVD 1988).

HDD #21A

HDD #21A consists of two straight bores approximately 1965 feet long and located westerly of the CP Rail railroad tracks in Kingsbury, NY. Both the bores from entry pit to exit pit of bore alignment, remains on the west side of the tracks. The ground surface elevation gently undulates between El. 134 to El. 140 (reference datum NAVD 1988).

4.1.2 Geotechnical Data

HDD #9

Subsurface investigations were conducted in 2020 by AECOM for Transmission Developers, Inc., and 2021 and 2022 by Kiewit. There are two borings to date at HDD #9: WFE-2, which reaches a depth of 40

feet below grade, and K-117.6-0.2. At the northern portion of the HDD bores. There appears to be a 2-foot layer of fill over a 6-foot layer of well graded sand, over a 2-foot layer of fat clay. The majority of the drill path appears to be through layers of clayey sand and fat clay below the previously described layers. The Geotechnical Data Report for this location is provided in Appendix C.

Based on borings drilled for this project, the soil profile for the HDD #9 BoreAid analysis was divided into five (5) layers: fill, loose to medium compact well graded sand, a shallow medium stiff fat clay, loose clayey sand and a deep very soft fat clay. The soil profiles used for BoreAid analyses of the HDD in this segment are presented in Appendix D.

HDD #10

Subsurface investigations were conducted in 2022 by Atlantic Testing Labs, Ltd. for Transmission Developers, Inc. and Kiewit. There are five borings to date at HDD #10: K117.6-1.6A, K117.6-1.6B and K117.6-1.6C, which reached depths of 35 feet below grade and KB-117.6-1.6D, which reached a depth of 57 feet below grade, and WFE-5 which reached a depth of 17 feet below grade. There appears to be a 1-foot layer of dense fill, over a 5-foot layer of dense low plasticity silt, over a 5-foot layer of dense well graded sand, over an 11-foot layer of medium dense to dense silty sand, over a layer of soft to stiff low plasticity clay in boring K117.6-1.6B. There appears to be a 1.5-foot layer of fill, over a 4.5-foot layer of dense well graded sand, over a 6-foot layer of medium dense to dense silty sand, over a 3.6-foot layer of loose well graded sand, over a 2.4-foot layer of loose poorly graded sand, over a layer of medium stiff low plasticity clay in boring K-117.6-1.6A. There appears to be a 2-foot layer of fill, over a 2.8-foot layer of dense low plasticity silt, over a 1.2-foot layer of dense silty sand, over a 6-foot layer of dense low plasticity silt, over a 15-foot layer of medium dense to dense silty sand, over a layer of medium stiff low plasticity clay in boring K117.6-1.6C. There appears to be a 20-foot layer of dense granular fill, a 10-foot layer of medium stiff cohesive fill, a 10-foot layer of soft low plasticity clay, and a 17-foot layer of loose poorly graded sand. Boring WFE-5 shows a 9 foot layer of silty sand, over a 2 foot layer of silt, over a 6 foot layer of clayey silt. The borings were similar and the BoreAid analysis will be based on the layering observed in boring K117.6-1.6D, as it was the only boring extending past the bottom depth of the HDD alignment. The draft Geotechnical Data Report for this location is provided in Appendix C.

Based on the borings, the soil profile for the HDD #10 BoreAid analysis will be divided into four (4) layers: medium dense granular fill, medium stiff cohesive fill, soft low plasticity clay and loose well graded sand. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in BoreAid Output for HDD #10 in Appendix D.

The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #11

Subsurface investigations were conducted in 2020 by AECOM for Transmission Developers, Inc., and 2021 and 2022 by Kiewit. There are five borings at HDD #11: K117.6-2.1, K117.6-2.1, WFE-6, WFE-6A, and WFE-7 are located along the proposed HDD alignment between approximately Sta. 20105+00 and Sta. 20107+00. These five borings [5] ranged in depth below the ground surface from approximately 40 to 42 feet. The Geotechnical Data Report for this location is provided in Appendix C.

Based on the borings, the soil profile for the HDD #11 BoreAid analyses *was* divided into five (5) layers: medium-dense sand and gravel, loose silt, stiff clay, medium-dense sand, and rock (sandstone). The majority of the drill path appears to be through the layer of medium-dense sand. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in BoreAid Output for HDD #11 in Appendix D.

HDD #12

Subsurface investigations were conducted in 2020 by AECOM for Transmission Developers, Inc., and 2022 by Kiewit. There are three borings to date at HDD #12: WFE-9, WFE-9A and K-121.0, which reach depths of 40 feet, 39.5 feet, and 33 feet below grade, respectively. There appears to be a 1.5-foot layer of asphalt over a 9.5-foot layer of loose poorly graded sand, over a 4-foot layer of soft low plasticity silt, over a 3.5-foot layer of very soft low plasticity clay, over a 21.5-foot layer of medium dense poorly graded sand in boring WFE-9. There appears to be a 4-foot layer of silty sand over a 35.5-foot layer of sandstone in boring WFE-9A. There appears to be an 8-foot layer of loose fill over a 25-foot layer of sandstone in K-121.0. Boring WFE-9 is located outside of the proposed HDD limits, and boring K-121.0 contains soil conditions that are more prone to inadvertent return potential than WFE-9. Therefore, the BoreAid analysis will be based on the soil layering observed in K-121.0 to be conservative. The Geotechnical Data Report for this location is provided in Appendix C.

Based on borings drilled for this project, the soil profile for the HDD #12 BoreAid analysis was divided into two (2) layers: loose silty sand and sandstone. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #12A

Subsurface investigations were conducted in 2020 by AECOM for Transmission Developers, Inc. There is one boring to date at HDD #12A: WFE-9B, which reaches a depth of approximately 16 feet below grade. This bore indicates that there is a thin layer of fine-coarse sand followed by sandstone reaching the bottom of the bore. No additional borings are currently planned for this area. The Geotechnical Data Report for this location is provided in Appendix C.

Based on borings drilled for this project, the soil profile for the HDD #12A BoreAid analysis was divided into two (2) layers: poorly graded sand and sandstone. The existing boring drilled in this area does not reach the depth of the designed bore paths. The sandstone was assumed to continue through the depth of the HDD paths. It is recommended that the HDD subcontractor drill a test boring at the start of construction at the HDD 12A site before starting the HDD to confirm the ground conditions through the depth of the bore. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #13

Subsurface investigations were conducted in 2012 by TRC for Transmission Developers, Inc., and 2022 by Kiewit. There are three borings to date at HDD #13: B122.4-1, K-122.35 and K-122.4, which reach depths of 30 feet, 61 feet and 60 feet below grade, respectively. There appears to be a 4-foot layer of loose fill, over a 4-foot layer of loose silty sand, over a 10.5-foot layer of loose low plasticity silt, over a 5-foot layer of loose silty sand, over a layer of loose well graded sand in boring B122.4-1. There appears to be a 2-foot layer of medium dense fill, over a 9-foot layer of loose low plasticity silt, over a layer of loose to medium dense poorly graded and well graded sand in boring K-122.35. There appears to be a 7.5-foot layer of loose to medium dense fill, over a 9.5-foot layer of loose low plasticity silt, over a 18.3-foot layer of medium dense poorly graded sand, over a 7.7-foot layer of medium dense silty sand, over a 3.2-foot layer of loose low plasticity silt, over a layer of loose to medium dense poorly graded sand in boring K-122.4. The majority of the drill path looks to be through layers of medium dense poorly graded sand and loose silty sand. The Geotechnical Data Report for this location is provided in Appendix C.

Based on the borings, the soil profile for the HDD #13 BoreAid analysis will be divided into two (2) layers: loose silty sand and medium dense poorly graded sand. The elevations for these layers will correspond to the elevations observed in boring B-122.4. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #13A

Subsurface investigations were conducted in 2022 by Kiewit. There are two boring to date at HDD #13A: KB-122.9 and KB-123.0, which reached depths of 67 feet and 72 feet below grade, respectively. There appears to be a 25-foot layer of loose poorly graded sand over a 42-foot layer of very soft fat clay in boring KB-122.9. There appears to be a 6-foot layer of loose fill over a 9-foot layer of loose low plasticity silt, over a 45-foot layer of very soft low plasticity clay, over a 5-foot layer of loose poorly graded sand, over a 7-foot layer of very soft fat clay. The BoreAid analysis soil layering will be nonhorizontal and be based on the observations in boring KB-122.9 and KB-123.0.

The draft Geotechnical Data Report for this location is provided in Appendix C.

Based on borings drilled for this project, the soil profile for the HDD #13A BoreAid analysis was divided into six (6) layers: loose poorly graded sand, loose low plasticity silt, very soft low plasticity clay, very soft fat clay, loose poorly graded sand, and very soft low plasticity clay. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #14

Subsurface investigations were conducted in 2012 by TRC for Transmission Developers, Inc., and 2021 and 2022 by Kiewit. There are two borings at HDD #14: B123.1-1 (which reaches a depth of 25 feet below grade) and K-123.2 (which reaches a depth of 36 feet below grade). There appears to be a 2-foot layer of medium dense fill over a 2-foot layer of stiff clayey silt, over a layer of medium stiff low plasticity clay in boring B123.1-1. There appears to be a 4-foot layer of medium dense fill, over a 2-foot layer of medium stiff clayey silt, over a 4-foot layer of loose silty sand, over a 3-foot layer of medium stiff low plasticity clay, over a 14-foot layer of loose poorly graded sand, over a 6-foot layer of very soft fat clay, over medium stiff clayey silt in boring K-123.2. The Geotechnical Data Report for this location is provided in Appendix C.

Based on K-123.2, the soil profile for the HDD #14 BoreAid analysis will be divided seven (7) layers: medium dense fill, medium stiff clayey silt, loose silty sand, medium stiff low plasticity clay, loose poorly graded sand, very soft fat clay, medium stiff clayey silt. The soil profiles used for BoreAid analyses for the HDD in this segment are presented in the attached analyses. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #14A

Subsurface investigations were conducted in 2022 by Atlantic Testing Laboratories, Limited and 2021 and 2022 by Kiewit. There are two borings to date at HDD #14A: K-123.7 (that reaches a depth of 42 feet below grade) and K-123.8 (that reaches a depth 42 feet below grade). Based on K-123.7, there appears to be a 3-4 foot layer of loose fill, over a 38-foot layer of soft to stiff fat clay. Boring B-123.7 similarly shows fill over soft to stiff fat clay. Much of the drill path looks to be through a layer of fat clay. The Geotechnical Data Report for this location is provided in Appendix C.

Based on the borings, the soil profile for the HDD #14A BoreAid analysis will be divided into two (2) layers: loose fill and soft to stiff fat clay. The soil profiles used for BoreAid analyses for the HDD in this segment are presented in the attached analyses. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #15

Subsurface investigations were conducted in 2022 by Atlantic Testing Laboratories, Limited and 2021 and 2022 by Kiewit. There are three borings at HDD #15: K-125.5, K-125.6, and WFE-12 which reach depths of 41 feet,40 feet, and 17 feet below grade, respectively. There appears to be a 4-foot layer of medium dense fill, over a 3-foot layer of loose low plasticity silt, over a 4-foot layer of soft fat clay, over a 6-foot layer of medium dense poorly graded sand, over a 20-foot layer of very soft fat clay, over a layer of very loose low plasticity silt in bring K-125.5. There appears to be a 4-foot layer of medium dense fill, over a 2-foot layer of medium dense silty sand, over a 2-foot layer of medium dense clayey sand, over a 3-foot layer of stiff low plasticity clay, over a 6-foot layer of medium dense poorly graded sand, over a layer of very soft fat clay in boring K-125.6. Boring WFE-12 shows a 5 foot layer of loose sand, a 5 foot layer of medium stiff clayey silt, and a layer of medium dense to very loose sand. Based on the borings, the BoreAid analysis soil layering will be based on the observations in boring K-125.5. The Geotechnical Data Report for this location is provided in Appendix C.

Based on the borings, the soil profile for the HDD #15 BoreAid analysis will be divided into six (6) layers: medium dense sand, loose low plasticity silt, soft fat clay, medium dense poorly graded sand, very soft fat clay, and loose low plasticity silt. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #16

Subsurface investigations were conducted in 2022 by Atlantic Testing Laboratories, Limited and 2021 and 2022 by Kiewit. There are three borings at HDD #16: B-127.06-1, K-127.0 and K-127.1, which reached depths of 30 feet, 41 feet and 36 feet below grade, respectively. There appears to be a 4-foot layer

of loose fill, over a 9.5-foot layer of medium stiff to stiff low plasticity clay, over a 10-foot layer of loose low plasticity silt, over a layer of soft low plasticity clay in boring B-127.06-1. There appears to be a 3-foot layer of medium dense fill, over a 6-foot layer of medium stiff silty clay, over an 8-foot layer of medium dense silty sand, over a layer of very soft fat clay in boring K-127.0. There appears to be a 4-foot layer of loose to dense fill, over a 2-foot layer of medium stiff low plasticity silt, over a 6-foot layer of medium stiff to stiff low plasticity clay, over a 5-foot layer of loose poorly graded sand, over a layer of very soft fat clay in boring K-127.1. Based on the borings, the BoreAid analysis soil layering will be based on the observations in boring K-127.1. The Geotechnical Data Report for this location is provided in Appendix C.

Based on the borings, the soil profile for the HDD #16 BoreAid analysis will be divided into five (5) layers: loose to dense sand, medium stiff low plasticity silt, medium stiff low plasticity clay, loose silty sand, and very soft fat clay. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #17

Subsurface investigations were conducted in 2020 by AECOM for Transmission Developers, Inc., and 2021 and 2022 by Kiewit. There are three borings at HDD #17: WFE-16, K-127.9 and K-128.0, which extend to depths of 40.1 feet, 45 feet and 45 feet below grade, respectively. There appears to be a 4.5-foot layer of poorly graded sand over a 2.5-foot layer of stiff low plasticity clay, over a 3.5-foot layer of stiff fat clay, over of 3.5-foot layer of stiff low plasticity clay, over a 10-foot layer of stiff low plasticity clay, over a layer of stiff fat clay in boring WFE-16. There appears to be a 4-foot layer of medium dense fill, over a 8 foot layer of stiff fat clay, over a layer of soft to medium stiff low plasticity clay in boring K-127.9. There appears to be a 2-foot layer of medium dense fill, over a 10-foot layer of stiff low plasticity clay, over a 33-foot layer of very soft to medium stiff fat clay, over a layer of very soft to medium stiff low plasticity clay in boring-128.0. Based on the similar soil layering in all three borings, the BoreAid analysis layering will be based on boring WFE-16. The Geotechnical Data Report for this location is provided in Appendix C.

Based on WFE-16, the soil profile for the HDD #17 BoreAid analysis will be divided into seven (7) layers: poorly graded sand, stiff low plasticity clay, two layers of stiff fat clay, stiff low plasticity clay, stiff fat clay, and stiff low plasticity clay. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #18

Subsurface investigations were conducted in 2020 by AECOM for Transmission Developers, Inc., and 2021 and 20222 by Kiewit. There are three borings to date at HDD #18: WFE-18, K-129.9A, and K-129.9B, which extend to depths of 40 feet, 50 feet, and 40 feet below grade, respectively. There appears to be a 3-foot layer of silty sand over a 6-foot layer of medium stiff organic clay, over a 7-foot layer of soft to medium stiff low plasticity silt, over a 6.5-foot layer of medium stiff low plasticity clay, over a 3.5-foot layer of medium dense poorly graded sand, over a layer of very soft fat clay in boring WFE-18. There appears to be a 2-foot layer of loose fill, over a 2-foot layer of medium stiff low plasticity clay, over a 2-foot layer of loose clayey sand, over a 2-foot layer of medium stiff low plasticity clay, over a 9-foot layer of very soft clayey silt, over a 5-foot layer of very soft low plasticity clay, over a 5-foot layer of medium dense silty sand, over a layer of very soft low plasticity clay in boring K129.9A. There appears to be a 2-foot layer of medium dense fill, over a 2-foot layer of loose silty sand, over a 2-foot layer of soft low plasticity clay, over a 2-foot layer of soft organic clay, over a 9-foot layer of very soft fat clay, over a 5-foot layer of very soft low plasticity clay, over a 4-foot layer of medium dense poorly graded sand, over a layer of very soft fat clay in boring K-129.9B. All three borings consisted of similar soil conditions, therefore the BoreAid soil layering will be based on boring WFE-18. The Geotechnical report for this HDD location and test data is provided in Appendix C

Based on the borings, the soil profile for the HDD #18 BoreAid analysis will be divided into seven (7) layers: silty sand, medium stiff organic clay, soft to medium stiff low plasticity silt, medium stiff low plasticity clay, medium stiff poorly graded sand, and two very soft fat clay layers. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #19

Subsurface investigations were conducted in 2013 by TRC for Transmission Developers, Inc., and 2021 and 2022 by Kiewit. There were two borings to date at HDD #19: B130.8-1 and K-130.9, which extended to depths of 30 feet and 40 feet below grade, respectively. There appears to be a 6-foot layer of medium stiff fill over a 7.5-foot layer of medium stiff fat clay, over a 10-foot layer of medium stiff low plasticity clay, over a 5-foot layer of stiff low plasticity silt, over a 1.5-foot layer of medium dense silty sand in boring B130.8-1. There appears to be a 2-foot layer of medium dense fill, over a 2-foot layer of medium dense clayey sand, over an 8-foot layer of very soft to soft low plasticity clay, over a 5-foot layer of loose silty sand, over an 8-foot layer of dense rock fragments, over a layer of shale bedrock in boring K-130.9. Based on the conditions observed in both borings, using boring B130.8-1 is more conservative when

analyzing frac-out failure in BoreAid, and therefore will be used in the analysis. The Geotechnical report for this HDD location and test data is provided in Appendix C.

Based on the borings, the soil profile for the HDD #19 BoreAid analysis will be divided into five (5) layers: medium stiff fill, medium stiff fat clay, medium stiff low plasticity clay, stiff low plasticity silt, and medium dense silty sand. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #20

Subsurface investigations were conducted in 2012 by TRC for Transmission Developers, Inc., and 2021 and 2022 by Kiewit. There were five borings to date at HDD #20: WFE-18A, B131.5-1, K-131.6, K-131.7A, and K-131.7B, which extended to depths of 40 feet, 20 feet, 40 feet, 50 feet and 50 feet below grade, respectively. There appears to be a 4-foot layer of medium dense silty sand over a 14.5-foot layer of medium stiff silty clay, over loose sandy silt in boring B131.5-1. There appears to be a 2-foot layer of dense fill, over a 10-foot layer of soft low plasticity clay, over a 5-foot layer of loose clayey sand, over a 10-foot layer of medium dense silty sand, over soft fat clay in boring K-131.6. There appears to be a 6-foot layer of medium dense fill over a 2-foot layer of loose silty sand, over a 4-foot layer of soft fat clay, over a 5-foot layer of loose silty sand, over a 10-foot layer of soft high plasticity silt, over soft fat clay in boring K-131.7A. There appears to be a 6-foot layer of medium dense fill over a 2-foot layer of loose silty sand, over a 4-foot layer of soft fat clay, over a 5-foot layer of loose silty sand, over a 10-foot layer of soft high plasticity silt, over soft fat clay in boring K-131.7B. Boring WFE-18A shows a 10 to 12 foot layer of loose to medium stiff silty sand over very loose sand and soft silty clay. Boring K-131.7A is more applicable when analyzing frac-out failure in BoreAid due to its proximity to Bond Creek , and therefore will be used in the analysis. The Geotechnical report for this HDD location and test data is provided in Appendix C

Based on borings drilled for this project, the soil profile for the HDD #20 BoreAid analysis was divided into six (6) layers: medium dense fill, loose silty sand, soft fat clay, loose silty sand, soft high plasticity silt and soft fat clay. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #21

Subsurface investigations were conducted in 2021 by AECOM, 2022 by Terracon, and 2022 by Atlantic Testing Laboratories, Ltd. There are six borings to date at HDD #21: K-131.9, WFE-19, K-132.1, KB-

132.1A, K-132.2, and KB-132.3A, which extended to depths of 40, 40, 40, 60, 40 and 56.5 feet below grade, respectively. There appears to be a 6-foot layer of very loose fill over a 16-foot layer of very soft peat, over a 5-foot layer of medium dense clayey sand, over a 13-foot layer of very soft fat clay in boring K-131.9. There appears to be a 5-foot layer of very loose poorly graded sand over a 2-foot layer of soft low plasticity silt, over a 2-foot layer of loose poorly graded sand, over a 14.5-foot layer of loose organics silt, over a 5-foot layer of medium dense poorly graded sand, over a 11.5-foot layer of very soft fat clay in boring WFE-19. There appears to be a 6-foot layer of very loose fill over a 2-foot layer of very soft inorganic silt, over a 4-foot layer of very soft peat, over a 7.5-foot layer of very loose silty sand, over an 8-foot layer of very soft inorganic silt, over a 12.5-foot layer of low plasticity clay in boring K-132.1. There appears to be a 6-foot layer of loose fill over a 24-foot layer of medium stiff fat clay, over a 7-foot layer of very soft low plasticity clay, over a 3-foot layer of very dense weathered rock, over a 20-foot layer of shale bedrock in boring KB-132.1A. There appears to be a 6-foot layer of very loose fill over a 2-foot layer of very soft peat, over a 4-foot layer of very soft low plasticity clay, over a 5.5-foot layer of loose poorly graded sand, over a 5-foot layer of loose poorly graded gravel, over a 7.5-foot layer of loose well graded sand, over a 10-foot layer of shale bedrock in boring K-132.2. There appears to be a 6-foot layer of medium dense fill over a 24-foot layer of medium stiff fat clay, over a 5-foot layer of very soft low plasticity silt, over a 5.5-foot layer of very soft fat clay, over a 1-foot layer of very dense weathered rock, over a 10-foot layer of shale bedrock in boring KB-132.3A. The BoreAid analysis will be based on non-horizontal layering corresponding to borings KB-132.3A, KB-132.1A, and WFE-19.

Based on borings drilled for this project, the soil profile for the HDD #21 BoreAid analysis was divided into six (6) layers: loose fill, stiff low plasticity clay, loose organic silt, soft low plasticity clay, very dense weathered rock, and shale bedrock. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

HDD #21A

Subsurface investigations were conducted in 2021 by AECOM, 2022 by Terracon, and 2022 by Atlantic Testing Laboratories, Ltd. There are five borings to date at HDD #21A: K-132.4, KB-132.5A, K-132.5, K-132.6 and WFE-19A, which extended to depths of 41, 55.2, 40, 30, and 40.5 feet below grade, respectively. There appears to be a 2-foot layer of loose fill over a 2-foot layer of loose poorly graded sand, over a 4-foot layer of medium dense clayey sand, over a 19-foot layer of loose silty sand, over a 14-foot layer of very soft clay in boring K-132.4. There appears to be a 4-foot layer of medium dense fill over a 6-foot layer of stiff low plasticity clay, over a 10-foot layer of loose poorly graded sand, over an 8.5-foot layer of medium stiff low plasticity clay, over a 26.5-foot layer of very soft low plasticity clay, over a 0.2-foot layer of very dense weathered rock in boring KB-132.5A. There appears to be a 31-foot layer of medium dense silty sand over a 9-foot layer of very soft fat clay in boring K-132.5. There appears to be a 12-foot layer of medium dense silty sand over a 10-foot layer of loose silty sand, over an 8-foot layer of medium dense silty sand in boring K-132.6. There appears to be a 33.5-foot layer of medium dense poorly graded sand over a 6.5-foot layer of soft fat clay in boring WFE-19A. The BoreAid analysis will be based on non-horizontal layering corresponding to borings KB-132.3A, K-132.5, and WFE-19A. The Geotechnical report for this HDD location and test data is provided in Appendix C.

Based on borings drilled for this project, the soil profile for the HDD #21A BoreAid analysis will be divided into five (5) layers: medium dense well graded sand, stiff low plasticity clay, very soft low plasticity clay, very dense weathered rock, and shale bedrock. The soil profiles used for BoreAid analyses of the HDDs in this segment are presented in Appendix D.

5.0 DESIGN SUMMARY

The HDD construction process generally consists of three steps:

Step 1: Drill a small diameter (approximately 7 to 9 inches diameter) pilot hole along the preplanned bore path. During the pilot hole boring, the location of the drill bit is tracked to confirm that it is following the planned path. If the drilling is observed to start to deviate from the planned path, corrections are made using a "bent" lead drilling section and controlled rotation of drill pipe string. The drill bit is design to cut through the soil in combination with pressurized drilling fluid assisting the cutting of the soil, and transport of the cuttings to the entry pit for removal. The drilling fluid is generally a combination of bentonite (a clay mineral) and water, combined with NSF certified additives to support sides of the borehole and to better carry the cuttings to the entry pit at lower pressures and velocities. The drilling fluids typically used under waterbodies and wetland areas are typically required in the project

specifications to be “non-toxic and environmentally friendly”. Once the pilot bore reaches the exit point, the next step of the process, hole enlargement begins.

Step 2: Enlarge the pilot hole to the diameter required for insertion of the conduits. This is accomplished by using successively larger reaming bits pulled through the pilot bore to gradually enlarge the bore from about 8 inches diameter to 16 to 22 inches diameter to accommodate in this case a HDPE conduit about 10 inches in diameter in one bore and a bundle of two conduits, one 10 inches diameter and the other 2 inches diameter, that are to be pulled into the enlarged bore hole. We estimate that one, and possibly a second reaming pass, will be used to create the 16-to-22 inch -inch-diameter borehole. This pulling in of a bundle of conduits is sometimes referred to as a slick bore. During this step, the borehole is still filled with drilling fluid to support the sides of the bore hole in preparation for Step 3, the insertion of the conduit.

Step 3: Pull the conduits into the enlarged hole. While the pilot hole and reaming operations are ongoing, the contractor will also be fabricating the conduits to be installed. The conduits come in about 40-foot-long sections and need to be fusion butt welded, debeaded internally, and arranged for the pullback into to the borehole. Ideally, the complete conduit (or bundle of conduits) will be welded (and bundled) into one long length for insertion. The goal is usually to pull the bundle into the bore in one, continuous, smooth, around the clock, operation. However, depending on work area and access constraints, sometimes the pipe is assembled in 2 or 3 lengths that then joined (welded), “on the fly” as the conduit (bundle) is slowly pulled into the borehole. As the conduit (bundle) is pulled into the hole it is usually ballasted with clean water, and some of the drilling fluid supporting the sides of the hole is displaced by the conduit and collected for eventual disposal. Upon completion of the conduit installation, the conduit will be allowed to relax and come to equilibrium in the hole, and the conduit will be cleaned and capped as described in the HDD technical specifications.

5.1 GEOMETRY AND LAYOUT

The HDD profiles are generally defined by the following parameters:

- Entry point location;
- Exit point location;
- Entry angle;
- Exit angle;
- Horizontal and vertical radius of Curvature;
- Lengths of tangent sections;
- Length of crossing;
- Depth of crossing and depth of cover;

- Site constraints and obstructions; and
- Available work and layout areas

The proposed bore paths entry angle, exit angle, and a vertical and horizontal design radii of curvature for each HDD crossing in this segment are shown in the design drawings provided in Appendix E.

The design drawings to summarize the proposed HDD installations are in Appendix E. The HDD technical specifications are found in Section 330507.13 of the Technical Specifications. Inadvertent release prevention and mitigation plans for each HDD crossing are provided as separate documents.

The site conditions posed various challenges in developing a design that is both constructible and minimizes the potential for negative environmental impacts. The proposed design has entry and exit pits and work areas constrained by available easements and traffic considerations. Available work areas may limit the lengths of the conduit that can be pre-assembled, necessitating having to pre-assemble the bundle several segments that will have to be welded together during the pullback Work zone requirements are shown in Appendix A. HDD specific work areas at the entry and exit ends of the bores are noted on the drawings in Appendix E. In addition, space and easement constraints will require that during pullback, the above ground sections of the conduit will not be straight and will require rollers to accommodate a horizontal bend. Conduit assembly is expected to be performed at the ends of the alignment shown on the drawings in Appendix E for HDD specific work areas. In some cases, the limited work area at the one end of the HDD alignment, may require that the drilling and reaming prior to pullback be performed by the HDD rig located at the one end of the alignment, but the HDD rig may need to be relocated to the other end of the alignment for the pullback/conduit installation phase of the work. In addition, for some longer bores in soft/weak ground conditions, the intersection bore method may be used to better control the risk of inadvertent drilling fluid releases.

5.2 SUBSURFACE MODEL DEVELOPMENT

A subsurface model was developed for each HDD location based on the boring logs to approximately represent the subsurface conditions along the proposed HDD alignment. BoreAid Version 5.0.14 (2015) modeling software (a product of Vermeer) was used to model the HDD. Geotechnical input parameters of the soil were estimated as described below.

The internal friction angles (AASHTO LRFD, Ed. 7) were estimated using the Standard Penetration Test (SPT) blow counts. The shear modulus (G) of each layer was estimated using soil density or consistency based on SPT blow count (N-value) and representative soil layer descriptions were used to estimate

Young's Modulus (E) using Hunt (1986). The shear modulus was estimated using the relationship G = E/[2(1+ν)], taking Poisson's Ratio (ν) equal to 0.3. Dry and saturated unit weights were selected based on soil type using Table 2-8 from the Manual on Estimating Soil Properties for Foundation Design (EPRI, 1990). For cohesive soils, cohesion was estimated based on empirical correlations with SPT blow counts (EPRI 1990). Tables for soil properties used for the HDDs in Segment 3 – Package 2 is presented in Appendix F.

5.2.1 BoreAid Analysis

For the BoreAid analyses, the pipe configuration analyzed was for a pipe with a dimension ratio (DR) of 9 which is assumed to be ballasted with water during pullback to create a near neutral buoyancy. The following conduit configurations were used:

1) An individual 10-inch-diameter DR 9 HDPE (or 12-inch diameter DR 7 HDPE) conduit, and

2) A bundle consisting of a 10-inch-diameter DR 9 HDPE casing and a 2-inch-diameter DR 9 HDPE conduit (or a 12-inch diameter DR 7 HDPE conduit with a 3-inch-diameter DR 7 HDPE conduit)

The stresses and deflections of the pipe are evaluated and compared to allowable values as shown on the BoreAid runs presented in Appendix D.

In addition, a run where 2-inch-diameter DR 9 HDPE conduit is modeled alone was performed to check installation stresses in that conduit.

5.2.2 Inadvertent Return and Hydro-fracture Analysis

BoreAid modeling software was used to perform inadvertent return analyses for each HDD alignment. The bore path alignment was selected and checked so that the allowable bore pressures are greater than the static and circulating pressures throughout most of the alignment except at the ends. The allowable pressures are related to in-situ ground and water stresses around the bore hole, and the strength of the ground. The Limiting Formation Pressure Figure from BoreAid indicates a generally acceptable factor of safety against the potential for inadvertent return along the proposed bore paths except at the ends.

Based on the bore path selection process, areas with the greatest potential for an inadvertent return were examined and adjusted during the design process to further limit the risks associated with an inadvertent return when possible. The entry and exit points exhibited the greatest potential for inadvertent returns. The depth of the entry/exit pits should be considered by the Contractor to increase the effective soil stress

and provide a storage volume for returns to and near the entry and exit points. Note that while the potential for inadvertent return has been reduced through the design process, inadvertent returns are still possible through existing fissures in the soil or rock, shrinkage cracks, weak soils, or porous deposits of coarse gravel.

Fractures within and/or inadvertent releases through the surrounding soils may cause loss of drilling fluid pressures or inadvertent return of drilling fluid into the wetlands. The areas of greatest concern are reduced soil cover over the bore alignment and where there is a risk of release to the wetlands. The contractor will be required to institute pre-emptive measures in this area to mitigate the effects of a release in the event that one should occur. Such measures may include containment booms and a standby vacuum truck to collect any released drilling fluids immediately. Ground heave or settlement from inadvertent releases also pose risks to structures such as roadways. The HDD alignments were designed with geometries to providing enough soil cover to reduce the risk of inadvertent return. The Inadvertent Return Contingency Plan describes additional methods for mitigating inadvertent returns.

5.3 LIMITATIONS

The structural analysis and inadvertent return mitigation analysis were performed using the proposed design bore paths and typically anticipated equipment and means and methods. The HDD subcontractor must submit structural and inadvertent return mitigation calculations and analysis for each bore path, including their final bore path geometry reflecting its specific equipment and contractor's specific means, methods, drilling fluids, and proposed final contractor refined final planned alignment. It is important to note that the Kiewit Design Team's analysis has been done without consideration for point loading due to unpredictable subsurface features such as encountering rocks, boulders, or other extremely dense material that may damage the pipe. The risk of such pipeline damage is low, yet has been reported on some projects in recent years.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 RISK AWARENESS AND ASSESSMENT

The risks to be aware of during HDD include: inadvertent returns or fluid loss: any potential obstructions blocking or causing large deviations from the planned bore path and electromagnetic effects on the HDD steering equipment from nearby high voltage power lines.

6.2 SITE ANALYSIS

A site analysis must be performed prior to commencing HDD operations. Considerations might need to be taken for items such as for site access, construction of HDD entry and exit pits, and layout area for equipment and supplies.

6.3 EROSION CONTROL

The proposed bore path crosses under roads, parking lots, water, stormwater and gas and electric utility lines, as well as under streams/wetlands, bodies of water, and railroads. The soil erosion control drawing will show where primary soil erosion control measures are required. The technical specifications and Inadvertent Release Contingency Plan both detail the requirements for both primary and secondary sediment and erosion control measures to be followed in case of an inadvertent return, which ultimately could deposit the fine bentonite sediment into the stream or wetland or bodies of water if not controlled. Construction of the entry and exit pits, and related work area may be close to the stream/wetlands. Silt fence, straw bales, and other soil erosion control measures will be required to be installed as shown in the construction drawings. Secondary control measures are to be readily accessible at or near the work areas in accordance with the project specifications and Inadvertent Release Contingency Plan.

6.4 SURVEILLANCE AND MONITORING

During installation of the pipe by HDD, monitoring the stream, wetlands, waterbodies and bore alignment for indications of potential inadvertent returns or inadvertent releases will be necessary. The contractor will have primary responsibility for this monitoring and associated response and reporting in real-time. This will be accomplished as detailed in the Inadvertent Release Contingency Plan. Continuous visual inspection of the entire path is the most significant method of detection. However, an experienced drill crew can often prevent a return by monitoring drilling fluid pressures. A loss of pressure may indicate that an inadvertent release has occurred. Regardless of the level of preparation, inspection, monitoring, etc.,

inadvertent returns are not always possible to predict or prevent. However, a significant effort can minimize the possibility but not eliminate it.

7.0 REFERENCES

American Association of State Highway and Transportation Officials. (2014). AASHTO LRFD bridge design specifications, Seventh edition, U.S. customary units. Washington, DC: American Association of State Highway and Transportation Officials.

Mayne, P.W., and Kulhawy, F.H. (1990). Manual on Estimating Soil Properties for Foundation Design. Electric Power Research Institute (EPRI).

Hunt, R.E. (1986). Geotechnical Engineering Analysis and Evaluation, McGraw-Hill Book Company, New York.

Appendix A

Work Zones

Appendix A

HDD WORK ZONE CONFIGURATION CONSIDERATIONS

Introduction:

In general, HDD requires ample space for both entry and exit operations, work area, or Work zones. The HDD contractor or subcontractor ideally wants to consolidate all operations within these footprints. The exit Work zone also includes a narrower extension for the assembly of the full length pull back string of conduit or pipe. The size of these desired Work zones is driven by rig size in Table 1.

TYPICAL HDD ENTRY AND EXIT WORKSPACE		
SYSTEM DESCRIPTION	ENTRY WORKSPACE	EXIT WORKSPACE
MAXI (24"-48")	150' X 350'	150' X 250'
MIDI (12"-<24")	150' X 250'	100' X 200'
MINI (2"-<12")	VARIES PER SITE	VARIES PER SITE

TABLE 1

An example of an entry Work zones is shown in Figure 1a below.

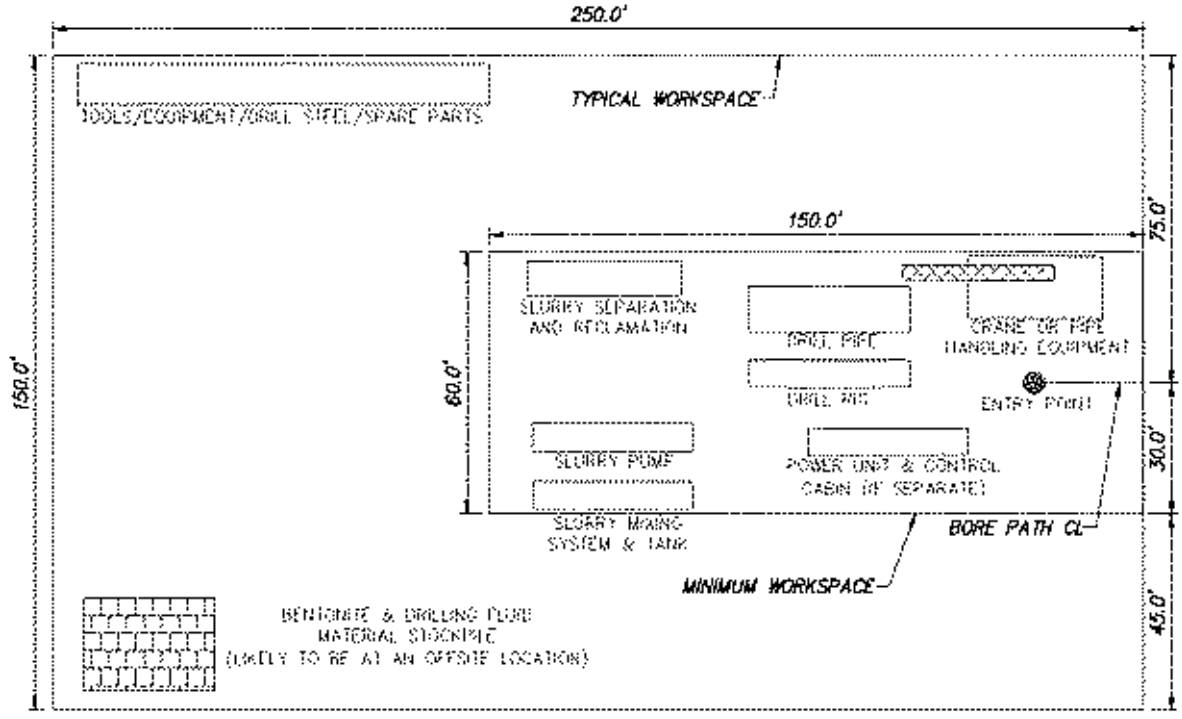


FIGURE 1a: Typical Entry Work Zone Configuration

An example of an exit Work zones is shown in Figure 1b below.

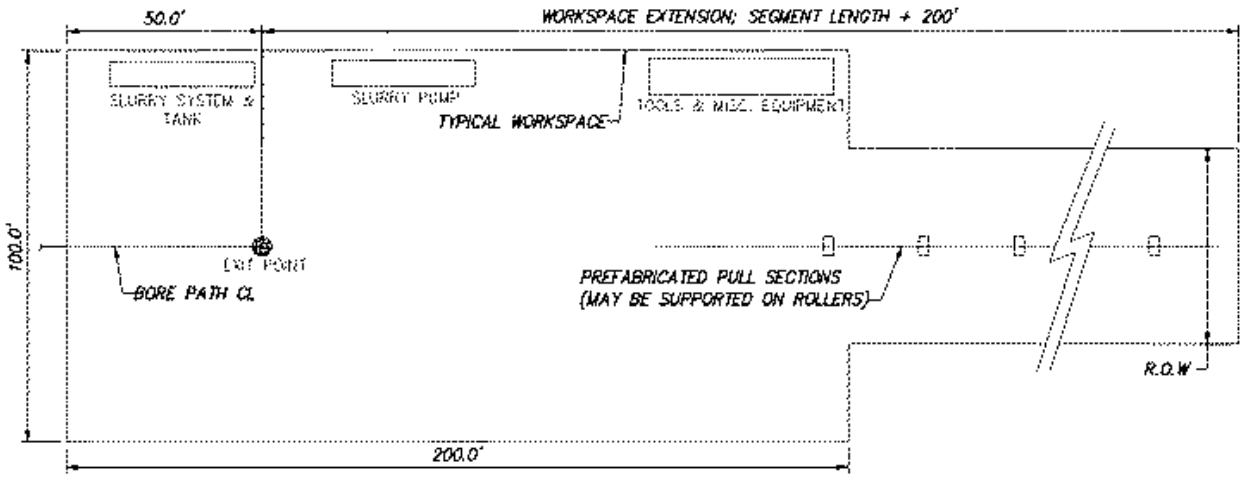


FIGURE 1b: Typical Exit Work Zone Configuration

Work zones should also be able to facilitate contingencies for space to recover a failed bore hole and a new offset bore, the ability swap entry for exit, or in some cases rigs on both ends.

CHPE Project Limitations:

Available Work zone areas for the Champlain Hudson Power Express Project (CHPE) are constrained because the project occupies a narrow existing corridor and is essential in a linear brown field. This is complicated by the rail corridor which precedes most forms of environmental regulations, and it traverses numerous wetlands or other sensitive areas which affects available Work zone areas.

We have assumed the majority of HDDs will be accommodated by a Mini or Midi HDD class machine and support equipment, <12-inch diameter and 1500 feet individual bores.

1. Ideally, an Entry workspace approximately 20 to 25 feet wide x 150 to 200 feet long for a small rig with a mounted pipe rack and self-contained power unit and operator control cabin on the rig; a separate mud mixing and pumping unit, plus a separate mud processing and separation unit support by equipment arranged linearly. Since each crossing is a pair two, 20 x 150 Work zones are equivalent to a 40 x 150 overall work area, and we have assumed the support equipment will be set once for both HDDs. It is also assumed existing roads or access roads will parallel one side of a Work zone.
2. Ideally, an exit workspace approximately 15 to 20 feet wide and between 60% and 110% of the bore length is needed to layout and assemble the conduit for pullback.

A somewhat smaller entry Work zones may be possible depending on drill rig specifics and the availability of nearby areas for support equipment support operations. The project will have remote

yards. Small work areas tend to reduce access and efficiency of operations, raise costs, but are necessitated by the specific project and site constraints.

See Figure 1c below covers general considerations and typical workspace configurations drafted for the CHPE Project.

GROUND TYPE	RIG SIZE	BORE LENGTH (ft)	WORK AREA (ft^2)	NOMINAL FOOTPRINT [ft x ft]
SOIL	Large/Maxi	>2,500	37,500*	150 x 250*
	Medium/Midi	1000-2500	15,000*	100 x 150*
	Small/Mini	<1000	3,000*	30 x 100*
ROCK	Large/Maxi	>2,500	37,500*	150 x 250*
	Small/Mini & Medium/Midi	1000-2500	15,000*	100 x 150*
PIPE ASSEMBLY	ALL	ALL	**	25 x (conduit length + 50)**

Notes:

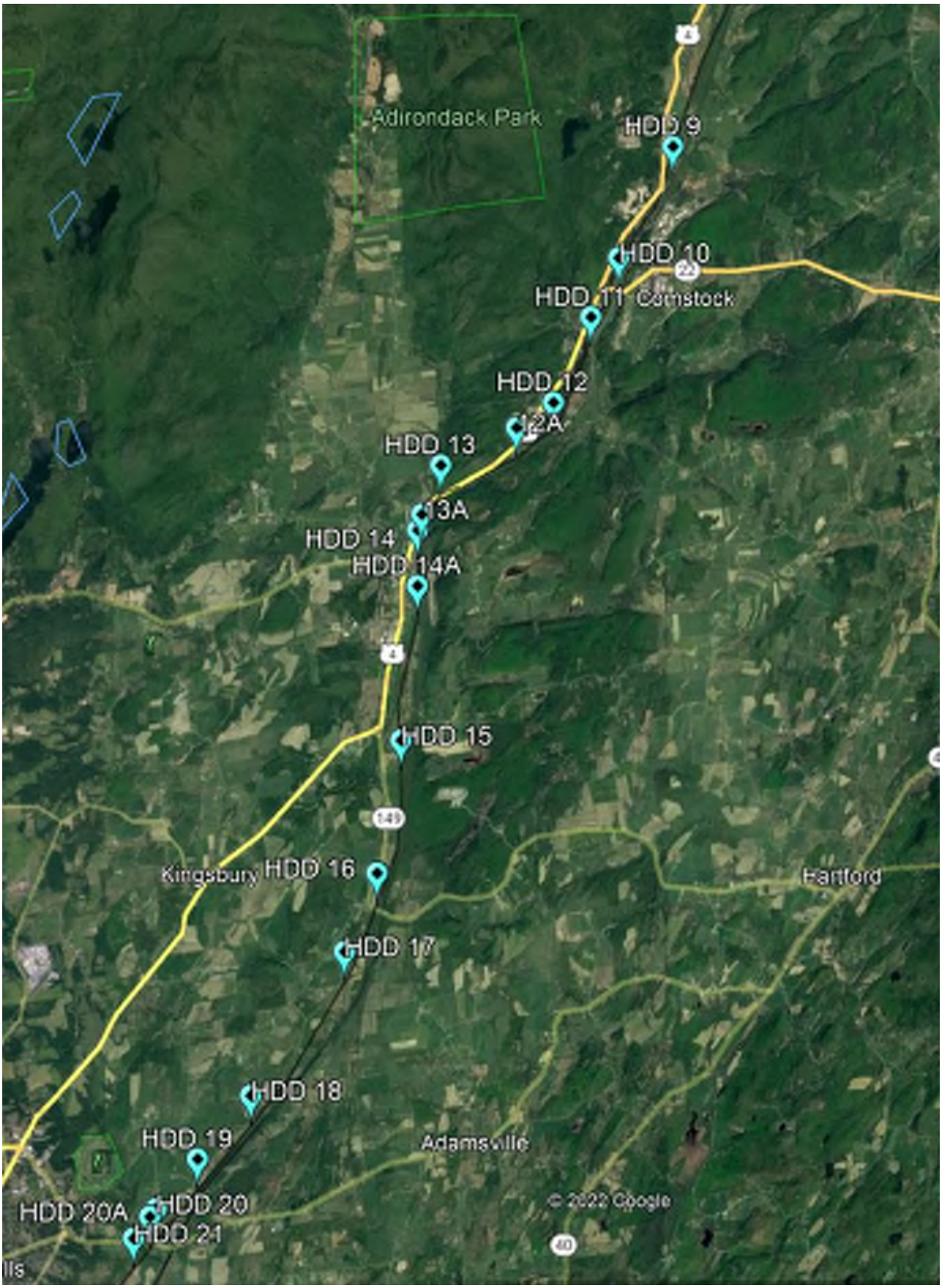
* The entry and exit workspaces typically need space for a drill rig and support equipment such as a pipe rack, power unit operator control cabin, a mud mixing and pumping unit, plus a separate mud processing and separation unit support equipment arranged linearly in line may be possible. Somewhat smaller work areas may be possible depending on drill rig specifics and availability of nearby areas for support equipment and support operations. Often need to coordinate final work areas with selected contractor's specific operations. Smaller work areas tend to reduce access and efficiency of operations.

** For HDD conduit bundle assembly and pullback, need a corridor equal to at least 1/3 to ½ of the length of the total bundle length and minimum 20 feet wide, typically at the exit end. Best if corridor equals the full length of the total bundle length plus about 50 ft

FIGURE 1c

Appendix B

Locus Map


Adirondack Park
HDD 9
HDD 10
HDD 11
Comstock
HDD 12
12A
HDD 13
13A
HDD 14
HDD 14A
HDD 15
Kingsbury
HDD 16
Hartford
HDD 17
HDD 18
HDD 19
Adamsville
HDD 20A
HDD 20
HDD 21
© 2022 Google

Appendix C

HDD Geotechnical Reports for CHPE Segment 3 – Package 2 HDDs

Kiewit

MEMORANDUM

DATE: September 23, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

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

SUBJECT: Geotechnical Data: Segment 3 - Package 2 - HDD Crossing 9 – Revision 1
Champlain Hudson Power Express Project
Whitehall, 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 Whitehall, New York. The approximate station for the start of HDD crossing Number 9 is STA 20005+00 (43.475652° N, 73.429423° W).

