Technical Memorandum

To: Stephanie Labbe
PAR Electrical Contractors
60 Fuller Road
Chicopee, MA 01020

From: Balin Strickler
Quanta Subsurface
4308 N Barker Road
Spokane Valley, WA 99027

Date: November 10, 2016

Re: Northern Pass – Underground HDD/Trenchless Geotechnical Study

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Introduction

In accordance with our proposal dated April 12, 2016 and your authorization, we have completed a geotechnical drilling and a laboratory testing program for the Northern Pass Transmission line project in New Hampshire. The work was authorized in phases and completed under Par Electrical Contractors (PAR) job number of 29-6-1683 and 29-6-1684. The Northern Pass Transmission line project consists of construction of both overhead and underground transmission lines over much of New Hampshire, traversing from North to South. The underground portions of this alignment traverses approximately 60 miles of the proposed alignment. As part of the underground design, there are up to sixty trenchless underground crossings that require horizontal directional drilling (HDD) services in addition to thermal resistivity properties of the subsurface materials.

In order to complete the underground design at the HDD locations, Quanta Subsurface (QS) was contracted to perform a geotechnical field exploration and laboratory testing program at many of the locations to compliment the work that has been previously completed. The purpose of QS's geotechnical exploration and laboratory testing services for this phase of the project was to further characterize the subsurface materials at specific locations and to collect samples for thermal resistivity testing at specific depths on behalf of the HDD designer, Brierley Associates, contracted by PAR. QS performed the drilling and laboratory testing at the direction of Brierley Associates.

Figure 1 provides a map of the proposed route through New Hampshire. The area investigated included the middle section of underground construction as shown. The area of underground construction at the northern end of the project was not included in this investigation.

Scope of Work

The scope of work for this project generally includes:

- Review of the readily available aerial photographs and published geologic literature, including maps and reports pertaining to the project vicinity.
- Mark out the boring locations and notification of the local utility locating service prior to drilling.
- Drilling, logging, and sampling 81 borings to depths ranging from 35 to 75 feet below the existing ground surface. The boring logs and core photos are presented in Appendix A and B.
- Perform laboratory tests on selected samples obtained from the borings to evaluate index material properties and thermal resistivity values. The results of the index testing are in Appendix C and thermal resistivity testing are presented in Appendix D.
- Preparation of this memorandum presenting our findings of geotechnical investigation for this phase of the project.

Geotechnical Exploration and Laboratory Testing

QS's geotechnical field exploration program was conducted to evaluate the existing subsurface conditions and to collect samples to evaluate the index material and thermal resistivity properties of the subsurface materials at depths selected by Brierley Associated and PAR. Our evaluation included the drilling and logging of the subsurface materials as well as the collection of samples for laboratory testing. The exploration program was performed between May and September of 2016. SW Cole Exploration of Londonderry, New Hampshire and their sub-contractor GeoSearch Environmental Contractors of Fitchburg, MA advanced 81 borings using either hollow stem or solid flight augers along the proposed underground alignment to depths ranging from 35 to 75 feet below the existing ground surface and performed Standard Penetration Tests (SPT), in accordance with ASTM D1586, at 5-foot intervals. An auto-hammer was used for the SPT sampling. When rock was encountered the boreholes were advanced using wet rotary wash methods with either a roller bit or double tube coring methods.

Permits were required from the New Hampshire Department of Transportation for all of the borings. Shoreland permits were required for select borings. One-call utility locates were utilized for the entire project and a private utility locator was employed by SW Cole Exploration in areas of heightened concern. Traffic control and police details were subcontracted by SW Cole Exploration to provide support during the drilling program.

The drilling program was conducted under the supervision of QS representatives. The subsurface materials encountered at each boring location were visually classified by QS personnel in the field in general accordance with the USCS soil classification system and the QS rock core logging procedure, generally in accordance with International Society of Rock Mechanics procedures. Soil samples were collected using glass jars or 6-inch stainless steel sleeves, capped and then bagged for storage to protect from moisture loss and material disturbance. Rock core was logged, boxed and photographed.

The following provides several important notes with respect to the presented logs.