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

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 9
Borings WFE-2, K-117.6-0.2
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

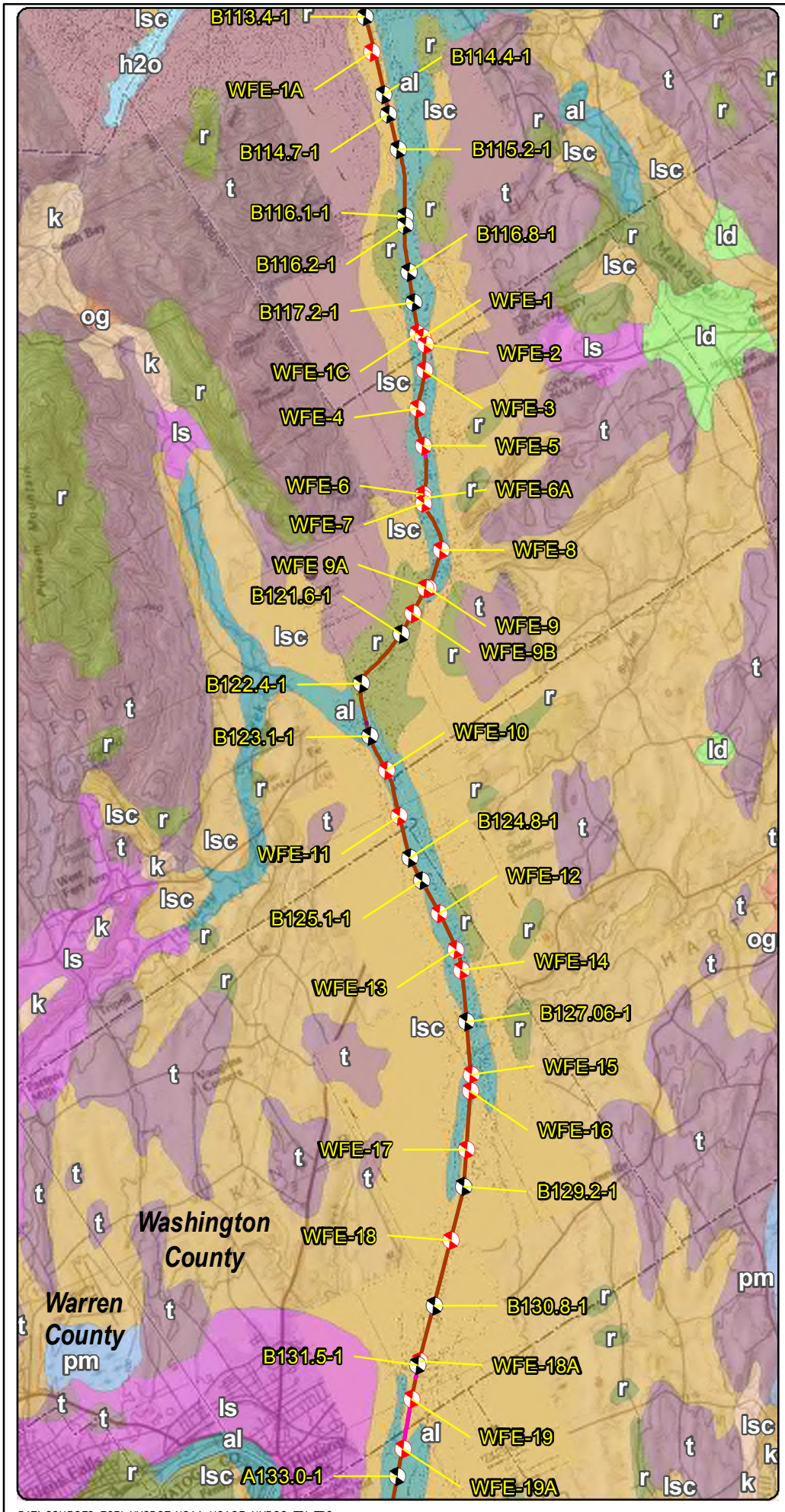
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

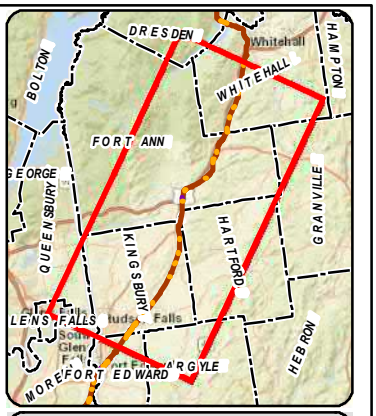
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

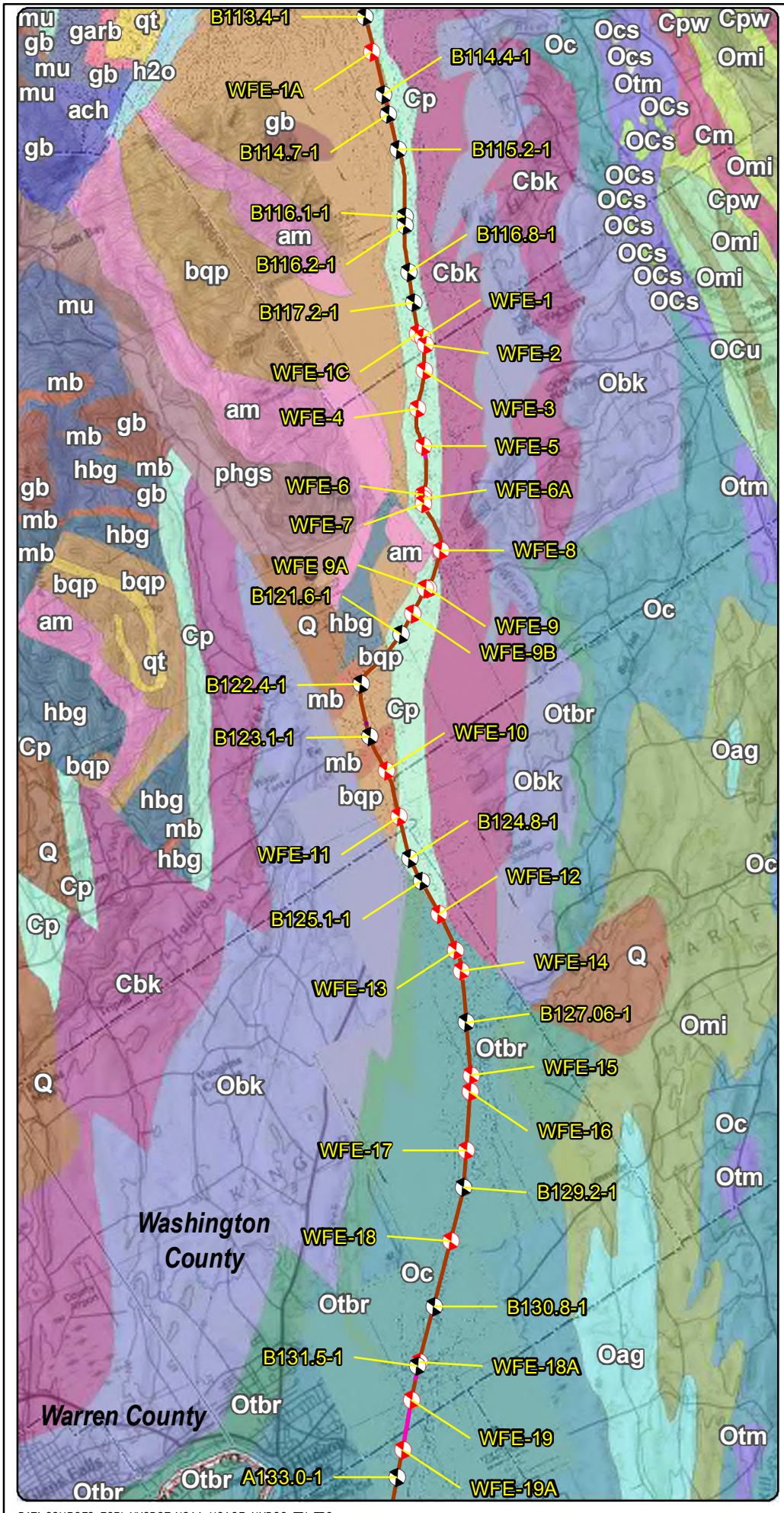
Champlain Hudson Power Express Inc.

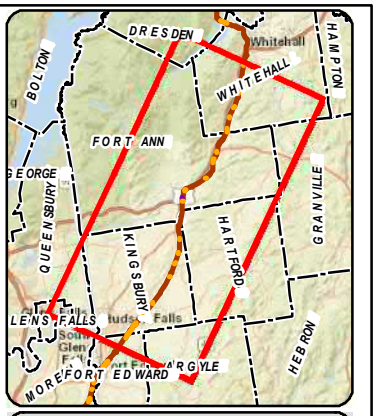
Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190930Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Ft_Ed_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

- Cbk - Beekmantown Group
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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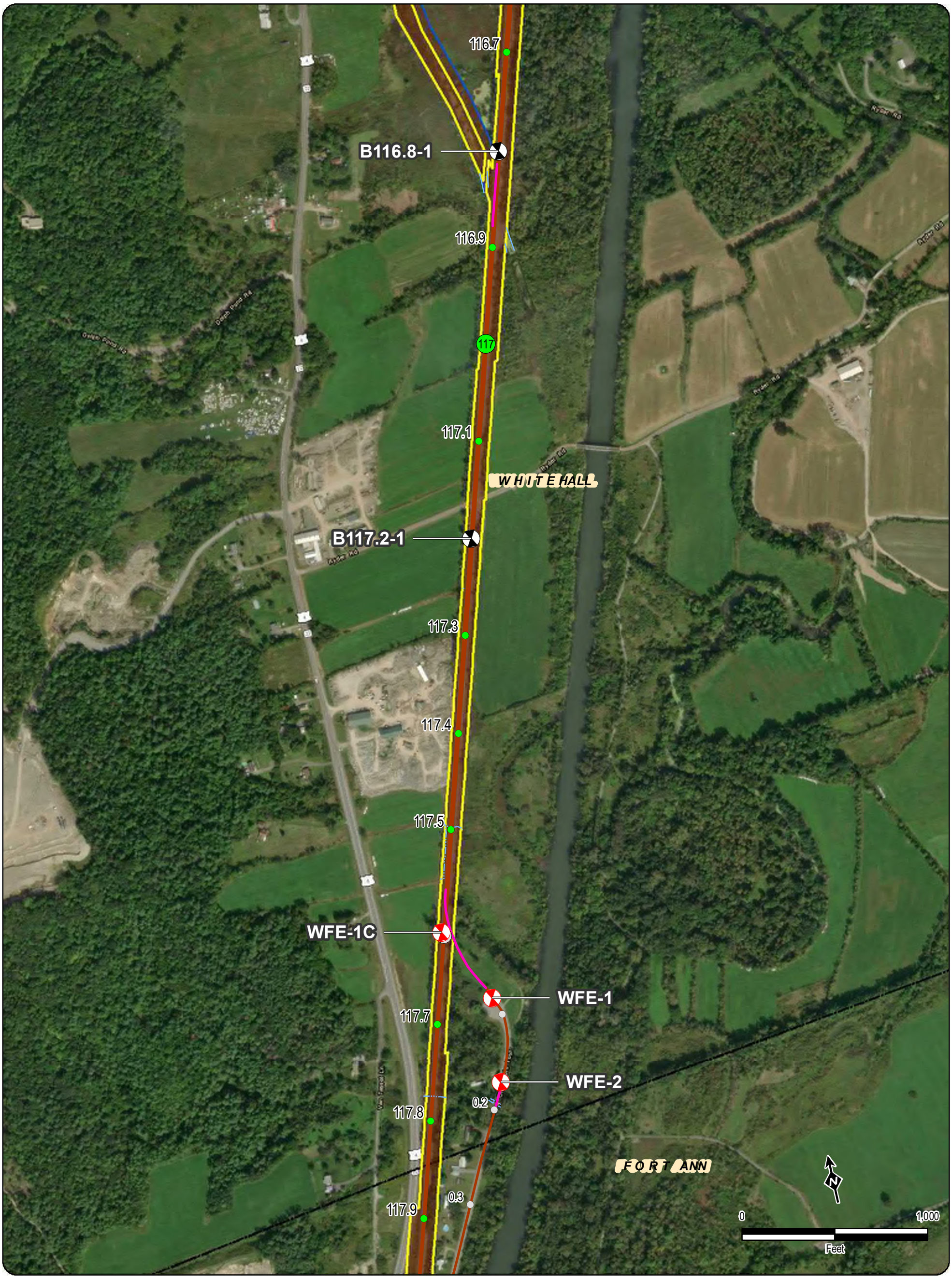
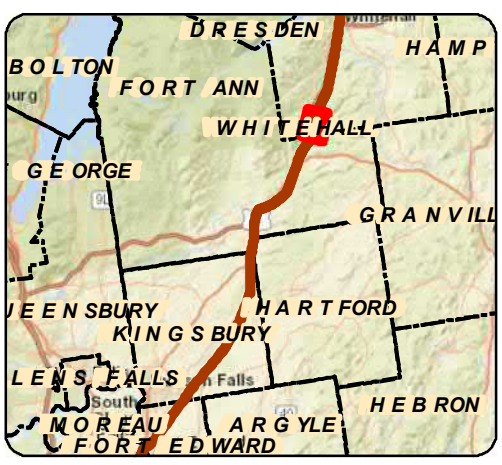




LEGEND

- 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

Whitehall to Fort Edward

Figure A-3

Sheet 4 of 16

Prepared by: AECOM 5/19/2021

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

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_LocationsMaps_for_May_2021_Report\Whitehall_to_Edward_Boring_Locations_Mapset_May_2021_Report.mxd

BORING CONTRACTOR: ADT	AECOM		SHEET 1 OF 2
DRILLER: Chris Chaillou			PROJECT NAME: CHPE -
SOILS ENGINEER/GEOLOGIST: Chris French	**BORING LOG**		PROJECT NO.: 60323056
LOCATION: Ft Ann Bypass MP - 0.17			HOLE NO.: **WFE-2**
			START DATE: 12/21/2020
			FINISH DATE: 12/21/2020
			OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: Geoprobe 7822DT
Water at 7' (inferred)	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit		BORING TYPE: SPT
	SIZE I.D.	4"	2.5"	- -		BORING O.D.: 4.5"
	SIZE O.D.	4.5"	3"	3 7/8"		SURFACE ELEV.:
	HAMMER WT.	140 lbs	140 lbs			LONGITUDE:
	HAMMER FALL	30"	30"			LATITUDE:

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE 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			Sand & Gravel (fill)	0.0'-0.5'; Asphalt (cored through) 0.5'-2.5'; Brown fine-coarse SAND, little silt, little subrounded gravel; loose, moist
1.0										
2.0										
3.0								SP	SAND	2.5'-5.0'; Brown medium-coarse SAND, little fine sand, little silt, occasional lenses of brown clay and silt; loose, moist
		3'-5'	S-1							TR-1; (3.0'-5.0')
4.0										
5.0										
		5'-7'	S-2	24"	18"	7 10 10 8	13	SP		Brown medium-coarse SAND, little fine sand, occasional lens of brown clay and silt; loose, moist
6.0										
7.0										
		7'-9'	S-3	24"	24"	4 2 4 4	3	SP/SM		Gray fine-medium SAND, little silt; very loose, saturated
8.0										TR-2; (8.0'-8.5')
9.0										
		9'-11'	S-4	24"	24"	WOH 3 2 2	3	CH	Silty Clay	Gray silty CLAY; very soft, moist
10.0										
11.0										
		11'-13'	S-5	24"	24"	2 1 1 4	1	SP/SM	SAND	Gray fine SAND, little silt; loose-medium dense, wet
12.0										
13.0										
		13'-15'	S-6	24"	24"	2 2 2 5	3	SP/SM		SAA
14.0										
15.0										
		15'-17'	S-7	24"	24"	4 3 9 5	8	SP/SM		Gray fine SAND, little medium sand, little silt, medium dense, saturated, wood fiber in shoe.
16.0										TR-3; (16.0'-16.5')
17.0										
18.0										
19.0										
20.0										

NOTES:

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

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

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

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

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT	AECOM		SHEET 2 OF 2
DRILLER: Chris Chaillou			PROJECT NAME: CHPE -
			PROJECT NO.: 60323056
			HOLE NO.: **WFE-2**
SOILS ENGINEER: Chris French			START DATE: 12/21/2020
	BORING LOG		FINISH DATE: 12/21/2020
LOCATION: Ft Ann Bypass MP - 0.17			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	24"	18"	1	1	9	10	7	SM		Gray fine-medium SAND, little silt, little clay; loose, moist
21.0												Silty SAND	
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	24"		WOH/18"		1	- -	CH		Gray silty CLAY; very soft, moist
26.0													
27.0													
28.0													
29.0													
30.0													
		30'-32'	S-10	24"	24"	WOH	WOH	WOH	WOH	- -	CH		SAA
31.0												Silty CLAY	
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	24"	WOH	WOH	WOH	WOH	- -	CH		SAA
36.0													TR-4; (36.0'-36.5')
37.0													
38.0													
		38'-40'	S-12	24"	24"	WOH	WOH	WOH	WOH	- -	CH		SAA
39.0													
40.0													
													Boring WFE-2 terminated at 40', grouted to surface
41.0													
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.

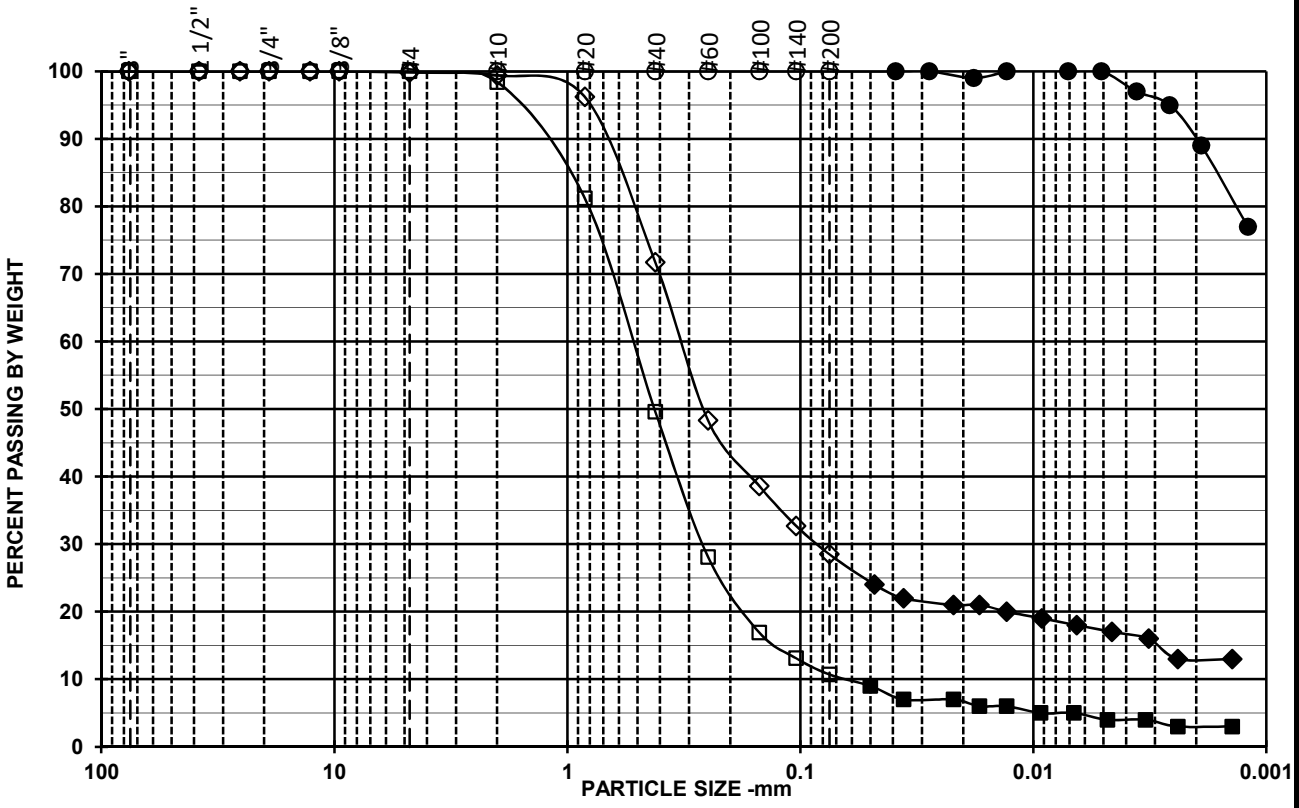
SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Aquifer
CHPE- Whitehall-Ft. Edward 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 (%)	ORGANIC CONTENT (burnoff) (%)	
WFE-1A	S-2	5-7	24.4	44	17	27	CL	93	39		
WFE-1A	S-5	11-13	43.0	68	23	45	CH	99.8	84		
WFE-1C	S-3	7-9	44.5				CH	99.3	86		
WFE-1C	S-7	15-17	44.5	78	27	51	CH	100	94		
WFE-1C	S-10	30-32	45.7	61	23	38	CH	100	87		
WFE-2	S-2	5-7	7.3				SW-SM	10.7	3		
WFE-2	S-7	15-17	26.0				SC	28.5	13		
WFE-2	S-9	25-27	66.0	71	26	45	CH	100	90		
WFE-4	S-2	5-7	18.0				SC	34	13		
WFE-4	S-4	9-11	18.3				SM	17	5		
WFE-5	S-2	5-7	19.9				SM	19	3		
WFE-5	S-4	9-11	18.6	28	15	13	CL	91	28		
WFE-6A	S-2	5-7	13.6				SP-SC	9	3		
WFE-6A	S-4	9-11	17.4				SP-SM	7	2		
WFE-8	S-3	6-8	24.9				SC	48.5	12		
WFE-8	S-4	8-10	88.5	128	53	75	MH	94	43		
WFE-10	S-2	5-7	38.0	71	24	47	CH	94	76		
WFE-10	S-4	9-11	22.5				CL	83.9	32		
WFE-12	S-2	5-7	23.5	49	20	29	CL	62.5	35		
WFE-12	S-4	9-11	28.3				CL	95.8	37		
WFE-14	S-3	7-9	25.7				CL	75.7	44		
WFE-14	S-5	13-15	22.5				ML	53.9	17		
WFE-16	S-3	7-9	36.7	75	25	50	CH	100	90		
WFE-16	S-9	25-27	37.1	73	24	49	CH	100	80		
WFE-18	S-3	7-9	229.7	293	93	200	OH	58	43	34.1	
WFE-18	S-8	20-22	34.3	30	21	9	CL	95	26		
WFE-18	S-10	30-32	64.3	56	21	35	CH	100	87		
WFE-18A	S-2	5-7	19.9	30	13	17	CL	88.5	29		
WFE-18A	S-7	15-17	18.9				SM	14.3	1		
WFE-18A	S-10	30-32	62.9	62	22	40	CH	99	86		
WFE-19A	S-3	7-9	38.1				SP-SM	8	3		
WFE-19A	S-8	20-22	31.8				SP-SM	8.3	2		
WFE-19A	S-10	30-32	17.6				SW-SM	8	1		

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
□	7.3				SW-SM		Brown, Well-graded sand with silt	03/26/21
◇	26.0				SC		Brown, Clayey sand	03/26/21
○	66.0	71	26	45	CH		Gray, Fat clay	03/26/21

Aquifer

TerraSense, LLC #7853-21003

CHPE- Whitehall-Ft. Edward Borings

Symbol	□	◇	○
Boring	WFE-2	WFE-2	WFE-2
Sample	S-2	S-7	S-9
Depth	5-7	15-17	25-27
% +3"	0	0	0
% Gravel	0	0.2	0
% SAND	89.3	71.3	0
%C SAND	1.6	0.4	0
%M SAND	48.8	27.7	0
%F SAND	38.9	43.2	0
% FINES	10.7	28.5	100
D_{100} (mm)	4.75	9.53	2
D_{60} (mm)	0.527	0.323	
D_{30} (mm)	0.26	0.084	
D_{10} (mm)	0.063		
Cc	2		
Cu	8.4		

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	100
4"	100.0	100.0	100
3"	100.0	100.0	100
1 1/2"	100.0	100.0	100
1"	100.0	100.0	100
3/4"	100.0	100.0	100
1/2"	100.0	100.0	100
3/8"	100.0	100.0	100
#4	100.0	99.8	100
#10	98.4	99.4	100
#20	81.2	96.2	100
#40	49.6	71.7	100
#60	28.1	48.3	100
#100	16.9	38.6	100
#140	13.1	32.7	100
#200	10.7	28.5	100
5μ m	4	17	100
2μ m	3	13	90
1μ m	3	13	72

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Boring Location Plans Page 2 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/25/2022** Finish Date: **1/25/2022**

Boring No.: **K-117.6-0.2** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/25/2022	AM	2.1'	4.0'
1/25/2022	PM	*2.3'	4.0'
1/25/2022	PM	*13.0'	4.0'

Coordinates
Northing **776103.619**
Easting **1692801.589**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **126.136**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

Borehole caved at 27.0 feet. *May be affected by water utilized to advance the borehole.

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
							0.4	5" ASPHALT PAVEMENT	
1	CASING						1.3	10.5" CONCRETE	
		1	1.5	2.0	SS	52	2.0	SUBBASE (frozen) FILL	3
2		2	2.0	4.0	SS	40 22 10 12			18
3							3.2	Brown mf GRAVEL; and cmf SAND; trace SILT (wet, non-plastic) GP Possible FILL	
4	WET ROTARY	3	4.0	6.0	SS	6 4 3 2	4.5	Brown mf+ SAND; trace SILT (wet, non-plastic) Frozen SP	7
5								Brown cmf SAND; some SILT (saturated, non-plastic) SM	
6		4	6.0	8.0	SS	1 1 1 1		Advanced casing to 4.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	4
7								Brownish-Grey mf SAND; and SILT (saturated, non-plastic) SM	
8		5	8.0	10.0	SS	WR/24"		w = 25.3%, LL = NP, PL = NP, PI = NP % Fines = 41.7%	22
9								Grey SILT; some mf+ SAND; trace CLAY (saturated, very slightly plastic) ML	
10									
11									
12									
13									
14		6	14.0	16.0	SS	WH/18" 2		Grey mf SAND; little SILT; trace CLAY; trace ORGANIC MATERIAL (roots, vegetation, stems) (saturated, very slightly plastic) SM	19
15									
16									
17									
18									
19		7	19.0	21.0	SS	3 8 8 9		Grey mf SAND; some SILT (saturated, non-plastic) SM	14
20								w = 18.3%, LL = NP, PL = NP, PI = NP % Fines = 23.5%	
21									
22							22.0		
23									
24		8	24.0	26.0	SS	6 9 4 3		Grey cmf SAND; little mf GRAVEL; trace SILT (saturated,	12
25									

f - fine, m - medium, c - coarse
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jake Crary; Mike Cole**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-117.6-0.2** Report No.: **CD10279D-01-03-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
26								non-plastic) SW	
27							27.0		
28		9	28.0	30.0	SS	WH/18" 3		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT; trace f SAND (saturated, non-plastic) CH	24
29									
30							30.0	w = 55.0%, LL = 65, PL = 26, PI = 39 % Fines = 99.7%	
31								Boring terminated at 30.0 feet.	
32									
33								Notes:	
34								1. Borehole backfilled with cement-bentonite grout.	
35								2. Soil classifications based on ATL Field Engineer's field classifications.	
36								3. Borehole was advanced with ATL's CME Truck 45 (Rig Unit No. CDGA461) drill rig.	
37									
38									
39									
40									
41									
42									
43									
44									
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ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-117.6-0.2	S-4	6.0 - 8.0	Brownish-Grey mf SAND; and SILT	41.7	25.3	NP	NP	NP	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey mf SAND; some SILT	23.5	18.3	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT; trace f SAND	99.7	55.0	65	26	39	--	--	--	--	--	--	--	--
K-117.6-1.6A	S-2	4.0 - 6.0	Brown cmf+ SAND; little f GRAVEL; trace SILT	--	--	--	--	--	--	400	25	8.20	14,190	--	--	--
	S-3	6.0 - 8.0	Brown cmf SAND; some SILT; trace f GRAVEL	21.0	6.8	--	--	--	--	--	--	--	--	--	--	--
	S-6	19.0 - 21.0	Grey CLAY; little SILT; little f SAND	--	25.3	46	20	26	--	--	--	--	--	--	--	--
	S-8	28.0 - 30.0	Grey CLAY; some mf SAND; trace SILT	70.0	33.3	47	19	28	--	--	--	--	--	--	--	--
K-117.6-1.6B	S-4	6.0 - 7.2	Brown cmf SAND; and f GRAVEL; trace SILT	--	10.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Orangish-Greyish-Brown c-mf+ SAND; little SILT; trace f GRAVEL	20.0	18.2	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; and cmf+ SAND; trace f GRAVEL; trace SILT	48.0	26.7	43	18	25	--	--	--	--	--	--	--	--
K-117.6-1.6C	S-4	8.0 - 9.3	Greyish-Brown SILT; little cmf+ SAND; trace f GRAVEL	--	17.6	--	--	--	--	--	--	--	--	--	--	--
	S-6	19.0 - 21.0	Greyish-Brown c-mf SAND; some SILT; trace mf+ GRAVEL	26.0	12.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	28.0 - 30.0	Grey CLAY; and cmf- SAND; trace f GRAVEL; trace SILT	55.2	35.1	44	18	25	--	--	--	--	--	--	--	--
K-117.6-2.1	S-4	6.0 - 8.0	Grey SILT; little f SAND	--	15.4	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Mottled Brownish-Grey CLAY; and mf SAND; little SILT; trace ORGANIC MATERIAL (vegetation)	57.2	47.9	41	19	22	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Orangish-Brown cm+f SAND; trace SILT; trace f GRAVEL	8.1	16.4	--	--	--	--	--	--	--	--	--	--	--
	S-11	38.0 - 40.0	Orangish-Brown c-m+f SAND; trace SILT; trace mf GRAVEL	5.6	16.4	--	--	--	--	--	--	--	--	--	--	--
K-117.6-2.3	S-4	6.0 - 8.0	Brown c-mf+ SAND; some SILT; little m+f GRAVEL	25.0	13.7	--	--	--	--	--	--	--	--	--	--	--
	RC-4	30.1 - 31.2	Grey SANDSTONE	--	--	--	--	--	--	--	--	--	--	--	1,311	4.43
	RC-4	32.7 - 33.0	Grey SANDSTONE	--	--	--	--	--	--	--	--	--	--	20,440	--	--
K-122.35	S-3	4.0 - 6.0	Orangish-Brown SILT; trace f SAND	--	23.5	NP	NP	NP	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Orangish-Brown SILT; trace f SAND; trace ORGANIC MATERIAL (roots)	--	--	--	--	--	4.5	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Brown c-mf SAND; little SILT; trace f GRAVEL	13.0	23.8	--	--	--	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS

ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-117.6-0.2	S-4	6-8	25.3
	S-7 [1]	19-21	18.3
	S-9	28-30	55.0
K-117.6-2.1	S-4	6-8	15.4
	S-6	14-16	47.9
	S-9	29-31	16.4
	S-11 [1]	38-40	16.4
K-117.6-2.3	S-4 [1]	6-8	13.7
K-130.9	S-4	6-8	46.6
	S-6	14-16	65.2
K-131.6	S-4	6-8	48.7
	S-7	19-21	22.6
	ST-1	35-37	55.9
K-131.7A	S-4	6-8	23.3
	S-7	19-21	43.6
	S-9	29-31	70.9
	ST-1	45-47	66.4
K-131.7B	S-6	14-16	178.4
	S-9	29-31	60.9
	ST-1	45-47	58.7

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-131.9	S-5	8-10	411.1
	S-8	24-26	62.8
	ST-1	35-37	70.9
K-132.1	S-6	14-16	121.0
	S-8	24-26	44.8
	ST-1	35-37	37.7

1. Sample mass was less than the minimum mass outlined in the referenced test method.

Reviewed By: _____ Date: 02/18/22

ATLANTIC TESTING LABORATORIES

WBE certified company

AMOUNT OF MATERIAL IN SOILS FINER THAN THE NO. 200 SIEVE

ASTM D 1140

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-03-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 18, 2022
	United Cable Installation	**Test Date:**	February 11, 2022
	Various Locations, New York	**Performed By:**	A. Rivers

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-117.6-0.2	S-4	6-8	A	10	205.83	41.7
K-117.6-0.2	S-7	19-21	A	10	220.45	23.5
K-117.6-0.2	S-9	28-30	A	10	273.37	99.7
K-117.6-2.1	S-6	14-16	A	10	163.54	57.2
K-130.9	S-4	6-8	A	10	144.29	85.8
K-131.6	S-4	6-8	A	10	138.58	96.9
K-131.6	ST-1	35-37	A	10	227.62	99.9
K-131.7A	S-7	19-21	A	10	175.90	78.3
K-131.7A	ST-1	45-47	A	10	221.28	86.6
K-131.7B	S-6	14-16	A	10	147.24	3.1
K-131.7B	ST-1	45-47	A	10	239.55	99.8
K-131.9	S-5	8-10	A	10	133.26	2.0
K-131.9	ST-1	35-37	A	10	194.65	99.0
K-132.1	S-6	14-16	A	10	202.17	44.3
K-132.1	ST-1	35-37	A	10	299.54	99.4

Reviewed By: _____ Date: February 18, 2022

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client: Kiewit Instrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-117.6-0.2	S-4	NP	NP	NP
K-117.6-0.2	S-7	NP	NP	NP
K-117.6-0.2	S-9	65	26	39
K-117.6-2.1	S-6	41	19	22
K-130.9	S-4	39	18	21
K-131.6	S-4	41	20	21
K-131.6	ST-1	62	25	37
K-131.7A	S-7	53	21	32
K-131.7A	ST-1	53	25	28
K-131.7B	S-6	NP	NP	NP
K-131.7B	ST-1	55	19	36
K-131.9	S-5	NP	NP	NP
K-131.9	ST-1	51	20	31
K-132.1	S-6	NP	NP	NP
K-132.1	ST-1	44	19	25

SAMPLE INFORMATION

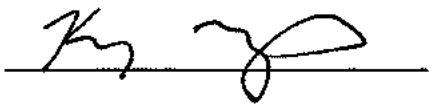
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-117.6-0.2	S-4	6.35	15	25.3
K-117.6-0.2	S-7	2.38	30	18.3
K-117.6-0.2	S-9	0.595	1	55.0
K-117.6-2.1	S-6	2	5	47.9
K-130.9	S-4	2	5	46.6
K-131.6	S-4	0.595	2	48.7
K-131.6	ST-1	0.841	1	55.9
K-131.7A	S-7	2	2	43.6
K-131.7A	ST-1	9.51	10	66.4
K-131.7B	S-6	9.51	30	178.4
K-131.7B	ST-1	0.595	1	58.7
K-131.9	S-5	4.76	20	411.1
K-131.9	ST-1	2	1	70.9
K-132.1	S-6	4.76	10	121.0
K-132.1	ST-1	2	1	37.7

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-117.6-0.2	S-4	Air Dry	Pulverizing and Screening
K-117.6-0.2	S-7	Air Dry	Pulverizing and Screening
K-117.6-0.2	S-9	Air Dry	Pulverizing and Screening
K-117.6-2.1	S-6	Air Dry	Pulverizing and Screening
K-130.9	S-4	Air Dry	Pulverizing and Screening
K-131.6	S-4	Air Dry	Pulverizing and Screening
K-131.6	ST-1	Air Dry	Pulverizing and Screening
K-131.7A	S-7	Air Dry	Pulverizing and Screening
K-131.7A	ST-1	Air Dry	Pulverizing and Screening
K-131.7B	S-6	Air Dry	Pulverizing and Screening
K-131.7B	ST-1	Air Dry	Pulverizing and Screening
K-131.9	S-5	Air Dry	Pulverizing and Screening
K-131.9	ST-1	Air Dry	Pulverizing and Screening
K-132.1	S-6	Air Dry	Pulverizing and Screening
K-132.1	ST-1	Air Dry	Pulverizing and Screening

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By:  Date: 02/18/22

Kiewit

MEMORANDUM

DATE: December 16, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

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

SUBJECT: Geotechnical Data: Segment 3 – Package 2 - HDD Crossing 10 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located north of Fort Ann, New York. The approximate station for the start of HDD crossing Number 10 is STA 20076+00 (43.4589° N, 73.4413° W).

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

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 2, Whitehall to Glens Falls, New York, dated June 15, 2022.
- Terracon, 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 10
Borings WFE-5, K-117.6-1.6A, K-117.6-1.6B, K-117.6-1.6C, K-117.6-1.6D
Segment 3 - Design Package 2

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-5	1686843.0	773219.5	130.2
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

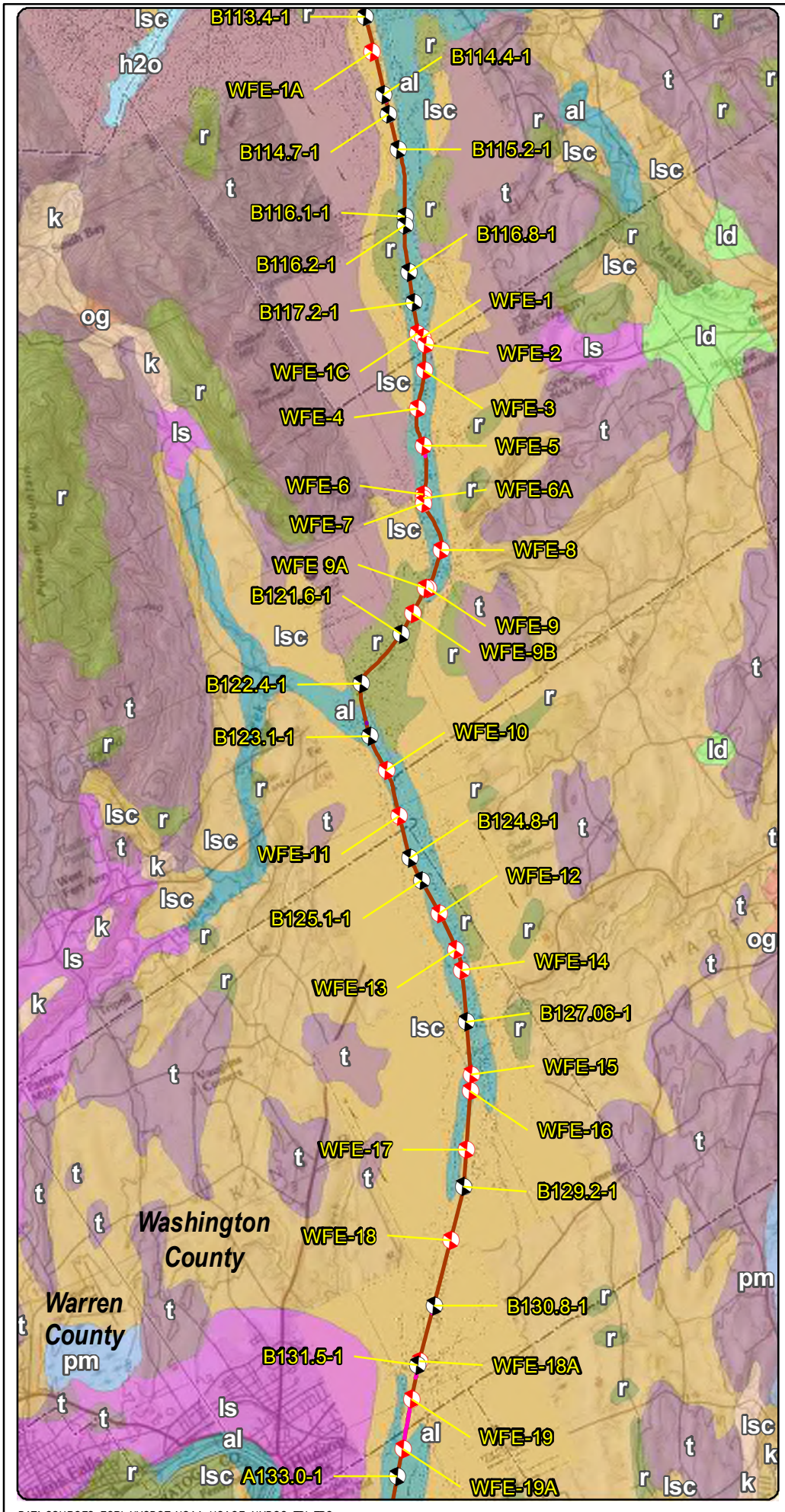
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

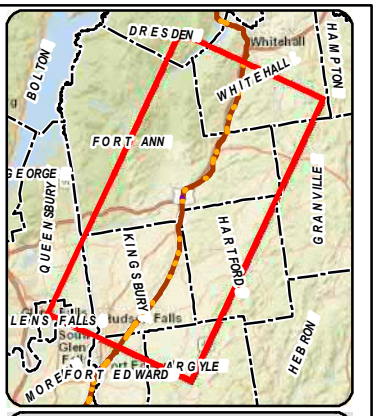
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

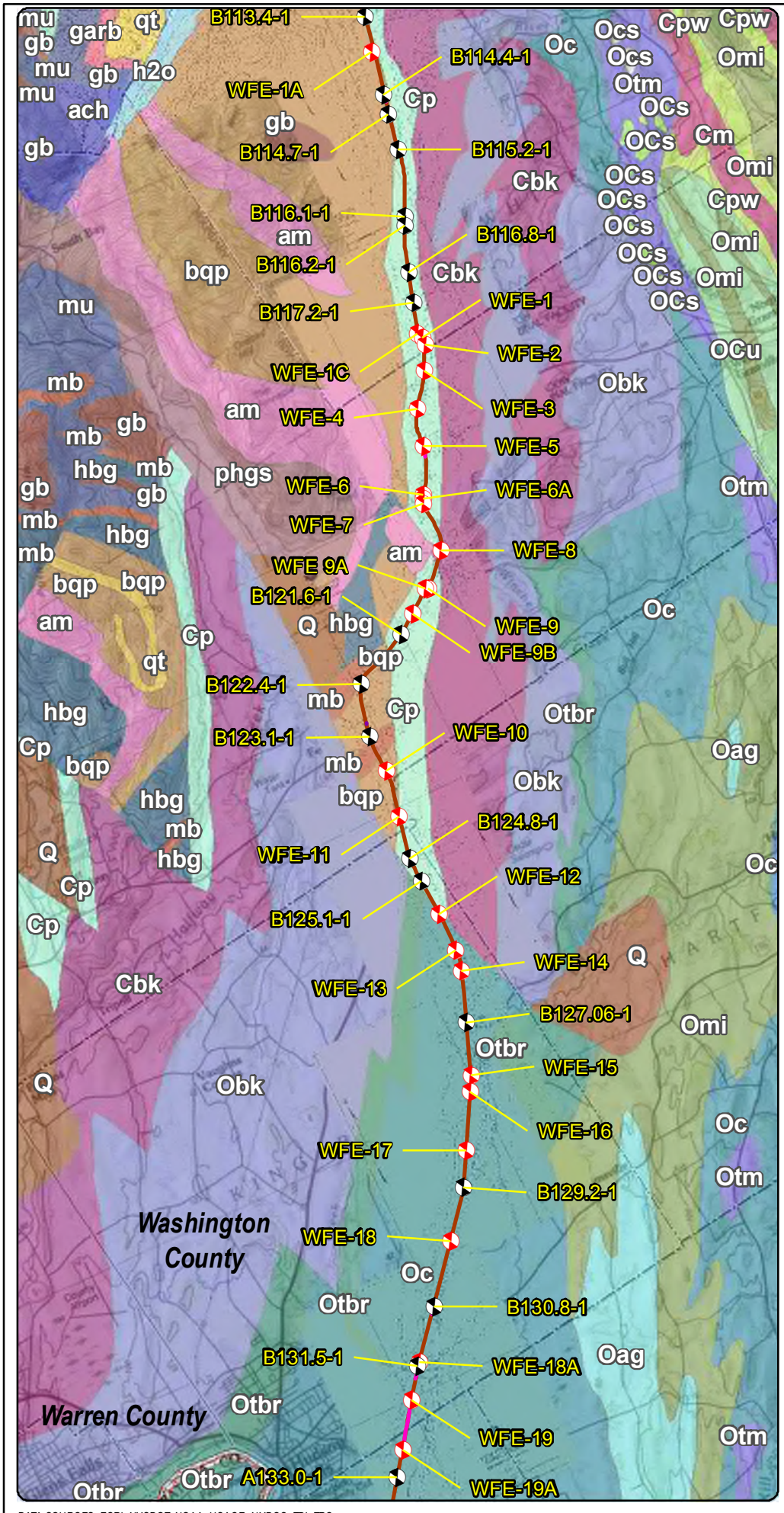
Champlain Hudson Power Express Inc.

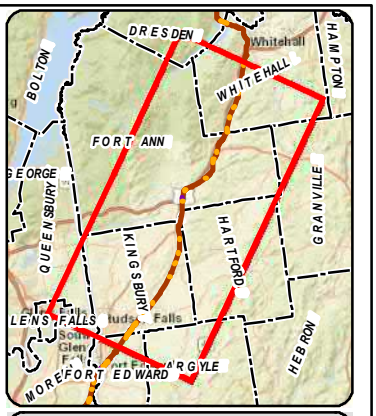
Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190930Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Ft_Ed_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

- Cbk - Beekmantown Group
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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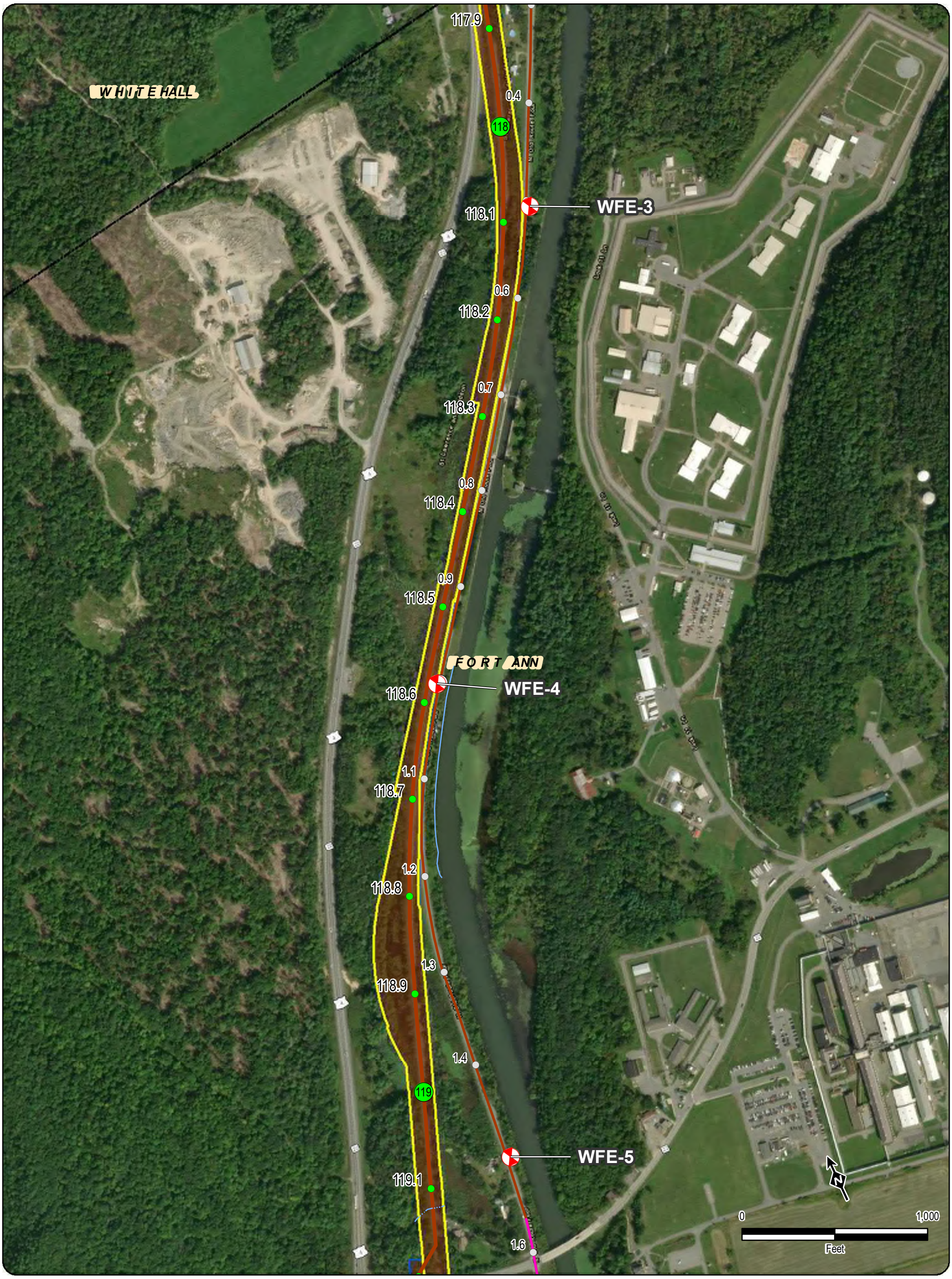
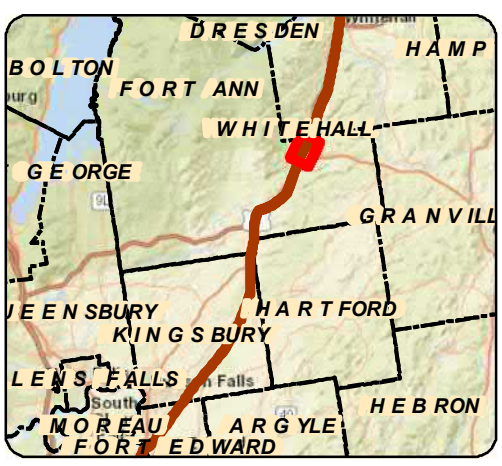




LEGEND

- 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

Whitehall to Fort Edward

Figure A-3

Sheet 5 of 16

Prepared by: AECOM 5/19/2021

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

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Edward_Boring_Locations_

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER/GEOLOGIST: Chris French

LOCATION: Ft Ann Bypass MP - 1.5

AECOM

BORING LOG

SHEET 1 OF 1

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-5**

START DATE: 12/22/20

FINISH DATE: 12/22/20

OFFSET: N/A

DRILL RIG: Geoprobe 7822DT

BORING TYPE: SPT

BORING O.D.: 4.5"

SURFACE ELEV.:

LONGITUDE:

LATITUDE:

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL
7' (inferred)	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit	
	SIZE I.D.	4"	2.5"	- -	
	SIZE O.D.	4.5"	3"	3 7/8"	
	HAMMER WT.	140 lbs	140 lbs		
	HAMMER FALL	30"	30"		

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-5'				Hand Cleared							0.0'-2.0'; Brown fine-medium SAND, little subrounded gravel; very loose, moist
1.0													
2.0													2.0'-5.0'; Brown fine SAND, little silt, little subrounded gravel; loose, moist
3.0													
		3'-5'	S-1										TR-1; (3.0'-5.0')
4.0													
5.0													
		5'-7'	S-2	24"	24"	2	3	3	3	4	SP/SM	Silty SAND	Brown fine-medium SAND, little silt, trace coarse sand; loose, moist
6.0													
7.0													
		7'-9'	S-3	24"	24"	2	1	1	2	1	SM		Gray silty SAND, trace clay; loose, wet
8.0													TR-2; (8.0'-8.5')
9.0													
		9'-11'	S-4	24"	24"	1	2	2	4	3	ML	SILT	Gray SILT, trace clay; medium stiff, moist
10.0													
11.0													
		11'-'13'	S-5	24"	24"	3	5	8	6	8	ML	Clayey SILT	Gray clayey SILT, brown mottling; stiff, moist
12.0													
													TR-3; (12.0'-12.5')
13.0													
		13'-15'	S-6	24"	24"	6	9	10	18	12	ML		Brown clayey SILT; stiff, moist
14.0													
15.0													
		15'-17'	S-7	24"	24"	15	18	13	11	20	ML		SAA
16.0													TR-4; (16.0'-16.5')
17.0													
													Boring WFE-5 terminated at 17', grouted to surface
18.0													
19.0													
20.0													

NOTES:

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

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

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

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

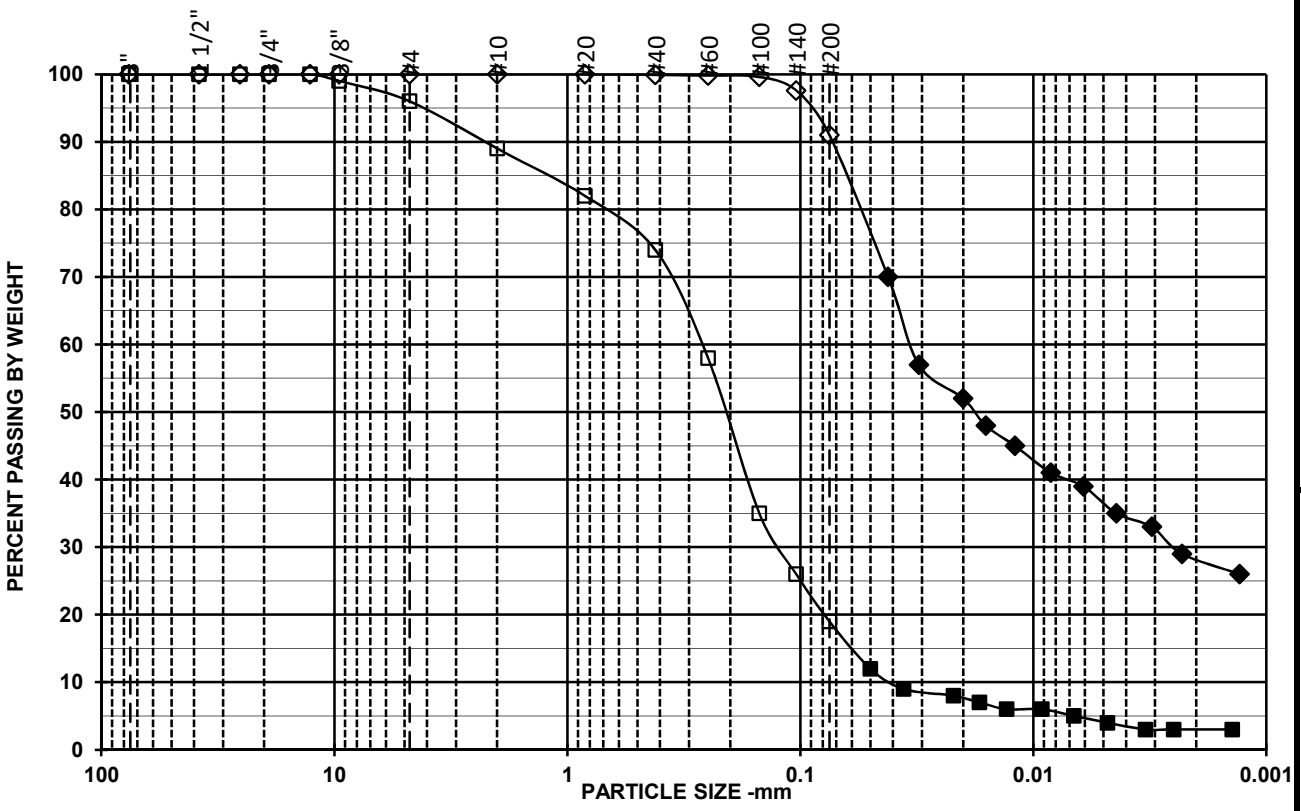
SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Aquifer
CHPE- Whitehall-Ft. Edward 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 (%)	ORGANIC CONTENT (burnoff) (%)	
WFE-1A	S-2	5-7	24.4	44	17	27	CL	93	39		
WFE-1A	S-5	11-13	43.0	68	23	45	CH	99.8	84		
WFE-1C	S-3	7-9	44.5				CH	99.3	86		
WFE-1C	S-7	15-17	44.5	78	27	51	CH	100	94		
WFE-1C	S-10	30-32	45.7	61	23	38	CH	100	87		
WFE-2	S-2	5-7	7.3				SW-SM	10.7	3		
WFE-2	S-7	15-17	26.0				SC	28.5	13		
WFE-2	S-9	25-27	66.0	71	26	45	CH	100	90		
WFE-4	S-2	5-7	18.0				SC	34	13		
WFE-4	S-4	9-11	18.3				SM	17	5		
WFE-5	S-2	5-7	19.9				SM	19	3		
WFE-5	S-4	9-11	18.6	28	15	13	CL	91	28		
WFE-6A	S-2	5-7	13.6				SP-SC	9	3		
WFE-6A	S-4	9-11	17.4				SP-SM	7	2		
WFE-8	S-3	6-8	24.9				SC	48.5	12		
WFE-8	S-4	8-10	88.5	128	53	75	MH	94	43		
WFE-10	S-2	5-7	38.0	71	24	47	CH	94	76		
WFE-10	S-4	9-11	22.5				CL	83.9	32		
WFE-12	S-2	5-7	23.5	49	20	29	CL	62.5	35		
WFE-12	S-4	9-11	28.3				CL	95.8	37		
WFE-14	S-3	7-9	25.7				CL	75.7	44		
WFE-14	S-5	13-15	22.5				ML	53.9	17		
WFE-16	S-3	7-9	36.7	75	25	50	CH	100	90		
WFE-16	S-9	25-27	37.1	73	24	49	CH	100	80		
WFE-18	S-3	7-9	229.7	293	93	200	OH	58	43	34.1	
WFE-18	S-8	20-22	34.3	30	21	9	CL	95	26		
WFE-18	S-10	30-32	64.3	56	21	35	CH	100	87		
WFE-18A	S-2	5-7	19.9	30	13	17	CL	88.5	29		
WFE-18A	S-7	15-17	18.9				SM	14.3	1		
WFE-18A	S-10	30-32	62.9	62	22	40	CH	99	86		
WFE-19A	S-3	7-9	38.1				SP-SM	8	3		
WFE-19A	S-8	20-22	31.8				SP-SM	8.3	2		
WFE-19A	S-10	30-32	17.6				SW-SM	8	1		

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
□	19.9				SM		Dark gray, Silty sand organic mat'l noted	03/29/21
◇	18.6	28	15	13	CL		Greenish gray, Lean clay	03/26/21
○								

Aquifer

TerraSense, LLC #7853-21003

CHPE- Whitehall-Ft. Edward Borings

Symbol	□	◇	○
Boring	WFE-5	WFE-5	
Sample	S-2	S-4	
Depth	5-7	9-11	
% +3"	0	0	
% Gravel	4	0	
% SAND	77	9	
%C SAND	7	0	
%M SAND	15	0.1	
%F SAND	55	8.9	
% FINES	19	91	
D_{100} (mm)	19.1	2	
D_{60} (mm)	0.266	0.033	
D_{30} (mm)	0.12	0.003	
D_{10} (mm)	0.04		
Cc	1.4		
Cu	6.7		

Sieve Size/ID #	Percent Finer Data		
6"	100	100.0	
4"	100	100.0	
3"	100	100.0	
1 1/2"	100	100.0	
1"	100	100.0	
3/4"	100	100.0	
1/2"	100	100.0	
3/8"	99	100.0	
#4	96	100.0	
#10	89	100.0	
#20	82	100.0	
#40	74	99.9	
#60	58	99.8	
#100	35	99.6	
#140	26	97.6	
#200	19	91.0	
5μ m	4	37	
2μ m	3	28	
1μ m	3	25	

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Boring Location Plans Page 3 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/27/2022** Finish Date: **1/27/2022**

Boring No.: **K-117.6-1.6A** Sheet **1** of **2**

Coordinates
Northing **773141.412**
Easting **1686495.08**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **138.646**

Boring Advance By:
HW (4") Casing/3 7/8" Wet Rotary

Groundwater Observations

Date	Time	Depth	Casing
1/27/2022	AM	2.3'	4.0'
1/27/2022	AM	*6.8'	4.0'
1/27/2022	PM	*11.4'	9.0'
1/27/2022	PM	*10.0'	CAVED

Borehole caved at 26.0 feet. *May be affected by water utilized to advance the borehole.

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
0	CASING						0.1	1" ASPHALT PAVEMENT	
							0.6	6" CONCRETE	
							1.5	SUBBASE FILL	
2		1	2.0	4.0	SS	5 36 21 14		Brown cmf+ SAND; little f GRAVEL; trace SILT (wet, non-plastic) SW	15
4		2	4.0	6.0	SS	12 21 17 18		Similar Soil (saturated, non-plastic) SW	14
6		3	6.0	8.0	SS	23 24 26 29	6.0	Brown cmf SAND; some SILT; trace f GRAVEL (saturated, non-plastic) SW-SM w = 6.8% % Fines = 21.0%	12
8		4	8.0	10.0	SS	4 4 14 20		Similar Soil (saturated, non-plastic) SW-SM	8
10	WET ROTARY							Advanced casing to 9.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
12							12.0		
14		5	14.0	16.0	SS	2 3 6 6		Brown cmf SAND; little f GRAVEL; trace SILT (saturated, non-plastic) SW	6
16							15.6	Orangish-Brown f SAND; trace SILT (saturated, non-plastic) SP	
18							18.0		
20		6	19.0	21.0	SS	WH 5 4 5		Grey CLAY; little SILT; little f SAND (saturated, plastic) CL w = 25.3%, LL = 46, PL = 20, PI = 26	12
24		7	24.0	26.0	SS	3 3 3 6		Grey CLAY; little SILT; trace f SAND; trace ORGANIC MATERIAL	17

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jake Crary; Mike Cole**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-117.6-1.6A** Report No.: **CD10279D-01-03-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
26								(vegetation stalks) (saturated, plastic) CL	
27									
28		8	28.0	30.0	SS	WH 1 4 4		(3" Brass Lined Split Spoon) Grey CLAY; some mf SAND; trace SILT (saturated, plastic) CL	24
29								w = 33.3%, LL = 47, PL = 19, PI = 28 % Fines = 70.0%	
30									
31									
32									
33		9	33.0	35.0	SS	WH 2 3 2		Grey CLAY; little SILT (saturated, plastic) CL	22
34									
35							35.0		
36								Boring terminated at 35.0 feet.	
37									
38								Notes:	
39								1. Borehole backfilled with cement-bentonite grout.	
40								2. Soil classifications based on ATL Field Engineer's field classifications.	
41								3. Borehole was advanced with ATL's CME Truck 45 (Rig Unit No. CDGA461) drill rig.	
42									
43									
44									
45									
46									
47									
48									
49									
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60									
61									
62									

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **2/7/2022** Finish Date: **2/8/2022**

Boring No.: **K-117.6-1.6B** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/7/2022	PM	1.0'	8.0'
2/7/2022	PM	*6.1'	15.0'
2/8/2022	AM	*17.3'	15.0'
2/8/2022	AM	*16.3	15.0'

Coordinates
Northing **773110.996**
Easting **1686347.344**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **147.242**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
							0.1	1" ASPHALT PAVEMENT	
1	CASING	1	0.5	0.8	SS	50/3"	0.4	4" CONCRETE	1
							0.8	Brown f GRAVEL; and cmf SAND; trace SILT (saturated, non-plastic) SUBBASE, Frozen GP FILL	
2		2	2.0	4.0	SS	20 33 33 34			14
3								Greyish-Brown SILT; little mf+ SAND (saturated, non-plastic) ML	
4		3	4.0	6.0	SS	15 27 22 30		Similar Soil (saturated, non-plastic) ML	15
5								(Orangish-Brown from 5.3 to 5.6 feet)	
6							6.0		
		4	6.0	7.2	SS	39 31 50/2"		Brown cmf SAND; and f GRAVEL; trace SILT (saturated, non-plastic) SW w = 10.0%	10
7									
8		5	8.0	8.3	SS	50/4"		Greyish-Black COBBLE Fragments (saturated, non-plastic)	2
9									
10									
11							11.0		
12									
13									
14		6	14.0	16.0	SS	10 19 22 23		Orangish-Greyish-Brown cmf+ SAND; some SILT; trace f GRAVEL (saturated, non-plastic) SM	9
15	WET ROTARY								
16								Advanced casing to 15.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
17									
18									
19		7	19.0	21.0	SS	4 7 5 9		Orangish-Greyish-Brown c-mf+ SAND; little SILT; trace f GRAVEL (saturated, non-plastic) SM w = 18.2% % Fines = 20.0%	5
20									
21									
22							22.0		
23									
24		8	24.0	26.0	SS	2 2 1 3		Brown CLAY; little SILT; trace cmf SAND; trace f GRAVEL	11
25									

f - fine, m - medium, c - coarse
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Brad Perry; Ian Ross**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-117.6-1.6B** Report No.: **CD10279D-01-03-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
26								(saturated, plastic) CL	
27							27.0		
28		9	28.0	30.0	SS	13 43 13 9		(3" Brass Lined Split Spoon) Grey CLAY; and cmf+ SAND; trace f GRAVEL; trace SILT (saturated, plastic) CL w = 26.7%, LL = 43, PL = 18, PI = 25 % Fines = 48.0%	17
33		10	33.0	35.0	SS	2 4 5 6		Mottled Blackish-Grey CLAY; trace SILT; trace ORGANIC MATERIAL (wood fragments at 33.2 to 33.3 feet) (saturated, plastic) CL	23
35							35.0	Boring terminated at 35.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classification.
3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **2/8/2022** Finish Date: **2/8/2022**

Boring No.: **K-117.6-1.6C** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/8/2022	AM	1.6'	4.0'
2/8/2022	AM	*3.2'	4.0'
2/8/2022	PM	*13.4'	4.0'

Coordinates
Northing **773063.051**
Easting **1686168.445**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **148.914**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
1	CASING						0.1	1" ASPHALT PAVEMENT	
							0.4	4" CONCRETE	
2							2.0	SUBBASE (frozen) FILL	
		1	2.0	4.0	SS	21 40 30 22		Brown SILT; little mf+ SAND (wet, non-plastic) ML	12
3								Advanced casing to 4.0 feet and began advancing 3 7/8" tri-cone	
4	WET ROTARY	2	4.0	6.0	SS	6 14 16 16	4.8	roller bit wet rotary open hole within the borehole.	14
5								Brown SILT; little mf+ SAND (saturated, non-plastic) ML	
6		3	6.0	8.0	SS	15 18 23 19	6.0	Brown cmf+ SAND; little SILT (saturated, non-plastic) SM	15
7								Greyish-Brown SILT; little f SAND (saturated, non-plastic) ML	
8		4	8.0	9.3	SS	9 13 50/4"		Greyish-Brown SILT; little cmf+ SAND; trace f GRAVEL	10
9								(saturated, non-plastic) ML w = 17.6%	
10								Encountered GRAVEL seams from 9.3 feet to 12.5 feet.	
11									
12							12.0		
13									
14		5	14.0	16.0	SS	26 23 25 28		Greyish-Brown cmf+ SAND; little SILT; trace f GRAVEL	15
15								(saturated, non-plastic) SM	
16									
17									
18									
19		6	19.0	21.0	SS	12 16 17 19		Greyish-Brown c-mf SAND; some SILT; trace mf+ GRAVEL	12
20								(saturated, non-plastic) SM w = 12.4% % Fines = 26.0%	
21									
22									
23									
24		7	24.0	26.0	SS	12 14 11 7		Black cmf SAND; little f GRAVEL; trace SILT (saturated,	10
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Brad Perry; Ian Ross**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-117.6-1.6C** Report No.: **CD10279D-01-03-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
26								non-plastic) SW-SM	
27									
28		8	28.0	30.0	SS	3 4 4 4		(3" Brass Lined Split Spoon) Grey CLAY; and cmf- SAND; trace f GRAVEL; trace SILT (saturated, plastic) CL	19
29								w = 35.1%, LL = 44, PL = 19, PI = 25 % Fines = 55.2%	
30									
31									
32									
33		9	33.0	35.0	SS	2 4 3 5		Grey CLAY; little cmf SAND; trace SILT; trace ORGANIC MATERIAL (vegetation) (saturated, plastic) CL	22
34									
35							35.0	Boring terminated at 35.0 feet.	
36									
37								Notes:	
38								1. Borehole backfilled with cement-bentonite grout.	
39								2. Soil classifications based on ATL Field Engineer's field classification.	
40								3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.	
41									
42									
43									
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ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-117.6-0.2	S-4	6.0 - 8.0	Brownish-Grey mf SAND; and SILT	41.7	25.3	NP	NP	NP	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey mf SAND; some SILT	23.5	18.3	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT; trace f SAND	99.7	55.0	65	26	39	--	--	--	--	--	--	--	--
K-117.6-1.6A	S-2	4.0 - 6.0	Brown cmf+ SAND; little f GRAVEL; trace SILT	--	--	--	--	--	--	400	25	8.20	14,190	--	--	--
	S-3	6.0 - 8.0	Brown cmf SAND; some SILT; trace f GRAVEL	21.0	6.8	--	--	--	--	--	--	--	--	--	--	--
	S-6	19.0 - 21.0	Grey CLAY; little SILT; little f SAND	--	25.3	46	20	26	--	--	--	--	--	--	--	--
	S-8	28.0 - 30.0	Grey CLAY; some mf SAND; trace SILT	70.0	33.3	47	19	28	--	--	--	--	--	--	--	--
K-117.6-1.6B	S-4	6.0 - 7.2	Brown cmf SAND; and f GRAVEL; trace SILT	--	10.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Orangish-Greyish-Brown c-mf+ SAND; little SILT; trace f GRAVEL	20.0	18.2	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; and cmf+ SAND; trace f GRAVEL; trace SILT	48.0	26.7	43	18	25	--	--	--	--	--	--	--	--
K-117.6-1.6C	S-4	8.0 - 9.3	Greyish-Brown SILT; little cmf+ SAND; trace f GRAVEL	--	17.6	--	--	--	--	--	--	--	--	--	--	--
	S-6	19.0 - 21.0	Greyish-Brown c-mf SAND; some SILT; trace mf+ GRAVEL	26.0	12.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	28.0 - 30.0	Grey CLAY; and cmf- SAND; trace f GRAVEL; trace SILT	55.2	35.1	44	18	25	--	--	--	--	--	--	--	--
K-117.6-2.1	S-4	6.0 - 8.0	Grey SILT; little f SAND	--	15.4	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Mottled Brownish-Grey CLAY; and mf SAND; little SILT; trace ORGANIC MATERIAL (vegetation)	57.2	47.9	41	19	22	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Orangish-Brown cm+f SAND; trace SILT; trace f GRAVEL	8.1	16.4	--	--	--	--	--	--	--	--	--	--	--
	S-11	38.0 - 40.0	Orangish-Brown c-m+f SAND; trace SILT; trace mf GRAVEL	5.6	16.4	--	--	--	--	--	--	--	--	--	--	--
K-117.6-2.3	S-4	6.0 - 8.0	Brown c-mf+ SAND; some SILT; little m+f GRAVEL	25.0	13.7	--	--	--	--	--	--	--	--	--	--	--
	RC-4	30.1 - 31.2	Grey SANDSTONE	--	--	--	--	--	--	--	--	--	--	--	1,311	4.43
	RC-4	32.7 - 33.0	Grey SANDSTONE	--	--	--	--	--	--	--	--	--	--	20,440	--	--
K-122.35	S-3	4.0 - 6.0	Orangish-Brown SILT; trace f SAND	--	23.5	NP	NP	NP	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Orangish-Brown SILT; trace f SAND; trace ORGANIC MATERIAL (roots)	--	--	--	--	--	4.5	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Brown c-mf SAND; little SILT; trace f GRAVEL	13.0	23.8	--	--	--	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

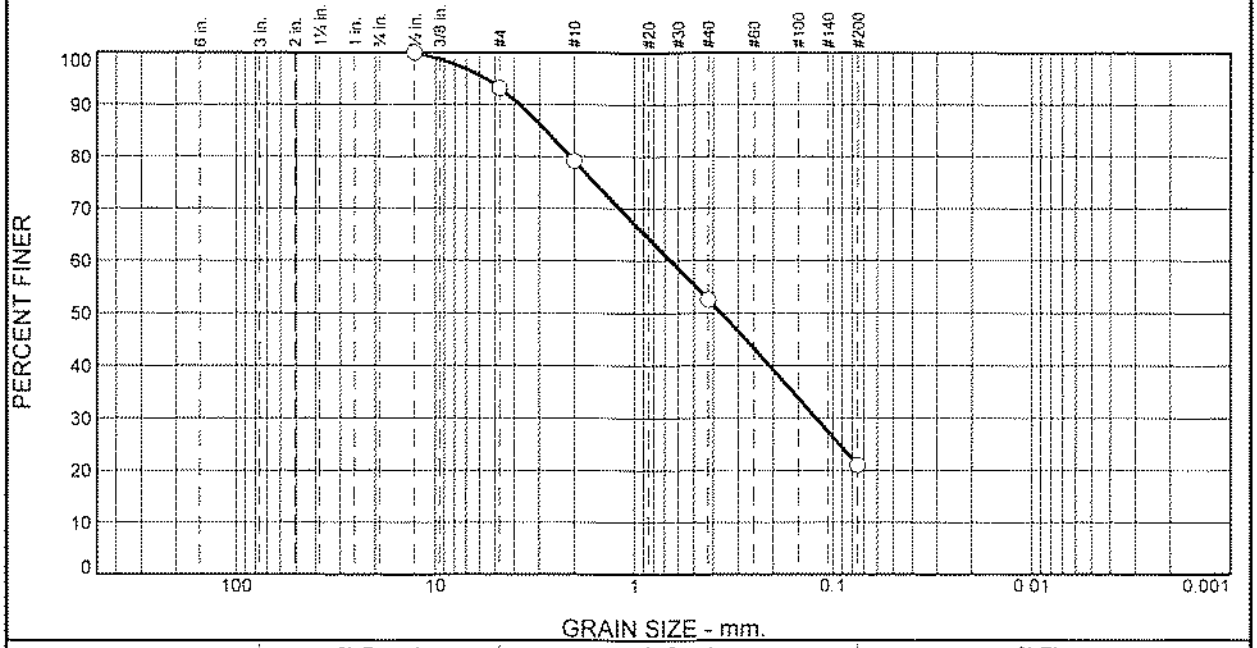
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-02-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/07/22

Sample No: K-117.6-1.6A **Source of Sample:** Boring Sample

Location: In-place **Elev./Depth:** 6-8'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	7	14	26	32	21	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	93		
#10	79		
#40	53		
#200	21		

Soil Description

Brown cmf SAND: some SILT: trace f GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 2.7863 D_{60}= 0.6571 D_{50}= 0.3671

D_{30}= 0.1217 D_{15}= D_{10}=

C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 6.8%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 02/07/22

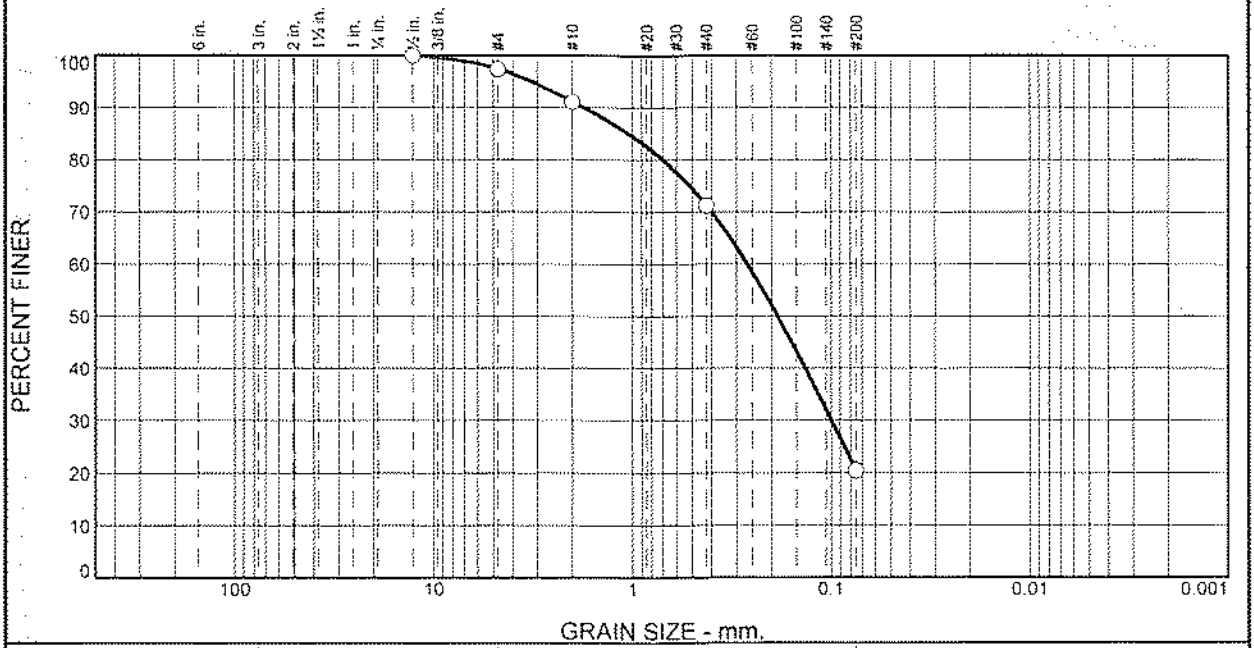
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-04-03-22

Client: Kiewit Intrastructure Co. **Date:** 03/01/22

Sample No: K-117.6-1.6B **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 19-21'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	3	6	20	51	20	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	97		
#10	91		
#40	71		
#200	20		

* (no specification provided)

Soil Description

Orangish Greyish Brown c-mf+ SAND; little SILT; trace f GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 1.0520 D_{60}= 0.2654 D_{50}= 0.1868
D_{30}= 0.0999 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 18.2%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 03/01/22

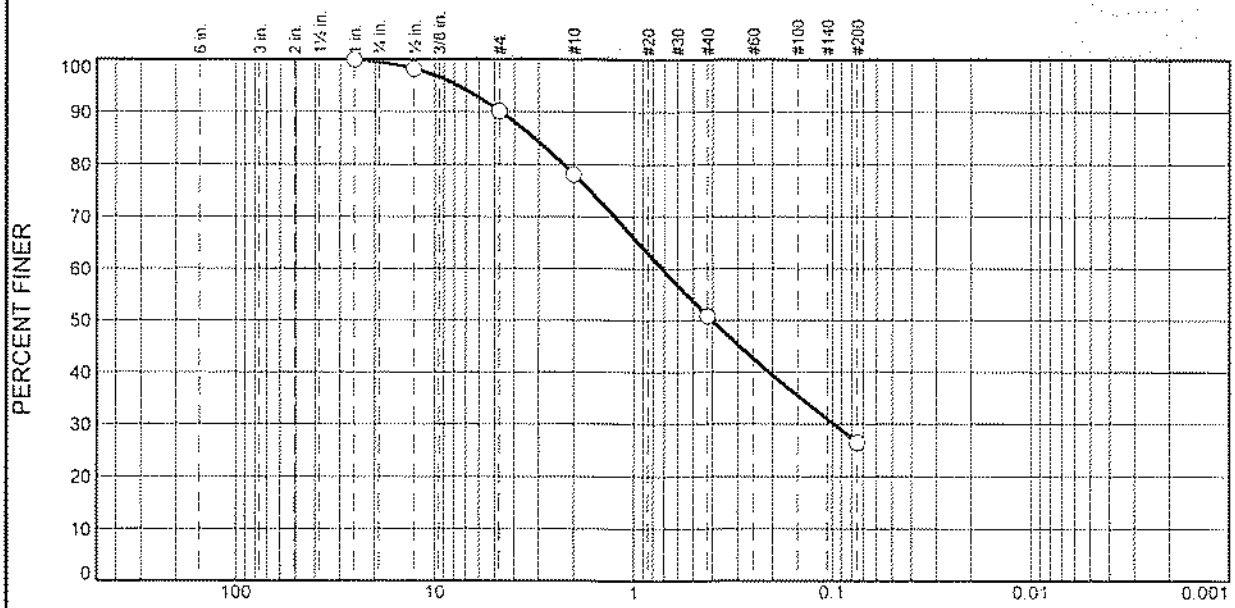
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-04-03-22

Client: Kiewit Intrastructure Co. **Date:** 03/01/22

Sample No: K-117.6-1.6C **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 19-21'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	9	12	27	25	26	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1"	100		
1/2"	98		
#4	90		
#10	78		
#40	51		
#200	26		

Soil Description

Greyish Brown c-mf SAND; some SILT; trace mf-GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 3.1640 D_{60}= 0.7206 D_{50}= 0.4057
D_{30}= 0.0989 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 12.4%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 03/01/22

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

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. KB-117.6-1.6D

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: 43.457289° Longitude: -73.441606°

Surface Elev.: 144.4936 (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
0.8	143.7	**ASPHALT**								
		FILL - SILTY SAND WITH GRAVEL, occasional cobbles, and asphalt noted, brown				8	15-20-18-28 N=38			
						20	22-28-15-29 N=43	4.0		15
			5			14	16-32-50/4"			
						18	29-20-17-19 N=37			
9.0	135.5									
		FILL - WELL GRADED SAND WITH GRAVEL, trace silt, occasional cobbles noted, brown	10			18	13-17-16-20 N=33			
			15			18	23-30-31-25 N=61			
20.0	124.5									
		FILL - CLAYEY SAND, wood fragments noted, gray	20			18	3-3-14-18 N=17	22.7	29-17-12	26
			25	▽		16	3-4-5-6 N=9			

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

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA, with water added after 40'

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

WATER LEVEL OBSERVATIONS

▽ *30 minutes after drilling to 40'*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-02-2022 | Boring Completed: 08-02-2022

Drill Rig: Diedrich D-50 | Driller: S. Morey

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-117.6-1.6D

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: 43.457289° Longitude: -73.441606°

Surface Elev.: 144.4936 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - CLAYEY SAND, wood fragments noted, gray *(continued)*							
30.0	114.5	**LEAN CLAY (CL)**, varved silt and clay, gray, soft	30		24	WH-WH-4-4 N=4			
35.0	109.5	**CLAYEY SAND (SC)**, gray, very loose	35		24	WH-WH-WH-WH	26.2	31-17-14	49
40.0	104.5	**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, gray, loose to medium dense	40		24	4-4-4-4 N=8			
			45		12	10-14-15-12 3" Spoon (Bulk Sample)			
					10	7-6-9-15 3" Spoon (Bulk Sample)			
		10.3 lbs of soil collected from 3 spoons	50		15	12-10-10-15 3" Spoon (Bulk Sample)	15.3		7
			55			4-5-6-6			

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

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA, with water added after 40'

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

WATER LEVEL OBSERVATIONS

30 minutes after drilling to 40'

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-02-2022 | Boring Completed: 08-02-2022

Drill Rig: Diedrich D-50 | Driller: S. Morey

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-117.6-1.6D

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: 43.457289° Longitude: -73.441606°

Surface Elev.: 144.4936 (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
	57.0	87.5			X	11	N=11				
	Boring Terminated at 57 Feet										

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

Hammer Type: Automatic

Advancement Method:
4 1/4" HSA, with water added after 40'

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

WATER LEVEL OBSERVATIONS

▽ *30 minutes after drilling to 40'*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-02-2022 | Boring Completed: 08-02-2022

Drill Rig: Diedrich D-50 | Driller: S. Morey

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-115.5	2-4	13.4	3.4
KB-115.5	15-17	70.8	
KB-117.6-1.6D	3-5	4.0	
KB-117.6-1.6D	20-22	22.7	
KB-117.6-1.6D	35-37	26.2	
KB-117.6-1.6D	49-51	15.3	
KB-122.9	4-6	23.1	
KB-122.9	15-17	18.6	
KB-122.9	25-27	77.9	
KB-122.9	45-47	74.8	
KB-123.0	2-4	10.9	
KB-123.0	20-22	68.3	
KB-123.0	35-37	51.0	
KB-123.0	50-52	45.9	
KB-123.0	65-67	34.5	
KB-132.1A	4-6	27.5	
KB-132.1A	15-17	38.1	
KB-132.1A	30-32	34.0	
KB-132.3A	4-6	12.1	
KB-132.3A	15-17	45.2	
KB-132.3A	30-32	37.2	
KB-132.5A	4-6	17.4	
KB-132.5A	30-32	38.8	
KB-132.5A	45-47	38.2	
KB-135.7	2-4	36.6	
KB-135.7	15-17	41.9	
KB-135.7	30-32	34.8	
KB-135.8	2-4	5.6	
KB-135.8	15-17	42.7	
KB-135.8	30-32	36.8	
KB-135.8	40-42	28.3	
KB-160.6	2-4	12.2	
KB-163.1	4-6	11.7	
KB-163.2	8-10	12.1	
KB-169.0-3.3	6-8	12.0	
KB-169.0-3.3	25-27	11.5	
KB-169.0-3.3	35-37	8.4	
KB-177.1	10-12	8.9	
KB-177.1	25-27	11.5	
KB-177.1	40-42	11.2	
KB-177.1	50-52	5.7	
KB-182.7B	6-8	31.5	

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

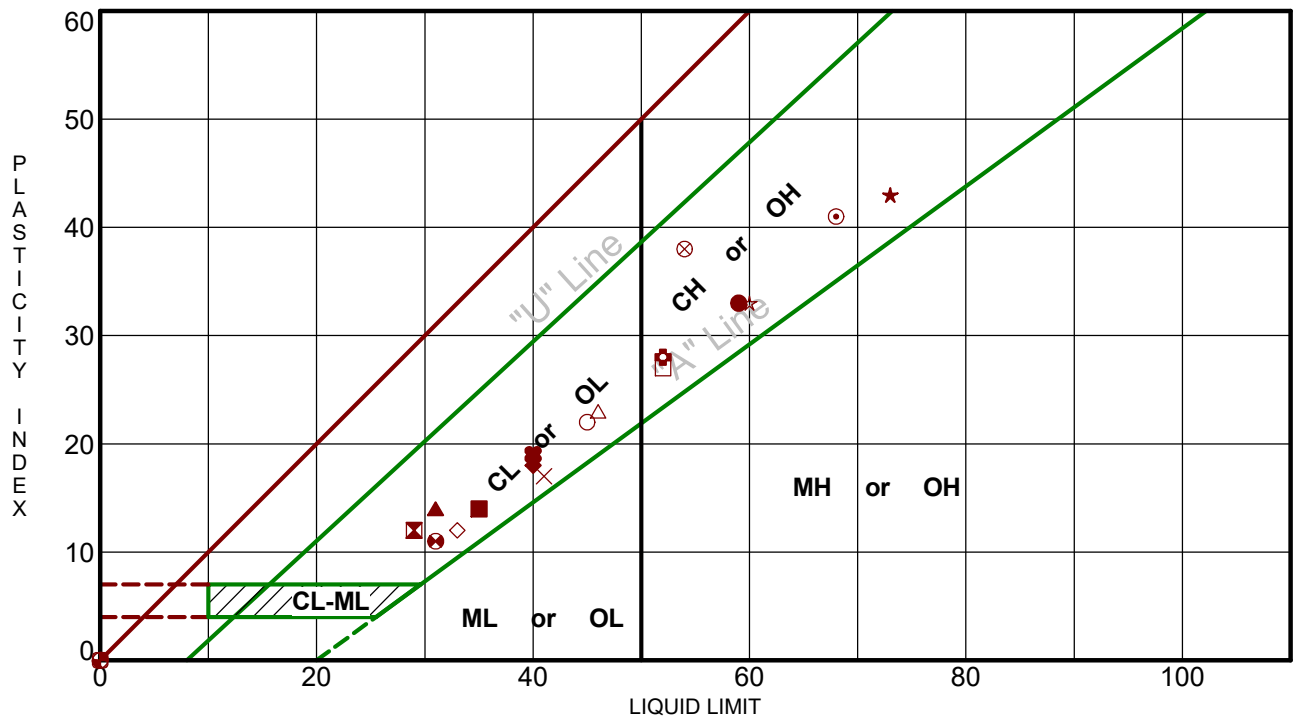
PROJECT NUMBER: JB215256G

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-115.5	15 - 17	59	26	33	86.6	CH	FAT CLAY
⊠	KB-117.6-1.6D	20 - 22	29	17	12	25.5	SC	CLAYEY SAND
▲	KB-117.6-1.6D	35 - 37	31	17	14	48.6	SC	CLAYEY SAND
★	KB-122.9	25 - 27	73	30	43	98.8	CH	FAT CLAY
⊙	KB-122.9	45 - 47	68	27	41	91.5	CH	FAT CLAY
✿	KB-123.0	20 - 22	52	24	28	81.5	CH	FAT CLAY with SAND
○	KB-123.0	35 - 37	45	23	22	75.9	CL	LEAN CLAY with SAND
△	KB-123.0	50 - 52	46	23	23	65.8	CL	SANDY LEAN CLAY
⊗	KB-123.0	65 - 67	54	16	38	91.9	CH	FAT CLAY
⊕	KB-132.1A	4 - 6	NP	NP	NP	10.0	SP-SM	POORLY GRADED SAND with SILT and GRAVEL
□	KB-132.1A	15 - 17	52	25	27	96.9	CH	FAT CLAY
⊗	KB-132.1A	30 - 32	31	20	11	100.0	CL	LEAN CLAY
◕	KB-132.3A	4 - 6	NP	NP	NP	31.7	SM	SILTY SAND
☆	KB-132.3A	15 - 17	60	27	33	88.6	CH	FAT CLAY
✿	KB-132.3A	30 - 32	NP	NP	NP	53.0	ML	SANDY SILT with GRAVEL
■	KB-132.5A	4 - 6	35	21	14	94.3	CL	LEAN CLAY
◆	KB-132.5A	30 - 32	40	22	18	98.7	CL	LEAN CLAY
◇	KB-132.5A	45 - 47	33	21	12	94.9	CL	LEAN CLAY
×	KB-135.7	2 - 4	41	24	17	26.1	GC	CLAYEY GRAVEL with SAND
✖	KB-135.7	15 - 17	40	21	19	91.9	CL	LEAN CLAY

PROJECT: CHPE - Additional HDD Borings - Phase 3

PROJECT NUMBER: JB215256G

SITE: Fort Ann to Coxsackie, NY

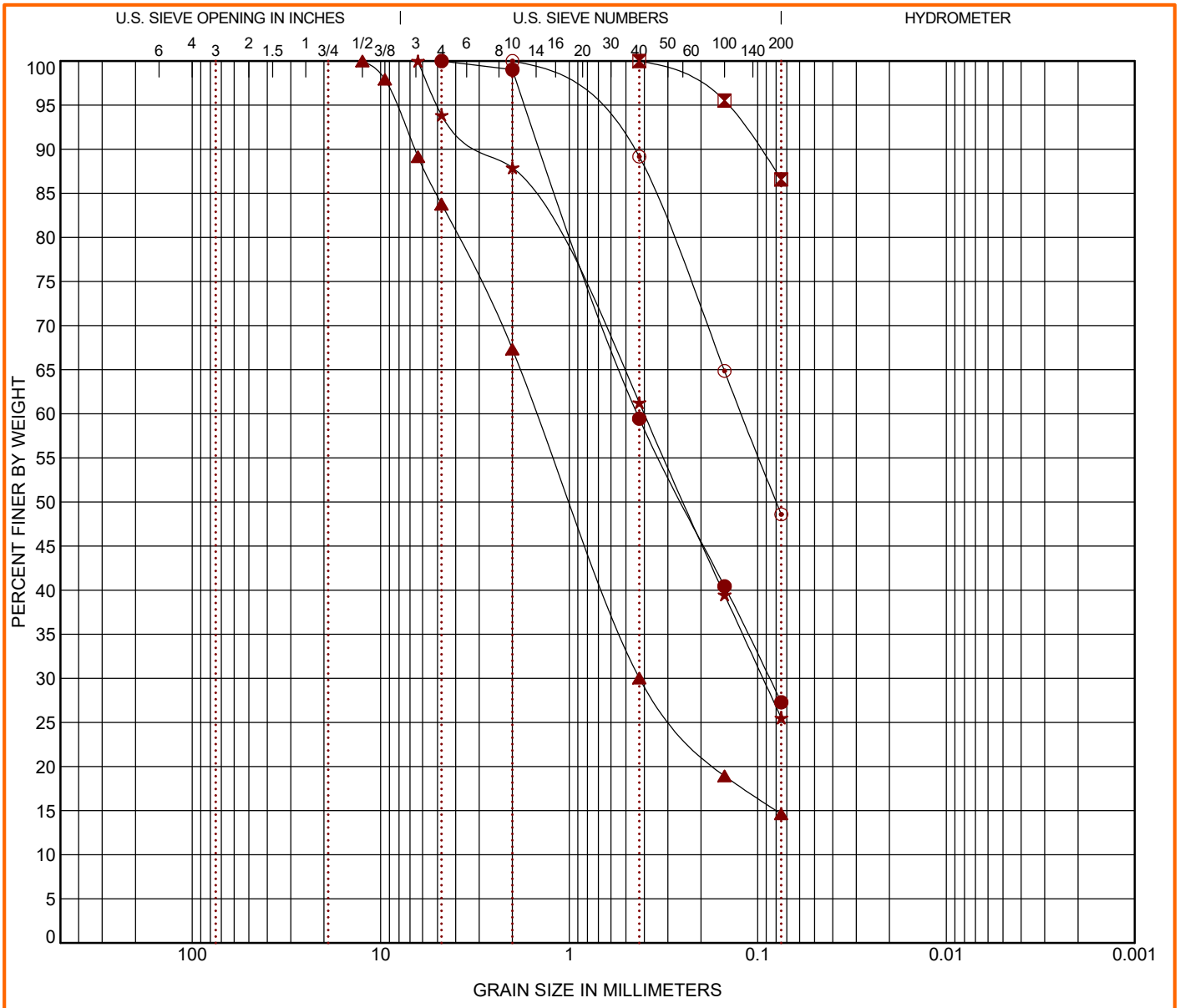
Terracon
30 Corporate Cir Ste 201
Albany, NY

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

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 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-115.5	2 - 4	SILTY SAND (SM)	13.4					
⊠	KB-115.5	15 - 17	FAT CLAY (CH)	70.8	59	26	33		
▲	KB-117.6-1.6D	3 - 5	SILTY SAND with GRAVEL (SM)	4.0					
★	KB-117.6-1.6D	20 - 22	CLAYEY SAND (SC)	22.7	29	17	12		
⊙	KB-117.6-1.6D	35 - 37	CLAYEY SAND (SC)	26.2	31	17	14		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-115.5	2 - 4	4.75	0.434	0.087		0.0	0.0	72.7		27.3	
⊠	KB-115.5	15 - 17	0.425				0.0	0.0	13.4		86.6	
▲	KB-117.6-1.6D	3 - 5	12.5	1.475	0.424		0.0	16.2	69.1		14.6	
★	KB-117.6-1.6D	20 - 22	6.35	0.4	0.094		0.0	6.1	68.3		25.5	
⊙	KB-117.6-1.6D	35 - 37	2	0.122			0.0	0.0	51.4		48.6	

PROJECT: CHPE - Additional HDD Borings - Phase 3

PROJECT NUMBER: JB215256G

SITE: Fort Ann to Coxsackie, NY

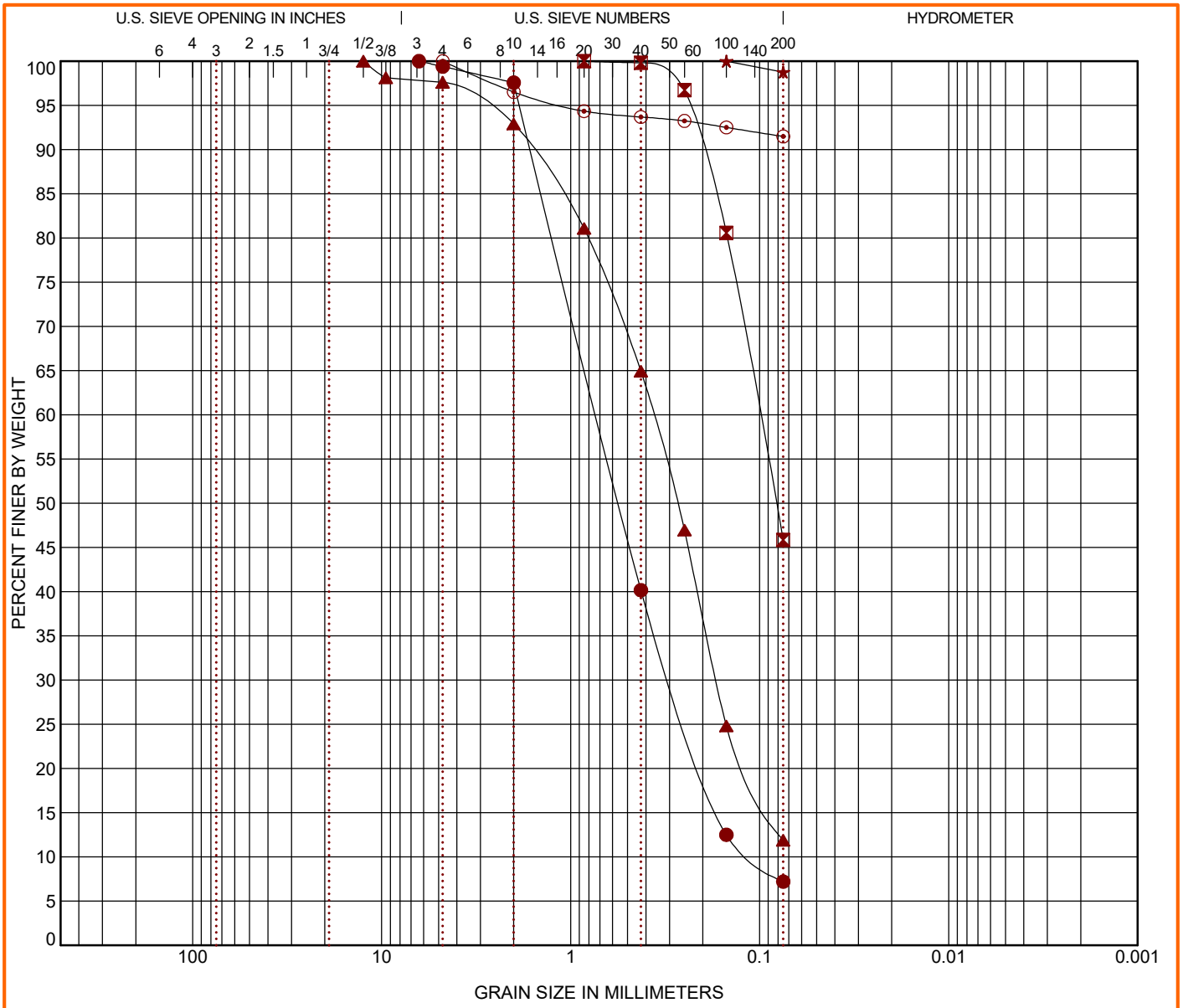
Terracon
30 Corporate Cir Ste 201
Albany, NY

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

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 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-117.6-1.6D	49 - 51	POORLY GRADED SAND with SILT (SP-SM)	15.3				1.07	6.71
⊠	KB-122.9	4 - 6	SILTY SAND (SM)	23.1					
▲	KB-122.9	15 - 17	POORLY GRADED SAND with SILT (SP-SM)	18.6				1.15	5.42
★	KB-122.9	25 - 27	FAT CLAY (CH)	77.9	73	30	43		
⊙	KB-122.9	45 - 47	FAT CLAY (CH)	74.8	68	27	41		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-117.6-1.6D	49 - 51	6.35	0.726	0.29	0.108	0.0	0.6	92.2		7.2	
⊠	KB-122.9	4 - 6	0.85	0.099			0.0	0.0	54.1		45.9	
▲	KB-122.9	15 - 17	12.5	0.368	0.169		0.0	2.4	85.7		11.9	
★	KB-122.9	25 - 27	0.15				0.0	0.0	1.2		98.8	
⊙	KB-122.9	45 - 47	4.75				0.0	0.0	8.5		91.5	

PROJECT: CHPE - Additional HDD Borings - Phase 3

PROJECT NUMBER: JB215256G

SITE: Fort Ann to Coxsackie, NY

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 JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

Kiewit

MEMORANDUM

DATE: September 23, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

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

SUBJECT: Geotechnical Data: Segment 3 – Package 2 - HDD Crossing 11 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located north of Fort Ann, New York. The approximate station for the start of HDD crossing Number 11 is STA 20105+00 (43.4515° N, 73.4454° W).