1. The origin or genesis of the subsurface materials was not noted on the electronic logs provided in Appendix A.
2. Mud rotary methods were used and the boreholes were backfilled immediately with a bentonite/grout mixture due to all the boreholes being on the New Hampshire DOT right-of-way, groundwater elevation was interpreted and placed on the logs however it should be considered approximate and needs to be verified.
3. Due to poor ground conditions, steel casing was abandoned in the following boreholes. The borehole was grouted with the casing remaining in the borehole.
    a. BH11-B, approximately 44 to 49 feet below ground surface.
    b. BH47-B, approximately 4 to 65 feet below ground surface.

Soil and rock core samples from the investigation were selected by Brierley. Laboratory testing included grain size, moisture content, atterberg limits, rock strength, and rock abrasivity. Laboratory results are provided in Appendix B.

The thermal resistivity samples were selected based on preliminary HDD designs developed by Brierley. The samples were collected, packaged and shipped to the GeoTherm USA (GeoTherm) laboratory located in Livermore, California. Stainless steel sleeves were prioritized for testing. Laboratory results are provided in Appendix C.

Table 1 provides a summary of the boreholes, locations, depths (borehole, bedrock, and groundwater) and the thermal resistivity sample info and results. The table includes previous work completed by others at the request of PAR.

Geological Unit Descriptions

The following section describes the regional and local geology of the project area and descriptions of the surficial soil and bedrock units mapped along the alignment where the HDD underground investigation was conducted.

Regional Geology

The surficial geology of the White Mountains in New Hampshire is derived from the erosional and depositional processes of the continental and mountain glaciers of the Wisconsin Glacial Episode during the late Pleistocene Epoch. The dominant glacial soils that are found in this region are glacial till, glaciofluvial and glacio-lacustrine deposits. Younger post glacial deposits formed from the numerous rivers, streams and lakes that dominate the landscape. These include alluvium and stream terrace deposits.

Bedrock in the White Mountains are comprised of folded and faulted Paleozoic sedimentary and volcanic rocks that have been regionally metamorphosed and intruded by large and small bodies of plutonic rocks. The grade of metamorphism ranges from the chlorite zone at one extreme to the sillimanite zone at the other (Billings, 1980). The majority of the rocks mapped in this region consist of granite, quartz diorite, schist, granofels/gneiss, and localized zones of felsic pegmatites.

Site Geology and Unit Descriptions

Organic Soil/Wetland Deposits

An approximate 2 foot to 6 foot layer of organic soil was encountered in several borings that were drilled away from the edge of the roadway. This unit consists of very loose to loose, dark brown to brown, Silty Sand and Sandy Silt with varying amounts of organics. Organic soils were also found underlying the fill in areas within the vicinity of existing wetlands.

Artificial Fill

Artificial fill has been placed within the existing roadways and is present in the majority of the borings advanced for this investigation. The approximate thickness of the fill ranged from 2 feet to upwards of 10 feet. This unit consists of loose to medium dense, brown to reddish brown, fine to medium grained, Silty Sand, Poorly Graded Sand with Silt, and Sandy Silt with varying amounts of gravel.

Alluvium

Alluvium is present at numerous locations along the alignment. It is primarily found proximal to existing rivers and streams as flood plain deposits. The thickness of the alluvium is variable with transitions to underlying units being gradual. Typically, this unit consists of very loose to dense, pale brown to olive gray to light brown, fine grained or fine to medium grained, Poorly Graded Sand with Silt, Silty Sand or Poorly Graded Sand with varying amounts of gravel.

Stream Terrace Deposits

The stream terrace deposits are mapped in the vicinity of existing streams and rivers on terraces cut into glacial deposits in the valleys. The approximate thickness of these units ranged from 3 feet to 20 feet. Typically, this unit consists of medium dense to very dense, moderate brown to olive brown to yellowish brown, Silty Sand with Gravel, Poorly Graded Sand with Silt and Gravel, Silty Gravel with Sand, or Poorly Graded Gravel with Sand. Cobbles and boulders were also present in varying amounts.

Glaciolacustrine Deposits

The glacio-lacustrine deposits are generally described as sand, gravel, silt and clay that were laid down during deglaciation of the region. Material from these sediments was derived mostly from within ice sheet and transported by meltwater and deposited as deltas into ponded water bodies (Koteff, 2009). The approximate thickness of these units was less than 50 feet. Typically, this unit consists of soft to stiff, loose to medium dense, gray to light olive gray, Sandy Silt and Silty Sand with varying amounts of clay and thin to varved bedding planes present.