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

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 11
Borings WFE-6, WFE-6A, WFE-7, K-117.6-2.1, K-117.6-2.3
Segment 3 - Design Package 2

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

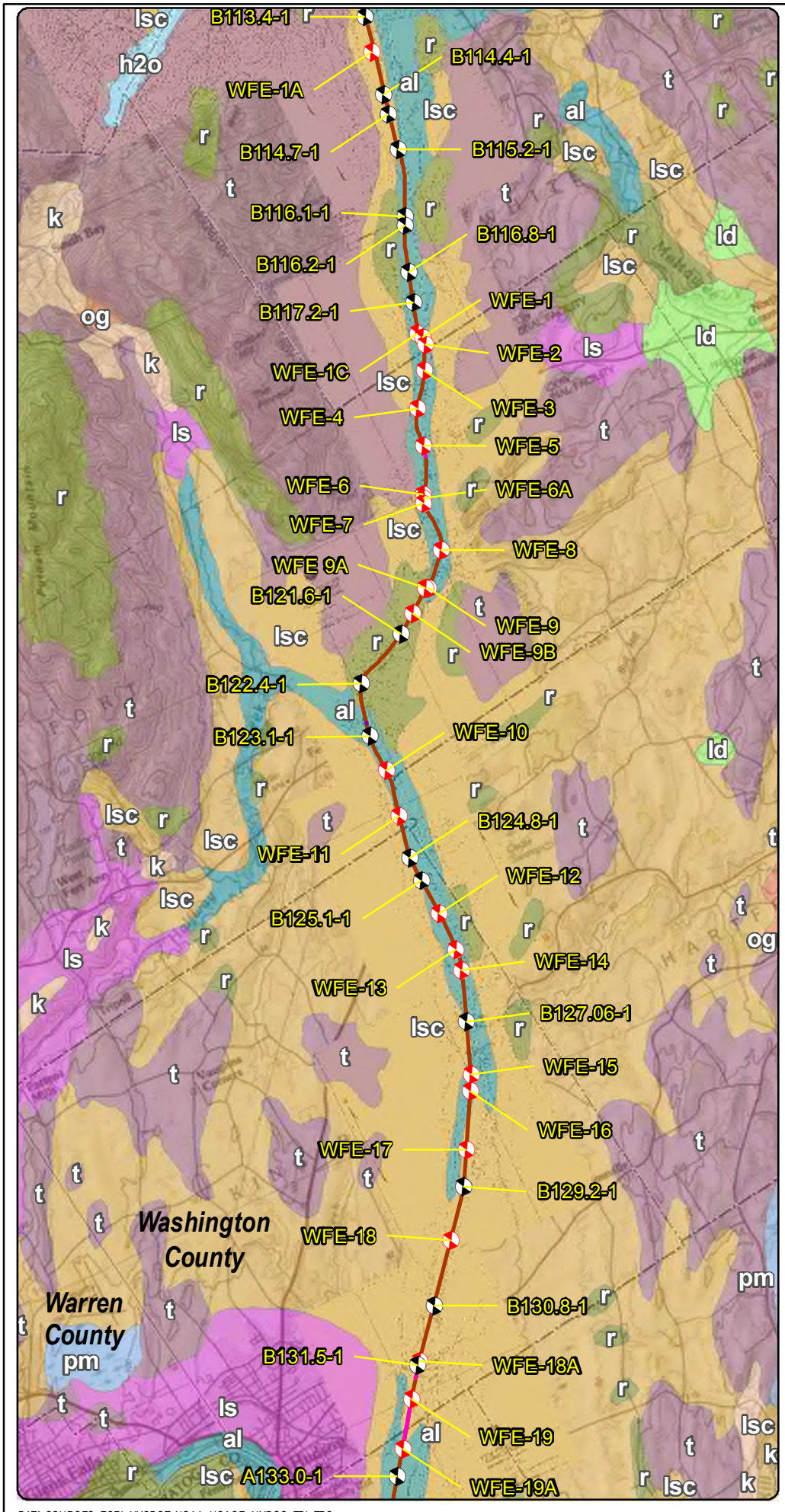
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

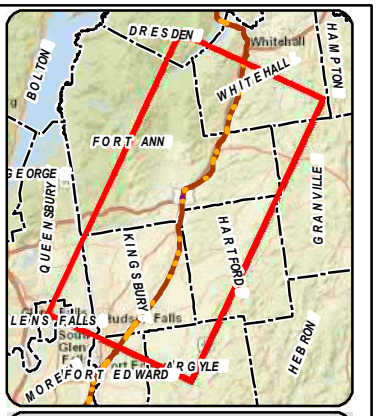
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Whitehall to Fort Edward Figure 3-3

Prepared on 5/5/2021

by: AECOM

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

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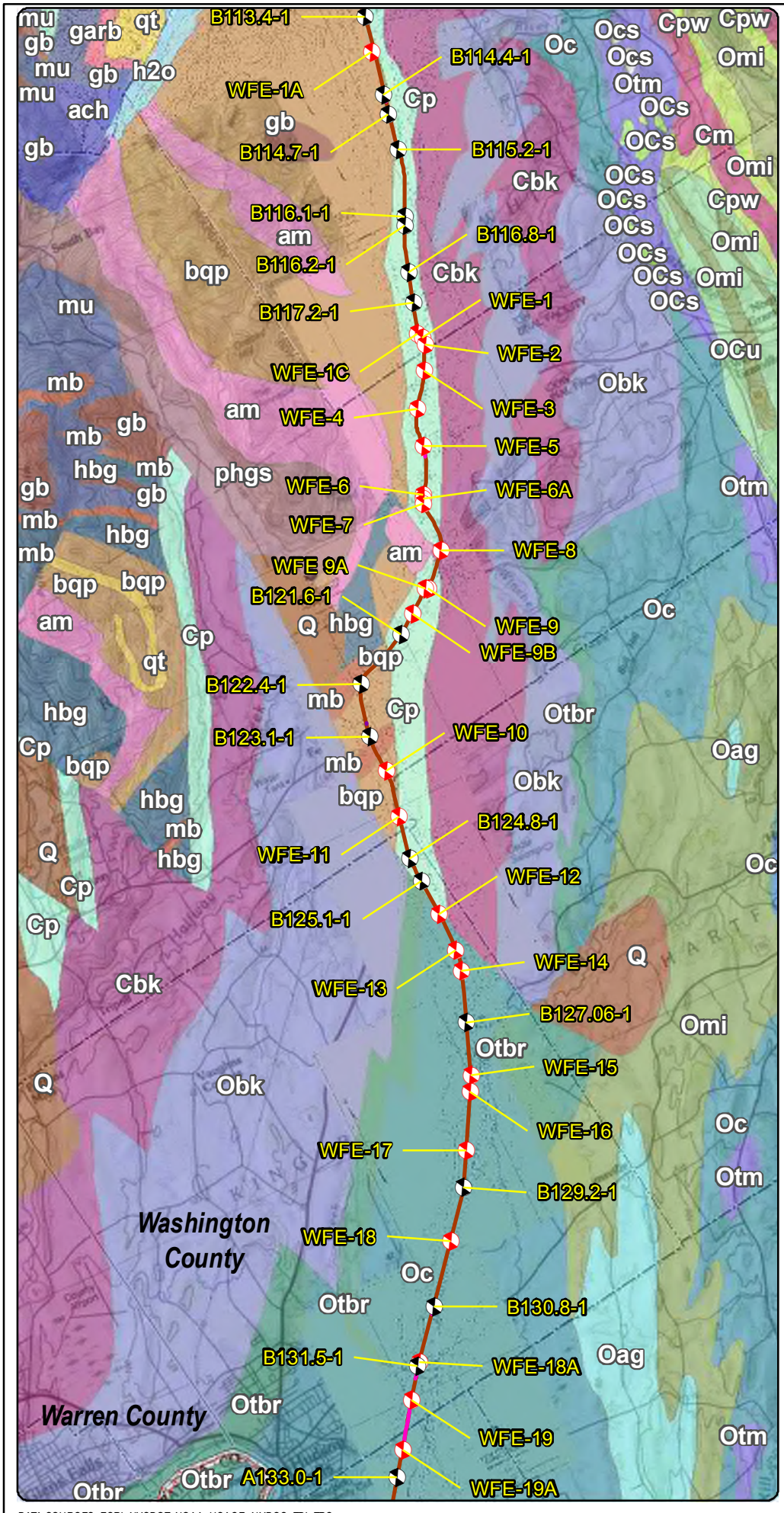
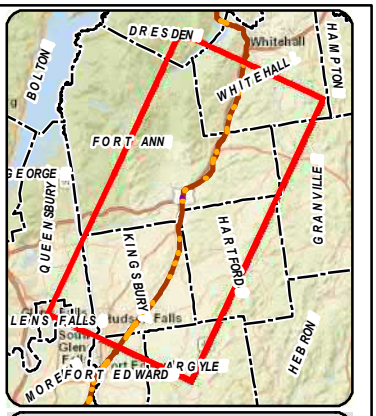




LEGEND

- 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

- Cbk - Beekmantown Group
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

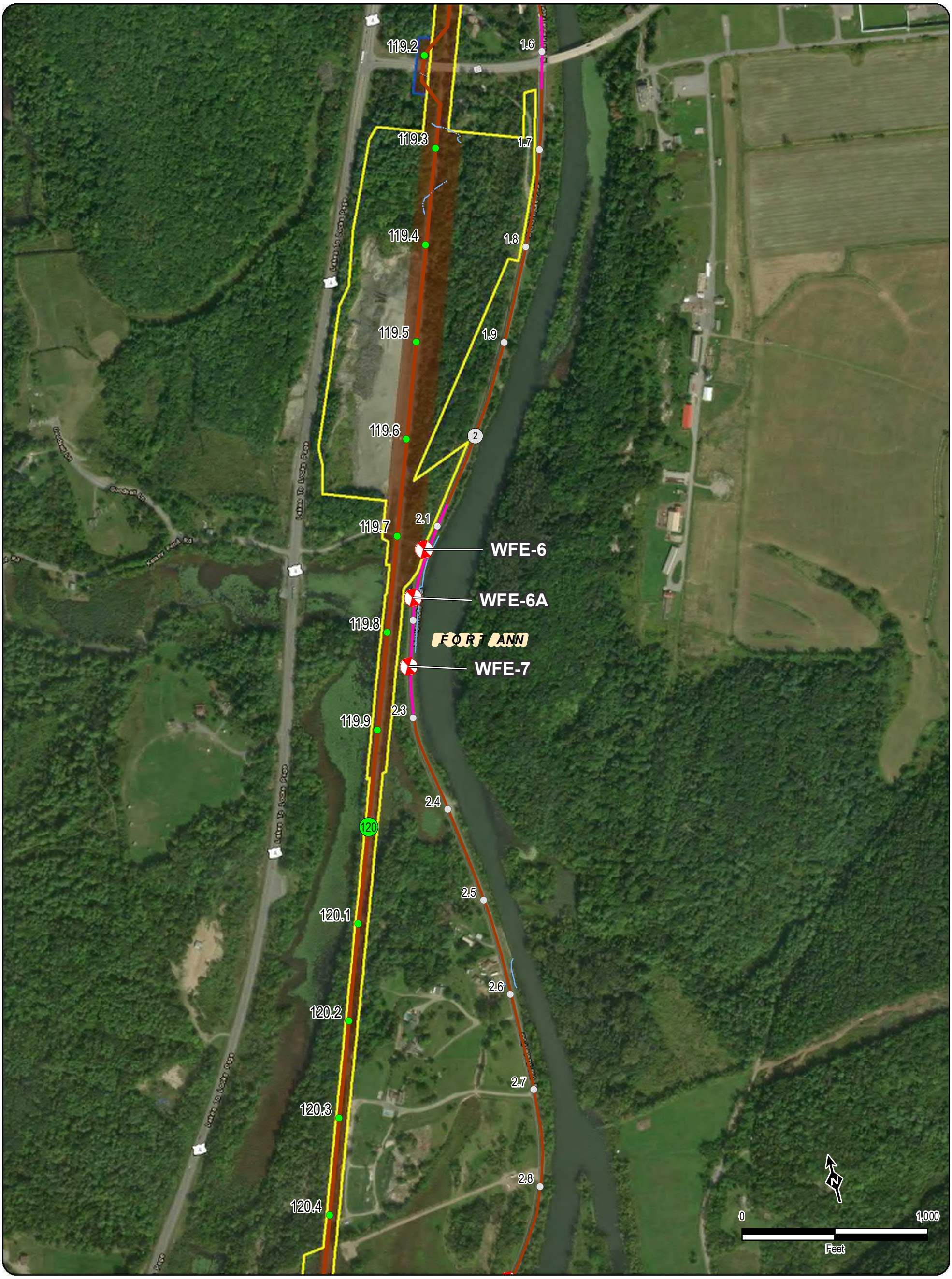
Bedrock Geology and Geotechnical Borings Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

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\Whitehall_to_Ft_Ed_Boring_Locations_Bedrock_May_2021_Report.mxd



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

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Whitehall to Fort Edward

Figure A-3

Sheet 6 of 16

Prepared by: AECOM 5/19/2021

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Edward_Boring_Locations_Mapset_May_2021_Report.mxd

BORING CONTRACTOR: ADT													SHEET 1 OF 2	
DRILLER: Chris Chaillou													PROJECT NAME: CHPE -	
SOILS ENGINEER/GEOLOGIST: Chris French													PROJECT NO.: 60323056	
LOCATION: Ft Ann Bypass MP - 2.11													HOLE NO.: **WFE-6**	
													START DATE: 12/17/20	
						BORING LOG							FINISH DATE: 12/17/20	
													OFFSET: N/A	
GROUND WATER OBSERVATIONS				CASING		SAMPLER		DRILL BIT		CORE BARREL			DRILL RIG: Geoprobe 7822DT	
Water at 5' (inferred)			TYPE	Flush Joint Steel		California Modified		Tricone Roller Bit					BORING TYPE: SPT	
			SIZE I.D.	4"		2.5"		- -					BORING O.D.: 4.5"	
			SIZE O.D.	4.5"		3"		3 7/8"					SURFACE ELEV.:	
			HAMMER WT.	140 lbs		140 lbs							LONGITUDE:	
			HAMMER FALL	30"		30"							LATITUDE:	

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE 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'-3.5'	S-1			Hand Cleared						Silty Sand and Gravel (Fill)	0.0'-3.5'; Dark brown fine-coarse SAND, littlle subangular gravel, little silt; moist, loose
1.0													
2.0													
3.0													
		3.5'-4.0'	S-2	10"	8"	33	52/4"						
4.0						Cored through obstacle					ML/SP		3.5'-4.0'; Dark brown SILT, some fine-medium sand, little clay, little subangular gravel; moist, medium stiff
5.0													
		5'-7'	S-3	24"	8"	37	73	58	20	85	GP		Dark gray angular fine-coarse GRAVEL, brown fine silty sand last 2", saturated
6.0													
7.0													
		7'-9'	S-4	24"	18"	8	4	5	5	6	ML/SM	CLAY and Silt	Gray clayey SILT, little fine sand; moist, stiff
8.0													TR 1: 7.0'-9.0'
9.0													
		9'-11'	S-5	24"	24"	7	6	10	9	10	CL		Brown CLAY and silt, trace fine sand; stiff, moist
10.0													
11.0													
		11'-'13'	S-6	24"	16"	12	15	15	12	20	CL		Brown and gray CLAY and silt, little fine sand; stiff, moist
12.0													TR 2: 11.0'-13.0'
13.0													
		13'-15'	S-7	24"	27"	13	12	10	12	14	CL		SAA
14.0													
15.0													
16.0													
17.0													
18.0													
19.0													
20.0													

NOTES:

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

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

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

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

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: Ft Ann Bypass MP - 2.11

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-6**

START DATE: 12/17/20

FINISH DATE: 12/17/20

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	24"	20"	3	WOH	1	2	-	CL	Silty Clay	Gray silty CLAY; moist, soft
21.0													
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	24"	WOH	3	12	6	10	CL		SAA
26.0											SM		26.4'-26.8'; Gray silty SAND, little clay; moist, soft
27.0													26.8'-27.0'; Gray medium SAND, little fine sand, trace silt; saturated, loose
28.0													
29.0													
30.0													
		30'-32'	S-10	24"	24"	6	14	15	16	19	SM	Silty SAND	Gray fine silty SAND; medium dense, wet
31.0													
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	18"	14	8	8	7	10	SM		Gray medium SAND, little fine sand, little silt; saturated, loose
36.0													
37.0													
38.0													
		38'-40'	S-12	24"	12"	3	6	8	10	9	SM		SAA
39.0													
													TR 5: 38.0-40.0'
40.0													
													Boring terminated at 40'
41.0													
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%

BORING CONTRACTOR: ADT														SHEET 1 OF 2	
DRILLER: Chris Chaillou														PROJECT NAME: CHPE -	
SOILS ENGINEER/GEOLOGIST: Chris French														PROJECT NO.: 60323056	
LOCATION: Ft Ann Bypass MP - 2.18														HOLE NO.: **WFE-6A**	
														START DATE: 12/18/20	
						BORING LOG								FINISH DATE: 12/18/20	
														OFFSET: N/A	
GROUND WATER OBSERVATIONS				CASING		SAMPLER		DRILL BIT		CORE BARREL				DRILL RIG: Geoprobe 7822DT	
Water at 2.5' (inferred)			TYPE	Flush Joint Steel		California Modified		Tricone Roller Bit						BORING TYPE: SPT	
			SIZE I.D.	4"		2.5"		- -						BORING O.D.: 4.5"	
			SIZE O.D.	4.5"		3"		3 7/8"						SURFACE ELEV.:	
			HAMMER WT.	140 lbs		140 lbs								LONGITUDE:	
			HAMMER FALL	30"		30"								LATITUDE:	

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE 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
						Hand Cleared							0'-4"; Brown fine SAND, little sub angular gravel; very loose, moist
1.0													
		4"-1' Core											4"-1'; Asphalt
2.0													1'-2.5'; Brown fine-coarse SAND, some angular gravel, little silt; loost, moist
		Hand Cleared											
3.0											SW/SM		2.5'-4.5'; Brown fine-coarse SAND, little subrounded gravel, little angular cobbles, little silt; loose, saturated
		3'-5'	S-1										
4.0													4.5'-5'; Brown fine-coarse SAND, little angular-subrounded gravel, little silt; loose, saturated
											SW/SM		
5.0													TR-1: (3.0'-5.0')
		5'-7'	S-2	24"	18"	22	9	5	4	9	SW/SM	Silty Sand and Gravel	Brown fine-coarse SAND, little angular-subrounded gravel, little silt; loose, saturated
6.0													
7.0													
		7'-9'	S-3	24"	24"	4	3	1	1	3	SP/SM		Gray fine-medium SAND, little silt; loose, saturated
8.0													
9.0													
		9'-11'	S-4	24"	3"	WOH/11"		2	2	1	SW		Brown fine-coarse SAND, little subangular gravel; very loose, saturated
10.0													
11.0													
		11'-'13'	S-5	24"	18"	9	19	14	12	21	ML	Sandy CLAY and SILT	Gray and Brown clayey SILT, trace fine sand; stiff, moist
12.0													
13.0													
		13'-15'	S-6	24"	24"	20	25	20	12	29	SM		Gray fine SAND, some silt, little medium sand; very loose, saturated
14.0													
15.0													
		15'-17'	S-7	24"	20"	2	11	10	8	14	CL		Gray CLAY and silt, trace fine sand, medium stiff; moist, red brown mottling,
16.0													TR-2; (16.0'-16.5')
17.0													
18.0													
19.0													
20.0													

NOTES:

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

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

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

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: Ft Ann Bypass MP - 2.18

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-6A**

START DATE: 12/18/20

FINISH DATE: 12/18/20

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	24"	24"	4	4	4	3	5	CL		Gray CLAY and silt; medium stuff, moist
21.0													
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	18"	3	4	4	5	5	SP		Gray medium SAND, some fine sand, trace silt; very loose, saturated
26.0													
27.0													
28.0													
29.0													
		30'-32'	S-10	24"	18"	6	5	5	6	7	SP		SAA
30.0													
31.0													
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	18"	6	5	7	11	8	SP		Gray medium SAND, little fine sand, trace silt; very loose, saturated
36.0													TR-3; (36.0'-36.5')
37.0													
38.0													
		38'-40'	S-12	24"	18"	4	5	7	7	8	SP		SAA
39.0													
40.0													
													Boring WFE-6A terminated at 40', grouted to surface
41.0													
42.0													
43.0													
44.0													
45.0													

SAND

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%

BORING CONTRACTOR: ADT													SHEET 1 OF 2
DRILLER: Chris Chaillou													PROJECT NAME: CHPE -
SOILS ENGINEER/GEOLOGIST: Chris French													PROJECT NO.: 60323056
													HOLE NO.: **WFE-7**
													START DATE: 12/15/20
						BORING LOG							FINISH DATE: 12/16/20
LOCATION: Ft Ann Bypass MP - 2.25													OFFSET: N/A
GROUND WATER OBSERVATIONS				CASING		SAMPLER		DRILL BIT		CORE BARREL			DRILL RIG: Geoprobe 7822DT
No water observed			TYPE	Flush Joint Steel		California Modified		Tricone Roller Bit		NQ			BORING TYPE: SPT/Core
			SIZE I.D.	4"		2.5"		- -		1 7/8"			BORING O.D.: 4.5"/3"
			SIZE O.D.	4.5"		3"		3 7/8"		3"			SURFACE ELEV.:
			HAMMER WT.	140 lbs		140 lbs							LONGITUDE:
DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	HAMMER FALL PEN. in	REC. in	30" BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)		30"		N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	LATITUDE: FIELD IDENTIFICATION OF SOILS
		0'-2.5'				Hand Cleared						Sand and Gravel (Fill)	0.0'-2.5'; Brown fine-coarse SAND, little angular gravel, little angular cobbles, trace silt (till)
1.0													
2.0													
3.0		2.5'-2.9'	S-1	4"	0"	50/4"							Refusal of split spoon at 2.9'
4.0													
5.0													Casing set to 5', begin coring at 5'
6.0												Gneiss	Light greenish gray gneiss, hard to very hard, moderately jointed 55°, iron staining, closed quartzite fractures. Lightly weathered from 5'-10'
	7	5.0'-8.0'	R-1	36"	26"	RQD: 4" = 11%							
7.0													
8.0													Core barrel broke at 8'
	4	8.0'-10.0'	R-2	24"	21"	RQD: 12" = 50%							SAA
9.0													
10.0													
	4	10.0'-15.0'	R-3	60"	56"	RQD: 36" = 60%							SAA
11.0													
12.0													
13.0													
14.0													
15.0													
	6	15.0'-18.0'	R-4	36"	16"	RQD: 11.5" = 32%							SAA
16.0													TR-1; (16.5'-17.25')
17.0													
18.0													
	3	18.0'-20.0'	R-5	24"	24"	RQD: 8" = 33%							SAA
19.0													Heavily weathered fracture 19'4"-19'7"
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: $Ncorr=N*(2.0^2-1.375^2)in./(3.0^2-2.4^2)in. = N*0.65$.

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

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: Ft Ann Bypass MP - 2.25

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-7**

START DATE: 12/15/20

FINISH DATE: 12/16/20

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
		20.0'-25.0'	R-6	60"	58"	RQD: 29" = 48%				SAA
21.0										
22.0										
	4.6									
23.0										
24.0										
25.0										
	3.3	25.0'-30.0'	R-7	60"	59"	RQD: 37" = 62%				SAA
26.0										
27.0										
28.0										
29.0										
30.0										
	6	30.0'-32.0'	R-8	24"	20"	RQD: 0" = 0%			Gneiss	Heavy vertical (or near vertical) mechanical fracturing
31.0										
32.0										
	4.5	32.0'-32.75'	R-9	8"	8"	RQD: 0" = 0%				Core bound in core barrel, large closed quartzite fracture >80%
33.0										
	5.2	32.75'-35.0'	R-10	28"	23"	RQD: 15.5" = 55%				SA
34.0										
35.0										
	4.0	35.0'-40.0'	R-11	60"	56.5"	RQD: 18" = 30%				SAA
36.0										
										TR-2; (35.6'-36.4')
37.0										
38.0										
39.0										
40.0										
										WFE-7 terminated at 40', grouted to surface
41.0										
42.0										
43.0										
44.0										
45.0										

NOTES: Consistantly hard drilling throughout

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.

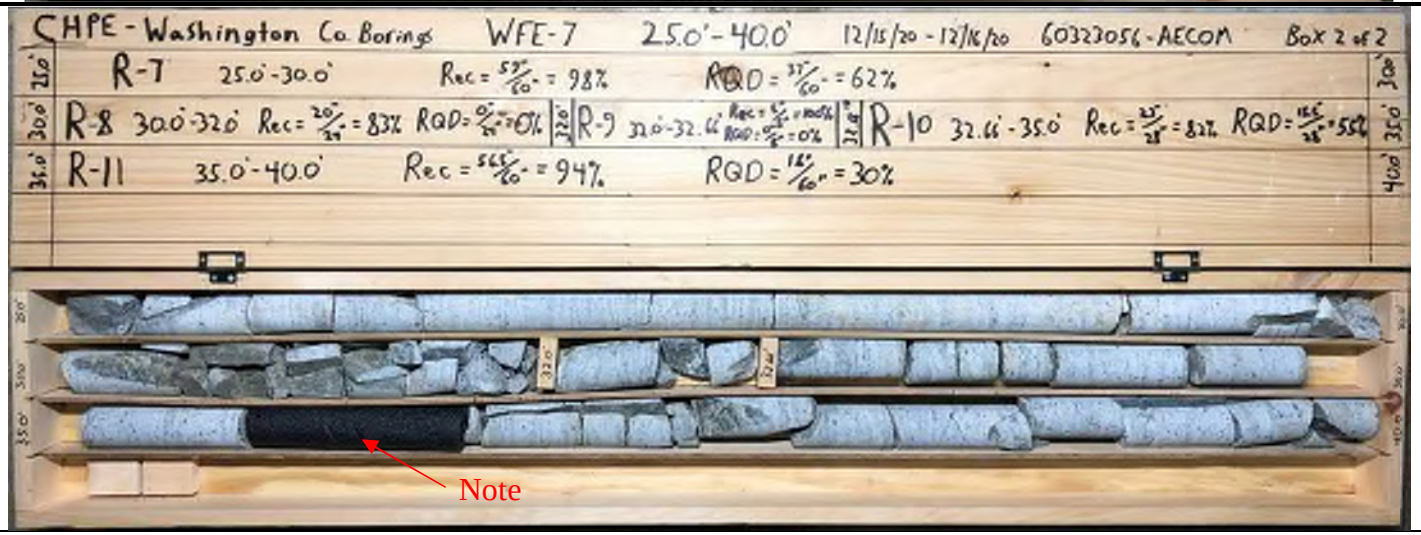
SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

ROCK CORE PHOTOGRAPHIC LOG

AECOM Project No: **60323056**
Project Name: **CHPE – Upstate New York Upland Geotechnical Investigation**
Location: **Whitehall – Fort Edward Segment**

Boring No.	Depth (ft.)	
WFE-7	5.0-25.0	

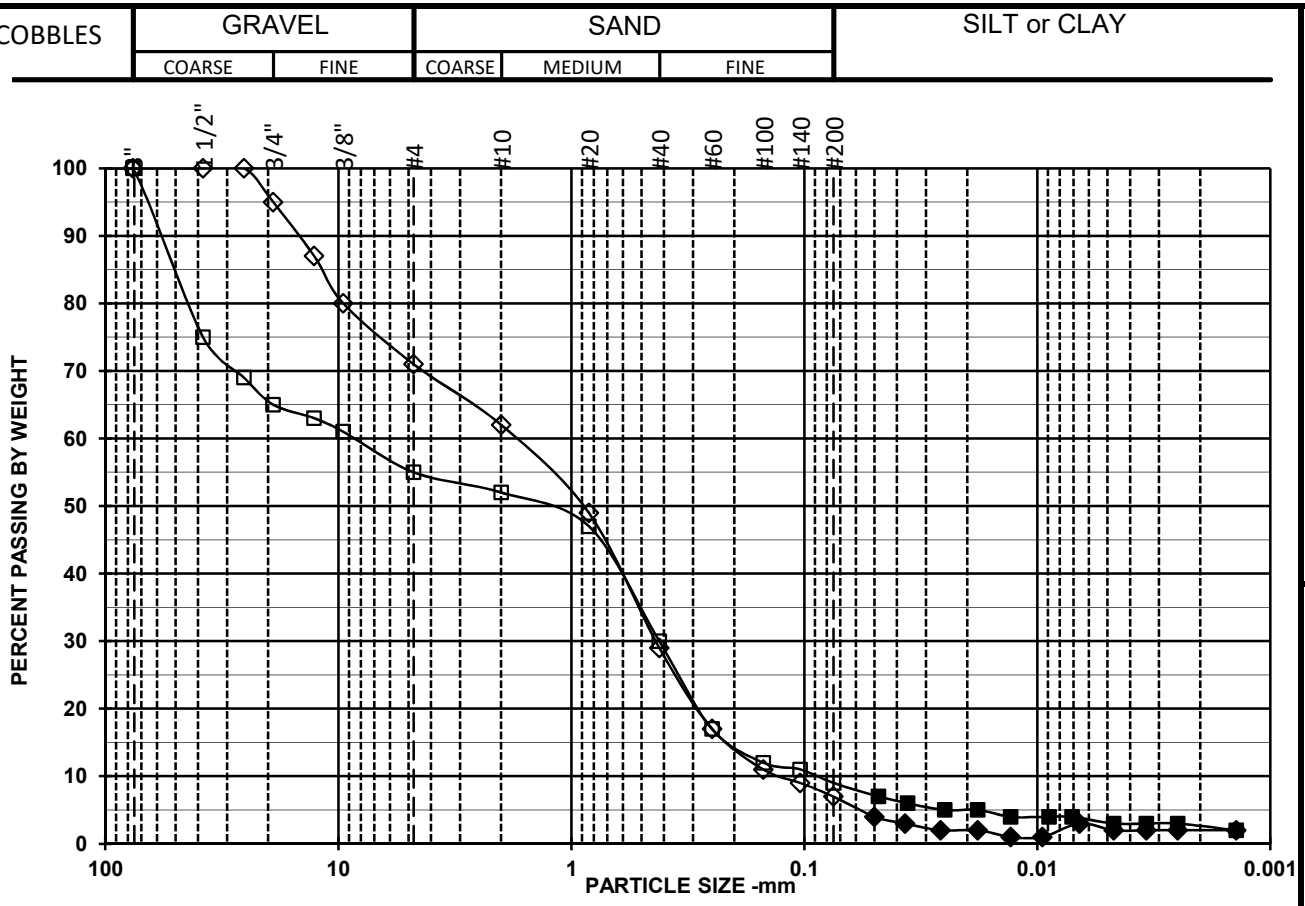
Boring No.	Depth (ft.)	
WFE-7	25.0-40.0	

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

Aquifer
CHPE- Whitehall-Ft. Edward 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 (%)	ORGANIC CONTENT (burnoff) (%)	
WFE-1A	S-2	5-7	24.4	44	17	27	CL	93	39		
WFE-1A	S-5	11-13	43.0	68	23	45	CH	99.8	84		
WFE-1C	S-3	7-9	44.5				CH	99.3	86		
WFE-1C	S-7	15-17	44.5	78	27	51	CH	100	94		
WFE-1C	S-10	30-32	45.7	61	23	38	CH	100	87		
WFE-2	S-2	5-7	7.3				SW-SM	10.7	3		
WFE-2	S-7	15-17	26.0				SC	28.5	13		
WFE-2	S-9	25-27	66.0	71	26	45	CH	100	90		
WFE-4	S-2	5-7	18.0				SC	34	13		
WFE-4	S-4	9-11	18.3				SM	17	5		
WFE-5	S-2	5-7	19.9				SM	19	3		
WFE-5	S-4	9-11	18.6	28	15	13	CL	91	28		
WFE-6A	S-2	5-7	13.6				SP-SC	9	3		
WFE-6A	S-4	9-11	17.4				SP-SM	7	2		
WFE-8	S-3	6-8	24.9				SC	48.5	12		
WFE-8	S-4	8-10	88.5	128	53	75	MH	94	43		
WFE-10	S-2	5-7	38.0	71	24	47	CH	94	76		
WFE-10	S-4	9-11	22.5				CL	83.9	32		
WFE-12	S-2	5-7	23.5	49	20	29	CL	62.5	35		
WFE-12	S-4	9-11	28.3				CL	95.8	37		
WFE-14	S-3	7-9	25.7				CL	75.7	44		
WFE-14	S-5	13-15	22.5				ML	53.9	17		
WFE-16	S-3	7-9	36.7	75	25	50	CH	100	90		
WFE-16	S-9	25-27	37.1	73	24	49	CH	100	80		
WFE-18	S-3	7-9	229.7	293	93	200	OH	58	43	34.1	
WFE-18	S-8	20-22	34.3	30	21	9	CL	95	26		
WFE-18	S-10	30-32	64.3	56	21	35	CH	100	87		
WFE-18A	S-2	5-7	19.9	30	13	17	CL	88.5	29		
WFE-18A	S-7	15-17	18.9				SM	14.3	1		
WFE-18A	S-10	30-32	62.9	62	22	40	CH	99	86		
WFE-19A	S-3	7-9	38.1				SP-SM	8	3		
WFE-19A	S-8	20-22	31.8				SP-SM	8.3	2		
WFE-19A	S-10	30-32	17.6				SW-SM	8	1		

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
□	13.6				SP-SC		Brown, Poorly graded sand with clay and gravel, Insufficient sample size	04/20/21
◇	17.4				SP-SM		Brown, Poorly graded sand with silt and gravel, Insufficient sample size	04/20/21
○								

Aquifer

TerraSense, LLC #7853-21003

CHPE- Whitehall-Ft. Edward Borings

Symbol	□	◇	○
Boring	WFE-6A	WFE-6A	
Sample	S-2	S-4	
Depth	5-7	9-11	
% +3"	0	0	
% Gravel	45	29	
% SAND	46	64	
%C SAND	3	9	
%M SAND	22	33	
%F SAND	21	22	
% FINES	9	7	
D_{100} (mm)	76.2	25.4	
D_{60} (mm)	8.48	1.75	
D_{30} (mm)	0.42	0.43	
D_{10} (mm)	0.088	0.12	
Cc	0.2	0.9	
Cu	96.4	14.6	

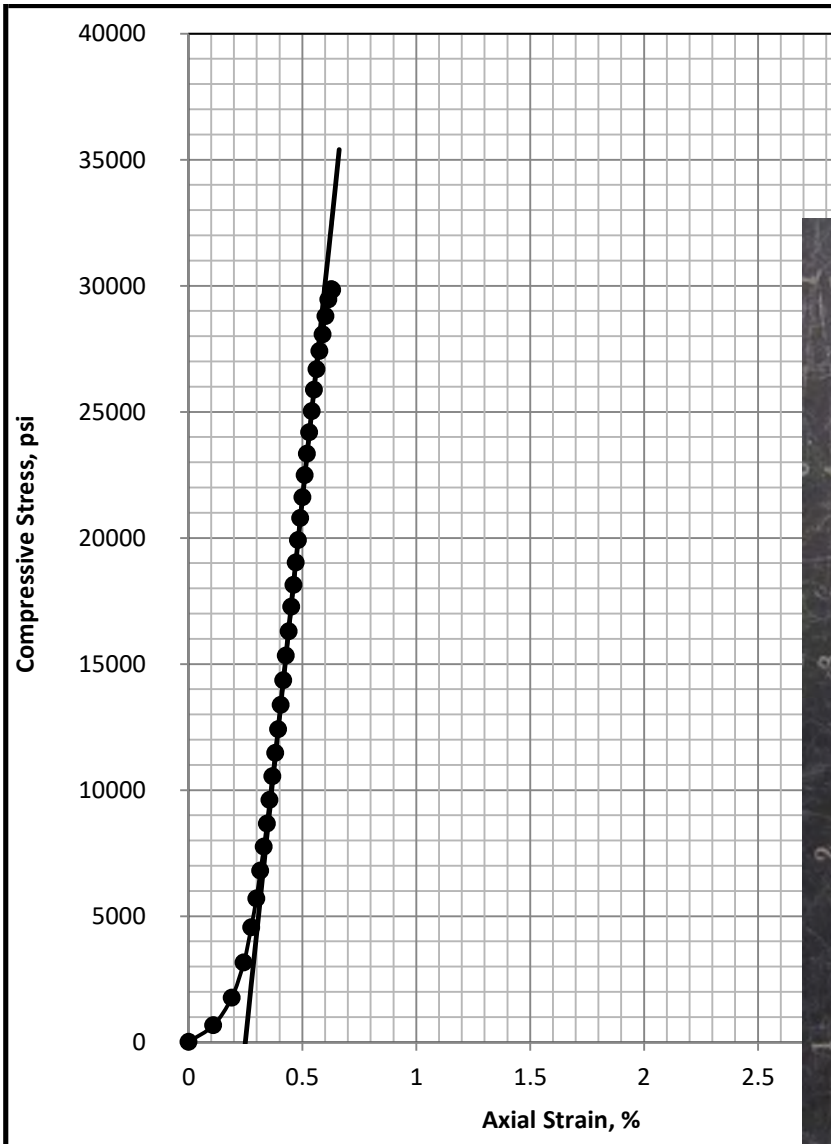
Sieve Size/ID #	Percent Finer Data		
6"	100	100	
4"	100	100	
3"	100	100	
1 1/2"	75	100	
1"	69	100	
3/4"	65	95	
1/2"	63	87	
3/8"	61	80	
#4	55	71	
#10	52	62	
#20	47	49	
#40	30	29	
#60	17	17	
#100	12	11	
#140	11	9	
#200	9	7	
5μ m	3	2	
2μ m	3	2	
1μ m	1	2	

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Aquifer
CHPE - Whitehall-Ft. Edward Borings
SUMMARY OF ROCK TESTING

SAMPLE IDENTIFICATION			STATE PROPERTIES			ENGINEERING PROPERTY TESTS					REMARKS
Boring	Run	Depth	WATER CONTENT (1) (%)	TOTAL UNIT WGT. (pcf)	DRY UNIT WGT. (pcf)	TEST TYPE (2)	Mohs HARDNESS (-)	UNCONFINED COMPRESSION TESTS (ASTM D7012)			
								COMPRESSIVE STRENGTH (psi)	AXIAL STRAIN @ FAILURE (%)	ESTIMATED (5) ELASTIC MODULUS (psi)	
WFE-7	R-3	13.6-13.9				M	9				
WFE-7	R-3	14.5-14.9	0.1	165	165	UC		29870	0.38	9E+06	
WFE-7	R-6	20.6-20.8				M	9				
WFE-7	R-6	23.1-23.5	0.2	164	163	UC		20830	0.29	7E+06	
WFE-9A	R-1	7.0-7.3				M	9				
WFE-9A	R-1	7.3-7.7	0.2	161	160	UC		32720	0.44	9E+06	
WFE-9A	R-7	28.4-28.8	0.1	169	168	UC		38760	0.35	1E+07	
WFE-9A	R-7	29.1-29.4				M	9				
WFE-9B	R-2	3.2-3.5				M	8				
WFE-9B	R-2	3.6-4	0.2	167	166	UC		22400	0.28	8E+06	
WFE-9B	R-3	7.4-7.6				M	7-8				
WFE-9B	R-3	7.6-8	0.1	170	170	UC		40230	0.41	1E+07	
WFE-14	R-2	27.85-28.25	0.6	169	168	UC		7460	0.25	3E+06	
WFE-14	R-2	29.4-29.7				M	3-4				

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



FAILURE PHOTO

Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.12	165	165	4.422	1.979

Specimen meets ASTM D4543 shape tolerances

Test Summary

Strain Rate (%/min)	Corrected Strain Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.09	0.38	29870	9E+06

Test by: DM
Test Date: Apr-12-21
Reviewed by: GET

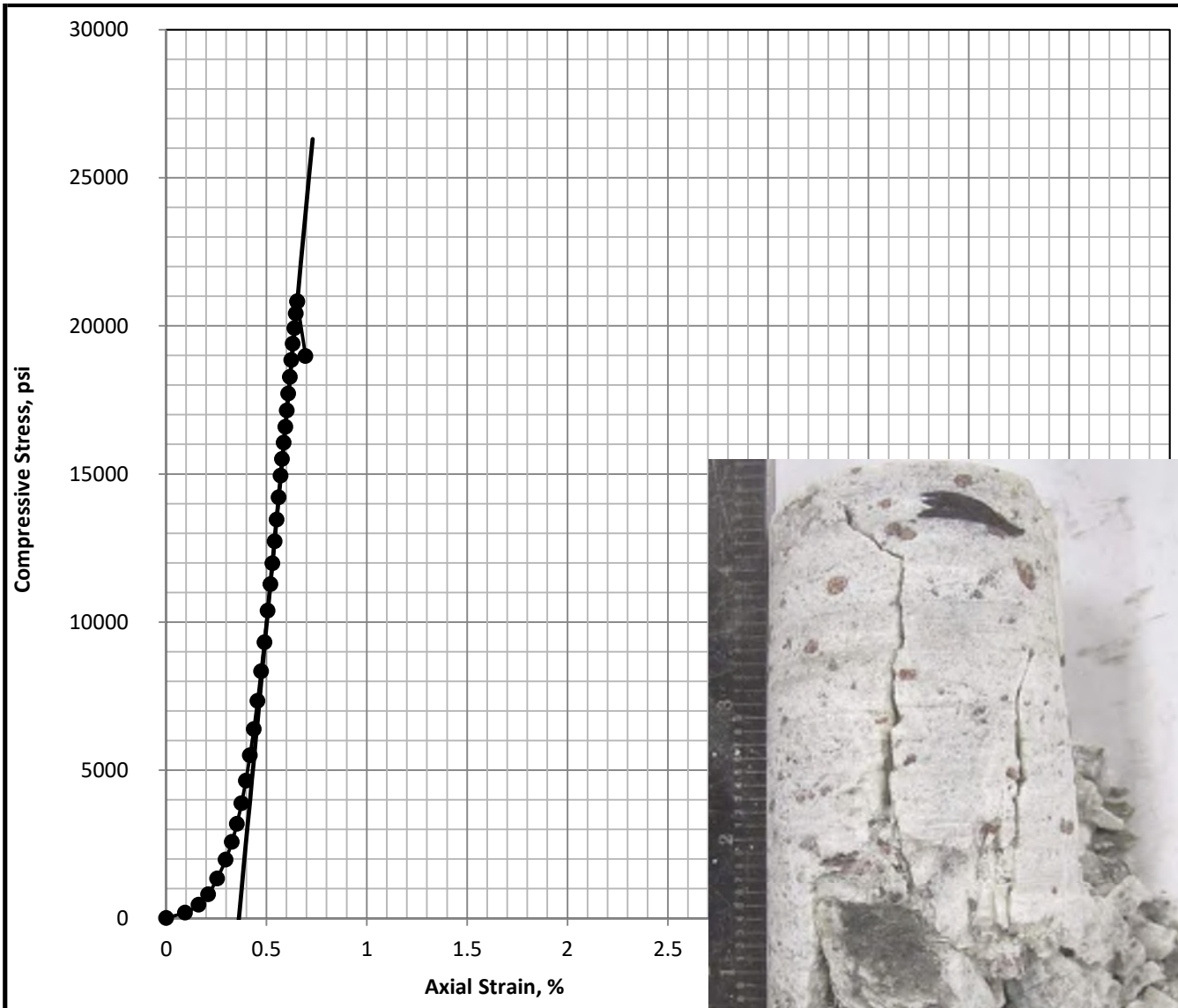
Aquifer

TerraSense, LLC
Project # 7853-21003

CHPE - Whitehall-Ft. Edward Borings

COMPRESSIVE STRESS VS STRAIN
UNCONFINED COMPRESSIVE STRENGTH TEST

Boring: WFE-7 Run: R-3
Depth 14.5-14.9 ft.



FAILURE PHOTO

Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.20	164	163	4.389	1.975

Specimen meets ASTM D4543 shape tolerances

Test Summary

Strain Rate (%/min)	Corrected Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.08	0.29	20830	7E+06

Test by: DM
Test Date: Apr-08-21
Reviewed by: GET

Aquifer	**CHPE - Whitehall-Ft. Edward Borings**	**COMPRESSIVE STRESS VS STRAIN UNCONFINED COMPRESSIVE STRENGTH TEST**
TerraSense, LLC Project # 7853-21003		**Boring: WFE-7 Run: R-6 Depth 23.1-23.5 ft.**

Boring Location Plans Page 4 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/28/2022** Finish Date: **1/28/2022**

Boring No.: **K-117.6-2.1** Sheet **1** of **2**

Coordinates
Northing **772033.124**
Easting **1684092.486**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **128.53**

Boring Advance By:
HW (4") Casing/3 7/8" Wet Rotary

Groundwater Observations

Date	Time	Depth	Casing
1/28/2022	AM	DRY	OPEN
1/28/2022	AM	0.7'	9.5'
1/28/2022	PM	*5.8'	9.5'
1/28/2022	PM	*6.5'	9.5'

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
0	CASING	1	0.0	2.0	SS	42 47 18 6	0.5	6" TOPSOIL & ORGANIC MATERIAL	20
1							0.8	Black mf SAND; trace SILT (moist, non-plastic) Frozen SP Possible FILL	
2		2	2.0	4.0	SS	6 16 25 17	1.7		10
3							3.0	Brown mf GRAVEL; little cmf SAND; trace SILT (wet, non-plastic) Frozen GP Possible FILL	
4		3	4.0	6.0	SS	8 8 10 6	3.7		8
5							4.0	Orangish-Brown mf+ SAND; trace SILT (wet, non-plastic) SP Possible FILL	
6		4	6.0	8.0	SS	4 4 5 5	6.0	Greyish-Brown f SAND; little SILT (wet, non-plastic) SM Possible FILL	12
7									
8		5	8.0	10.0	SS	1 2 1 2		ASPHALT Fragments FILL	7
9								Grey f SAND; little SILT (saturated, non-plastic) SM	
10	WET ROTARY							Grey SILT; little f SAND (saturated, non-plastic) ML w = 15.4%	
11								Grey SILT; little f SAND; trace CLAY (saturated, very slightly plastic) ML	
12							12.0	Advanced casing to 9.5 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
13									
14		6	14.0	16.0	SS	WH/18" 1		Mottled Brownish-Grey CLAY; and mf SAND; little SILT; trace ORGANIC MATERIAL (vegetation) (saturated, plastic) CL	24
15								w = 47.9%, LL = 41, PL = 19, PI = 22 % Fines = 57.2%	
16									
17							17.0		
18									
19		7	19.0	21.0	SS	WH/18" 1		Mottled Reddish-Greyish-Brown SILT; some f SAND; little CLAY; trace ORGANIC MATERIAL (vegetation) (saturated, slightly plastic) ML	24
20									
21									
22							22.0		
23									
24		8	24.0	26.0	SS	2 3 4 5		Grey f SAND; trace SILT; trace ORGANIC MATERIAL (woody	12
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Mark Childs; Ian Ross**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-117.6-2.1** Report No.: **CD10279D-01-03-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
26								vegetation, stalks) (saturated, non-plastic) SP	
27									
28									
29		9	29.0	31.0	SS	4 6 5 7		Orangish-Brown cm+f SAND; trace SILT; trace f GRAVEL (saturated, non-plastic) SW-SM w = 16.4% % Fines = 8.1%	16
30									
31									
32									
33									
34		10	34.0	36.0	SS	6 6 5 7		Brown cmf+ SAND; trace SILT (saturated, non-plastic) SW	23
35									
36									
37									
38		11	38.0	40.0	SS	6 6 7 7		(3" Brass Lined Split Spoon) Orangish-Brown c-m+f SAND; trace SILT; trace mf GRAVEL (saturated, non-plastic) SP-SM w = 16.4% % Fines = 5.6%	
39									
40		12	40.0	42.0	SS	6 9 10 10	40.0		24
41							40.8	(3" Brass Lined Split Spoon) Grey mf+ SAND; trace SILT (saturated, non-plastic) SP	
42							42.0	(3" Brass Lined Split Spoon) Brown mf+SAND; trace SILT (saturated, non-plastic) SP Three attempts were made to collect S-13 (42.0'-44.0'). Probable flowing sands caused borehole to collapse, unable to obtain sample.	
43									
44									
45									
46									
47								Boring terminated at 42.0 feet.	
48									
49								Notes: 1. Borehole backfilled with cement-bentonite grout. 2. Soil classifications based on ATL Field Engineer's field classifications. 3. Borehole was advanced with ATL's CME 75 Truck (Rig Unit No. CDGV451) drill rig.	
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/28/2022** Finish Date: **2/2/2022**

Boring No.: **K-117.6-2.3** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/31/2022	PM	6.6'	10.0'
2/1/2022	AM	*6.4'	10.0'
2/2/2022	AM	*6.4'	10.0'
2/2/2022	PM	*5.3'	10.0'

Coordinates
Northing **771536.184**
Easting **1683010.048**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **129.297**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary/NX Core**

Borehole caved at 39.5 feet. *May be affected by water utilized to advance the borehole.

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%)	Recovery (Inches)
1	CASING						0.3	4" ASPHALT PAVEMENT	
							1.0		
		1	1.0	1.3	SS	50/4"	1.3	8" CONCRETE	4
2		2	2.0	4.0	SS	43 31 17 8	2.6	Brown mf+ SAND; little SILT (frozen, non-plastic) SM FILL	14
3								CRUSHER RUN STONE FILL	
4		3	4.0	6.0	SS	7 5 9 8		Brown mf+ SAND; trace SILT (wet, non-plastic) SP Brown f SAND; trace f GRAVEL; trace SILT (saturated,	12
5							5.7	non-plastic) SP	
6		4	6.0	8.0	SS	10 13 13 6	6.0	Grey SILT; trace f SAND (saturated, non-plastic) ML	16
7							7.5	Brown c-mf+ SAND; some SILT; little m+f GRAVEL (saturated,	
8		5	8.0	9.9	SS	1 1 2 50/5"	8.0	non-plastic) SM w = 13.7% % Fines = 25.0% Grey SILT; little f SAND (saturated, non-plastic) ML	12
9							9.5		
10	WET ROTARY							Brown mf SAND; trace SILT (saturated, non-plastic) SP	
11								Encountered possible WEATHERED ROCK at 9.5 feet.	
12								Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
13									
14		6	14.0	14.0	SS	50/0"		NO RECOVERY - Possible WEATHERED ROCK Fragments in split spoon shoe	0
15	NX CORE (WET)		15.0	20.0	NX	RUN 1	15.0	Advanced 3 7/8" tri-cone roller bit to 15.0 feet and began coring.	57
16								Grey SANDSTONE	
17								57" or 95% Recovery	
18								9 Pieces (56") - 2% Chips and Fragments	
19								6 Pieces longer than 4" (48") - RQD = 80%	
20							20.0		
			20.0	25.0	NX	RUN 2		Grey SANDSTONE	51
21								51" or 85% Recovery	
22								4 Pieces (42") - 18% Chips and Fragments	
23								4 Pieces longer than 4" (42") - RQD = 70%	
24								Encountered vertical fractures from 23.0 feet to 25.0 feet.	
25							25.0		

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jake Crary; Mike Cole; Ian Ross**

Inspector **Tom Hunter (ATL); Ryan Morrison (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-117.6-2.3** Report No.: **CD10279D-01-03-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
			25.0	30.0	NX	RUN 3		Grey SANDSTONE 58" or 97% Recovery 6 Pieces (48") - 17% Chips and Fragments 4 Pieces longer than 4" (44") - RQD = 73% Encountered vertical fractures from 27.7 feet to 28.7 feet.	58
							30.0		
			30.0	35.0	NX	RUN 4		Grey SANDSTONE 60" or 100% Recovery 4 Pieces (48") - 20% Chips and Fragments 4 Pieces longer than 4" (48") - RQD = 80% Encountered vertical fractures from 30.5 feet to 31.5 feet.	60
							35.0		
			35.0	40.0	NX	RUN 5		Grey SANDSTONE 39" or 65% Recovery 6 Pieces (39") - 0% Chips and Fragments 4 Pieces longer than 4" (34") - RQD = 57% Encountered loss of drilling water return from 37.0 to 38.5 feet.	39
							40.0		
								Boring terminated at 40.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classifications.
3. Borehole was advanced with ATL's CME 45 Truck (Rig Unit No. CDGA461) drill rig.

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

Champlain Hudson Power Express
Kiewit Engineering (NY) Corp.

K-102.1 - Run 1

K-117.6-2.3 - Runs 1 through 4

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-117.6-0.2	S-4	6.0 - 8.0	Brownish-Grey mf SAND; and SILT	41.7	25.3	NP	NP	NP	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey mf SAND; some SILT	23.5	18.3	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT; trace f SAND	99.7	55.0	65	26	39	--	--	--	--	--	--	--	--
K-117.6-1.6A	S-2	4.0 - 6.0	Brown cmf+ SAND; little f GRAVEL; trace SILT	--	--	--	--	--	--	400	25	8.20	14,190	--	--	--
	S-3	6.0 - 8.0	Brown cmf SAND; some SILT; trace f GRAVEL	21.0	6.8	--	--	--	--	--	--	--	--	--	--	--
	S-6	19.0 - 21.0	Grey CLAY; little SILT; little f SAND	--	25.3	46	20	26	--	--	--	--	--	--	--	--
	S-8	28.0 - 30.0	Grey CLAY; some mf SAND; trace SILT	70.0	33.3	47	19	28	--	--	--	--	--	--	--	--
K-117.6-1.6B	S-4	6.0 - 7.2	Brown cmf SAND; and f GRAVEL; trace SILT	--	10.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Orangish-Greyish-Brown c-mf+ SAND; little SILT; trace f GRAVEL	20.0	18.2	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; and cmf+ SAND; trace f GRAVEL; trace SILT	48.0	26.7	43	18	25	--	--	--	--	--	--	--	--
K-117.6-1.6C	S-4	8.0 - 9.3	Greyish-Brown SILT; little cmf+ SAND; trace f GRAVEL	--	17.6	--	--	--	--	--	--	--	--	--	--	--
	S-6	19.0 - 21.0	Greyish-Brown c-mf SAND; some SILT; trace mf+ GRAVEL	26.0	12.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	28.0 - 30.0	Grey CLAY; and cmf- SAND; trace f GRAVEL; trace SILT	55.2	35.1	44	18	25	--	--	--	--	--	--	--	--
K-117.6-2.1	S-4	6.0 - 8.0	Grey SILT; little f SAND	--	15.4	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Mottled Brownish-Grey CLAY; and mf SAND; little SILT; trace ORGANIC MATERIAL (vegetation)	57.2	47.9	41	19	22	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Orangish-Brown cm+f SAND; trace SILT; trace f GRAVEL	8.1	16.4	--	--	--	--	--	--	--	--	--	--	--
	S-11	38.0 - 40.0	Orangish-Brown c-m+f SAND; trace SILT; trace mf GRAVEL	5.6	16.4	--	--	--	--	--	--	--	--	--	--	--
K-117.6-2.3	S-4	6.0 - 8.0	Brown c-mf+ SAND; some SILT; little m+f GRAVEL	25.0	13.7	--	--	--	--	--	--	--	--	--	--	--
	RC-4	30.1 - 31.2	Grey SANDSTONE	--	--	--	--	--	--	--	--	--	--	--	1,311	4.43
	RC-4	32.7 - 33.0	Grey SANDSTONE	--	--	--	--	--	--	--	--	--	--	20,440	--	--
K-122.35	S-3	4.0 - 6.0	Orangish-Brown SILT; trace f SAND	--	23.5	NP	NP	NP	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Orangish-Brown SILT; trace f SAND; trace ORGANIC MATERIAL (roots)	--	--	--	--	--	4.5	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Brown c-mf SAND; little SILT; trace f GRAVEL	13.0	23.8	--	--	--	--	--	--	--	--	--	--	--

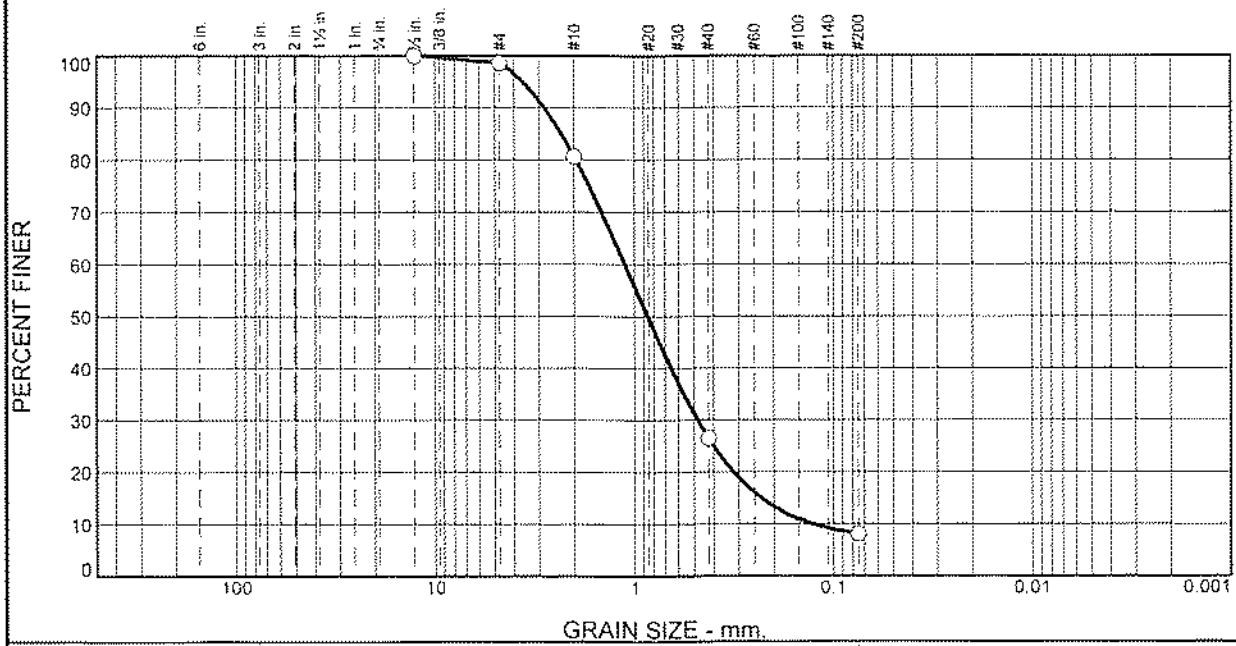
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-03-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/18/22

Sample No: K-117.6-2.1 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 29-31'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	18	55	18	8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	99		
#10	81		
#40	26		
#200	8.1		

* (no specification provided)

Soil Description

Orangish Brown cm+f SAND: trace SILT; trace f GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 2.3265 D_{60}= 1.1179 D_{50}= 0.8598
D_{30}= 0.4818 D_{15}= 0.2330 D_{10}= 0.1292
C_u= 8.66 C_c= 1.61

Classification

USCS= AASHTO=

Remarks

Moisture Content= 16.4%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 02/18/22

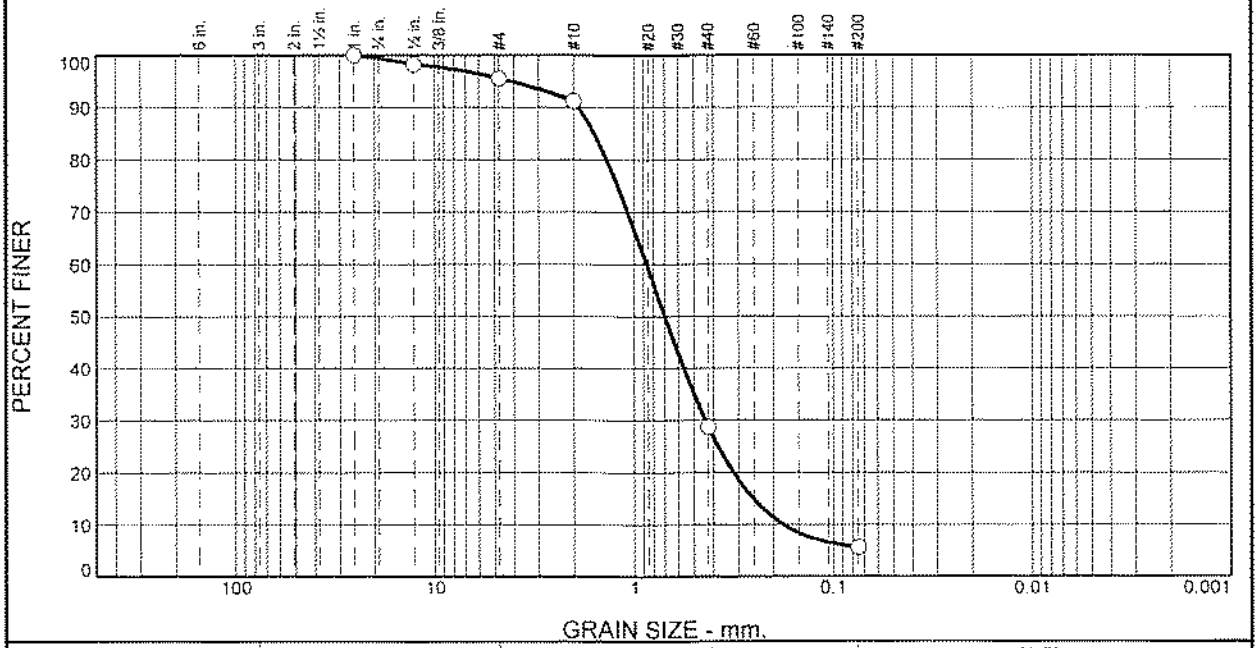
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-03-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/18/22

Sample No: K-117.6-2.1 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 38-40'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	3	5	62	23	6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1"	100		
1/2"	98		
#4	96		
#10	91		
#40	29		
#200	5.6		

* (no specification provided)

Soil Description

Orangish Brown c-m+f SAND; trace SILT; trace mf GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 1.5829 D_{60}= 0.8666 D_{50}= 0.7014
D_{30}= 0.4408 D_{15}= 0.2543 D_{10}= 0.1800
C_u= 4.81 C_c= 1.25

Classification

USCS= AASHTO=

Remarks

Moisture Content= 16.4%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 02/18/22

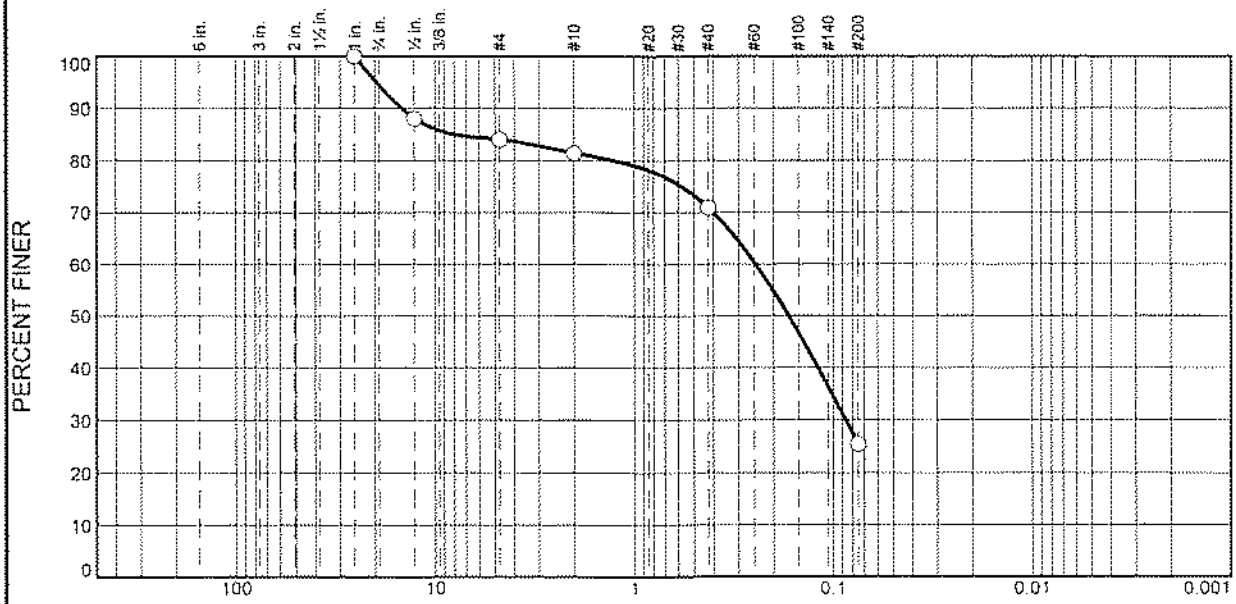
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-03-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/18/22

Sample No: K-117.6-2.3 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 6-8'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	6	10	3	10	46	25	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1"	100		
1/2"	88		
#4	84		
#10	81		
#40	71		
#200	25		

* (no specification provided)

Soil Description

Brown c-mf+ SAND; some SILT; little m+f GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 8.1571 D_{60}= 0.2469 D_{50}= 0.1685
D_{30}= 0.0868 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 13.7%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 02/18/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

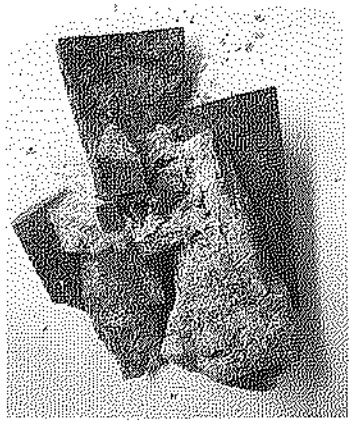
ATL Report No.: CD10279E-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS
ASTM D 7012, Method C

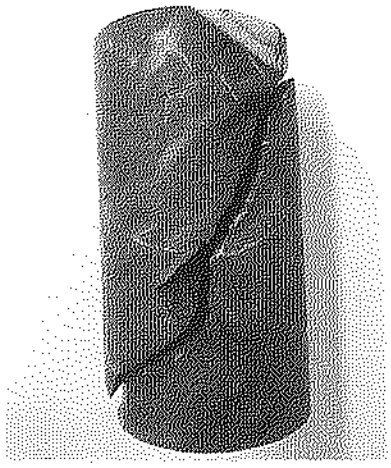
Boring No.	Sample No.	Depth (ft)	Diameter (in)	Length (in)	Load Rate (lbs/sec)	Total Load (lbs)	Area (in^2)	Compressive Strength (psi)
K-117.6-2.3	RC-4	32.7-33.0	1.98	4.01	300	62,970	3.08	20,440
K-130.9	RC-2	31.5-31.8	1.98	4.04	280	22,240	3.08	7,220

Failure Pictures

K-117.6-2.3, RC-4, 32.7-33.0'



K-130.9, RC-2, 31.5-31.8'



Reviewed By: _____ Date: February 18, 2022

Kiewit

MEMORANDUM

DATE: September 23, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

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

SUBJECT: Geotechnical Data: Segment 3 – Package 2 - HDD Crossing 12 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located north of Fort Ann, New York. The approximate station for the start of HDD crossing Number 12 is STA 20180+00 (43.434406° N, 73.455951° W).

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

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- Kiewit Engineering Group Inc., Boring K-121.0, Champlain-Hudson Power Express, dated June 24, 2022
- Terracon, Field Exploration and Laboratory Testing Results, Champlain-Hudson Power Express Project-Package 4b, Schenectady, dated June 24, 2022

Contact us if you have questions or require additional information.

HDD 12
Borings WFE-9, WFE-9A, K-121.0
Segment 3 - Package 2

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

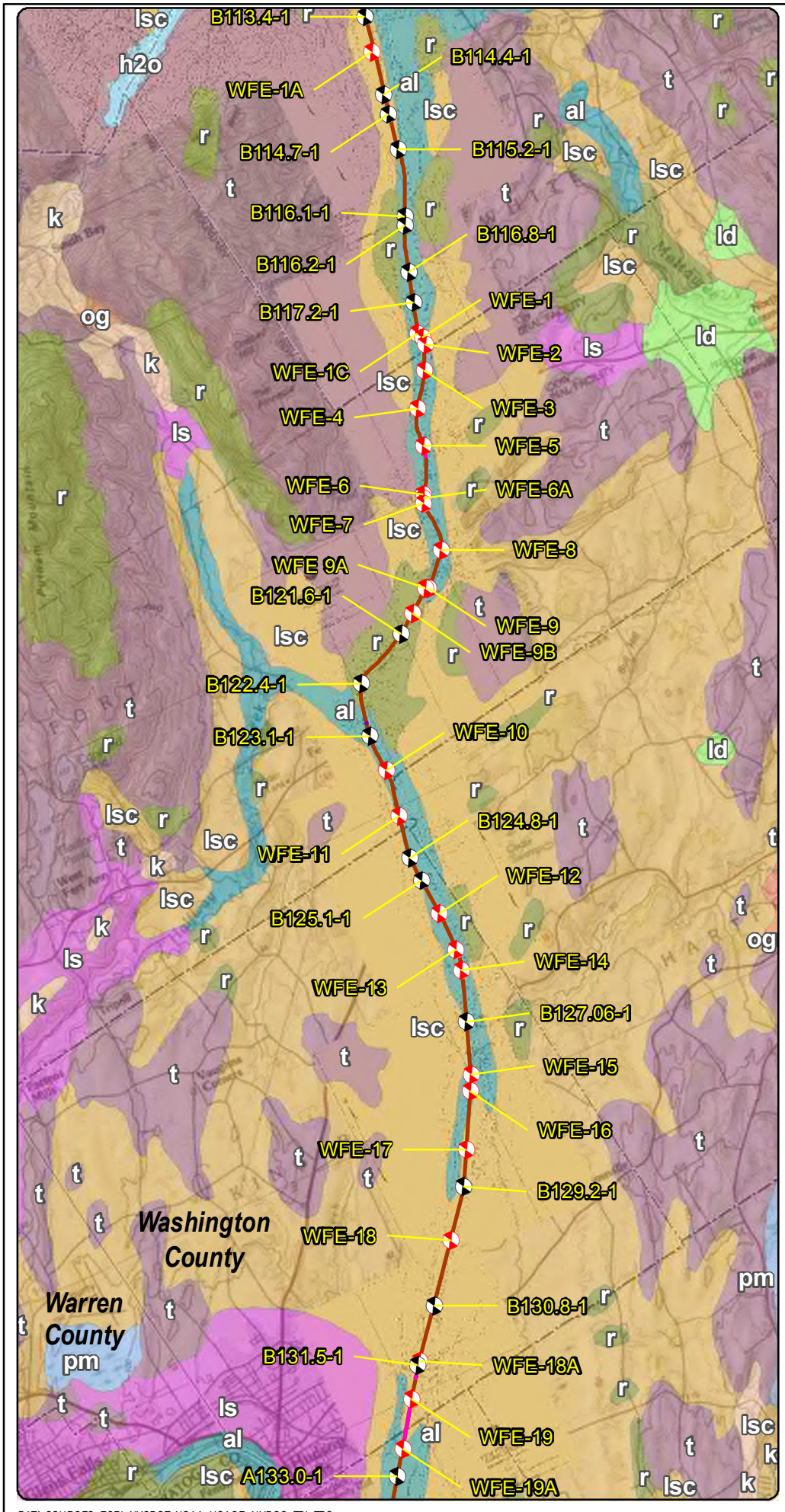
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

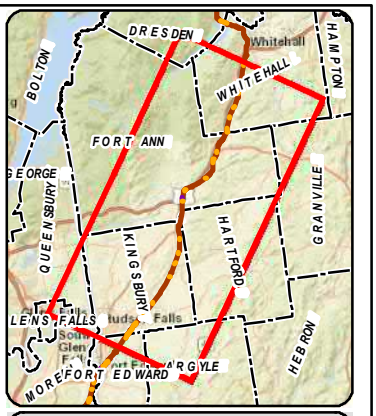
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

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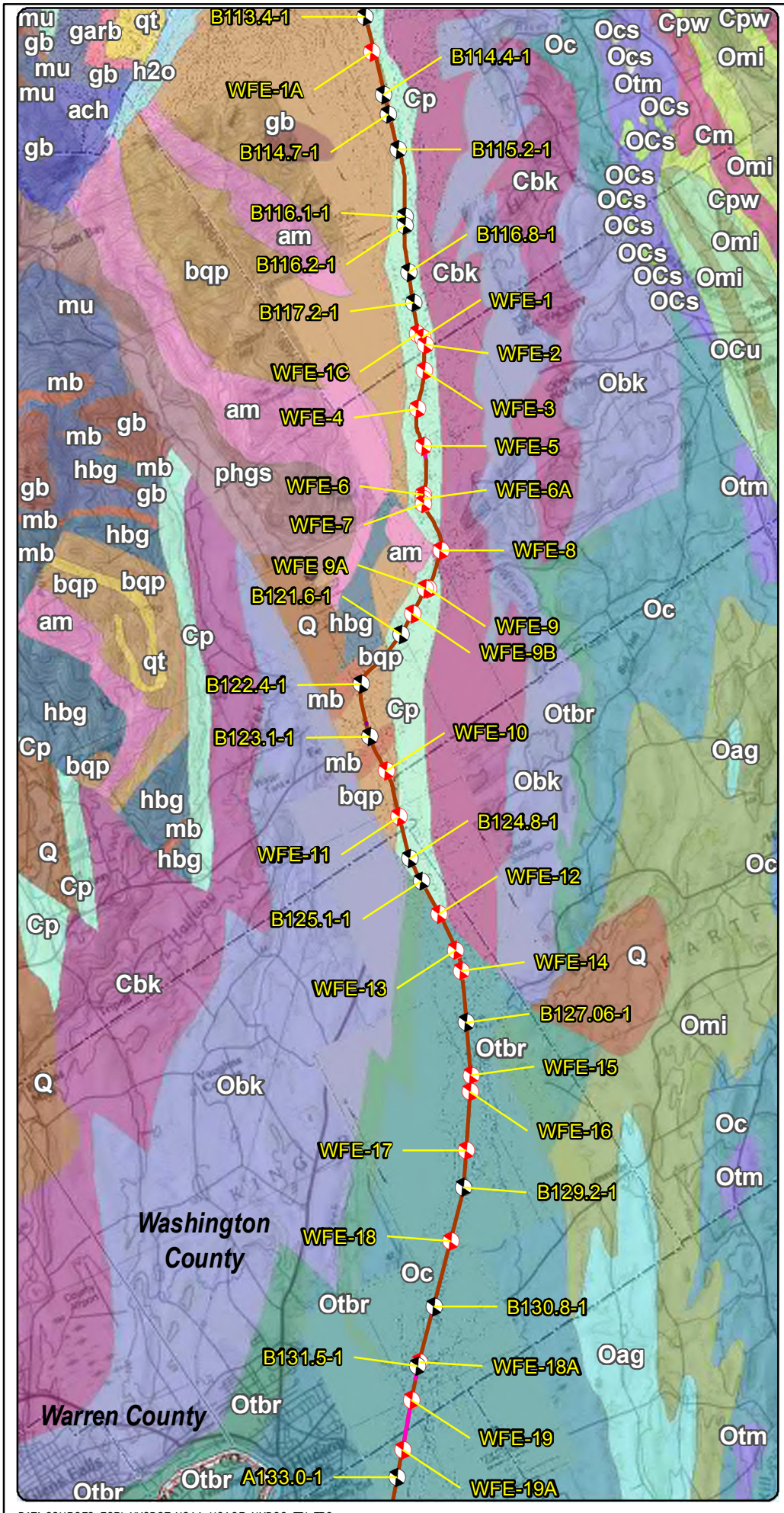

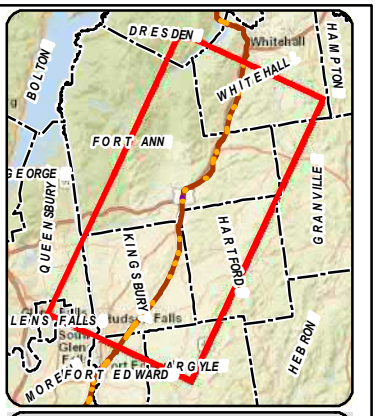

LEGEND

- 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

- Cbk - Beekmantown Group
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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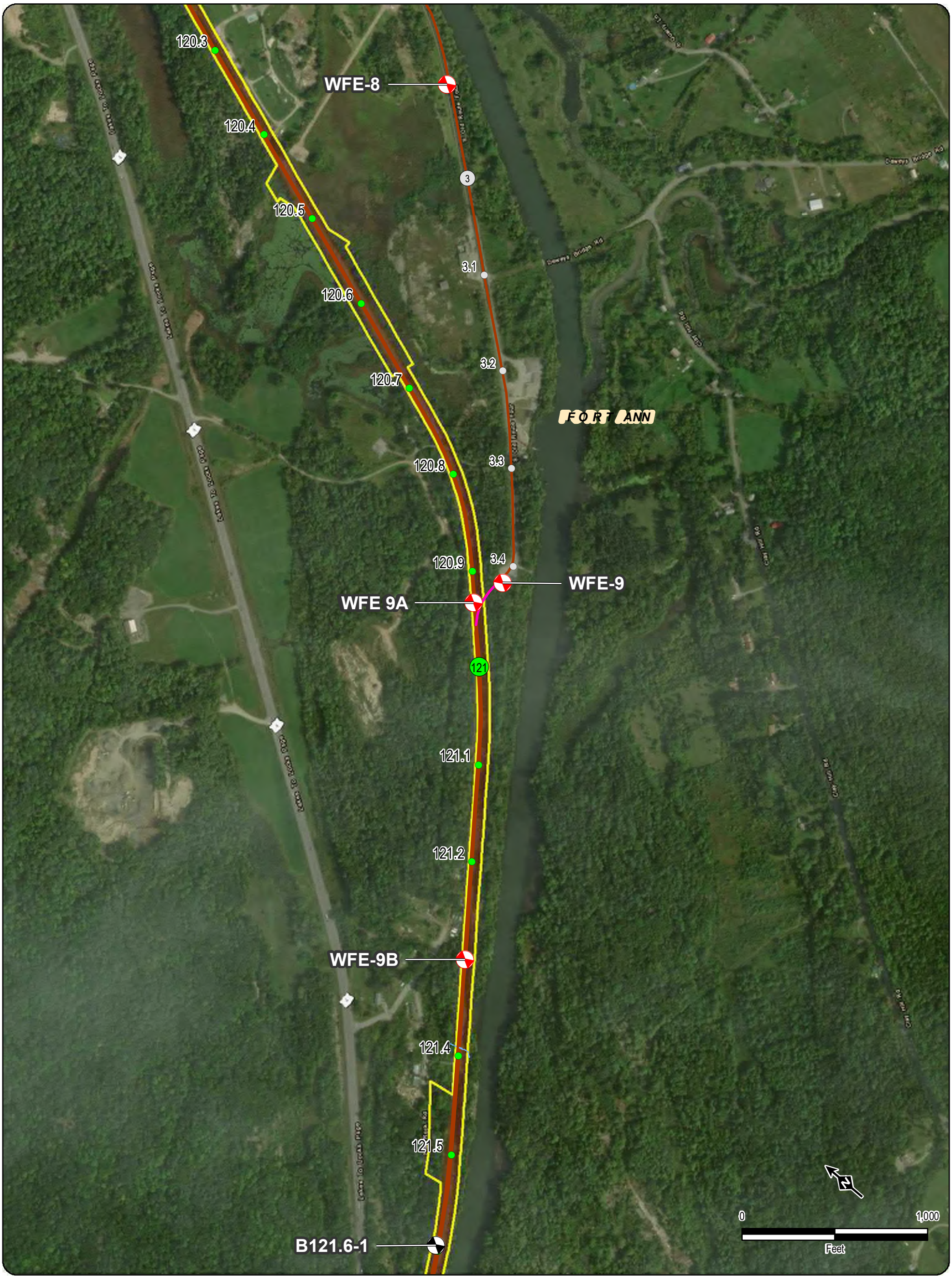

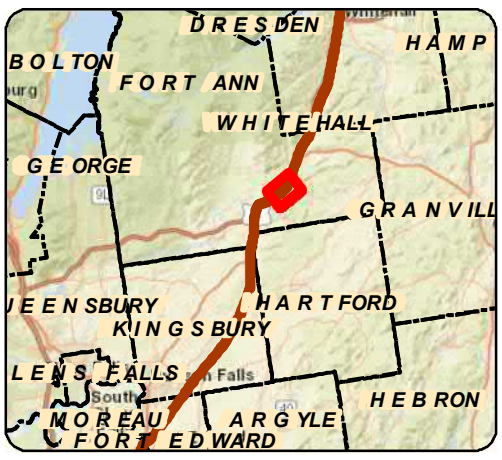

111.8 Certified Milepost - Tenths

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

LEGEND

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

Whitehall to Fort Edward

Figure A-3

Sheet 7 of 16

Prepared by: AECOM 5/19/2021

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

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Edward_Boring_Locations_Mapset_May_2021_Report.mxd

BORING CONTRACTOR: ADT	AECOM		SHEET 1 OF 2
DRILLER: Chris Chaillou			PROJECT NAME: CHPE -
SOILS ENGINEER/GEOLOGIST: Chris French	**BORING LOG**		PROJECT NO.: 60323056
LOCATION: Ft Ann Bypass MP - 3.42			HOLE NO.: **WFE-9**
			START DATE: 12/15/20
			FINISH DATE: 12/15/20
			OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: Geoprobe 7822DT
Water at 5' (inferred)	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit		BORING TYPE: SPT
	SIZE I.D.	4"	2.5"	- -		BORING O.D.: 4.5"
	SIZE O.D.	4.5"	3"	3 7/8"		SURFACE ELEV.:
	HAMMER WT.	140 lbs	140 lbs			LONGITUDE:
	HAMMER FALL	30"	30"			LATITUDE:

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE 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'-1.5'; Asphalt
1.0										1.5'-3.5'; Brown coarse-fine SAND, little subangular gravel, little rounded cobbles, trace silt
2.0										
3.0										
		3'-5'	S-1					SP		3.5'-5.0'; Brown medium-fine SAND, trace silty clay
4.0										TR-1; (3.0'-5.0')
5.0										
		5'-7'	S-2	24"	24"	2 5 6 6	7	SP	SAND	Gray fine-medium SAND, trace silt, heavy red/brown mottling, loose, saturated
6.0										
7.0										
		7'-9'	S-3	24"	18"	3 5 4 2	3	SP		Gray fine-medium SAND, trace silt; loose, saturated
8.0										TR-2; (8.0'-8.5')
9.0										
		9'-11'	S-4	24"	6"	4 3 2 2	3	SP		Brown and gray medium-fine SAND; loose, saturated
10.0										
11.0										
		11'-'13'	S-5	24"	18"	3 3 2 3	3	ML	SILT & CLAY	Dark brown SILT and clay, little fine sand; soft, moist
12.0										
13.0										
		13'-15'	S-6	24"	9"	5 5 4 4	6	ML		Gray SILT and clay, ilttle fine sand; soft, moist
14.0										
15.0										
		15'-17'	S-7	24"	24"	WOH WOH 1 2	1	CL		Gray CLAY and silt; medium stiff, moist, TR-3; (16.0'-16.5')
16.0										
17.0										
18.0										18.5' (*inferred*)
19.0									SAND	
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

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: Ft Ann Bypass MP - 3.42

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-9**

START DATE: 12/15/20

FINISH DATE: 12/15/20

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	24"	18"	WOH	WOH	WOH	2		SM		Gray fine SAND and silt, little clay; soft, moist
21.0													
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	12"	6	7	8	6	10	SP		Light gray medium SAND, little fine sand, trace silt; saturated, medium dense
26.0													TR-4; (26.0'-26.5')
27.0													
28.0													
29.0													
30.0												SAND	
		30'-32'	S-10	24"	12"	9	15	10	10	16	SP		SAA
31.0													
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	14"	8	12	14	10	17	SP		Light brown fine-medium SAND, trace silt; saturated, medium dense
36.0													
37.0													
38.0													
		38'-40'	S-12	24"	13"	11	18	14	9	21	SP		SAA
39.0													TR-5; (39.0'-39.5')
40.0													
													Boring WFE-9 terminated at 40', grouted to surface
41.0													
42.0													
43.0													
44.0													
45.0													

NOTES:

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SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT	AECOM		SHEET 1 OF 2
			PROJECT NAME: CHPE -
DRILLER: Chris Chaillou			PROJECT NO.: 60323056
			HOLE NO.: **WFE-9A**
SOILS ENGINEER/GEOLOGIST: Chris French	**BORING LOG**		START DATE: 12/11/20
			FINISH DATE: 1/5/21 (Railroad Delay)
LOCATION: MP -120.93 (CP Rail)			OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: Geoprobe 7822DT
No water observed	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit	NQ	BORING TYPE: SPT/Core
	SIZE I.D.	4"	2.5"	- -	1 7/8"	BORING O.D.: 4.5"/3"
	SIZE O.D.	4.5"	3"	3 7/8"	3"	SURFACE ELEV.:
	HAMMER WT.	140 lbs	140 lbs			LONGITUDE:
	HAMMER FALL	30"	30"			LATITUDE:

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)	N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-2'				Hand Cleared				0'-2' Bk m-c SAND, little sub angular gravel, moist
1.0										
2.0								SP	SAND	Br Gr m-c SAND, little sub angular gravel, little cobbles, little fine sand, moist TR-1; (2.0'-2.5')
		2'-2.5'	S-1							
3.0										
4.0										
	6.3	4'-8'	R-1	48"	43"	RQD: 29" = 60%				Casing set at 4' (1.5' into rock)
5.0										Gray-White Sandstone, hard, moderate jointing, moderate weathering, fractures from 0°-10°, 75° fracture 6.4'-6.7', oxidation starting in fractures, fine grain size
6.0										Casing advanced to 6'
7.0										
8.0										
	8.0	8'-9'	R-2	12"	10"	RQD: = 0%				SAA; Heavily jointed and weathered, significant iron staining
9.0										
	6.0	9'-14'	R-3	60"	60"	RQD: 49.5" = 83%				SAA; Light mechanical jointing, weathered
10.0										
11.0									SANDSTONE	TR-2; (9.7'-10.4')
12.0										
13.0										
14.0										
	6.4	14'-19'	R-4	60"	59"	RQD: 52" = 87%				SAA; SAA, losing water
15.0										
16.0										
17.0										
18.0										
19.0										
	4.8	19'-22.7'	R-5	46"	43"	RQD: 37.5" = 82%				SAA; fracture from 22.5'-22.7' at 65°, oxidation staing, losing water rapidly
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.

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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

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: MP -120.93 (CP Rail)

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-9A**

START DATE: 12/11/20

FINISH DATE: 1/5/21 (Railroad Delay)

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
21.0										
22.0										
23.0	6.1	22.7'-24.5'	R-6	20"	19"	RQD: 5" = 25%				SAA; moderate fracturing 90°, high oxidation staining
24.0										
25.0	5.2	24.5'-29.5'	R-7	60"	60"	RQD: 54" = 90%				SAA; Slight mechanical jointing, quartzlite sealed fracture at 28.5'-29.0'
26.0										TR-3; (25.9'-26.7')
27.0										
28.0										
29.0										
30.0	5.6	29.5'-34.5'	R-8	60"	58"	RQD: 56.5" = 94%			SANDSTONE	SAA
31.0										TR-4; (32.1'-32.8')
32.0										
33.0										
34.0										
35.0	6.4	34.5'-39.5'	R-9	60"	59"	RQD: 58.5" = 97.5%				SAA
36.0										
37.0										
38.0										
39.0										
40.0										WFE-9A Complete, terminated at 39.5', grouted to surface
41.0										
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

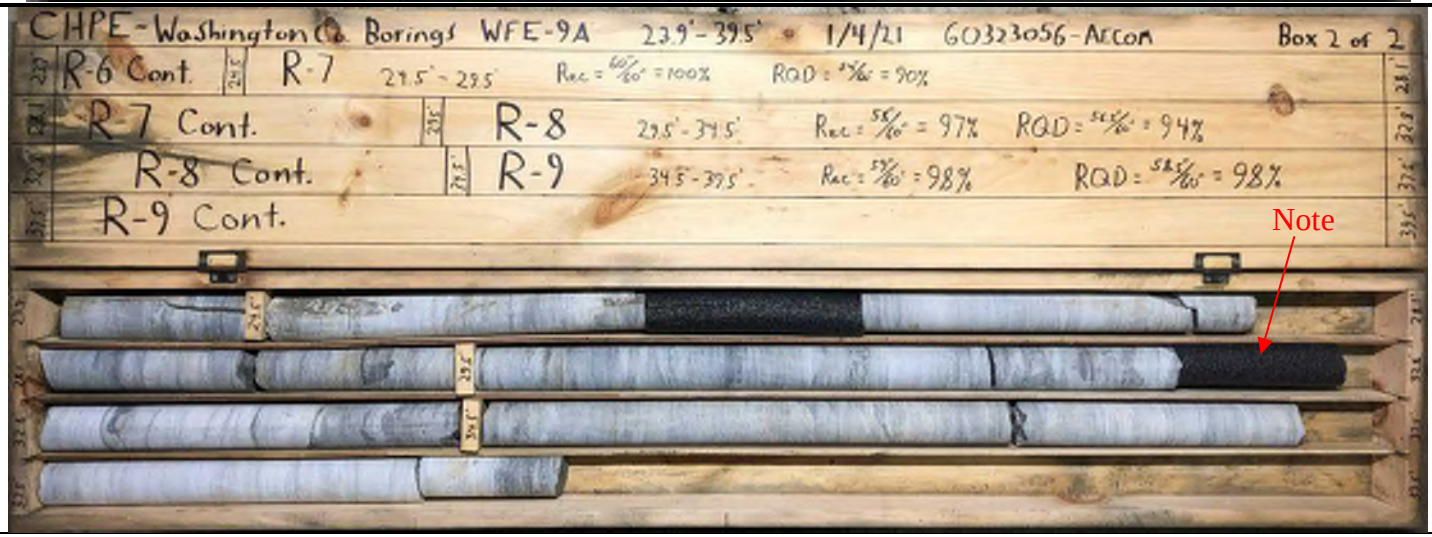
PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

ROCK CORE PHOTOGRAPHIC LOG

AECOM Project No: **60323056**
Project Name: **CHPE – Upstate New York Upland Geotechnical Investigation**
Location: **Whitehall – Fort Edward Segment**

Boring No.	Depth (ft.)
WFE-9A	4.0-23.9

Boring No.	Depth (ft.)
WFE-9A	23.9-39.5

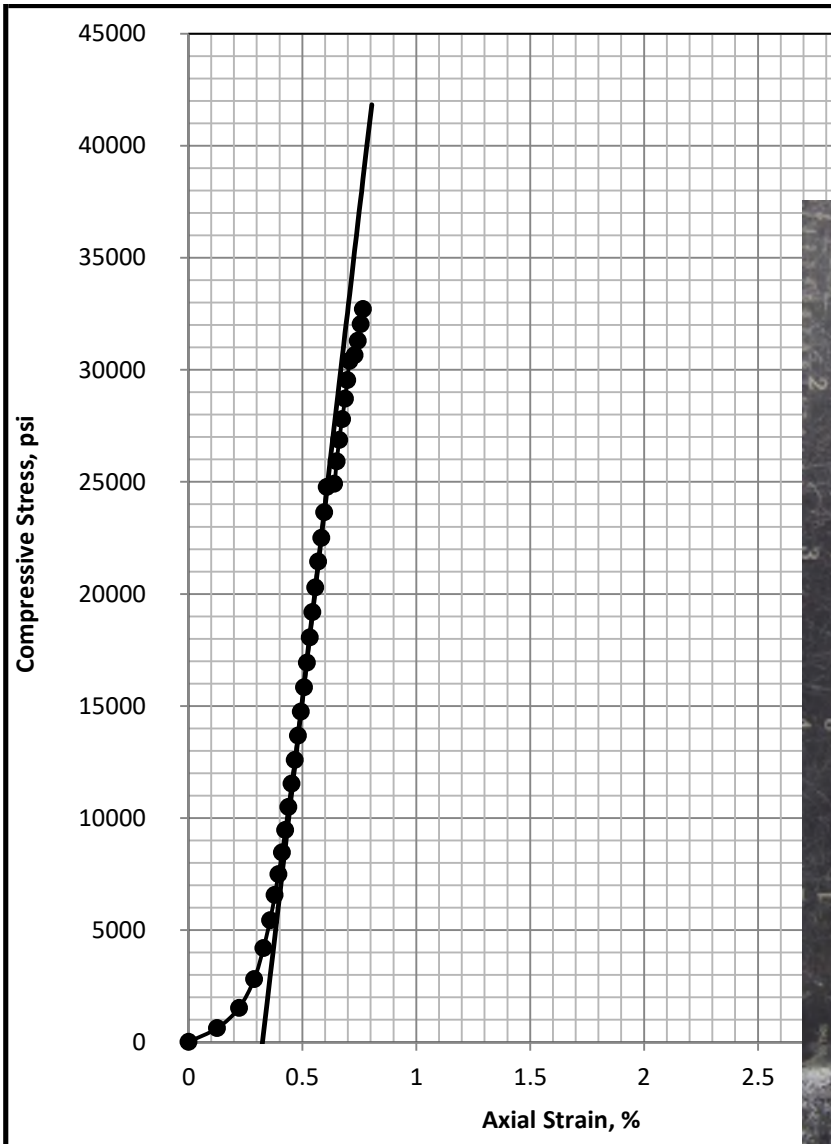


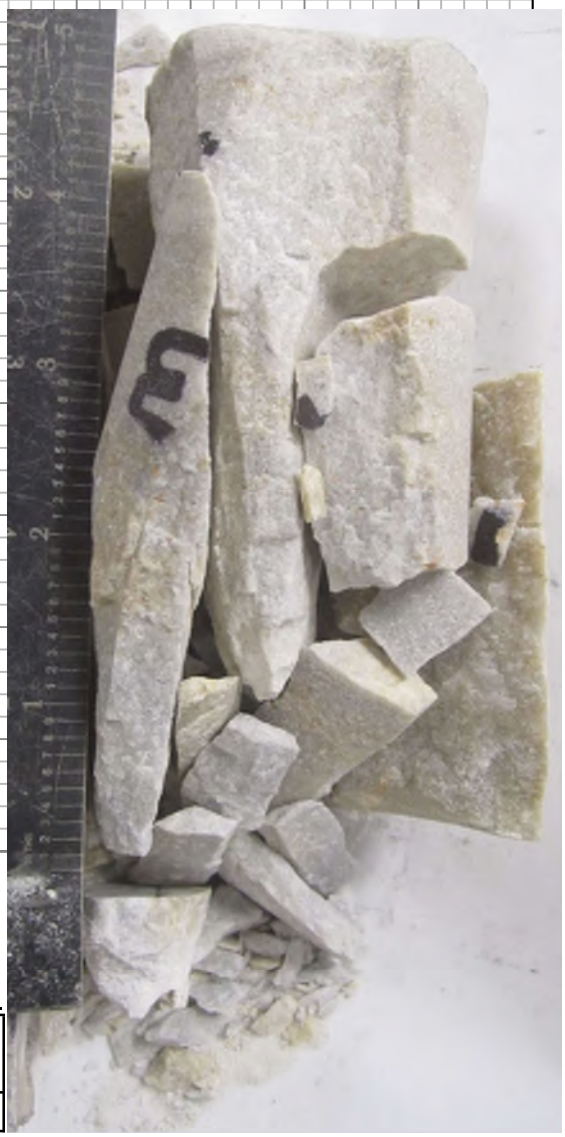
Note: Black foam inserts represent core pieces that were removed for geotechnical and/or thermal resistivity laboratory testing

Aquifer
CHPE - Whitehall-Ft. Edward Borings
SUMMARY OF ROCK TESTING

SAMPLE IDENTIFICATION			STATE PROPERTIES			ENGINEERING PROPERTY TESTS					REMARKS
Boring	Run	Depth	WATER CONTENT (1) (%)	TOTAL UNIT WGT. (pcf)	DRY UNIT WGT. (pcf)	TEST TYPE (2)	Mohs HARDNESS (-)	UNCONFINED COMPRESSION TESTS (ASTM D7012)			
								COMPRESSIVE STRENGTH (psi)	AXIAL STRAIN @ FAILURE (%)	ESTIMATED (5) ELASTIC MODULUS (psi)	
WFE-7	R-3	13.6-13.9				M	9				
WFE-7	R-3	14.5-14.9	0.1	165	165	UC		29870	0.38	9E+06	
WFE-7	R-6	20.6-20.8				M	9				
WFE-7	R-6	23.1-23.5	0.2	164	163	UC		20830	0.29	7E+06	
WFE-9A	R-1	7.0-7.3				M	9				
WFE-9A	R-1	7.3-7.7	0.2	161	160	UC		32720	0.44	9E+06	
WFE-9A	R-7	28.4-28.8	0.1	169	168	UC		38760	0.35	1E+07	
WFE-9A	R-7	29.1-29.4				M	9				
WFE-9B	R-2	3.2-3.5				M	8				
WFE-9B	R-2	3.6-4	0.2	167	166	UC		22400	0.28	8E+06	
WFE-9B	R-3	7.4-7.6				M	7-8				
WFE-9B	R-3	7.6-8	0.1	170	170	UC		40230	0.41	1E+07	
WFE-14	R-2	27.85-28.25	0.6	169	168	UC		7460	0.25	3E+06	
WFE-14	R-2	29.4-29.7				M	3-4				

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





Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.16	161	160	4.403	1.982

Specimen meets ASTM D4543 shape tolerances

FAILURE PHOTO

Test Summary

Strain Rate (%/min)	Corrected Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.09	0.44	32720	9E+06

Test by: DM
Test Date: Apr-12-21
Reviewed by: GET

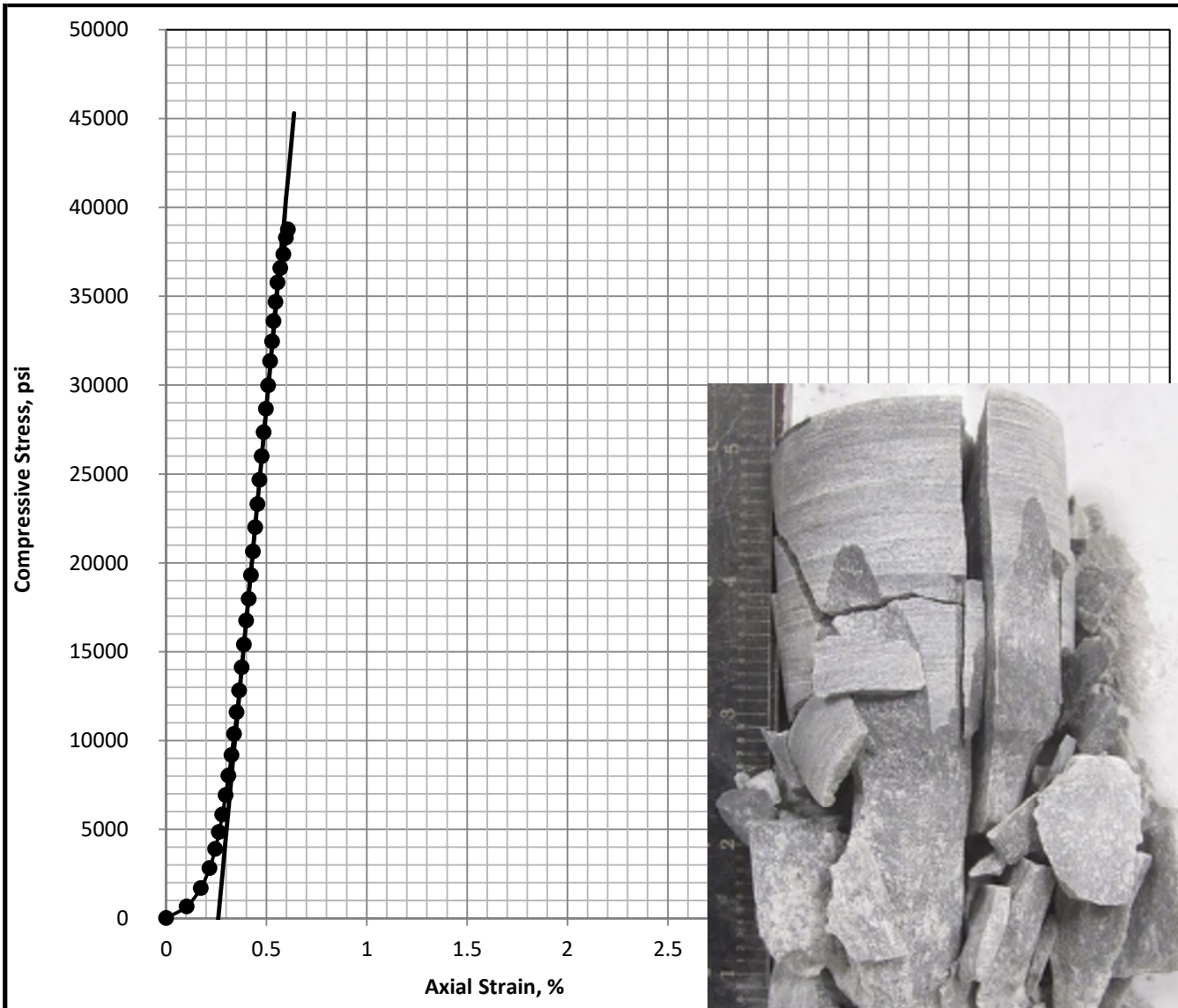
Aquifer

TerraSense, LLC
Project # 7853-21003

CHPE - Whitehall-Ft. Edward Borings

COMPRESSIVE STRESS VS STRAIN
UNCONFINED COMPRESSIVE STRENGTH TEST

Boring: WFE-9A Run: R-1
Depth 7.3-7.7 ft.



FAILURE PHOTO

Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.10	169	168	4.438	1.975

Specimen meets ASTM D4543 shape tolerances

Test Summary

Strain Rate (%/min)	Corrected Strain Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.06	0.35	38760	1E+07

Test by: DM
Test Date: Apr-08-21
Reviewed by: GET

Aquifer

TerraSense, LLC
Project # 7853-21003

CHPE - Whitehall-Ft. Edward Borings

COMPRESSIVE STRESS VS STRAIN
UNCONFINED COMPRESSIVE STRENGTH TEST

Boring: WFE-9A Run: R-7
Depth 28.4-28.8 ft.