Glaciofluvial Deposits

The glaciofluvial deposits are described as sands and gravels with minor amounts of silt and clay that were deposited within high energy meltwater channels draining into the valleys. The approximate thickness of these units was less than 50 feet. Typically, this unit consist of medium dense to very dense, light brown to grayish brown, Poorly Graded Sand with Gravel and Silt, Poorly Graded Gravel with Sand, or Silty Gravel with Sand with varying amounts of cobbles and boulders.

Till

The glacial till is described as light to dark gray, nonsorted to poorly sorted mixture of clay, silt sand, gravel, cobbles and boulders. Varying proportions of silt and sand form the matrix along with a variety of irregular shapes rock fragments. Most of the till deposits are found in the upland portions of the region and thicknesses can range from 20 feet to more than 100 feet (Hildreth, 2014). Typically, this unit consists of medium dense to very dense, gray to dark gray, Silty Sand with Gravel, Sandy Silt with Gravel, Silty Gravel with Sand, or Clayey Sand with Gravel with varying amounts of boulders.

Bedrock

The majority of the rocks mapped in this region consist of granite, quartz diorite, schist, granofels/gneiss, and localized zones of felsic pegmatites. All of these rock types were encountered within the project alignment. The weathering profile was typically fresh to slightly weathered, with occasional zones of highly weathered material at the contact with overburden soils. The rock strength ranges from medium strong to very strong and is largely dependent on weathering profiles. Numerous felsic dikes and sills were observed within many of the metamorphic units along with localized pegmatite zones.

References

Billings, Marland P., 1980, “The Geology of New Hampshire Part II Bedrock Geology”.

Hildreth, Carol T., 2014, Surficial geologic map of the Woodstock 7.5 minute quadrangle, New Hampshire: New Geologic Survey, scale 1:24,000.

Koteff, Carl, 2009, Surficial geologic map of the Webster 7.5 minute quadrangle, New Hampshire: New Hampshire Geologic Survey, scale 1:24,000.

Closure

We appreciate the opportunity to assist PAR with this geotechnical investigation. If you have any questions, please contact Balin Strickler at 509.789.7747 or bstrickler@quantasubsurface.com

Attachments
Table 1 – Geotechnical Summary Table
Figure 1 – Alignment Overview Map

Appendices
Appendix A – Exploratory Test Boring Logs
Appendix B – Core Photograph Logs
Appendix B – Index Testing Results
Appendix C – Thermal Resistivity Test Results

Norther Pass Transmission Line Project
Trenchless Thermal Resitivity Study
Nov-16