K-121.0 Boring Location Plan

Champlain Hudson Power Express

New York

PROJECT NUMBER 20001480

CREATED BY Kiewit

DATE 06/24/2022

Legend Key

- Kiewit Borings (2022)
- Borings by Others

Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-121.0

PROJECT NUMBER	20001480	**LOGGED BY**	Tom Kimmins	**COORDINATES**	N 1677775.07 E 768972.30 approx.
START DATE	05/10/2022	**DRILLER/RIG**	M. Eaves / Diedrich D-90	**GROUND ELEV.**	140.0 ft approx.
FINISH DATE	05/12/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0		FILL; SAND with silt and gravel, black, loose			29%		2-2-3-2 (5)	Boring advanced with 6" HSA
					34%		3-3-2-2 (5)	
	136.0	FILL; SAND, fine, brown, very loose						
5					42%		1-2-1-2 (3)	
	134.0	FILL; SAND with silt and gravel, organics, brown, loose						
					38%		2-3-2-8 (5)	
		Auger Refusal at 8 ft, began NQ corings						
	132.0	Sandstone, weathered, highly, fractured, moderately hard, gray			46% 17			
10								
					43% 0			
15	125.0	Sandstone, moderate fracturing, minor weathering, hard, grayish-white			100% 96			
					88% 88			
20	119.5	Sandstone, weathered, moderate fracturing, both vertical and horizontal, moderately hard, gray						Two coring shoes were burned up during drilling of the test boring.
					100% 76			
25								Very little to no water return during rock coring.
					100% 93			
30								

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: K-121.0

PROJECT NUMBER	20001480	**LOGGED BY**	Tom Kimmins	**COORDINATES**	N 1677775.07 E 768972.30 approx.
START DATE	05/10/2022	**DRILLER/RIG**	M. Eaves / Diedrich D-90	**GROUND ELEV.**	140.0 ft approx.
FINISH DATE	05/12/2022	**DRILL CONTRACTOR**	Parratt Wolff	**HAMMER TYPE/EFF.**	Manual

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			Sandstone, weathered, moderate fracturing, both vertical and horizontal, moderately hard, gray			100% / 93			
	107.0		Boring Terminated at 33 ft						

Legend

- ▲ SPT N Value
- ● MC (%)
- — PL & LL (%)
- ⊠ Fines Content (%)

20 40 60 80

35 40 45 50 55 60

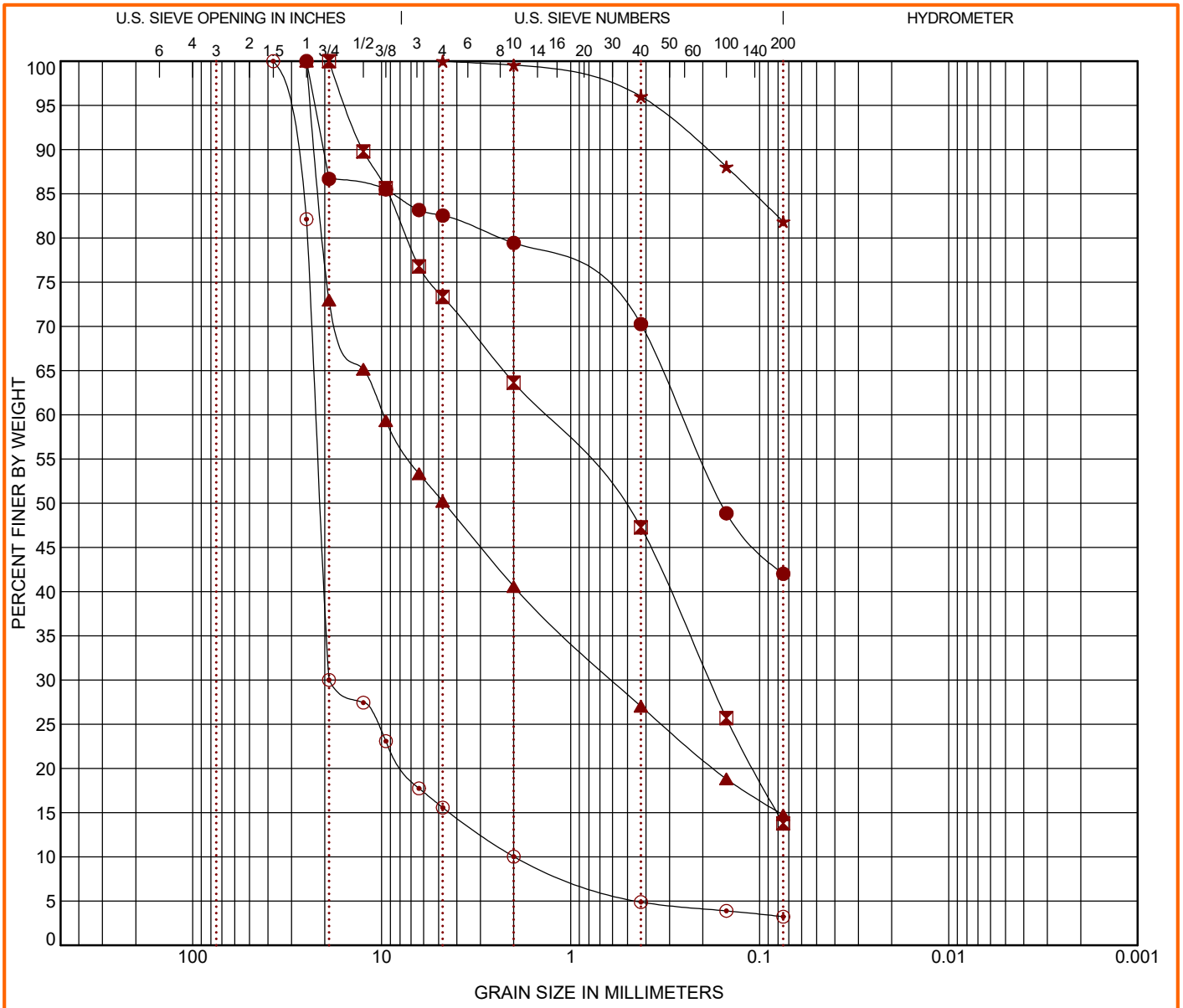
PHOTOGRAPHY LOG

K-121.0 - Runs 1-6 (Logged by Kiewit)

K-121.0 – Run 7 (Logged by Kiewit)

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-121.0	6 - 8	SILTY SAND with GRAVEL (SM)	20.3					

Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
K-121.0	6 - 8	25	0.258			0.0	17.5	40.5		42.0	

PROJECT: Champlain-Hudson Power Express Package 4b

SITE: Champlain to Hudson HDD Crossings Schenectady, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256F

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

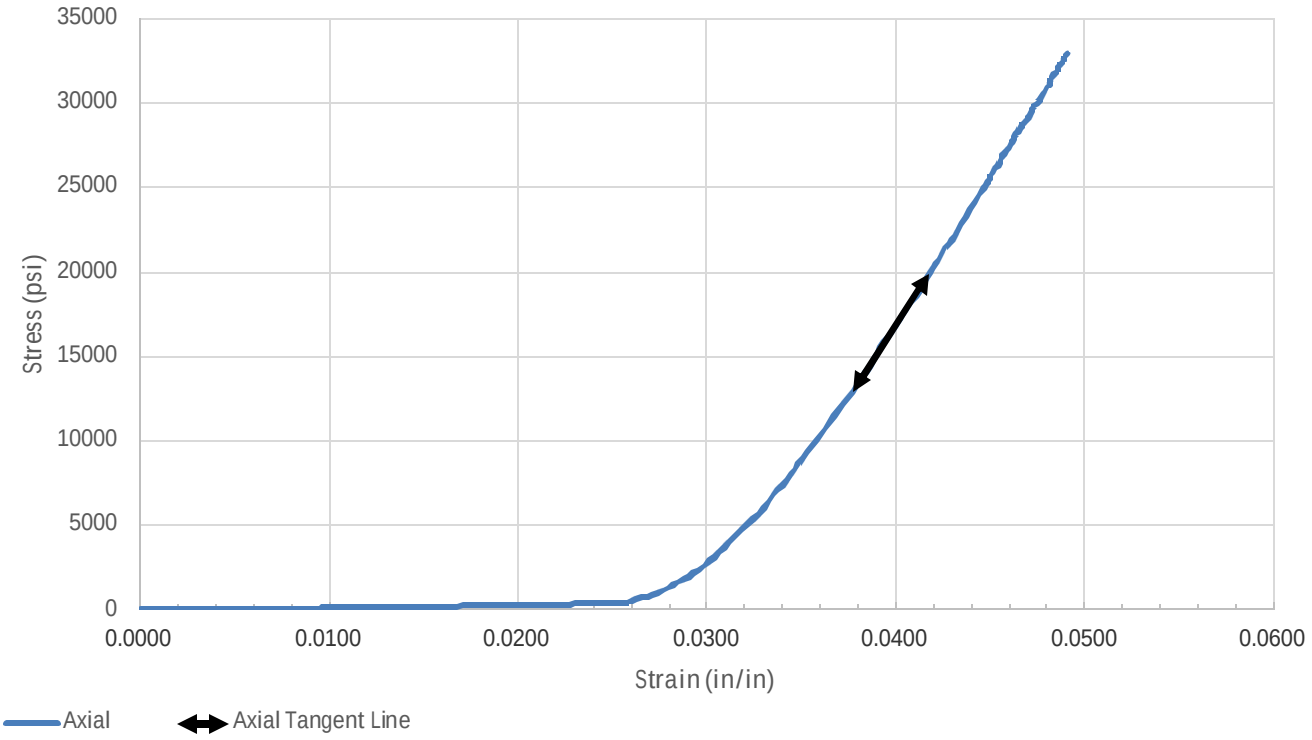
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256F CHAMPLAIN-HUDSON .GPJ TERRACON_DATATEMPLATE.GDT 6/16/22

Rock Core D7012 Method C

Client
Kiewit Engineering Corp

Project
Champlain-Hudson Power Express Project

Project No. JB215256



SAMPLE LOCATION

Site:	Kiewit Engineering Corp.		
Description:	Quartzite		
Boring:	K-121.0	Depth (feet):	25.0-30.0

SPECIMEN INFORMATION

Sample No.:	Lab: 5067	Mass (g):	553.55
Length (in.):	4.19	Diameter (in.):	1.99
L/D Ratio:	2.106	Density (pcf):	161.817

TEST RESULTS

Failure Load (lbs):	102374
Failure Strain (in/in):	0.056
Unconfined Compressive Strength (psi):	32,915
Elastic Modulus, E, (ksi):	1720
Time of Failure (min):	04:33
Rate of Loading (in/sec):	0.04
Moisture Content Post-break:	0.11%

Rock Core D7012 Method C

Client
Kiewit Engineering Corp

Project
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.

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	K-121.0	**Material Description**	Quartzite
Sample No		**Equipment Used**	Tinius Olsen (120,000lbs)
Depth (ft)	25-30	**TICCS ID/Serial No.**	C-48999, 118285
Lab No	5067	**Calibration Date**	11/2/2021

	TENSILE STRENGTH				
Lab No.	1	2	3	4	5
Diameter (in)	1.99	1.99	1.99	1.99	1.99
Length (in)	0.7	0.67	0.69	0.7	0.7
Length Diameter Ratio	0.35	0.34	0.35	0.35	0.35
Rate of Loading	0.007	0.0067	0.0069	0.007	0.007
Moisture Condition	0.16%	0.16%	0.16%	0.16%	0.16%
Maximum Applied Load (lbf)	8511	6925	4867	4442	4925
Splitting Tensile Strength (psi)	3891.6	3308.2	2257.7	2031.1	2251.9

	TENSILE STRENGTH				
Lab No.	6	7	8	9	10
Diameter (in)	1.99	1.99	1.99	1.99	1.99
Length (in)	0.68	0.57	0.6	0.57	0.63
Length Diameter Ratio	0.34	0.29	0.30	0.29	0.32
Rate of Loading	0.0052	0.0057	0.006	0.0057	0.0063
Moisture Condition	0.16%	0.16%	0.16%	0.16%	0.16%
Maximum Applied Load (lbf)	4000	5701	3764	3143	5994
Splitting Tensile Strength (psi)	1882.8	3201.3	2007.9	1764.9	3045.3

GeoTesting EXPRESS

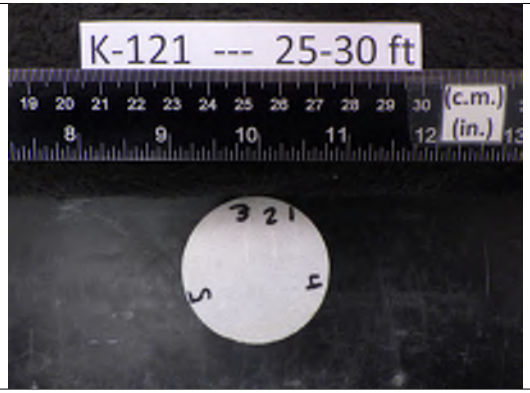
Client:	Terracon Consultants, Inc.				
Project:	Champlain-Hudson Power Express				
Location:				Project No:	GTX-315284
Boring ID:	K-121	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	---	Test Date:	06/17/22	Checked By:	smd
Depth :	25-30 ft	Test Id:	670473		
Test Comment:	---				
Visual Description:	---				
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-121	---	25-30 ft	1	4.9	4.2	4.55	
			2	2.5	2.7	2.60	
			3	5.3	4.6	4.95	
			4	5.9	5.6	5.75	
			5	5.7	7.3	6.50	
			Average CAIs			4.87	
			Average CAI *			5.30	
				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:



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-121.0
Sample Depth (ft.)	2'-6'
pH Analysis, ASTM G 51	7.89
Water Soluble Sulfate (SO4), ASTM C 1580 (ppm)	15
Sulfides, AWWA 4500-S D, (mg/kg)	Nil
Chlorides, ASTM D 512, (ppm)	146
Red-Ox, ASTM G 200, (mV)	+444
Total Salts, AWWA 2520 B, (mg/kg)	182
Resistivity (Saturated), ASTM G 57, (ohm-cm)	4960

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: September 23, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

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

SUBJECT: Geotechnical Data: Segment 3 – Package 2 - HDD Crossing 12.A – Revision 1
Champlain Hudson Power Express Project
Fort Ann, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located north of Fort Ann, New York. The approximate station for the start of HDD crossing Number 12.A is STA 20199+00 (43.4313° N, 73.4624° W).

The geotechnical data at this HDD crossing is attached. The available data is from the previous investigation by AECOM.

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.

Contact us if you have questions or require additional information.

HDD 12.A
Boring WFE-9B
Segment 3 - Design Package 2

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

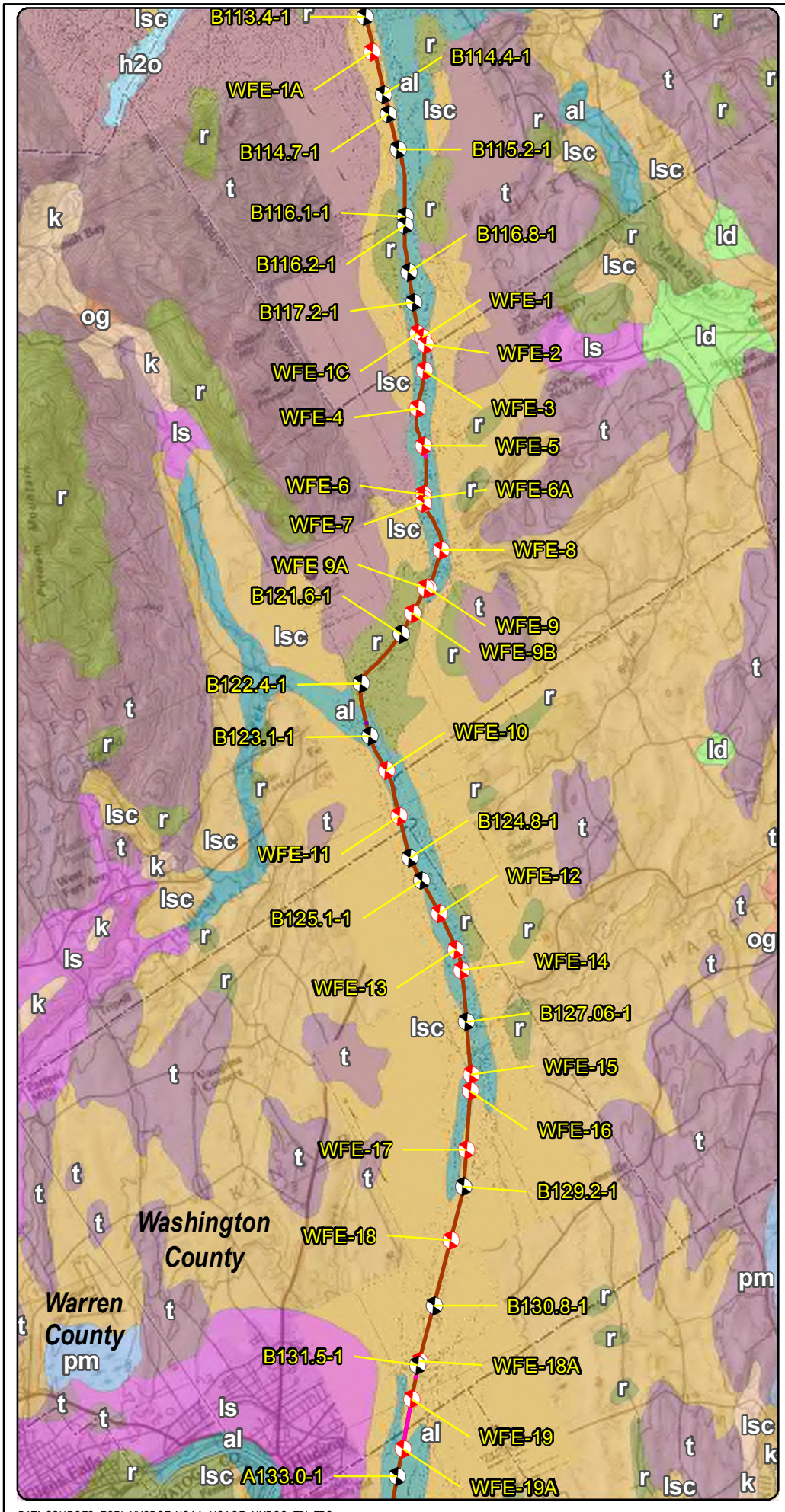
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

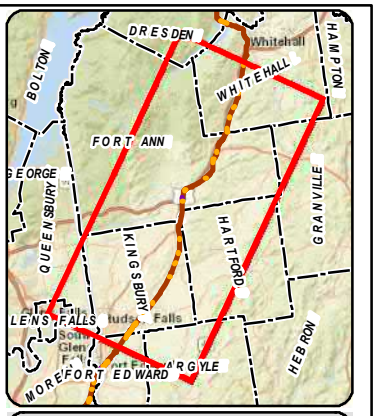
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

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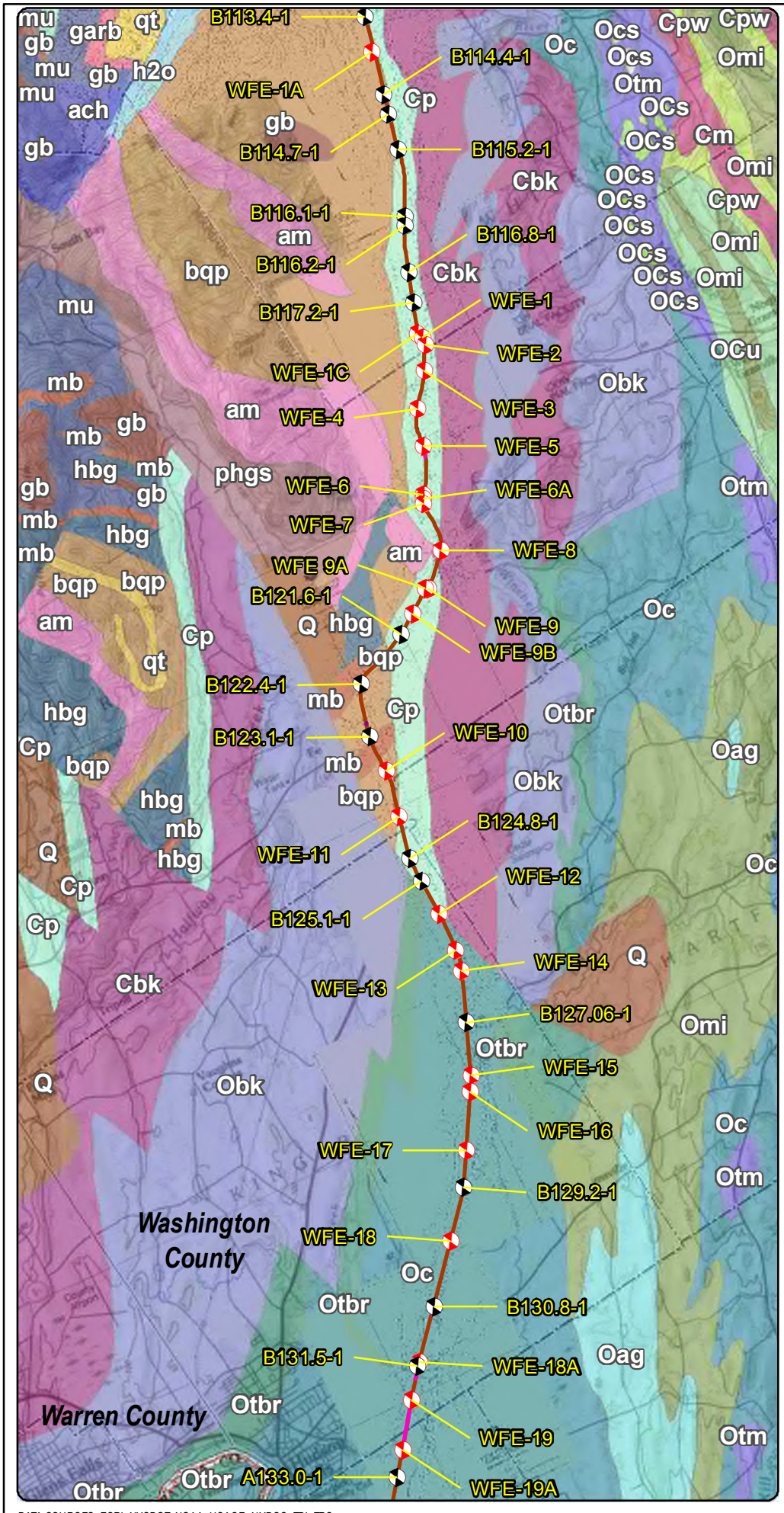

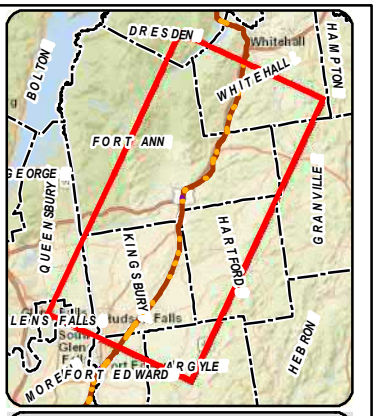

LEGEND

- 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

- Cbk - Beekmantown Group
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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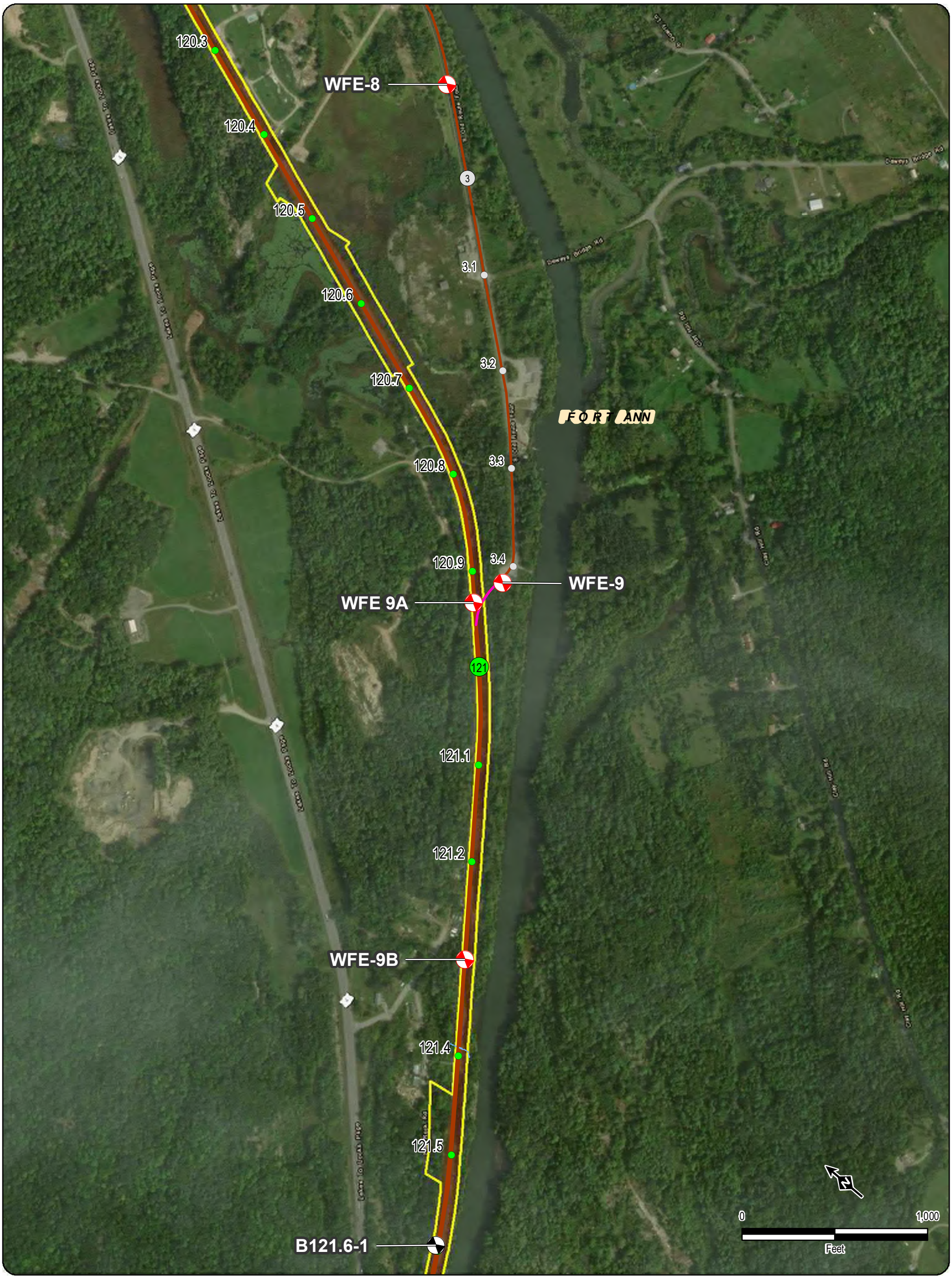

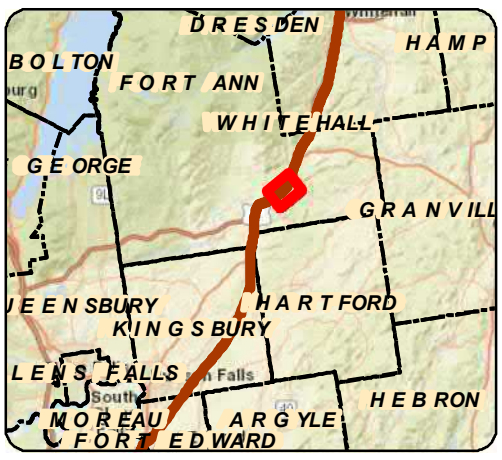

111.8 Certified Milepost - Tenths

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

LEGEND

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

Whitehall to Fort Edward

Figure A-3

Sheet 7 of 16

Prepared by: AECOM 5/19/2021

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

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BORING CONTRACTOR: ADT			AECOM									SHEET 1 OF 1
DRILLER: Chris Chaillou												PROJECT NAME: CHPE -
SOILS ENGINEER/GEOLOGIST: Chris French			**BORING LOG**									PROJECT NO.: 60323056
												HOLE NO.: **WFE-9B**
												START DATE: 1/5/21
												FINISH DATE: 1/5/21
LOCATION: MP - 121.3 (CP Rail)												OFFSET: N/A
GROUND WATER OBSERVATIONS				CASING	SAMPLER	DRILL BIT	CORE BARREL					DRILL RIG: Geoprobe 7822DT
No water observed			TYPE	Flush Joint Steel	California Modified		NQ					BORING TYPE: Core
			SIZE I.D.	4"	2.5"		1 7/8"					BORING O.D.: 3"
			SIZE O.D.	4.5"	3"		3"					SURFACE ELEV.:
			HAMMER WT.	140 lbs	140 lbs							LONGITUDE:
			HAMMER FALL	30"	30"							LATITUDE:

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	SAMPLE PEN. in	SAMPLE REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)	N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
1.0		0'-1'				Hand Cleared				Black fine-coarse SAND, some angular gravel, little silt, loose, moist-wet
	3.8	1'-2.2'	R-1	14"	13.5"	RQD: 4" = 28.6%				Gray and purple sandstone, fine grained, light-moderate weathering, moderate mechanical jointing, 1 fracture with oxidation staining at 25°
2.0	4.2	2.2'-6'	R-2	46"	40"	RQD: 34" = 74%				Sandstone, Light mechanical jointing
3.0										
4.0										
5.0										TR-1; (5.35'-6.0')
6.0	4.6	6'-11'	R-3	60"	53"	RQD: 38.5" = 64%				SAA, Moderate jointing (mechanical), moderately weathered section from 9.0'-9.5'
7.0										
8.0									Sandstone	TR-2; (7.85'-8.35')
9.0										
10.0										
11.0	5.5	11.0'-16.1'	R-4	61.5"	61.5"	RQD: 53.5" = 87%				SAA, Light mechanical jointing
12.0										
13.0										TR-3; (13.0'-13.7')
14.0										
15.0										
16.0										
17.0										WFE-9B complete, terminated at 16.1'. Grouted to surface.
18.0										
19.0										
20.0										

NOTES:

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

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

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

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

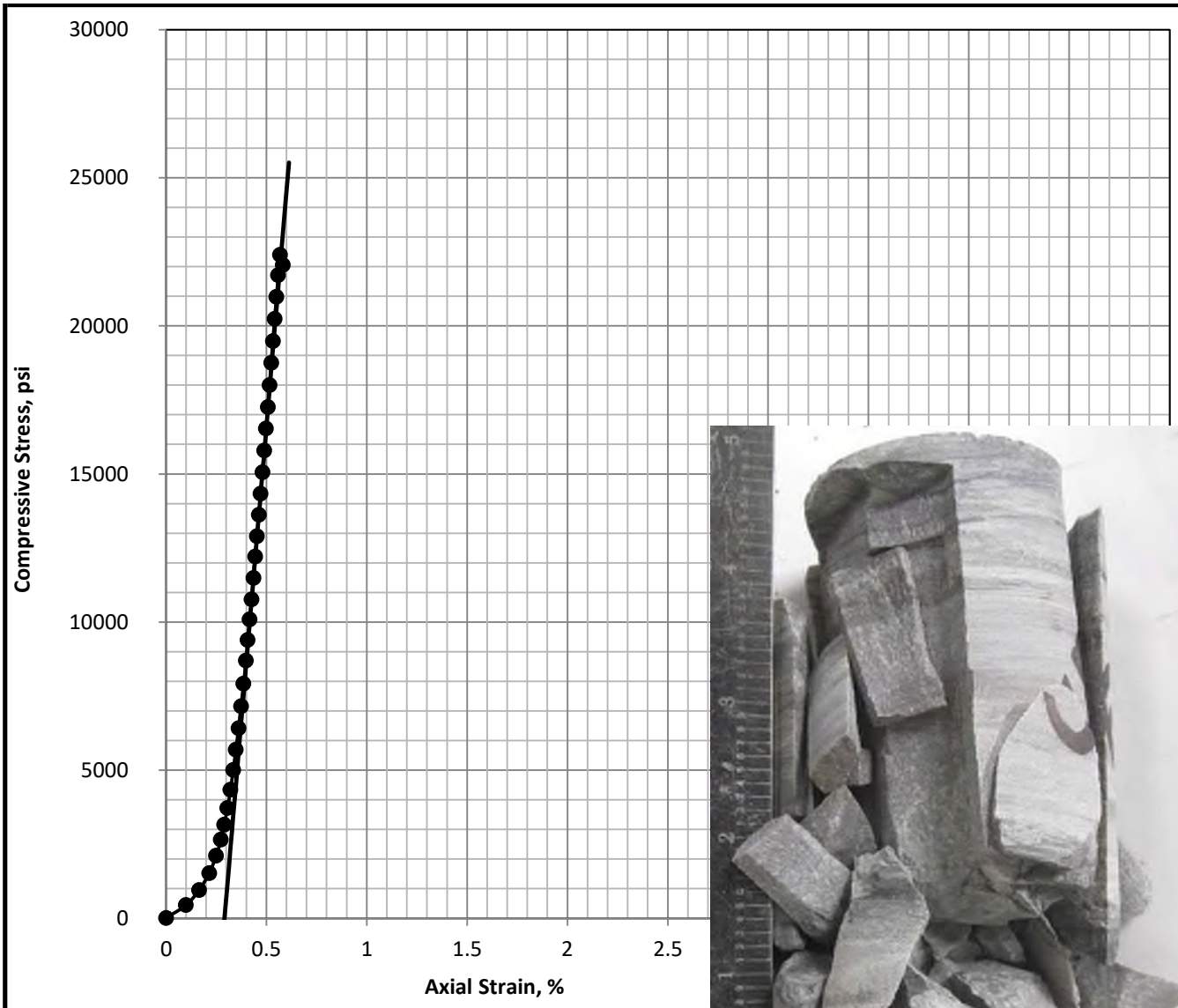
SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Aquifer
CHPE - Whitehall-Ft. Edward Borings
SUMMARY OF ROCK TESTING

SAMPLE IDENTIFICATION			STATE PROPERTIES			ENGINEERING PROPERTY TESTS					REMARKS
Boring	Run	Depth	WATER CONTENT (1) (%)	TOTAL UNIT WGT. (pcf)	DRY UNIT WGT. (pcf)	TEST TYPE (2)	Mohs HARDNESS (-)	UNCONFINED COMPRESSION TESTS (ASTM D7012)			
								COMPRESSIVE STRENGTH (psi)	AXIAL STRAIN @ FAILURE (%)	ESTIMATED (5) ELASTIC MODULUS (psi)	
WFE-7	R-3	13.6-13.9				M	9				
WFE-7	R-3	14.5-14.9	0.1	165	165	UC		29870	0.38	9E+06	
WFE-7	R-6	20.6-20.8				M	9				
WFE-7	R-6	23.1-23.5	0.2	164	163	UC		20830	0.29	7E+06	
WFE-9A	R-1	7.0-7.3				M	9				
WFE-9A	R-1	7.3-7.7	0.2	161	160	UC		32720	0.44	9E+06	
WFE-9A	R-7	28.4-28.8	0.1	169	168	UC		38760	0.35	1E+07	
WFE-9A	R-7	29.1-29.4				M	9				
WFE-9B	R-2	3.2-3.5				M	8				
WFE-9B	R-2	3.6-4	0.2	167	166	UC		22400	0.28	8E+06	
WFE-9B	R-3	7.4-7.6				M	7-8				
WFE-9B	R-3	7.6-8	0.1	170	170	UC		40230	0.41	1E+07	
WFE-14	R-2	27.85-28.25	0.6	169	168	UC		7460	0.25	3E+06	
WFE-14	R-2	29.4-29.7				M	3-4				

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



Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.20	167	166	4.390	1.972

Specimen meets ASTM D4543 shape tolerances

FAILURE PHOTO

Test Summary

Strain Rate (%/min)	Corrected Strain Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.09	0.28	22400	8E+06

Test by: DM
Test Date: Apr-12-21
Reviewed by: GET

Aquifer	**CHPE - Whitehall-Ft. Edward Borings**	**COMPRESSIVE STRESS VS STRAIN UNCONFINED COMPRESSIVE STRENGTH TEST**
TerraSense, LLC Project # 7853-21003		**Boring: WFE-9B Run: R-2 Depth 3.6-4 ft.**

ROCK CORE PHOTOGRAPHIC LOG

AECOM Project No: **60323056**
Project Name: **CHPE – Upstate New York Upland Geotechnical Investigation**
Location: **Whitehall – Fort Edward Segment**

Boring No.	Depth (ft.)
WFE-9B	1.0-16.1

Boring No.	Depth (ft.)
WFE-14	25.0-40.1

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

Kiewit

MEMORANDUM

DATE: September 23, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

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

SUBJECT: Geotechnical Data: Segment 3 - Package 2 - HDD Crossing 13 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located north of Fort Ann, New York. The approximate station for the start of HDD crossing Number 13 is STA 20253+00 (43.424392° N, 73.480765° W)

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

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 113.1-177.1, dated March 29, 2013.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 13
Borings B122.4-1, K-122.35,
K-122.4
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

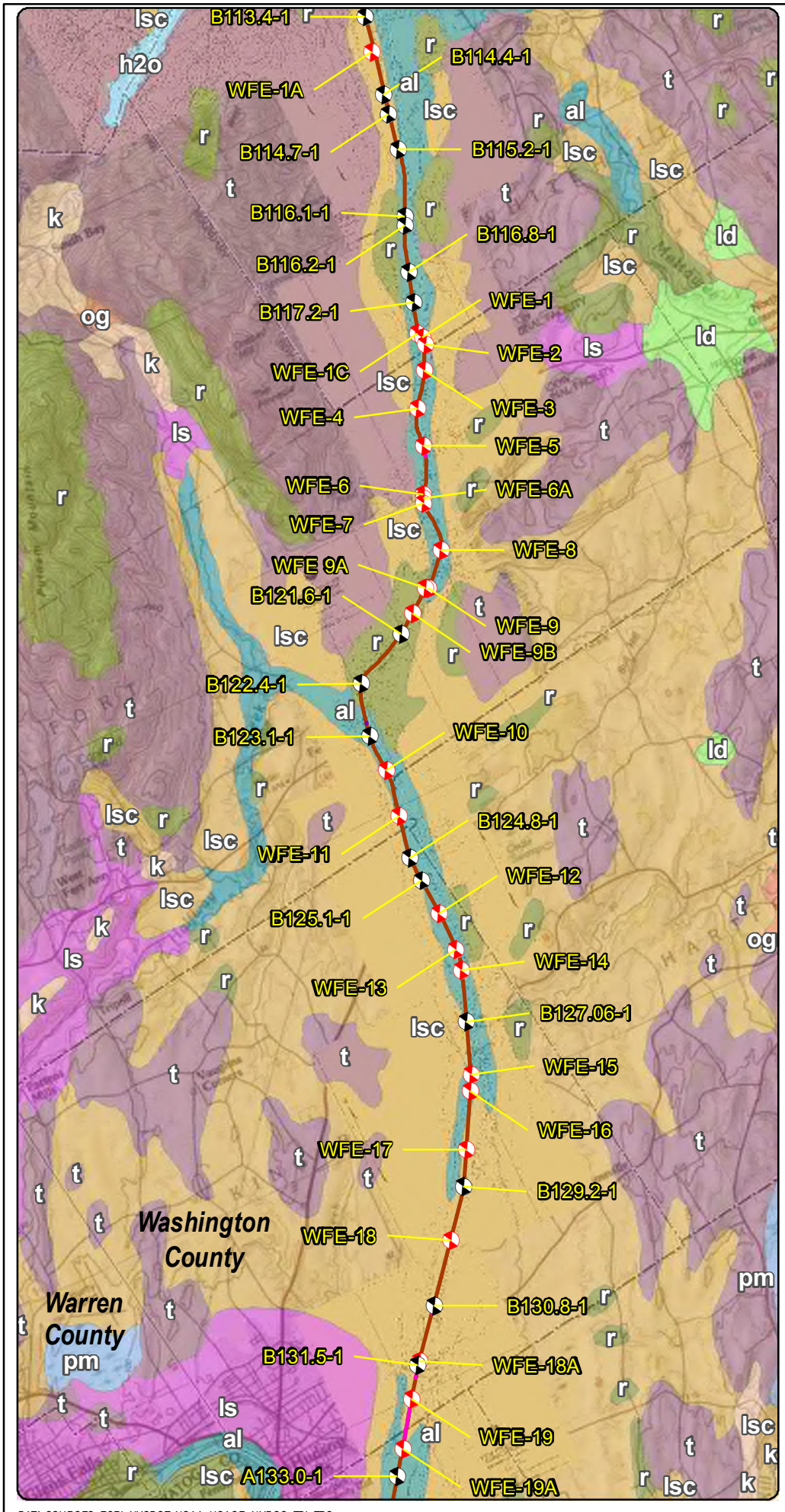
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

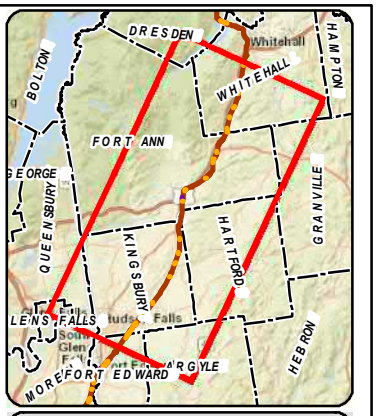
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

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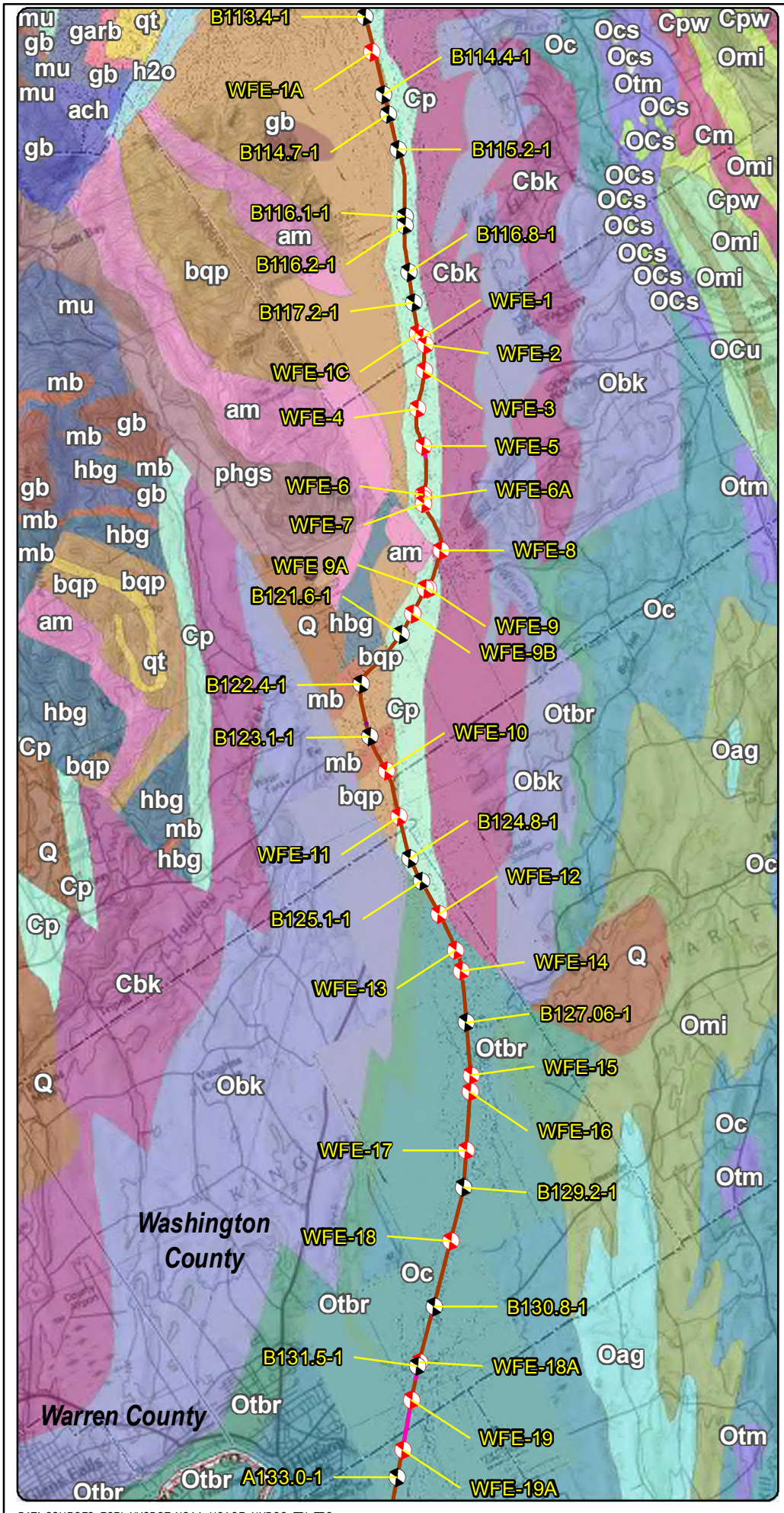

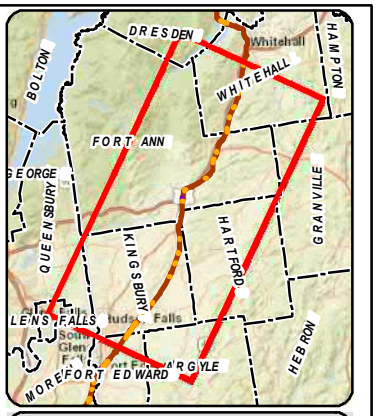

LEGEND

- 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

- Cbk - Beekmantown Group
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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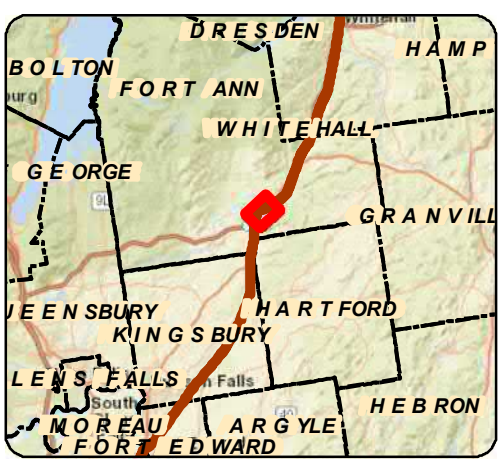


LEGEND

- 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

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

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Whitehall to Fort Edward

Figure A-3

Sheet 8 of 16

Prepared by: AECOM 5/19/2021

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Edward_Boring_Locations_Mapset_May_2021_Report.mxd

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CP RAILROAD ROW, NY

BORING	**B122.4-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
22.5'	3PM	12/13	0 HR

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

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	C. POPPE
DATE STARTED	12/13/2012
DATE COMPLETED	12/13/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	1 1 3 3		***BLACK M/C SAND, SM F/ GRAVEL SIZED ROCK FRAGMENTS, TR SILT (FILL)***	16.7	
	S-2	4 5 5 2		2.0 ***BROWN M/C SAND, SM F/C GRAVEL (FILL)***		
5	S-3	4 6 4 2		4.0 ***LIGHT BROWN F/ SAND, SM SILT, TR CLAY***		
	S-4	1 3 3 2		8.0		
	S-5	1 1 1 1			23.5	
10				***BROWN TO GRAY SILT, SM F/ SAND***		
15	S-6	2 2 2			24.7	
				18.5		
20	S-7	1 2 1			39.8	
				GRAY SILTY F/M SAND, TR ORGANICS		
				23.5		
25	S-8	1 3 1			22.6	
				GRAY M/F/C SAND, TR SILT		
30	S-9	2 1 2		30.0		
				END OF BORING AT 30'		
35						

DRN.	CMP
CKD.	PWK

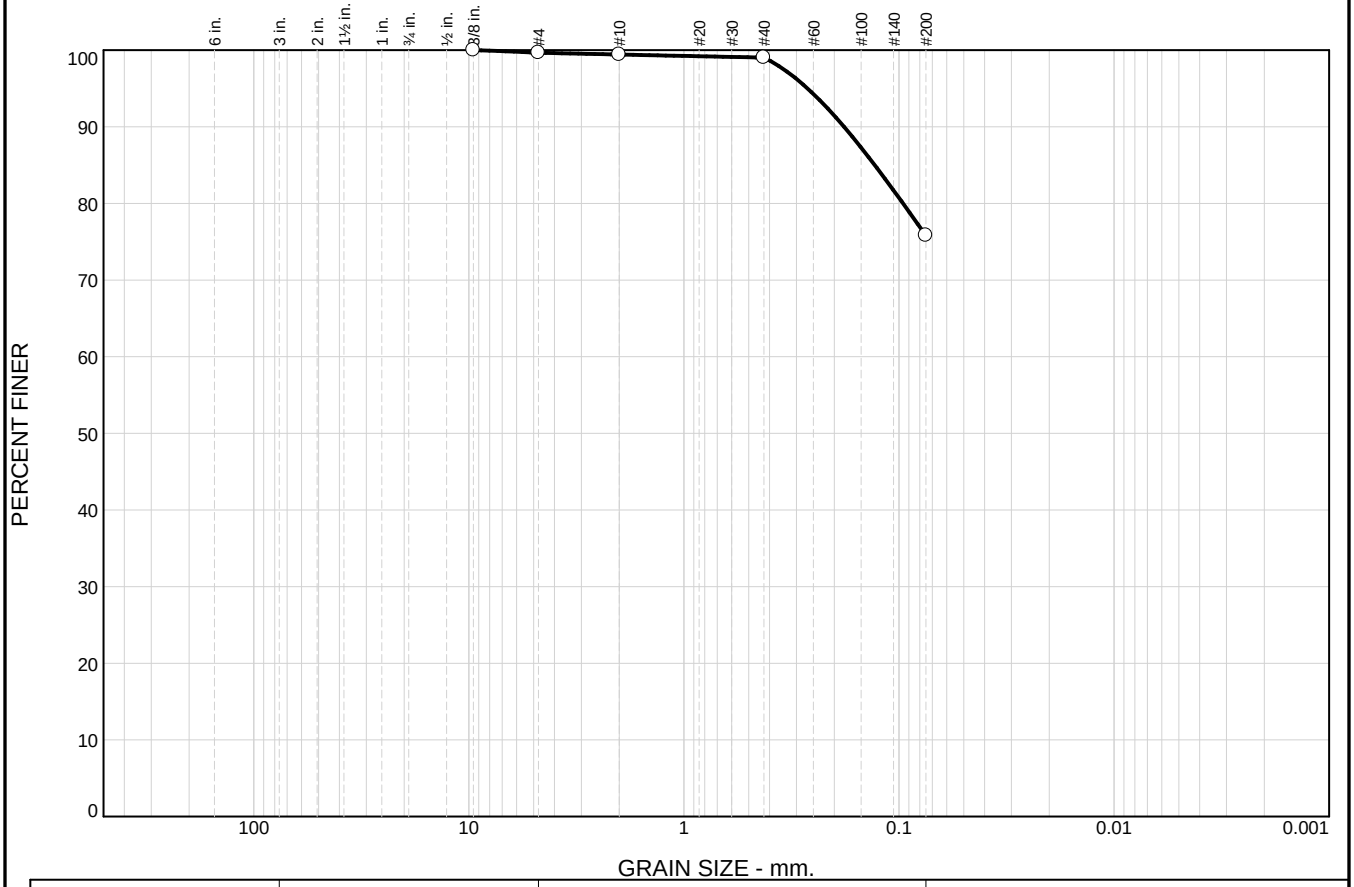
NEW PROJECTS TEST BORING LOG 195651_TDI_CP.GPJ SITE BLAUVELT.GDT 3/27/13

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CP
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)					
B120.1-1	R-1	1.7-2.3	-	-	-	-	-	-	-	-	-	-	-	165.1	1120	-
A120.8-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	4.0	-	-	-
	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	9.8	-	-	-
	R-1	6.1-6.8	-	-	-	-	-	-	-	-	-	-	-	170.4	1340	-
B121.6-1	R-1	6.3-6.6	-	-	-	-	-	-	-	-	-	-	-	168.7	430	-
B122.4-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	16.7	-	-	-
	S-5	8.0-10.0	-	0.3	23.9	75.8		-	-	-	-	-	23.5	-	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	24.7	-	-	-
	S-7	18.5-20.0	SM	0.0	67.6	32.4		-	-	-	-	-	39.8	-	-	4.4
	S-8	23.5-25.0	SW-SM	0.5	93.4	6.1		-	-	-	-	-	22.6	-	-	-
B123.1-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	8.0	-	-	-
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	44.6	77.9	-	-
	S-4	6.0-8.0	CH	-	-	-	-	58	29	29	0.1	-	33.0	89.6	-	-

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.3	0.3	0.4	23.2	75.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			0.1296							

Material Description	USCS	AASHTO
○ BROWN TO GRAY SILT, SM F/ SAND		

Project No. 195651 **Client:** TDI CHAMPLAIN HUDSON POWER EXPRESS - CP

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B122.4-1 **Depth:** 8.0-10.0 FT **Sample Number:** S-5

TRC Engineers, Inc.