Alignment Name	Geotech Company	Borehole ID	Date Drilled	Borehole Coordinates		Borehole Depth (ft)	Depth to Rock (ft)	Depth to Groudwater (ft)	GeoTherm Report Date	Sample ID	Sample Type	Sample Depth (ft)	Material Type	Lab Determined Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (pcf)	Notes
				Latitude	Longitude									Wet	Dry			
North (Trenchless)	Terracon	B-2A	1/15/2016	44.245206	-71.762253	17	4	Not Observed	2/17/2016	B-2A	Bulk	6' - 9'	ROCK	64	210	11	110	
North (Trenchless)	Terracon	B-4A	1/15/2016	44.193542	-71.751657	17		9	2/17/2016	B-4A	Bulk	8' - 10'	SOIL (SP)	48	163	7	119	
North (Trenchless)	Terracon	B-5	1/15/2016	44.181974	-71.756322	17		4	2/17/2016	B-5	Bulk	8' - 10'	SOIL (SM)	35	106	9	131	
North (Trenchless)	Terracon	B-5A	1/15/2016	44.168781	-71.764208	17		16	2/17/2016	B-5A	Bulk	8' - 10'	SOIL (ML)	39	147	12	118	
North (Trenchless)	Terracon	B-6	1/15/2016	44.158589	-71.777301	17		5	2/17/2016	B-6	Bulk	8' - 10'	SOIL (SM)	34	127	13	124	
North (Trenchless)	Terracon	B-6A	1/15/2016	44.1475	-71.789025	17		8	2/17/2016	B-6A	Bulk	8' - 10'	SOIL (SM)	36	137	14	120	
North (Trenchless)	Terracon	B-7	1/12/2016	44.134031	71.785166	15.8		9	2/17/2016	B-7	Bulk	8' - 10'	SOIL (SM)	44	227	21	104	
North (Trenchless)	Terracon	B-7A	1/12/2016	44.123974	-71.799756	15	14.5	9	2/17/2016	B-7A	Bulk	8' - 10'	SOIL (SP/SM)	40	131	10	128	
North (Trenchless)	Terracon	B-8	1/12/2016	44.113134	-71.813851	15.8	15.8	6	2/17/2016	B-8	Bulk	8' - 10'	SOIL (GM)	58	253	23	101	
North (Trenchless)	Terracon	B-8A	1/12/2016	44.103156	-71.821477	17		12	2/17/2016	B-8A	Bulk	8' - 10'	SOIL (SP)	68	196	4	115	
North (Trenchless)	Terracon	B-9	1/8/2016	44.093082	-71.827365	17		8	2/17/2016	B-9	Bulk	10' - 14'	SOIL (GW/GM)	40	141	12	122	
North (Trenchless)	Terracon	B-9A	1/8/2016	44.08395	-71.81225	17		12	2/17/2016	B-9A	Bulk	10' - 14'	SOIL (SP/SM)	52	176	12	118	
North (Trenchless)	Terracon	B-10	1/8/2016	44.076164	-71.795459	16.7		10	2/17/2016	B-10	Bulk	8' - 11'	SOIL (SM)	51	209	22	112	
North (Trenchless)	Terracon	B-10A	1/8/2016	44.062669	-71.792333	17		9	2/17/2016	B-10A	Bulk	8' - 10'	SOIL (GP/GM)	51	191	16	114	
North (Trenchless)	Terracon	B-11	1/7/2016	44.047567	-71.79316	15		Not Observed	2/17/2016	B-11	Bulk	8' - 10'	SOIL (SM)	68	174	6	116	
North (Trenchless)	Terracon	B-11A	1/7/2016	44.037327	-71.785886	15.1	13.5	Not Observed	2/17/2016	B-11A	Bulk	9' - 12'	SOIL (SM)	45	168	14	116	
North (Trenchless)	Terracon	B-12	1/6/2016	44.032376	-71.768103	15.3		Not Observed	2/17/2016	B-12	Bulk	6'- 10'	SOIL (SP/SM)	48	215	23	104	
North (Trenchless)	Terracon	B-12A	1/7/2016	44.024317	-71.752317	17	7	Not Observed	2/17/2016	B-12A	Bulk	10'-14'	SOIL	45	191	10	120	
North (Trenchless)	Terracon	B-12A	1/8/2016	44.024317	-71.752317	17	7	Not Observed	2/17/2016	B-12A	Core	12' - 12.5'	ROCK	49	68	<1	171	
North (Trenchless)	Terracon	B-13A	1/6/2016	44.028594	-71.719139	14	8	4	2/17/2016	B-13A	Core	11' - 12'	ROCK	53	71	<1	169	
North (Trenchless)	Terracon	B-14	1/6/2016	44.031538	-71.701313	17		Not Observed	2/17/2016	B-14	Bulk	8' - 10'	SOIL	45	126	11	131	
BB (Trenchless)	Terracon	B-32B	1/7/2016	44.056789	-71.794133	66	14	9	2/17/2016	B-32B	Bulk	10' - 14'	SOIL	46	173	14	116	