Mt. Laurel, NJ

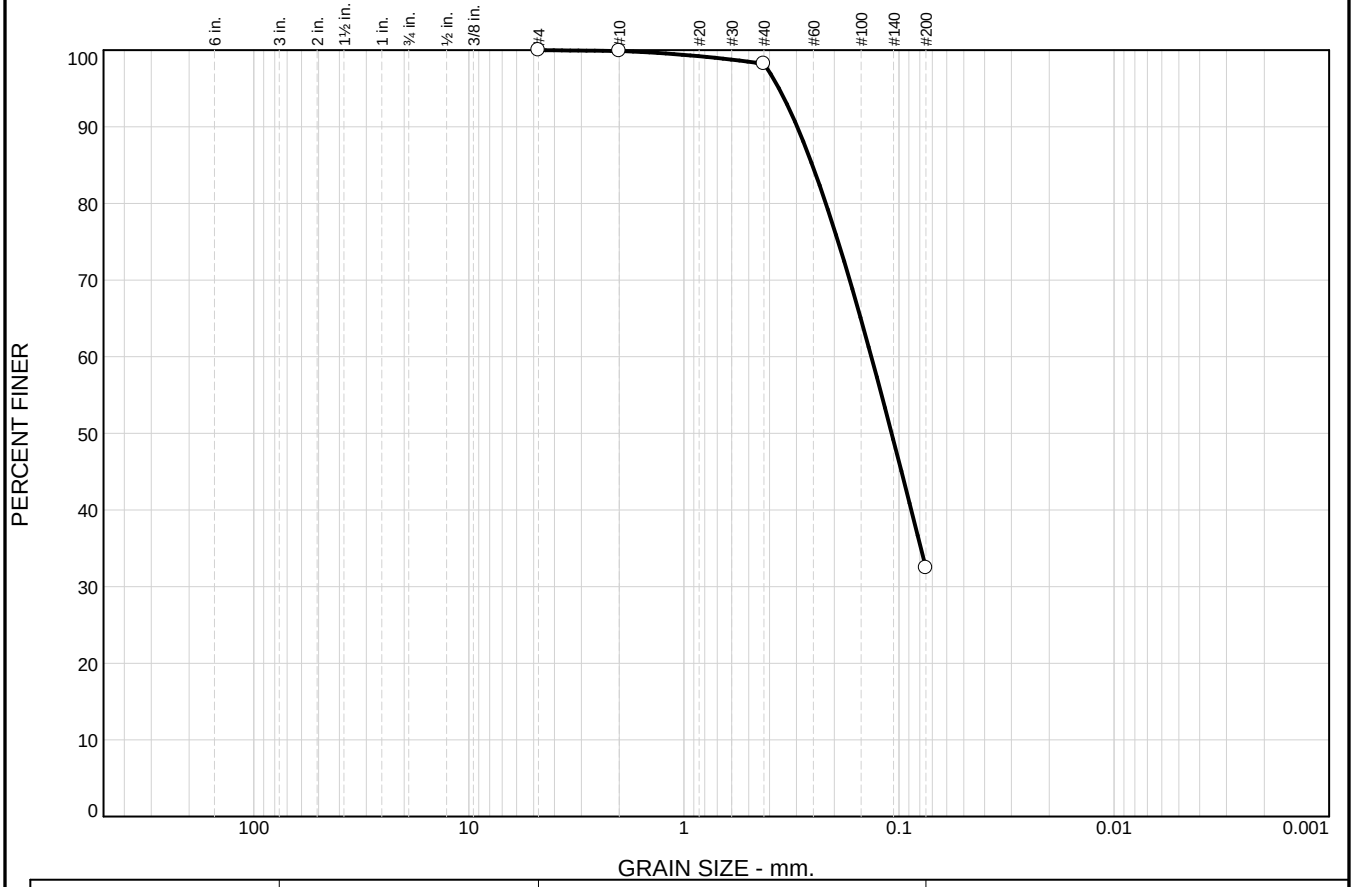
Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

Figure 19

Tested By: BMH 02/11/13 **Checked By:** _____

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.1	1.7	65.8	32.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			0.2529	0.1345	0.1082					

Material Description	USCS	AASHTO
○ DARK GRAY-BROWN SILTY F/M SAND, TR ORGANICS	SM	

Project No. 195651 **Client:** TDI CHAMPLAIN HUDSON POWER EXPRESS - CP

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B122.4-1 **Depth:** 18.5-20.0 FT **Sample Number:** S-7

TRC Engineers, Inc.

Mt. Laurel, NJ

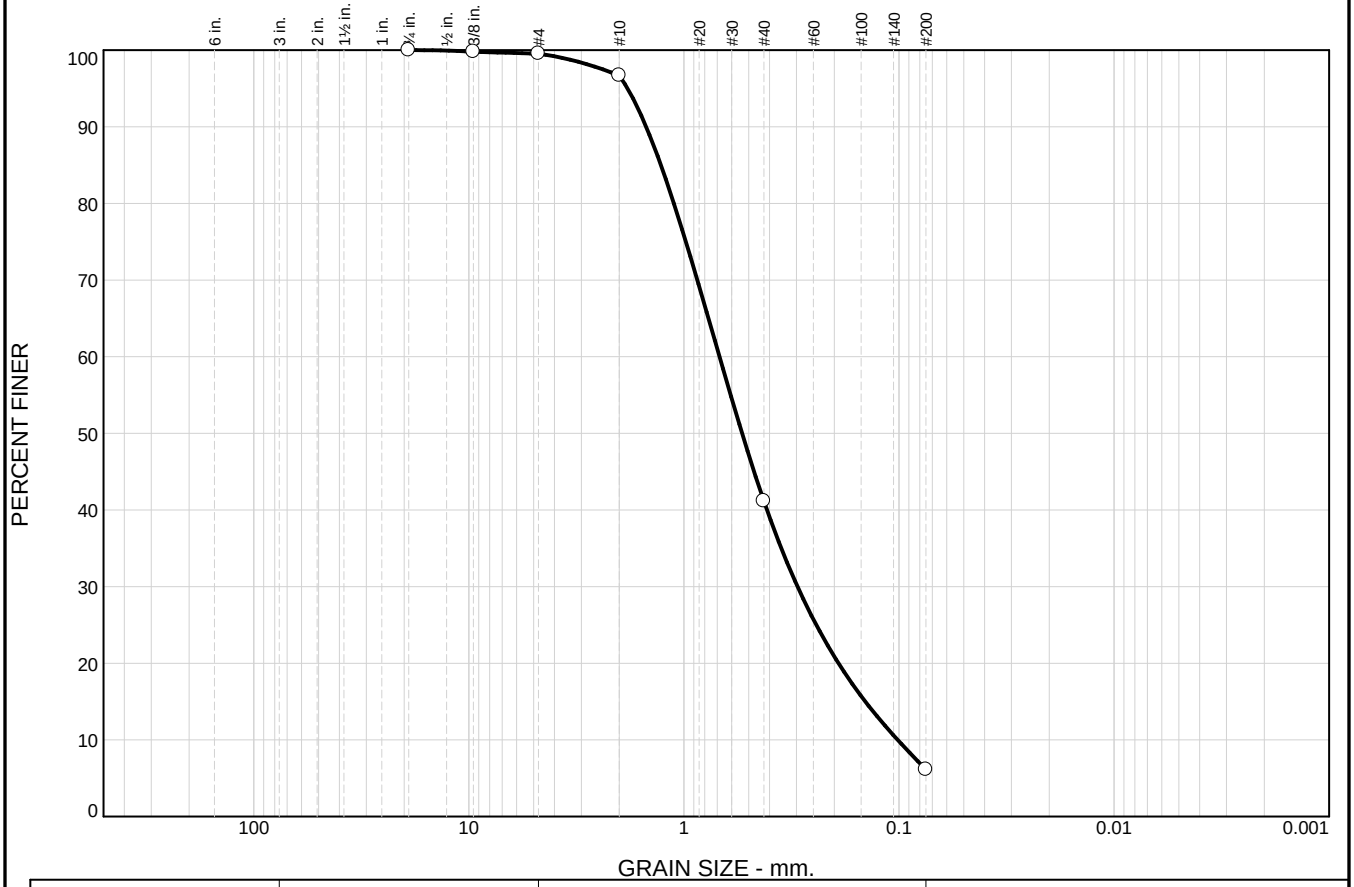
Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

Figure 20

Tested By: BMH 02/13/13 **Checked By:** _____

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.5	2.8	55.5	35.1	6.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.2801	0.6831	0.5365	0.2963	0.1434	0.1013	1.27	6.74

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

Project No. 195651 **Client:** TDI CHAMPLAIN HUDSON POWER EXPRESS - CP

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B122.4-1 **Depth:** 23.5-25.0 FT **Sample Number:** S-8

TRC Engineers, Inc.

Mt. Laurel, NJ

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

Figure 21

Tested By: BMH 02/13/13 **Checked By:** _____

Boring Location Plans Page 5 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/18/2022** Finish Date: **1/18/2022**

Boring No.: **K-122.35** Sheet **1** of **3**

Groundwater Observations

Date	Time	Depth	Casing
1/18/2022	AM	DRY	OPEN
1/18/2022	AM	*9.5'	14.0'
1/18/2022	PM	*12.6'	14.0'

Coordinates
Northing **762879.602**
Easting **1674289.793**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **135.753**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
1	CASING	1	0.0	2.0	SS	14 6 5 5	0.2	2" TOPSOIL & ORGANIC MATERIAL	6
2							2.0	Brownish-Black mf GRAVEL; some DEBRIS (cinders); little cmf SAND; trace SILT (wet, non-plastic) GP Possible FILL	
3		2	2.0	4.0	SS	6 6 4 3		Brown SILT; little cmf SAND (wet, non-plastic) ML	8
4		3	4.0	6.0	SS	3 3 4 2		Orangish-Brown SILT; trace f SAND (saturated, non-plastic) ML w = 23.5%, LL = NP, PL = NP, PI = NP	14
6		4	6.0	8.0	SS	4 4 4 5		Orangish-Brown SILT; trace f SAND; trace ORGANIC MATERIAL (roots) (saturated, non-plastic) ML OC = 4.5%	10
8		5	8.0	10.0	SS	3 7 7 7	8.0	NO RECOVERY - COBBLE Fragment in split spoon shoe	0
11							11.0		
12								Advanced casing to 14.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
14	WET ROTARY	6	14.0	16.0	SS	5 3 5 6		Brown mf+ SAND; trace SILT (saturated, non-plastic) SP	16
19		7	19.0	21.0	SS	5 8 5 7		Brown cmf SAND; some f GRAVEL; little SILT (saturated, non-plastic) SW-SM	17
24		8	24.0	26.0	SS	5 5 6 4		Brown c-mf SAND; little SILT; trace f GRAVEL (saturated,	8

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Mark Childs; John Trathen**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-122.35** Report No.: **CD10279D-01-03-22** Sheet **2** of **3**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - course; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%)	RECOVERY (inches)
								non-plastic) SM w = 23.8% % Fines = 13.0%	
26								Began utilizing mudded water at 24.0 feet.	
27									
28									
29		9	29.0	31.0	SS	3 5 8 10		Brown cmf SAND; trace f GRAVEL; trace SILT (saturated, non-plastic) SW	16
30									
31									
32							32.0		
33									
34									
35		10	35.0	37.0	SS	9 6 9 10		(3" Brass Lined Split Spoon) Black mf+ SAND; trace SILT (saturated, non-plastic) SP	10
36									
37		11	37.0	39.0	SS	7 9 8 9		(3" Brass Lined Split Spoon) Black mf+ SAND; little SILT (saturated, non-plastic) SP-SM	19
38									
39		12	39.0	41.0	SS	9 10 10 14		(3" Brass Lined Split Spoon) Black c-m+f SAND; trace SILT; trace f GRAVEL (saturated, non-plastic) SP-SM	20
40								w = 17.8% % Fines = 4.8%	
41									
42									
43									
44		13	44.0	46.0	SS	7 8 9 7		Blackish-Grey f SAND; trace SILT (saturated, non-plastic) SP	10
45									
46									
47									
48									
49		14	49.0	51.0	SS	5 5 12 14		Greyish-Black mf+ SAND; trace SILT (saturated, non-plastic) SP	12
50								Encountered Blackish-Grey SAND lense from 49.0 to 50.0 feet.	
51									
52									
53									
54		15	54.0	56.0	SS	4 5 5 5		Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL (saturated, non-plastic) SP-SM	16
55							55.6	w = 27.2%, LL = NP, PL = NP, PI = NP % Fines = 9.4%	
56									
57							57.0	Blackish-Grey SILT; little mf SAND (saturated, non-plastic) ML	
58									
59		16	59.0	61.0	SS	8 10 16 17		Greyish-Black cmf+ SAND; little f GRAVEL; trace SILT (saturated, non-plastic) SW	6
60									
61							61.0	Boring terminated at 61.0 feet.	
62									

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-122.35** Report No.: **CD10279D-01-03-22** Sheet **3** of **3**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
63								Notes:	
64								1. Borehole backfilled with cement-bentonite grout.	
65								2. Soil classifications based on ATL Field Engineer's field classifications.	
66								3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.	
67									
68									
69									
70									
71									
72									
73									
74									
75									
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91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

ATL-LOG1 NE_CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/18/2022** Finish Date: **1/19/2022**

Boring No.: **K-122.4** Sheet **1** of **3**

Groundwater Observations

Date	Time	Depth	Casing
1/18/2022	PM	DRY	OPEN
1/19/2022	AM	DRY	4.0'
1/19/2022	AM	*12.3'	19.0'
1/19/2022	PM	*13.2'	19.0'

Coordinates
Northing **762676.175**
Easting **1674100.08**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **135.937**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%)	Recovery (Inches)
0	CASING	1	0.0	2.0	SS	11 4 6 5	0.1	1" TOPSOIL & ORGANIC MATERIAL	15
1								Black DEBRIS (cinders); some cmf SAND; little mf GRAVEL;	
2		2	2.0	4.0	SS	7 7 6 5		trace SILT (moist, non-plastic) SW FILL	3
3								Encountered frozen soil to 0.5 feet.	
4							4.0	Similar Soil (wet, non-plastic) SW FILL	
		3	4.0	6.0	SS	7 7 3 2		NO RECOVERY	0
5									
6							6.0		
		4	6.0	8.0	SS	3 3 2 1		Brown cmf GRAVEL; little cmf SAND; trace SILT (saturated,	4
7							7.5	non-plastic) GW Possible FILL	
8		5	8.0	10.0	SS	3 2 1 2		Brown SILT; and mf- SAND (saturated, non-plastic) ML	12
9								w = 24.8%, LL = NP, PL = NP, PI = NP % Fines = 57.0%	
10									
11									
12									
13									
14		6	14.0	16.0	SS	4 2 2 4		Grey Similar Soil (saturated, non-plastic) ML	1
15									
16									
17							17.0		
18								Advanced casing to 19.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
19	WET ROTARY	7	19.0	21.0	SS	2 5 5 4		Grey mf+ SAND; trace SILT (saturated, non-plastic) SP	12
20								Encountered WOOD fragments from 19.0 to 19.2 feet.	
21									
22									
23									
24		8	24.0	26.0	SS	4 8 8 7		Grey mf+ SAND; trace SILT (saturated, non-plastic) SP	10
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Mark Childs; John Trathen**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-122.4** Report No.: **CD10279D-01-03-22** Sheet **2** of **3**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - course; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%)	RECOVERY (inches)
26									
27									
28									
29		9	29.0	31.0	SS	6 5 7 9		Similar Soil (saturated, non-plastic) SP w = 17.5%	12
30									
31									
32									
33									
34		10	34.0	36.0	SS	6 6 7 8		Similar Soil (saturated, non-plastic) SP	10
35							35.3		
36								Grey f SAND; some SILT (saturated, non-plastic) SM Encountered WOOD fragments from 35.3 to 35.4 feet.	
37									
38									
39		11	39.0	41.0	SS	4 8 15 22		Grey f SAND; little SILT (saturated, non-plastic) SM	11
40									
41									
42									
43							43.0		
44		12	44.0	46.0	SS	2 1 6 4		Blackish-Grey SILT (saturated, non-plastic) ML	10
45							45.2		
46								Greyish-Black mf+ SAND; trace SILT (saturated, non-plastic) SP	
47									
48									
49		13	49.0	51.0	SS	4 2 5 9		Greyish-Black c-mf SAND; little SILT; trace mf GRAVEL (saturated, non-plastic) SM w = 21.7% % Fines = 19.0%	16
50									
51									
52									
53									
54		14	54.0	56.0	SS	9 12 12 10		(3" Brass Lined Split Spoon) Greyish-Black mf+ SAND; trace SILT (saturated, non-plastic) SP	20
55									
56		15	56.0	58.0	SS	9 8 10 13		(3" Brass Lined Split Spoon) Similar Soil (saturated, non-plastic) SP	24
57									
58		16	58.0	60.0	SS	12 14 13 16		(3" Brass Lined Split Spoon) Greyish-Black cm+f SAND; trace SILT (saturated, non-plastic) SP w = 9.9% % Fines = 1.7%	19
59									
60							60.0		
61								Boring terminated at 60.0 feet.	
62									

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-122.4** Report No.: **CD10279D-01-03-22** Sheet **3** of **3**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
63								Notes:	
64								1. Borehole backfilled with cement-bentonite grout.	
65								2. Soil classifications based on ATL Field Engineer's field classifications.	
66								3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.	
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									
87									
88									
89									
90									
91									
92									
93									
94									
95									
96									
97									
98									
99									
100									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

ATL-LOG1 NE_CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-117.6-0.2	S-4	6.0 - 8.0	Brownish-Grey mf SAND; and SILT	41.7	25.3	NP	NP	NP	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey mf SAND; some SILT	23.5	18.3	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT; trace f SAND	99.7	55.0	65	26	39	--	--	--	--	--	--	--	--
K-117.6-1.6A	S-2	4.0 - 6.0	Brown cmf+ SAND; little f GRAVEL; trace SILT	--	--	--	--	--	--	400	25	8.20	14,190	--	--	--
	S-3	6.0 - 8.0	Brown cmf SAND; some SILT; trace f GRAVEL	21.0	6.8	--	--	--	--	--	--	--	--	--	--	--
	S-6	19.0 - 21.0	Grey CLAY; little SILT; little f SAND	--	25.3	46	20	26	--	--	--	--	--	--	--	--
	S-8	28.0 - 30.0	Grey CLAY; some mf SAND; trace SILT	70.0	33.3	47	19	28	--	--	--	--	--	--	--	--
K-117.6-1.6B	S-4	6.0 - 7.2	Brown cmf SAND; and f GRAVEL; trace SILT	--	10.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Orangish-Greyish-Brown c-mf+ SAND; little SILT; trace f GRAVEL	20.0	18.2	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; and cmf+ SAND; trace f GRAVEL; trace SILT	48.0	26.7	43	18	25	--	--	--	--	--	--	--	--
K-117.6-1.6C	S-4	8.0 - 9.3	Greyish-Brown SILT; little cmf+ SAND; trace f GRAVEL	--	17.6	--	--	--	--	--	--	--	--	--	--	--
	S-6	19.0 - 21.0	Greyish-Brown c-mf SAND; some SILT; trace mf+ GRAVEL	26.0	12.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	28.0 - 30.0	Grey CLAY; and cmf- SAND; trace f GRAVEL; trace SILT	55.2	35.1	44	18	25	--	--	--	--	--	--	--	--
K-117.6-2.1	S-4	6.0 - 8.0	Grey SILT; little f SAND	--	15.4	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Mottled Brownish-Grey CLAY; and mf SAND; little SILT; trace ORGANIC MATERIAL (vegetation)	57.2	47.9	41	19	22	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Orangish-Brown cm+f SAND; trace SILT; trace f GRAVEL	8.1	16.4	--	--	--	--	--	--	--	--	--	--	--
	S-11	38.0 - 40.0	Orangish-Brown c-m+f SAND; trace SILT; trace mf GRAVEL	5.6	16.4	--	--	--	--	--	--	--	--	--	--	--
K-117.6-2.3	S-4	6.0 - 8.0	Brown c-mf+ SAND; some SILT; little m+f GRAVEL	25.0	13.7	--	--	--	--	--	--	--	--	--	--	--
	RC-4	30.1 - 31.2	Grey SANDSTONE	--	--	--	--	--	--	--	--	--	--	--	1,311	4.43
	RC-4	32.7 - 33.0	Grey SANDSTONE	--	--	--	--	--	--	--	--	--	--	20,440	--	--
K-122.35	S-3	4.0 - 6.0	Orangish-Brown SILT; trace f SAND	--	23.5	NP	NP	NP	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Orangish-Brown SILT; trace f SAND; trace ORGANIC MATERIAL (roots)	--	--	--	--	--	4.5	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Brown c-mf SAND; little SILT; trace f GRAVEL	13.0	23.8	--	--	--	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
	S-12	39.0 - 41.0	Black c-m+f SAND; trace SILT; trace f GRAVEL	4.8	17.8	--	--	--	--	--	--	--	--	--	--	--
	S-15	54.0 - 56.0	Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL	9.4	27.2	NP	NP	NP	--	--	--	--	--	--	--	--
K-122.4	S-5	8.0 - 10.0	Brown SILT; and mf- SAND	57.0	24.8	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey mf+ SAND; trace SILT	--	17.5	--	--	--	--	--	--	--	--	--	--	--
	S-13	49.0 - 51.0	Greyish-Black c-mf SAND; little SILT; trace mf GRAVEL	19.0	21.7	--	--	--	--	--	--	--	--	--	--	--
	S-16	58.0 - 60.0	Greyish-Black cm+f SAND; trace SILT	1.7	9.9	--	--	--	--	--	--	--	--	--	--	--
K-123.2	S-3	4.0 - 6.0	Brown SILT; little mf SAND; trace CLAY	--	22.3	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Brown f SAND; some SILT	--	31.3	--	--	--	--	--	--	--	--	--	--	--
	S-6	10.0 - 12.0	Grey CLAY; little SILT; trace f SAND	--	28.4	48	20	28	--	--	--	--	--	--	--	--
	S-8	19.0 - 21.0	Grey c-m+f SAND; trace SILT	10.0	29.8	--	--	--	--	--	--	--	--	--	--	--
	S-10	28.0 - 30.0	Grey CLAY; little SILT; trace f SAND	97.0	65.5	67	21	46	--	--	--	--	--	--	--	--
	ST-1	30.0 - 32.0	Grey CLAY; little SILT; trace f SAND	--	--	--	--	--	--	1,400	15	8.24	5,418	--	--	--
K-123.7	S-3	4.0 - 6.0	Mottled Blackish-Grey CLAY; trace SILT; trace f SAND; trace ORGANIC MATERIAL (roots)	--	41.4	--	--	--	7.5	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Mottled Orangish-Grey CLAY; trace SILT	100.0	25.9	79	23	56	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT	100.0	48.4	73	20	53	--	--	--	--	--	--	--	--
	S-11	40.0 - 42.0	Grey CLAY; trace SILT	--	37.3	--	--	--	--	--	--	--	--	--	--	--
K-123.8	S-3	4.0 - 6.0	Orangish-Brown cmf+ SAND; little SILT	16.0	18.1	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Blackish-Grey CLAY; little SILT; trace f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments)	--	66.5	54	23	31	6.9	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Mottled Orangish-Greyish-Brown CLAY; trace SILT	100.0	37.2	67	18	49	--	--	--	--	--	--	--	--
	S-11	40.0 - 42.0	Bluish-Grey CLAY; trace SILT	--	33.5	--	--	--	--	--	--	--	--	--	--	--
K-125.5	S-3	4.0 - 6.0	Orangish-Brown SILT; trace f SAND	--	21.4	NP	NP	NP	--	--	--	--	--	--	--	--
	S-5	8.0 - 10.0	Grey CLAY; trace SILT	--	27.5	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Greyish-Black mf+ SAND; trace SILT	7.7	--	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	--	51.5	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT; trace mf SAND	94.0	38.0	70	21	49	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS

ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

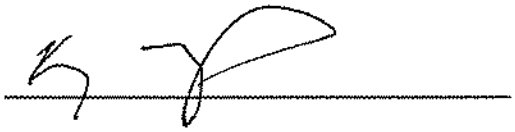
TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-122.35	S-3	4-6	23.5
	S-8	24-26	23.8
	S-12	39-41	17.8
	S-15	54-56	27.2
K-123.2	S-3 [1]	4-6	22.3
	S-4	6-8	31.3
	S-6	10-12	28.4
	S-8	19-21	29.8
	S-10	28-30	65.5
K-123.7	S-3	4-6	41.4
	S-6	14-16	25.9
	S-9	28-30	48.4
	S-11	40-42	37.3
K-123.8	S-3	4-6	18.1
	S-6	14-16	66.5
	S-9	28-30	37.2
	S-11	40-42	33.5

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-125.5	S-3	4-6	21.4
	S-5	8-10	27.5
	S-7	19-21	51.5
	S-9	28-30	38.0
K-127.0	S-3	4-6	32.8
	S-4	6-8	31.2
	S-6	14-16	22.8
	S-9	30-32	81.7
	S-11	39-41	63.9
K-127.1	S-3	4-6	30.7
	S-7	19-21	71.7
	S-9	30-32	58.0

1. Sample mass was less than the minimum mass outlined in the referenced test method.

Reviewed By:  Date: 01/31/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS

ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-02-02-22
Report Date: February 7, 2022
Date Received: February 1, 2022

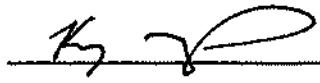
TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-117.6-1.6A	S-3	6-8	6.8
	S-6 [1]	19-21	25.3
	S-8	28-30	33.3
K-122.4	S-5	8-10	24.8
	S-9 [1]	29-31	17.5
	S-13 [1]	49-51	21.7
	S-16	58-60	9.9
K-125.6	S-3	4-6	17.8
	S-5	8-10	24.7
	S-7	19-21	49.2
	ST-1	28-30	49.4
K-127.9	S-4	6-8	30.0
	S-6	14-16	32.4
	S-8	24-26	28.8
	ST-1	38-40	30.0
K-128.0	S-5	8-10	28.0
	S-7	19-21	39.2
	S-9	29-31	30.3
	ST-1	38-40	51.2

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-129.9A	S-5	8-10	134.2
	S-8	24-26	31.1
	S-10	34-36	52.6
	ST-1	41-43	40.5
K-129.9B	S-6	14-16	88.0
	S-8	24-26	18.3
	ST-1	27-29	51.2
	S-10	34-36	50.8

1. Sample mass was less than the minimum mass outlined in the referenced test method.

Reviewed By:  Date: 02/07/22

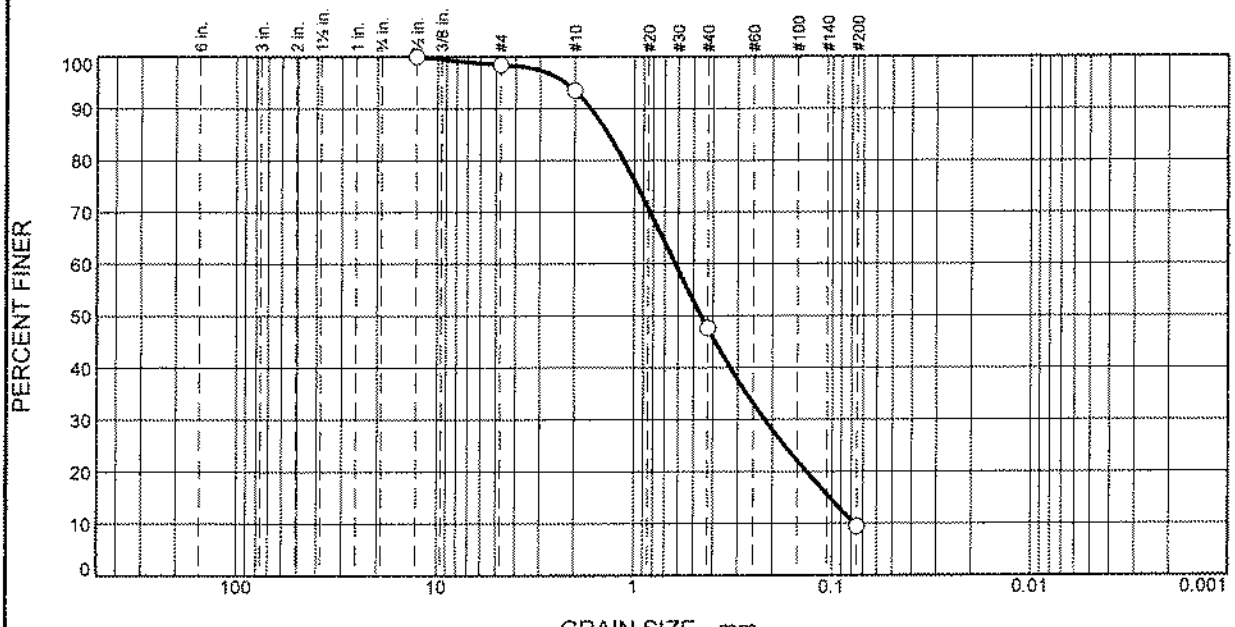
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-01-22

Client: Kiewit Intrastructure Co. **Date:** 01/31/22

Sample No: K-122.35, S-15 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 54-56'



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	2	5	45	39	9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	98		
#10	93		
#40	48		
#200	9.4		

Soil Description

Blackish Grey c-mf SAND; trace SILT; trace f GRAVEL

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 1.3516 D_{60}= 0.6206 D_{50}= 0.4596
D_{30}= 0.2184 D_{15}= 0.1026 D_{10}= 0.0774
C_u= 8.02 C_c= 0.99

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

Moisture Content= 27.2%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 01/31/22

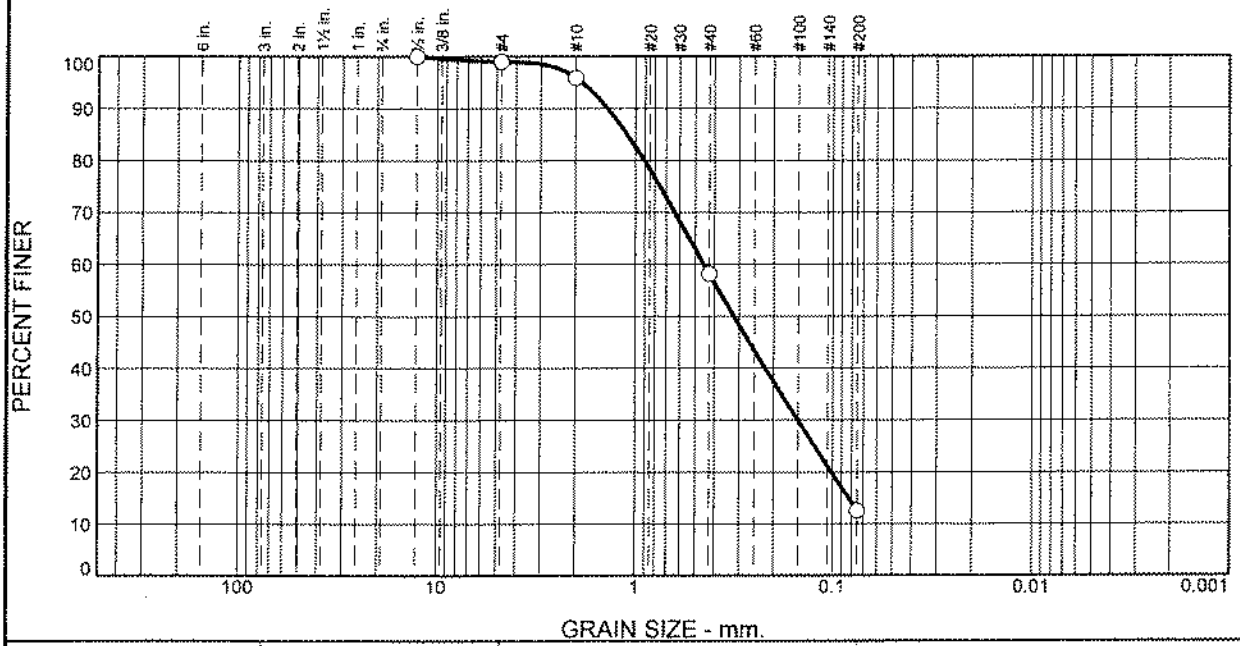
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-01-22

Client: Kiewit Intrastructure Co. **Date:** 01/31/22

Sample No: K-122.35, S-8 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 24-26'



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	3	38	45	13	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	99		
#10	96		
#40	58		
#200	13		

Soil Description

Brown c-mf SAND; little SILT; trace f GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 1.1029 D_{60}= 0.4528 D_{50}= 0.3190
D_{30}= 0.1503 D_{15}= 0.0829 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 23.8%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 01/31/22

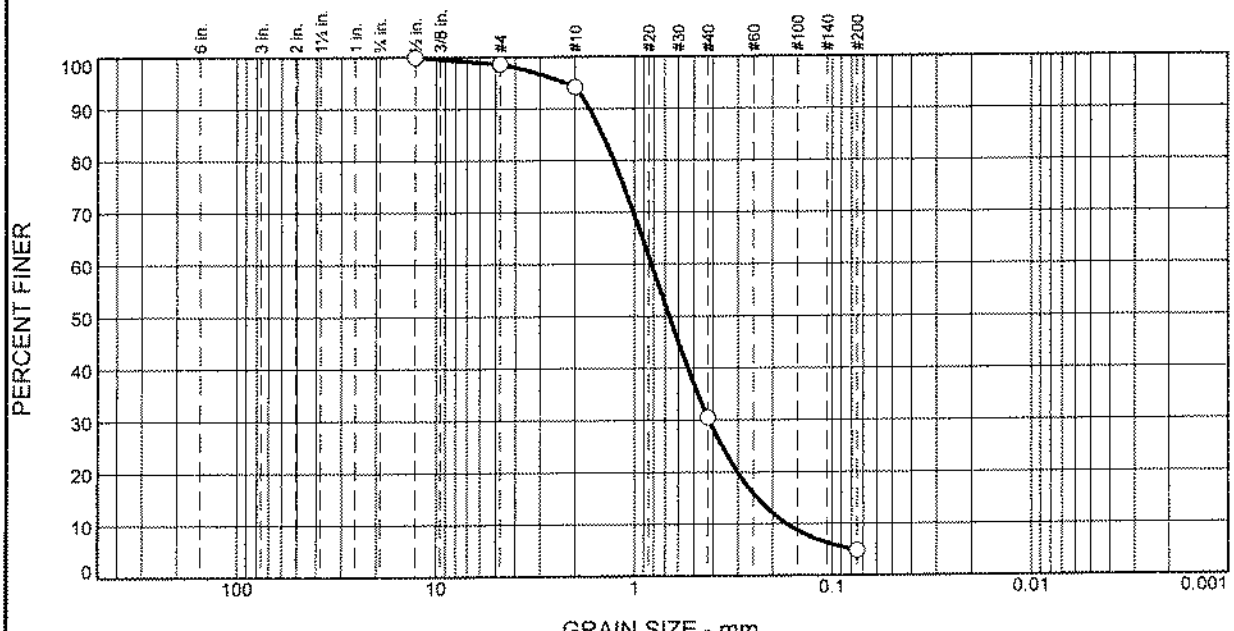
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-01-22

Client: Kiewit Intrastructure Co. **Date:** 01/31/22

Sample No: K-122.35, S-12 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 39-41'



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	5	63	26	5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	99		
#10	94		
#40	31		
#200	4.8		

* (no specification provided)

Soil Description

Black c-m+f SAND; trace SILT; trace f GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 1.4553 D_{60}= 0.8225 D_{50}= 0.6676
D_{30}= 0.4187 D_{15}= 0.2390 D_{10}= 0.1699
C_u= 4.84 C_c= 1.25

Classification

USCS= SP AASHTO=

Remarks

Moisture Content= 17.8%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 01/31/22

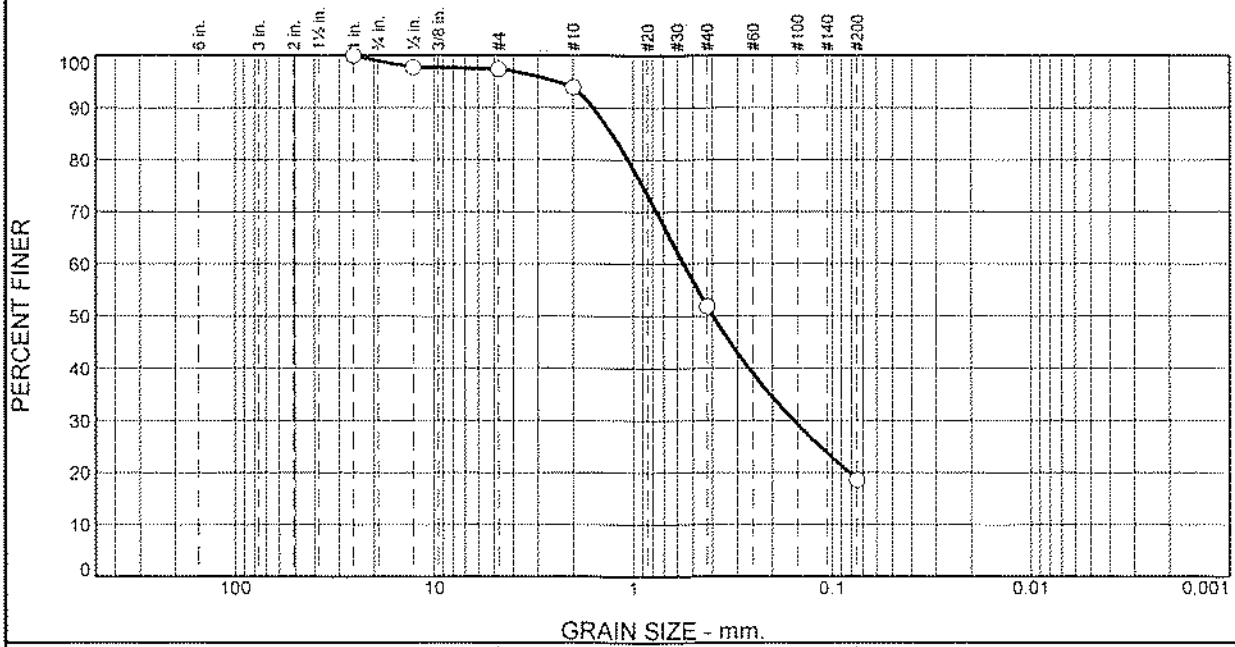
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-02-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/07/22

Sample No: K-122.4, S-13 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 49-51'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	2	3	42	33	19	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1"	100		
1/2"	98		
#4	97		
#10	94		
#40	52		
#200	19		

Soil Description

Greyish Black c-mf SAND; little SILT; trace mf GRAVEL

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 1.2811 D_{60}= 0.5586 D_{50}= 0.3970
D_{30}= 0.1564 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 21.7%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 02/07/22

ATLANTIC TESTING LABORATORIES

WBE certified company

AMOUNT OF MATERIAL IN SOILS FINER THAN THE NO. 200 SIEVE
ASTM D 1140

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-02-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 7, 2022
	United Cable Installation	**Test Date:**	February 3, 2022
	Various Locations, New York	**Performed By:**	M. White

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-117.6-1.6A	S-8	28-30	A	10	672.08	70
K-122.4	S-5	8-10	A	10	339.75	57
K-125.6	ST-1	28-30	A	10	257.41	100
K-127.9	S-4	6-8	A	10	164.08	95
K-127.9	ST-1	38-40	A	10	392.67	100
K-128.0	S-7	19-21	A	10	163.31	100
K-128.0	ST-1	38-40	A	10	216.36	100
K-129.9A	S-5	8-10	A	10	136.68	24
K-129.9A	ST-1	41-43	A	10	240.79	100
K-129.9B	ST-1	27-29	A	10	186.13	100

Reviewed By: _____ Date: February 7, 2022

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client: Kiewit Instrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-122.35	S-3	NP	NP	NP
K-122.35	S-15	NP	NP	NP
K-123.2	S-6	48	20	28
K-123.2	S-10	67	21	46
K-123.7	S-6	79	23	56
K-123.7	S-9	73	20	53
K-123.8	S-6	54	23	31
K-123.8	S-9	67	18	49
K-125.5	S-3	NP	NP	NP
K-125.5	S-9	70	21	49
K-127.0	S-4	51	22	29
K-127.0	S-9	72	20	52
K-127.1	S-3	34	22	12
K-127.1	S-9	68	19	49

SAMPLE INFORMATION

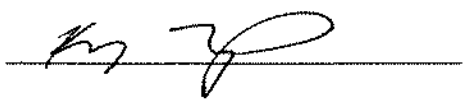
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-122.35	S-3	2	5	23.5
K-122.35	S-15	4.76	52	27.2
K-123.2	S-6	2	1	28.4
K-123.2	S-10	6.35	1	65.5
K-123.7	S-6	0.297	0	25.9
K-123.7	S-9	0.297	0	48.4
K-123.8	S-6	2	7	66.5
K-123.8	S-9	0.297	0	37.2
K-125.5	S-3	2	5	21.4
K-125.5	S-9	9.51	2	38.0
K-127.0	S-4	2	2	31.2
K-127.0	S-9	9.51	2	81.7
K-127.1	S-3	6.35	24	30.7
K-127.1	S-9	2	1	58.0

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-122.35	S-3	Air Dry	Pulverizing and Screening
K-122.35	S-15	Air Dry	Pulverizing and Screening
K-123.2	S-6	Air Dry	Pulverizing and Screening
K-123.2	S-10	Air Dry	Pulverizing and Screening
K-123.7	S-6	Air Dry	Not Necessary
K-123.7	S-9	Air Dry	Not Necessary
K-123.8	S-6	Air Dry	Pulverizing and Screening
K-123.8	S-9	Air Dry	Not Necessary
K-125.5	S-3	Air Dry	Pulverizing and Screening
K-125.5	S-9	Air Dry	Pulverizing and Screening
K-127.0	S-4	Air Dry	Pulverizing and Screening
K-127.0	S-9	Air Dry	Pulverizing and Screening
K-127.1	S-3	Air Dry	Pulverizing and Screening
K-127.1	S-9	Air Dry	Pulverizing and Screening

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By:  Date: 01/31/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client: Kiewit Instrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-02-02-22
Report Date: February 7, 2022
Date Received: February 1, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-117.6-1.6A	S-6	46	20	26
K-117.6-1.6A	S-8	47	19	28
K-122.4	S-5	NP	NP	NP
K-125.6	S-5	50	22	28
K-125.6	ST-1	60	20	40
K-127.9	S-4	70	25	45
K-127.9	ST-1	30	17	13
K-128.0	S-7	78	23	55
K-128.0	ST-1	43	18	25
K-129.9A	S-5	NP	NP	NP
K-129.9A	ST-1	44	20	24
K-129.9B	S-6	96	49	47
K-129.9B	ST-1	55	20	35

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-117.6-1.6A	S-6	4.76	19	25.3
K-117.6-1.6A	S-8	6.35	28	33.3
K-122.4	S-5	2	5	24.8
K-125.6	S-5	0.42	2	24.7
K-125.6	ST-1	0.177	0	49.4
K-127.9	S-4	2	13	30.0
K-127.9	ST-1	0.177	0	30.0
K-128.0	S-7	0.149	0	39.2
K-128.0	ST-1	0.177	0	51.2
K-129.9A	S-5	2	25	134.2
K-129.9A	ST-1	0.177	0	40.5
K-129.9B	S-6	0.841	9	88.0
K-129.9B	ST-1	0.177	0	51.2

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-117.6-1.6A	S-6	Air Dry	Pulverizing and Screening
K-117.6-1.6A	S-8	Air Dry	Pulverizing and Screening
K-122.4	S-5	Air Dry	Pulverizing and Screening
K-125.6	S-5	Air Dry	Pulverizing and Screening
K-125.6	ST-1	Air Dry	Not Necessary
K-127.9	S-4	Air Dry	Pulverizing and Screening
K-127.9	ST-1	Air Dry	Not Necessary
K-128.0	S-7	Air Dry	Not Necessary
K-128.0	ST-1	Air Dry	Not Necessary
K-129.9A	S-5	Air Dry	Pulverizing and Screening
K-129.9A	ST-1	Air Dry	Not Necessary
K-129.9B	S-6	Air Dry	Pulverizing and Screening
K-129.9B	ST-1	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By:  Date: 02/07/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-01-01-22
Project:	Champlain Hudson Power Express	**Report Date:**	January 31, 2022
	United Cable Installation	**Date Received:**	January 25, 2022
	Various Locations, New York		

PERCENT ORGANICS, ASH CONTENT, AND MOISTURE CONTENT

ASTM D 2974

Boring No.	Sample No.	Organics (%)	Ash (%)	Moisture (%)	Test Method	Furnace Temperature (°C)
K-122.35	S-4	4.5	95.5	22.8	A	440
K-123.7	S-3	7.5	92.5	41.4	A	440
K-123.8	S-6	6.9	93.1	66.5	A	440
K-127.1	S-3	4.5	95.5	30.7	A	440

Reviewed By: _____ Date: 01/31/22

Kiewit

MEMORANDUM

DATE: December 16, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

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

SUBJECT: Geotechnical Data: Segment 3 - Package 2 - HDD Crossing 13.A
Champlain Hudson Power Express Project
Fort Ann, New York

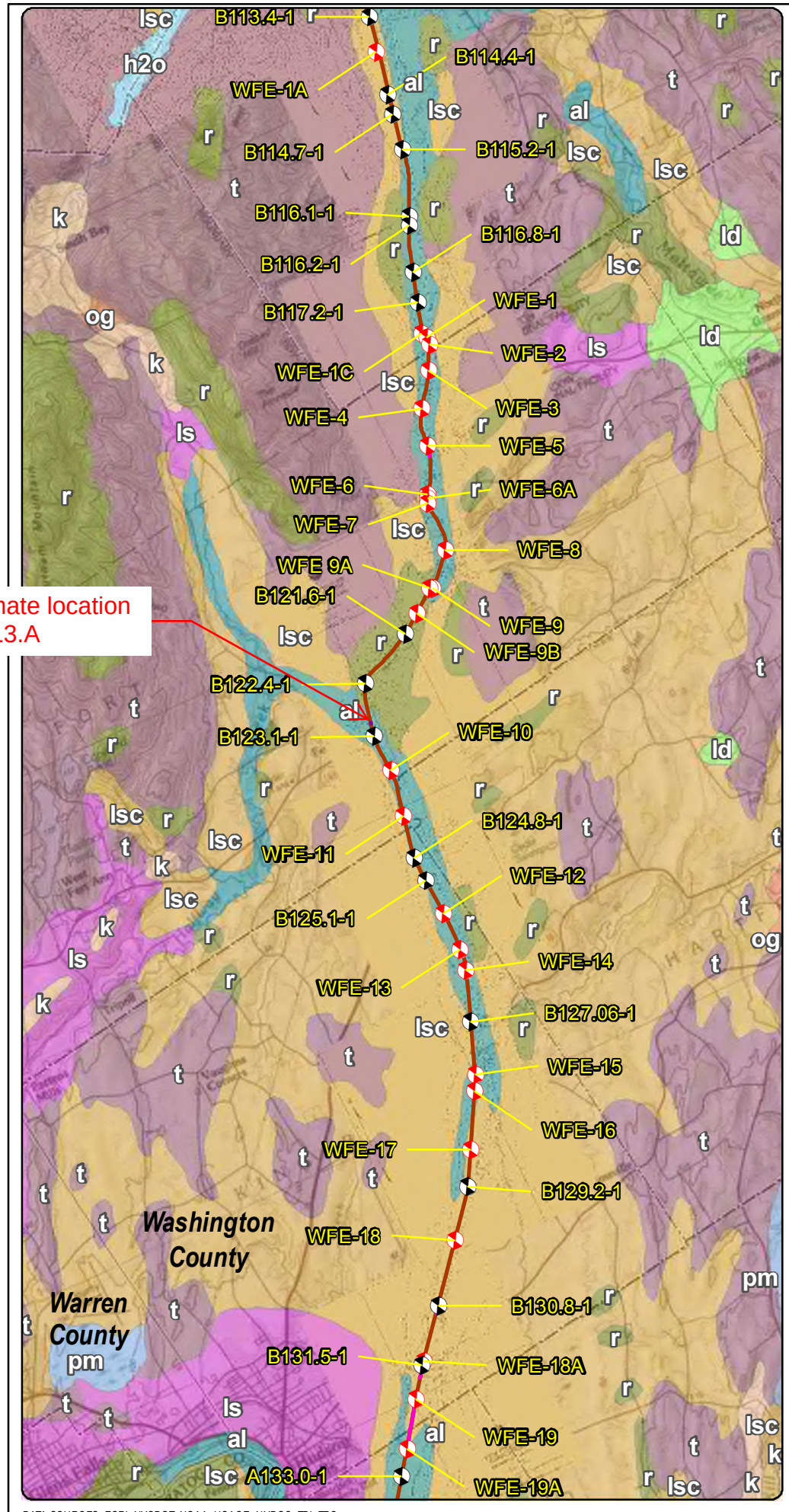
Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located in Fort Ann, New York. The approximate station for the start of HDD crossing Number 13.A is STA 20281+00 (43.4178° N, 73.4847° W)

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

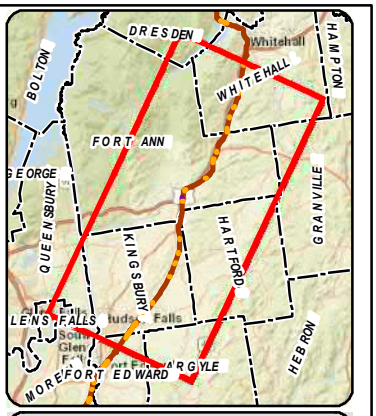
- Terracon, Results of Field Exploration, Champlain-Hudson Power Express – Additional HDD Borings – Phase 3, Fort Ann to Coxsackie, NY, dated November 3, 2022.

Contact us if you have questions or require additional information.

HDD 13.A
Borings KB-122.9, K-123.0
Segment 3 - Design Package 2



Approximate location of HDD 13.A



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
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Whitehall to Fort Edward

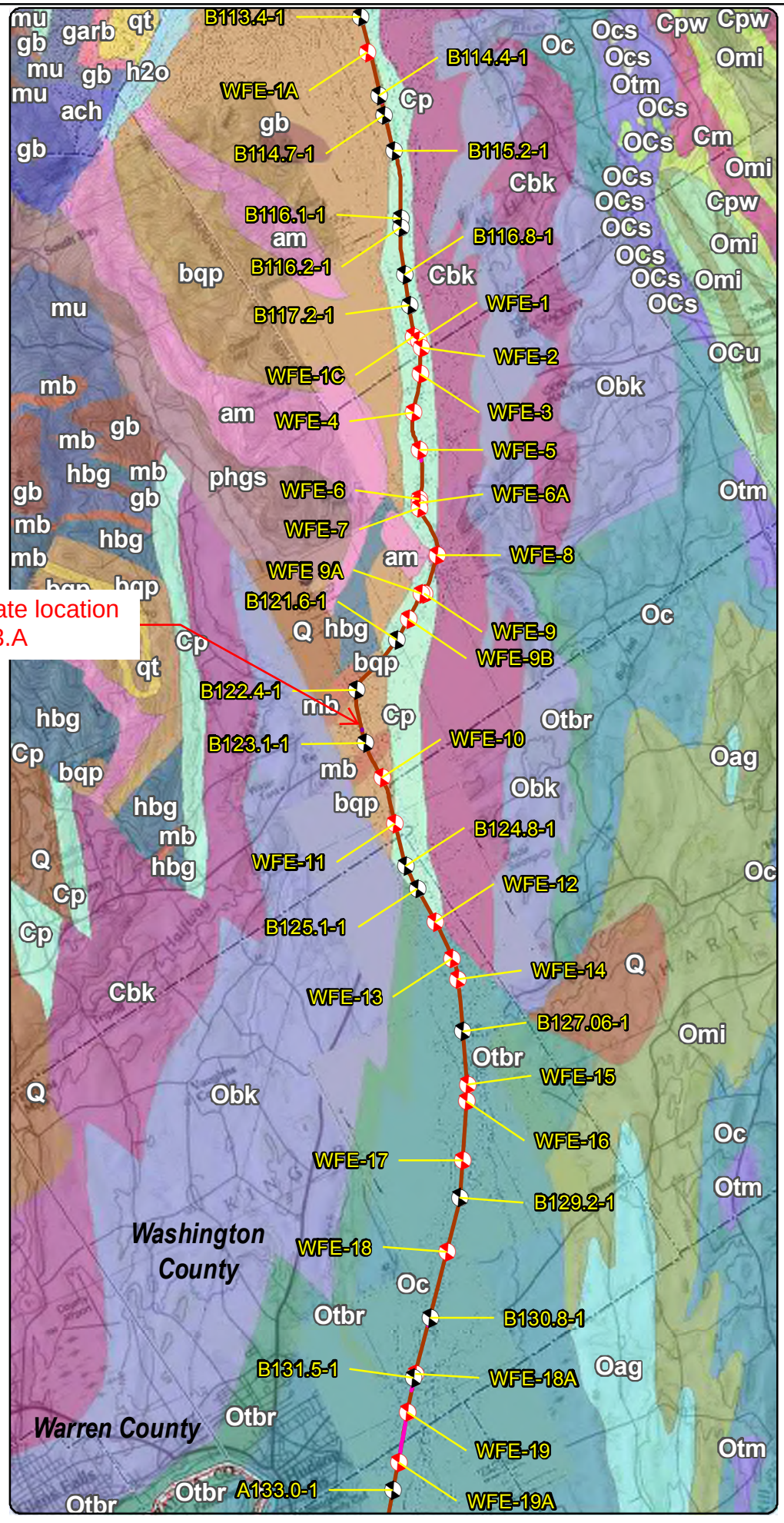
Figure 3-3

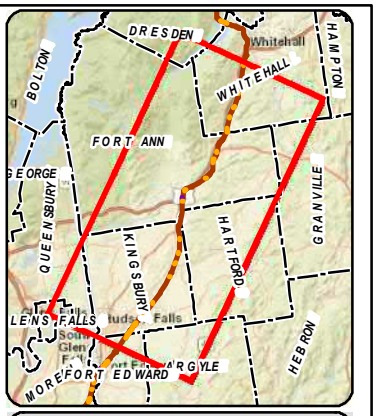
Prepared on 5/5/2021

by: AECOM

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Ft_Ed_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

- Cbk - Beekmantown Group
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

Y:\Projects\CHPE\IRoute\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190909Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Ft_Ed_Boring_Locations_Bedrock_May_2021_Report.mxd

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

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. KB-122.9

PROJECT: CHPE - Additional HDD Borings - Phase 3

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

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.417671° Longitude: -73.485330°

Surface Elev.: 131.0147 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.2	130.8									
TOPSOIL										
SILTY SAND (SM), brown, very loose to medium dense						9	9-5-5-5 N=10			
						24	3-3-3-5 N=6			
			5			24	3-3-3-2 N=6	23.1		46
						24	WH-WH-WH-WH			
						24	WH-WH-2-3 N=2			
			10			22	1-WH-2-3 N=2			
15.0	116									
POORLY GRADED SAND WITH SILT (SP-SM), brown, very loose to medium dense			15			10	5-5-5-6 N=10	18.6		12
			20			24	2-1-1-1 N=2			
25.0	106									
FAT CLAY (CH), varved silt and clay, gray, very soft			25			24	WR-WH-WH-WH	77.9	73-30-43	99

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
WR = Weight of rods

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-29-2022 | Boring Completed: 08-29-2022

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-122.9

PROJECT: CHPE - Additional HDD Borings - Phase 3

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

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.417671° Longitude: -73.485330°

Surface Elev.: 131.0147 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
FAT CLAY (CH), varved silt and clay, gray, very soft *(continued)*								
	30			24	WH-WH-WH-WH			
	35			24	WH-WH-WH-WH			
	40			24	WR-WR-WH-WH			
	45			24	WH-WH-WH-WH	74.8	68-27-41	91
	50			24	WH-WH-WH-WH 3" Split Spoon With Ring Samplers			
	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
WR = Weight of rods

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-29-2022 | Boring Completed: 08-29-2022

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-122.9

PROJECT: CHPE - Additional HDD Borings - Phase 3

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

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.417671° Longitude: -73.485330°

Surface Elev.: 131.0147 (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
		FAT CLAY (CH), varved silt and clay, gray, very soft *(continued)*				24	WH-WH-WH-WH			
			60			24	WH-WH-WH-WH			
			65			24	WH-WH-WH-WH			
	67.0	64								
		Boring Terminated at 67 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
WR = Weight of rods

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-29-2022 | Boring Completed: 08-29-2022

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-123.0

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: 43.415828° Longitude: -73.485474°

Surface Elev.: 133.3183 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	133	**TOPSOIL**							
		FILL - SILTY SAND, occasional bricks noted, brown			15	6-10-7-4 N=17			
					6	4-3-3-4 N=6	10.9		15
			5		8	3-2-2-2 N=4			
6.0	127.3				20	2-2-3-4 N=5			
		SILT (ML), occasional sand partings, orange and brown, medium stiff to stiff							
			10		16	4-5-5-8 N=10			
15.0	118.3								
		FAT CLAY WITH SAND (CH), varved silt and clay, gray, very soft	15		24	WR-WR-WR-WH			
			20		24	WR-WR-WR-WH	68.3	52-24-28	81
			25		24	WR-WR-WR-WR			

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

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 07-29-2022 | Boring Completed: 08-02-2022

Drill Rig: Diedrich D-50 | Driller: S. Morey

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-123.0

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: 43.415828° Longitude: -73.485474°

Surface Elev.: 133.3183 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
			30							
					X	24	WR-WR-WR-WR			
35.0	98.3		35							
					X	24	WR-WR-WR-WR	51.0	45-23-22	76
			40							
					X	24	WR-WR-WR-WR			
			45							
					X	24	WR-WR-WR-WR			
50.0	83.3		50							
					X	24	WR-WR-WR-WH	45.9	46-23-23	66
			55							
					X		WR-WR-WR-WH			

FAT CLAY WITH SAND (CH), varved silt and clay, gray, very soft *(continued)*

LEAN CLAY WITH SAND (CL), varved silt and clay, gray, very soft

SANDY LEAN CLAY (CL), varved silt and clay, gray, very soft

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

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 07-29-2022 | Boring Completed: 08-02-2022

Drill Rig: Diedrich D-50 | Driller: S. Morey

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-123.0

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

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Surface Elev.: 133.3183 (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
	SANDY LEAN CLAY (CL), varved silt and clay, gray, very soft *(continued)*					24	3" Spoon with ring samplers			
	60.0	73.3	60							
	POORLY GRADED SAND (SP), brown, very loose					1	WR-WR-WR			
	65.0	68.3	65							
	FAT CLAY (CH), varved silt and clay, occasional sand partings, gray, very soft					24	WR-WR-WR-WH	34.5	54-16-38	92
			70			12	WR-WR-WR			
	72.0	61.3								
	Boring Terminated at 72 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 JCH
Hammer Efficiency Summary:
Energy Transfer Ratio: 84.7% +/-5.0%
Hammer Efficiency Correction (CE): 1.41
WH = Weight of Hammer
WR = Weight of Rods

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 07-29-2022 | Boring Completed: 08-02-2022

Drill Rig: Diedrich D-50 | Driller: S. Morey

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-115.5	2-4	13.4	3.4
KB-115.5	15-17	70.8	
KB-117.6-1.6D	3-5	4.0	
KB-117.6-1.6D	20-22	22.7	
KB-117.6-1.6D	35-37	26.2	
KB-117.6-1.6D	49-51	15.3	
KB-122.9	4-6	23.1	
KB-122.9	15-17	18.6	
KB-122.9	25-27	77.9	
KB-122.9	45-47	74.8	
KB-123.0	2-4	10.9	
KB-123.0	20-22	68.3	
KB-123.0	35-37	51.0	
KB-123.0	50-52	45.9	
KB-123.0	65-67	34.5	
KB-132.1A	4-6	27.5	
KB-132.1A	15-17	38.1	
KB-132.1A	30-32	34.0	
KB-132.3A	4-6	12.1	
KB-132.3A	15-17	45.2	
KB-132.3A	30-32	37.2	
KB-132.5A	4-6	17.4	
KB-132.5A	30-32	38.8	
KB-132.5A	45-47	38.2	
KB-135.7	2-4	36.6	
KB-135.7	15-17	41.9	
KB-135.7	30-32	34.8	
KB-135.8	2-4	5.6	
KB-135.8	15-17	42.7	
KB-135.8	30-32	36.8	
KB-135.8	40-42	28.3	
KB-160.6	2-4	12.2	
KB-163.1	4-6	11.7	
KB-163.2	8-10	12.1	
KB-169.0-3.3	6-8	12.0	
KB-169.0-3.3	25-27	11.5	
KB-169.0-3.3	35-37	8.4	
KB-177.1	10-12	8.9	
KB-177.1	25-27	11.5	
KB-177.1	40-42	11.2	
KB-177.1	50-52	5.7	
KB-182.7B	6-8	31.5	

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

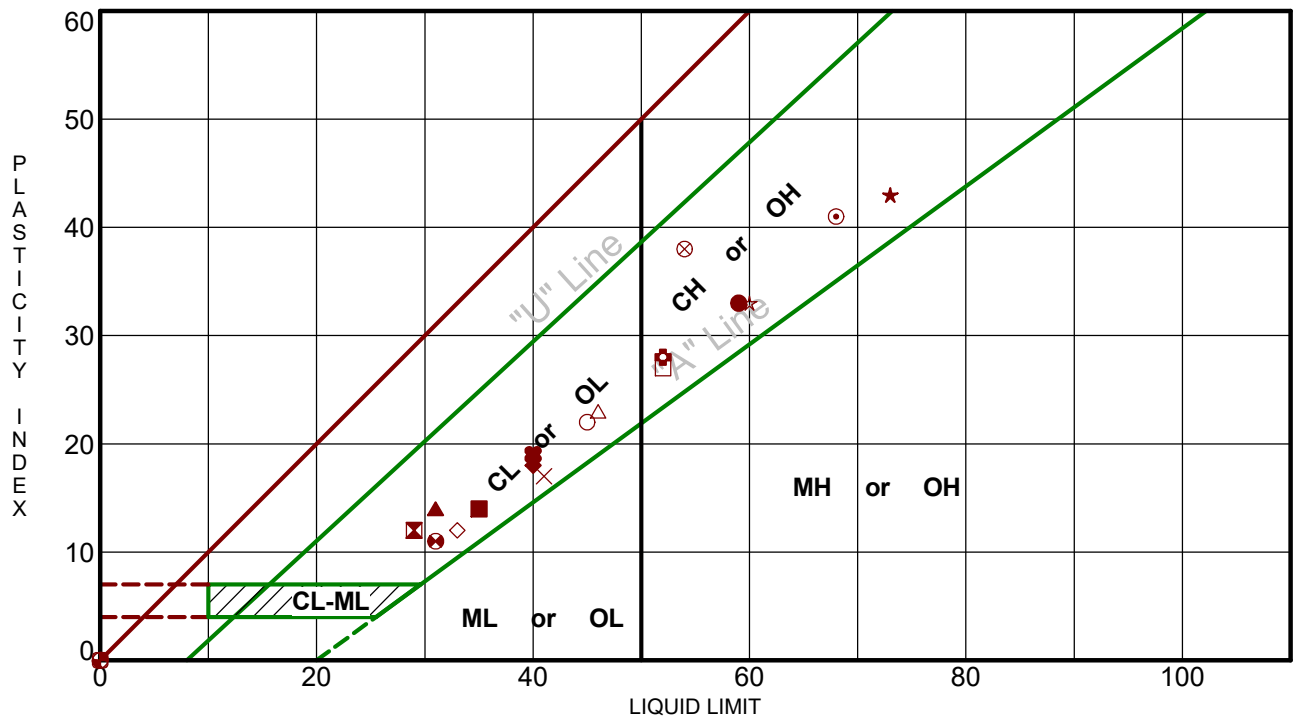
PROJECT NUMBER: JB215256G

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-115.5	15 - 17	59	26	33	86.6	CH	FAT CLAY
⊠	KB-117.6-1.6D	20 - 22	29	17	12	25.5	SC	CLAYEY SAND
▲	KB-117.6-1.6D	35 - 37	31	17	14	48.6	SC	CLAYEY SAND
★	KB-122.9	25 - 27	73	30	43	98.8	CH	FAT CLAY
⊙	KB-122.9	45 - 47	68	27	41	91.5	CH	FAT CLAY
✿	KB-123.0	20 - 22	52	24	28	81.5	CH	FAT CLAY with SAND
○	KB-123.0	35 - 37	45	23	22	75.9	CL	LEAN CLAY with SAND
△	KB-123.0	50 - 52	46	23	23	65.8	CL	SANDY LEAN CLAY
⊗	KB-123.0	65 - 67	54	16	38	91.9	CH	FAT CLAY
⊕	KB-132.1A	4 - 6	NP	NP	NP	10.0	SP-SM	POORLY GRADED SAND with SILT and GRAVEL
□	KB-132.1A	15 - 17	52	25	27	96.9	CH	FAT CLAY
⊗	KB-132.1A	30 - 32	31	20	11	100.0	CL	LEAN CLAY
◕	KB-132.3A	4 - 6	NP	NP	NP	31.7	SM	SILTY SAND
☆	KB-132.3A	15 - 17	60	27	33	88.6	CH	FAT CLAY
✿	KB-132.3A	30 - 32	NP	NP	NP	53.0	ML	SANDY SILT with GRAVEL
■	KB-132.5A	4 - 6	35	21	14	94.3	CL	LEAN CLAY
◆	KB-132.5A	30 - 32	40	22	18	98.7	CL	LEAN CLAY
◇	KB-132.5A	45 - 47	33	21	12	94.9	CL	LEAN CLAY
×	KB-135.7	2 - 4	41	24	17	26.1	GC	CLAYEY GRAVEL with SAND
✖	KB-135.7	15 - 17	40	21	19	91.9	CL	LEAN CLAY

PROJECT: CHPE - Additional HDD Borings - Phase 3

PROJECT NUMBER: JB215256G

SITE: Fort Ann to Coxsackie, NY

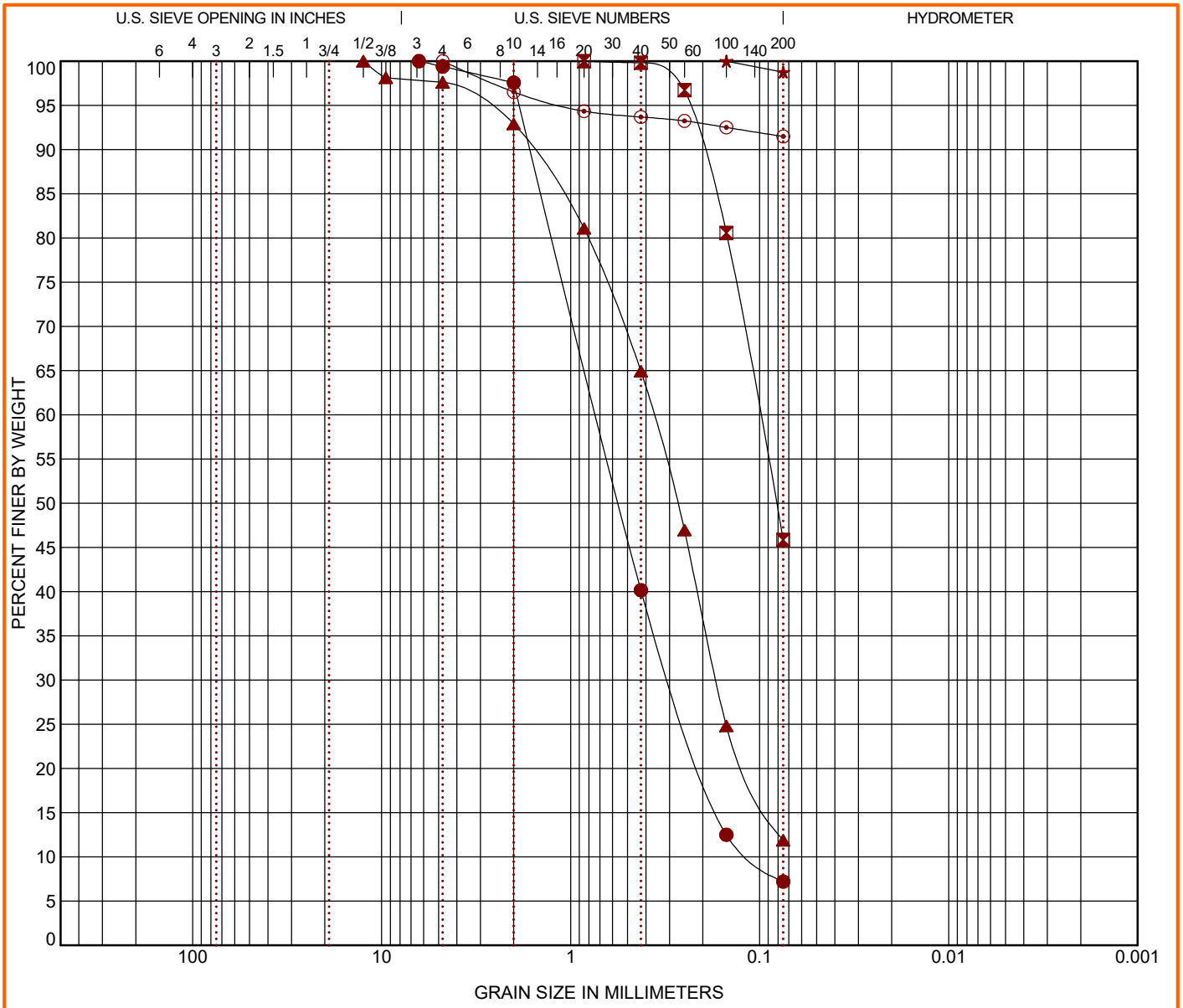
Terracon
30 Corporate Cir Ste 201
Albany, NY

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

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 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-117.6-1.6D	49 - 51	POORLY GRADED SAND with SILT (SP-SM)	15.3				1.07	6.71
⊠	KB-122.9	4 - 6	SILTY SAND (SM)	23.1					
▲	KB-122.9	15 - 17	POORLY GRADED SAND with SILT (SP-SM)	18.6				1.15	5.42
★	KB-122.9	25 - 27	FAT CLAY (CH)	77.9	73	30	43		
⊙	KB-122.9	45 - 47	FAT CLAY (CH)	74.8	68	27	41		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-117.6-1.6D	49 - 51	6.35	0.726	0.29	0.108	0.0	0.6	92.2		7.2	
⊠	KB-122.9	4 - 6	0.85	0.099			0.0	0.0	54.1		45.9	
▲	KB-122.9	15 - 17	12.5	0.368	0.169		0.0	2.4	85.7		11.9	
★	KB-122.9	25 - 27	0.15				0.0	0.0	1.2		98.8	
⊙	KB-122.9	45 - 47	4.75				0.0	0.0	8.5		91.5	

PROJECT: CHPE - Additional HDD Borings - Phase 3

PROJECT NUMBER: JB215256G

SITE: Fort Ann to Coxsackie, NY

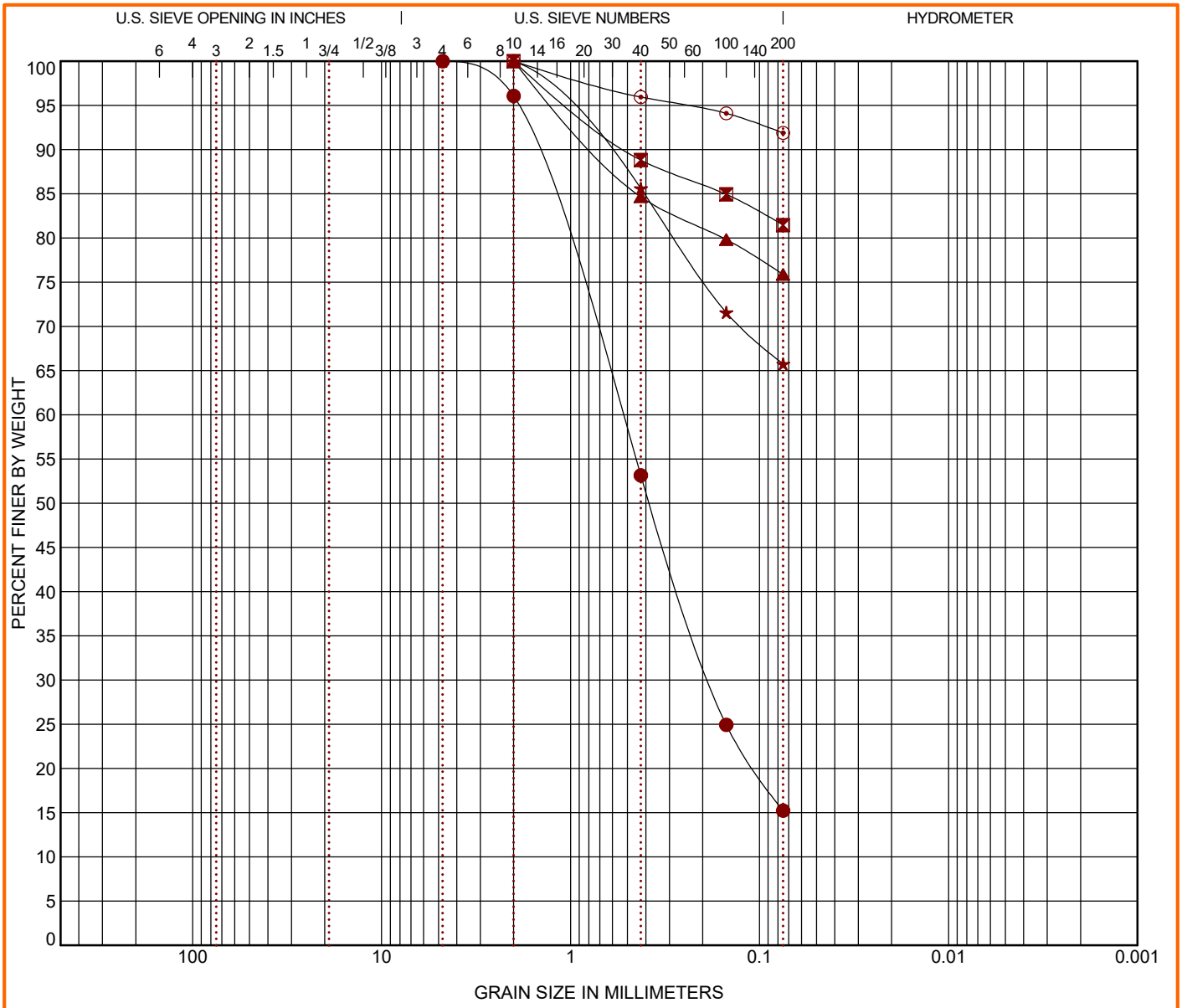
Terracon
30 Corporate Cir Ste 201
Albany, NY

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

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 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-123.0	2 - 4	SILTY SAND (SM)	10.9					
⊠	KB-123.0	20 - 22	FAT CLAY with SAND (CH)	68.3	52	24	28		
▲	KB-123.0	35 - 37	LEAN CLAY with SAND (CL)	51.0	45	23	22		
★	KB-123.0	50 - 52	SANDY LEAN CLAY (CL)	45.9	46	23	23		
⊙	KB-123.0	65 - 67	FAT CLAY (CH)	34.5	54	16	38		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-123.0	2 - 4	4.75	0.544	0.181		0.0	0.0	84.8		15.2	
⊠	KB-123.0	20 - 22	2				0.0	0.0	18.5		81.5	
▲	KB-123.0	35 - 37	2				0.0	0.0	24.1		75.9	
★	KB-123.0	50 - 52	4.75				0.0	0.0	34.2		65.8	
⊙	KB-123.0	65 - 67	2				0.0	0.0	8.1		91.9	

PROJECT: CHPE - Additional HDD Borings - Phase 3

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Kiewit

MEMORANDUM

DATE: September 23, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

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

SUBJECT: Geotechnical Data: Segment 3 - Package 2 - HDD Crossing 14 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, 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 Fort Ann, New York. The approximate station for the start of HDD crossing Number 14 is STA 20292+00 (43.414530° N, 73.485734° W)

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

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 113.1-177.1, dated March 29, 2013.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 14
Borings B123.1-1, K-123.2
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

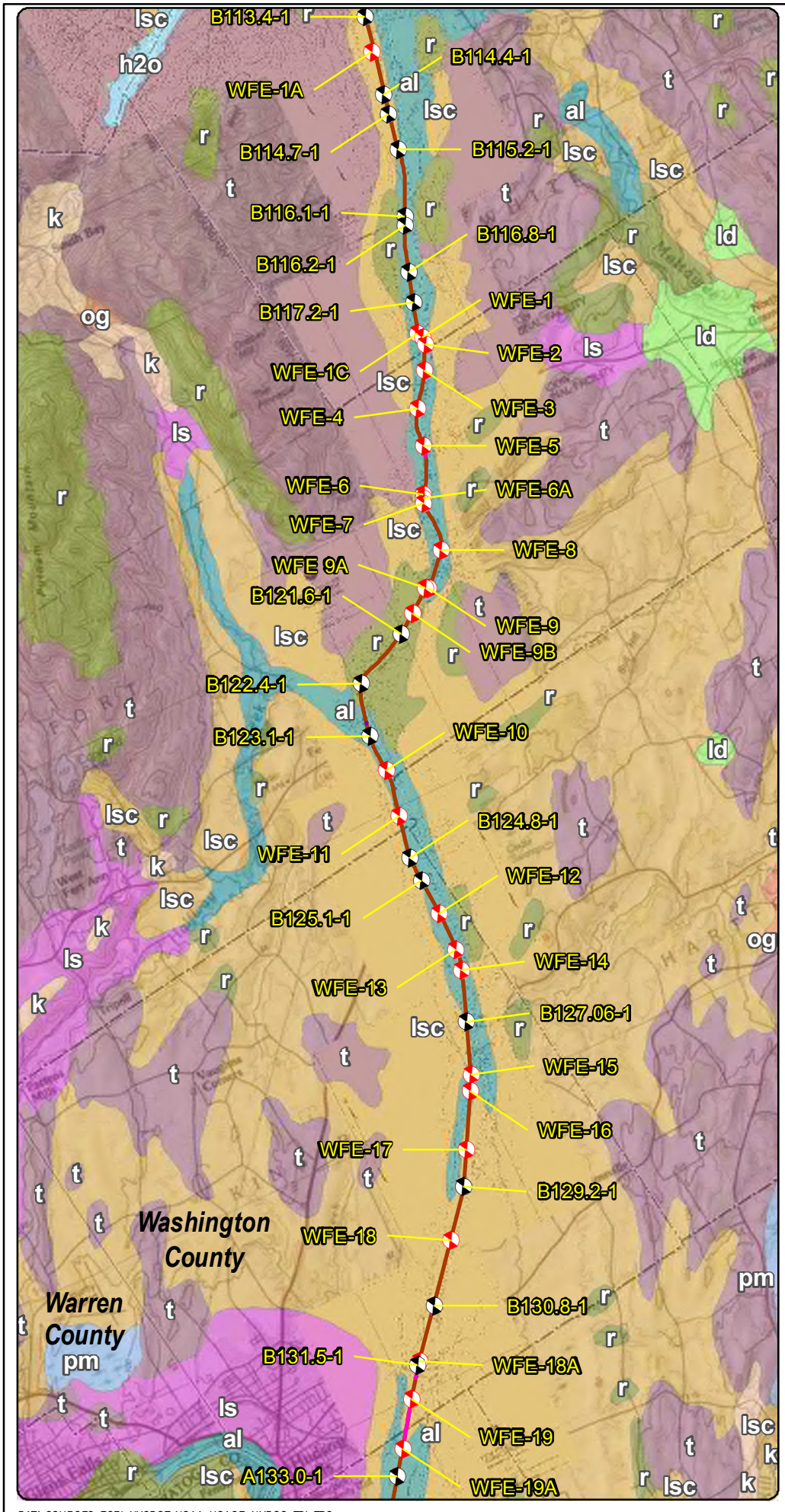
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

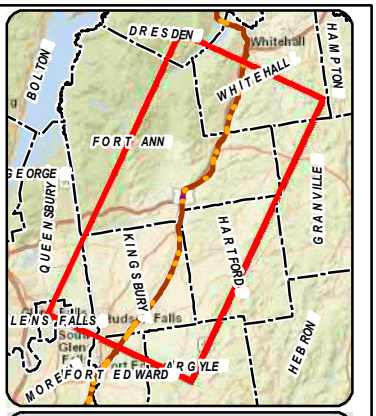
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

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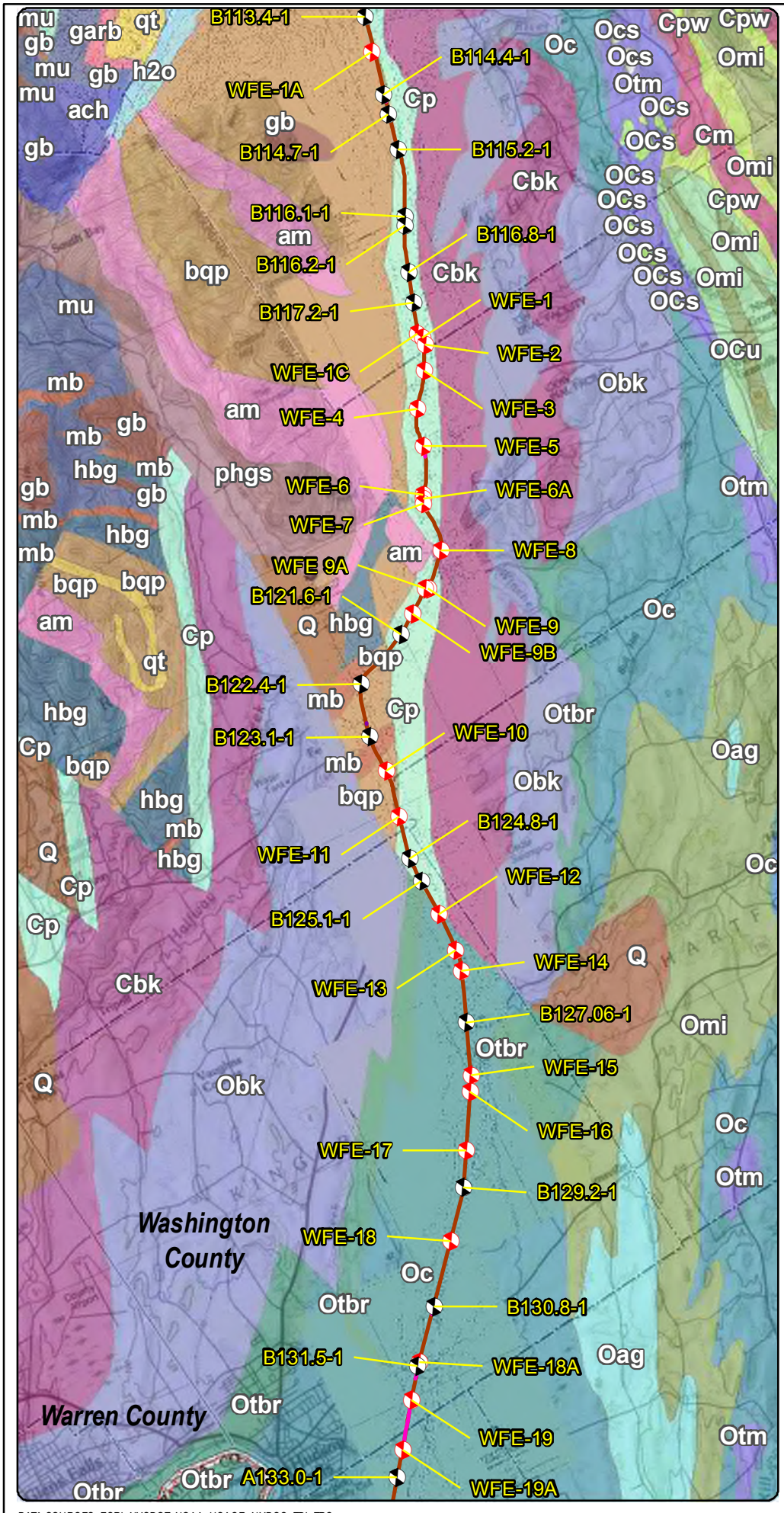

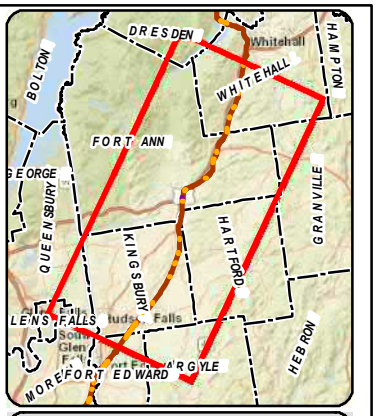

LEGEND

- 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

- Cbk - Beekmantown Group
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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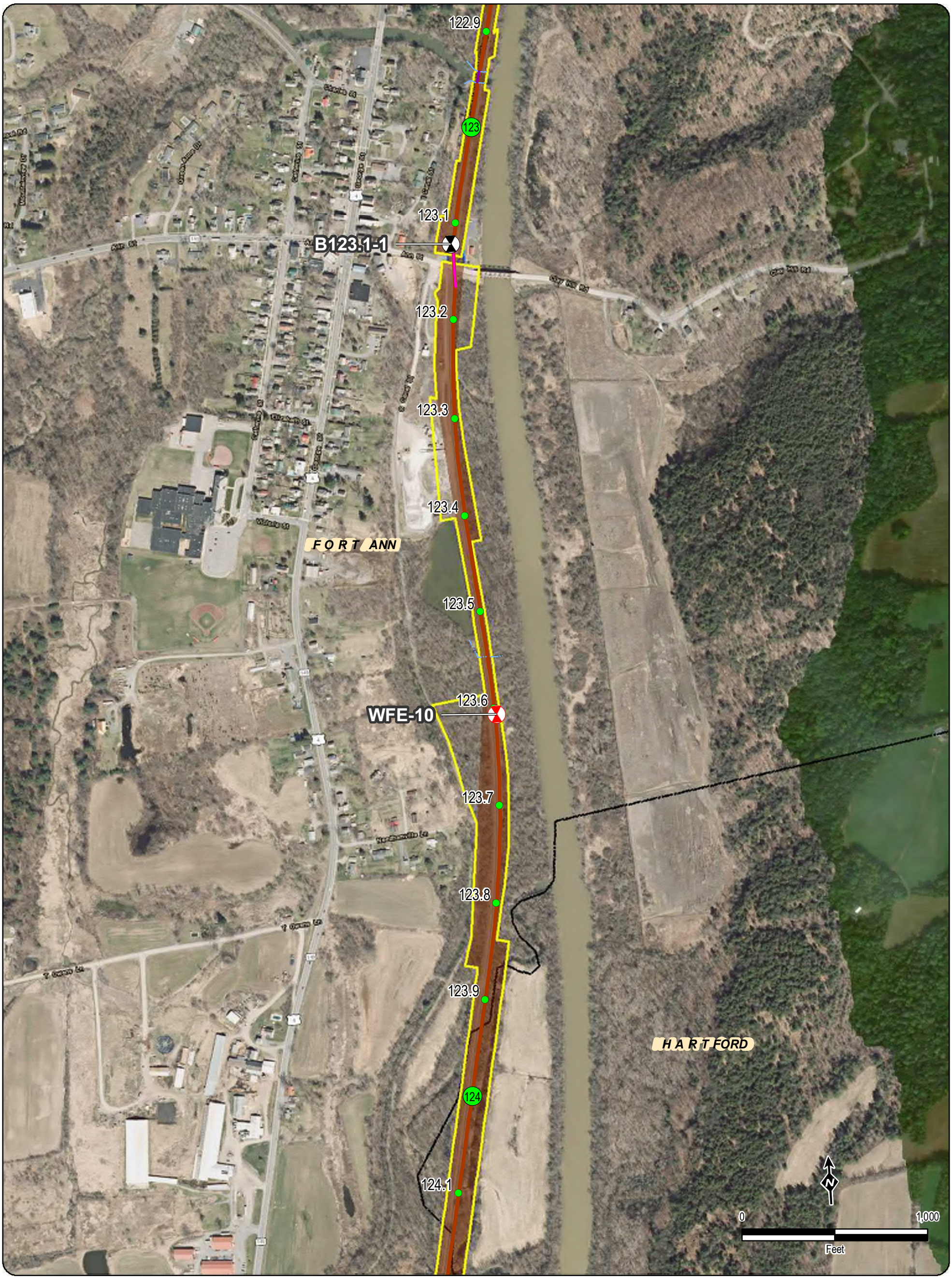
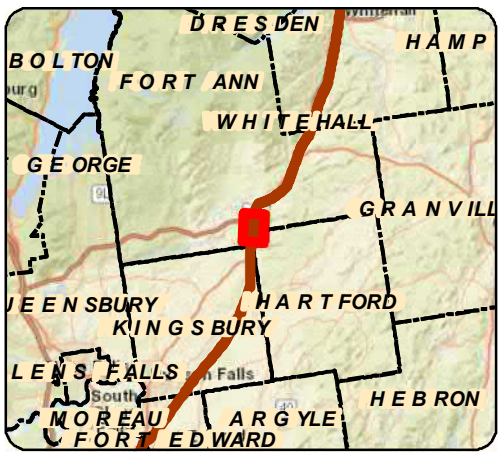




LEGEND

- 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

Whitehall to Fort Edward

Figure A-3

Sheet 9 of 16

Prepared by: AECOM 5/19/2021

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

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Edward_Boring_Locations_Mapset_May_2021_Report.mxd

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CP RAILROAD ROW, NY

BORING	**B123.1-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
15.8'	NR	12/13	0 HR

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
c_2	FROM	10.0 '	TO	25.0 '

DRILLER	R. CARUSO
HELPER	C. SMART
INSPECTOR	C. POPPE
DATE STARTED	12/13/2012
DATE COMPLETED	12/13/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	12 11 13 19		***BROWN F/M SANDY SILT, TR-SM F/ GRAVEL (FILL)***	8.0	
	S-2	11 7 8 9		2.0 ***BROWN AND GRAY CLAYEY SILT, SM F/ SAND***		
5	S-3	4 5 4 7		4.0	44.6	
	S-4	5 7 8 12			33.0	
	S-5	7 11 12 13		***GRAY CLAY, TR SILT***	36.7	
10						
	S-6	3 3 4		13.5	29.0	
15 ▼				***BROWN AND GRAY F/M/C SANDY CLAY, TR TO SM SILT***		
	S-7	5 6 5		18.5	23.8	
20				***GRAY CLAY, TR TO SM SM SILT, TR TO SM F/M SAND***		
	S-8	4 4 5		25.0		
25				***END OF BORING AT 25'***		
30						
35						

DRN.	CMP
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CP.GPJ SITE BLAUVELT.GDT 3/27/13

SUMMARY OF LABORATORY TEST DATA

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

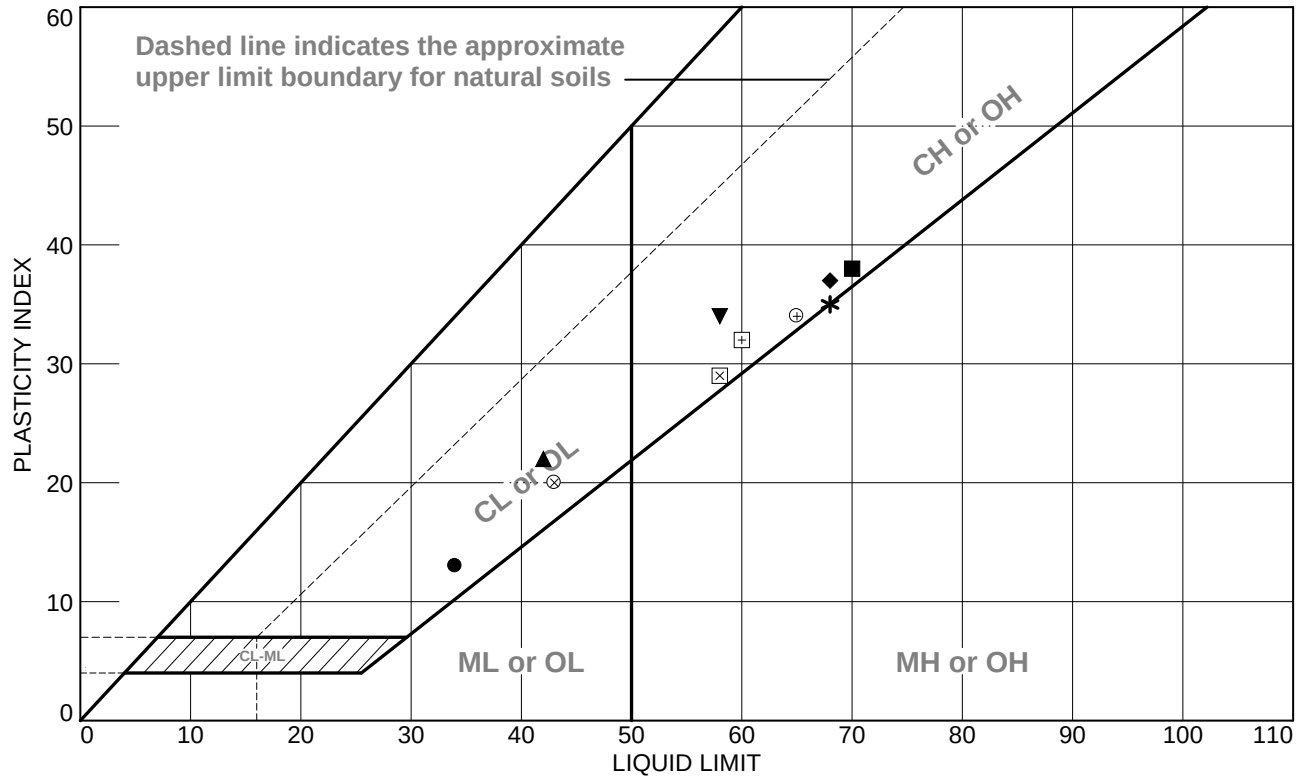
SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
B120.1-1	R-1	1.7-2.3	-	-	-	-	-	-	-	-	-	-	-	165.1	1120	-
A120.8-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	4.0	-	-	-
	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	9.8	-	-	-
	R-1	6.1-6.8	-	-	-	-	-	-	-	-	-	-	-	170.4	1340	-
B121.6-1	R-1	6.3-6.6	-	-	-	-	-	-	-	-	-	-	-	168.7	430	-
B122.4-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	16.7	-	-	-
	S-5	8.0-10.0	-	0.3	23.9	75.8		-	-	-	-	-	23.5	-	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	24.7	-	-	-
	S-7	18.5-20.0	SM	0.0	67.6	32.4		-	-	-	-	-	39.8	-	-	4.4
	S-8	23.5-25.0	SW-SM	0.5	93.4	6.1		-	-	-	-	-	22.6	-	-	-
B123.1-1	S-1	0.0-2.0	-	-	-	-	-	-	-	-	-	-	8.0	-	-	-
	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	44.6	77.9	-	-
	S-4	6.0-8.0	CH	-	-	-	-	58	29	29	0.1	-	33.0	89.6	-	-

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CP
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	-	-	-	-	-	-	-	-	-	-	36.7	-	-	-
	S-6	13.5-15.0	-	0.4	36.8	62.8		-	-	-	-	-	29.0	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	23.8	-	-	-
B124.8-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	13.7	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	22.6	107.1	-	-
	S-5	8.0-10.0	-	0.0	22.1	77.9		-	-	-	-	-	6.2	-	-	-
B125.1-1	S-1	0.0-2.0	SW-SM	29.5	60.3	10.2		-	-	-	-	-	17.9	-	-	-
	S-2	2.0-4.0														
	S-5	8.0-10.0	SP-SM	0.3	90.5	9.2		-	-	-	-	-	19.1	-	-	-
	S-6	13.5-15.0														
	S-8	23.5-25.0	CH	-	-	-	-	53	25	28	0.1	-	29.1	-	-	-
B127.06-1	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	26.8	-	-	-
	S-5	8.0-10.0	-	0.0	6.7	7.8	85.5	-	-	-	-	2.80	29.3	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

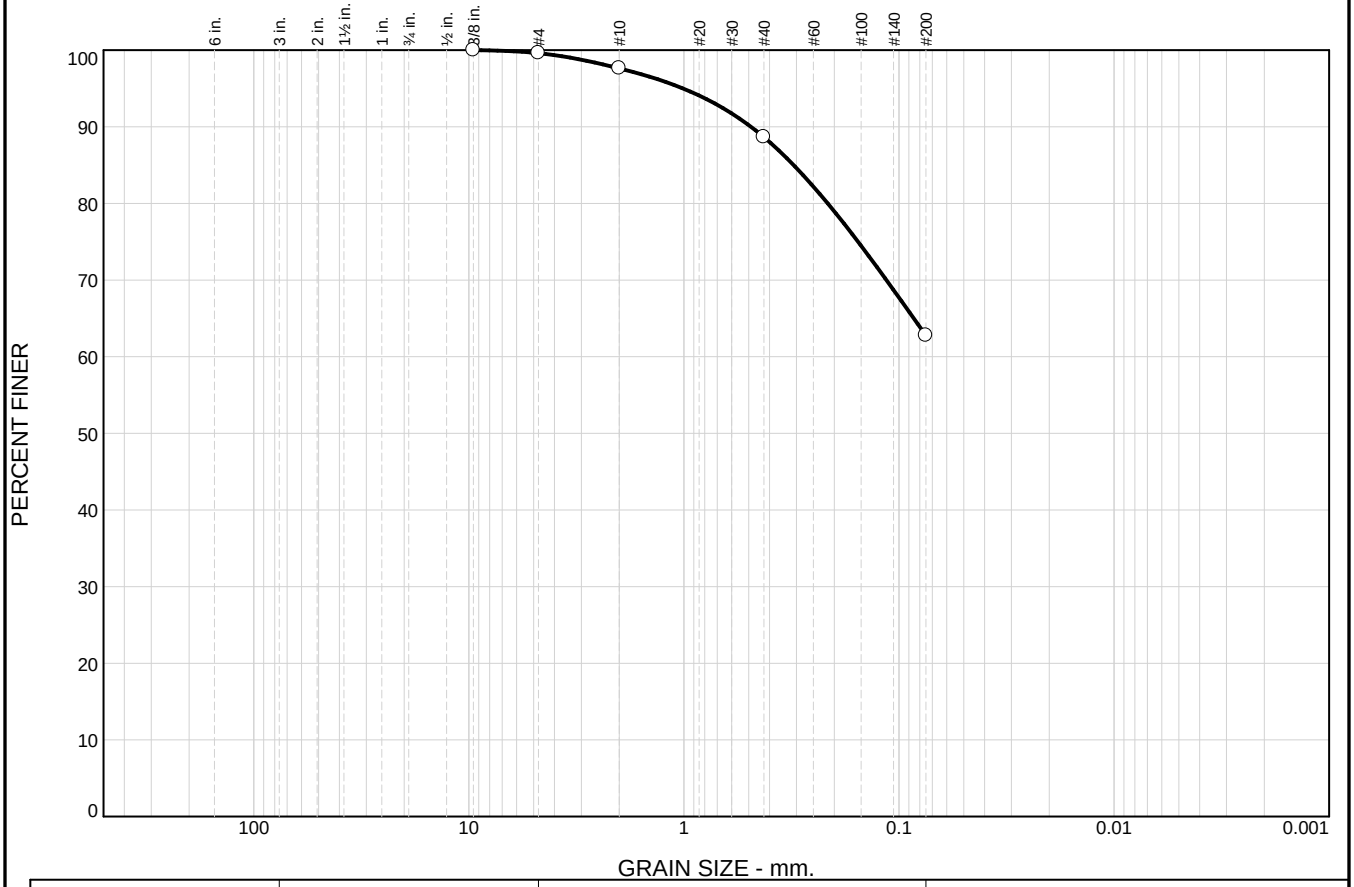
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B113.1-1	S-7	18.5-20.0 FT	27.3	21	34	13	CL
■	B113.1-1	S-9	28.5-30.0 FT	38.8	32	70	38	CH/OH
▲	B113.4-1	S-3 & S-4	4.0-8.0 FT	27.3	20	42	22	CL
◆	B113.4-1	S-8	23.5-25.0 FT	50.3	31	68	37	CH
▼	B114.4-1	S-9	28.5-30.0 FT	49.2	24	58	34	CH
✱	B114.4-1	S-7	18.5-20.0 FT	49.7	33	68	35	CH/MH
⊕	B115.2-1	S-7	18.5-20.0 FT	45.6	31	65	34	CH
⊞	B116.8-1	S-12	43.5-45.0 FT	52.2	28	60	32	CH
⊗	B119.2-1	S-4 & S-5	7.0-11.0 FT	26.7	23	43	20	CL
⊠	B123.1-1	S-4	6.0-8.0 FT	33.0	29	58	29	CH

TRC
Engineers, Inc.
Mt. Laurel, NJ

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

Project No.: 195651 **Figure** 1

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.4	2.0	8.9	25.9	62.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			0.3091							

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

Project No. 195651 **Client:** TDI CHAMPLAIN HUDSON POWER EXPRESS - CP

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B123.1-1 **Depth:** 13.5-15.0 FT **Sample Number:** S-6

TRC Engineers, Inc.

Mt. Laurel, NJ

Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

Figure 22

Tested By: BMH 01/25/13 **Checked By:** _____