BB (Trenchless)	Terracon	B-32B	1/8/2016	44.056789	-71.794133	66	14	9	2/17/2016	B-32B	Core	20.5' - 21'	ROCK	48	66	<1	177	
BB (Trenchless)	Terracon	B-32B	1/9/2016	44.056789	-71.794133	66	14	9	2/17/2016	B-32B	Core	29' - 30'	ROCK	50	65	<1	179	
BB (Trenchless)	Terracon	B-32B	1/10/2016	44.056789	-71.794133	66	14	9	2/17/2016	B-32B	Core	41' - 42'	ROCK	47	73	<1	178	
BB (Trenchless)	Terracon	B-32B	1/11/2016	44.056789	-71.794133	66	14	9	2/17/2016	B-32B	Core	50' - 51'	ROCK	49	71	<1	174	
BB (Trenchless)	Terracon	B-32B	1/12/2016	44.056789	-71.794133	66	14	9	2/17/2016	B-32B	Core	60' - 61'	ROCK	42	66	<1	177	
BB (Trenchless)	Terracon	B-38A	1/5/2016	44.031712	-71.694427	68	34.5	5.5	2/17/2016	B-38A	Bulk	9' - 11'	SOIL	57	189	11	113	
BB (Trenchless)	Terracon	B-38A	1/6/2016	44.031712	-71.694427	68	34.5	5.5	2/17/2016	B-38A	Bulk	20' - 22'	SOIL	47	176	12	119	
BB (Trenchless)	Terracon	B-38A	1/7/2016	44.031712	-71.694427	68	34.5	5.5	2/17/2016	B-38A	Bulk	30' - 34'	SOIL	51	142	9	124	
BB (Trenchless)	Terracon	B-38A	1/8/2016	44.031712	-71.694427	68	34.5	5.5	2/17/2016	B-38A	Core	40' - 41'	ROCK	45	60	<1	165	
BB (Trenchless)	Terracon	B-38A	1/9/2016	44.031712	-71.694427	68	34.5	5.5	2/17/2016	B-38A	Core	49' - 50'	ROCK	43	59	<1	164	
BB (Trenchless)	Terracon	B-38A	1/10/2016	44.031712	-71.694427	68	34.5	5.5	2/17/2016	B-38A	Core	62' - 62.5'	ROCK	32	78	1	164	
BB (Trenchless)	Terracon	B-38B	1/5/2016	44.03136	-71.692443	65	38.5	6	2/17/2016	B-38B	Bulk	10' - 14'	SOIL	45	147	12	123	
BB (Trenchless)	Terracon	B-38B	1/6/2016	44.03136	-71.692443	65	38.5	6	2/17/2016	B-38B	Bulk	20' -24'	SOIL	49	136	9	121	
BB (Trenchless)	Terracon	B-38B	1/7/2016	44.03136	-71.692443	65	38.5	6	2/17/2016	B-38B	Bulk	35' - 38.5'	SOIL	44	139	14	118	
BB (Trenchless)	Terracon	B-38B	1/8/2016	44.03136	-71.692443	65	38.5	6	2/17/2016	B-38B	Core	40' - 41'	ROCK	41	68	<1	163	
BB (Trenchless)	Terracon	B-38B	1/9/2016	44.03136	-71.692443	65	38.5	6	2/17/2016	B-38B	Core	50' - 51'	ROCK	54	70	<1	166	
BB (Trenchless)	Terracon	B-38B	1/10/2016	44.03136	-71.692443	65	38.5	6	2/17/2016	B-38B	Core	60' - 61'	ROCK	42	77	1	157	
BB (Trenchless)	Terracon	B-38C	1/12/2016	44.0313	-71.690878	65	45.8	6	2/17/2016	B-38C	Bulk	4' - 6'	SOIL	47	171	13	120	
BB (Trenchless)	Terracon	B-38C	1/13/2016	44.0313	-71.690878	65	45.8	6	2/17/2016	B-38C	Bulk	20' - 25'	SOIL	60	192	10	116	
BB (Trenchless)	Terracon	B-38C	1/14/2016	44.0313	-71.690878	65	45.8	6	2/17/2016	B-38C	Bulk	30' - 35'	SOIL	54	195	20	109	
BB (Trenchless)	Terracon	B-38C	1/15/2016	44.0313	-71.690878	65	45.8	6	2/17/2016	B-38C	Core	48' - 49'	ROCK	46	66	<1	170	
BB (Trenchless)	Terracon	B-38C	1/16/2016	44.0313	-71.690878	65	45.8	6	2/17/2016	B-38C	Core	53' - 54'	ROCK	41	72	1	170	
BB (Trenchless)	Terracon	B-38C	1/17/2016	44.0313	-71.690878	65	45.8	6	2/17/2016	B-38C	Core	63' - 64'	ROCK	37	81	1	172	
BB (Trenchless)	Terracon	B-39B	12/28/2015	44.024453	-71.685138	64	19	5	2/17/2016	B-39B	Bulk	10' - 14'	SOIL	56	214	14	104	
BB (Trenchless)	Terracon	B-39B	12/29/2015	44.024453	-71.685138	64	19	5	2/17/2016	B-39B	Core	22' - 23'	ROCK	45	79	<1	171	
BB (Trenchless)	Terracon	B-39B	12/30/2015	44.024453	-71.685138	64	19	5	2/17/2016	B-39B	Core	29' - 30'	ROCK	49	63	<1	169	
BB (Trenchless)	Terracon	B-39B	12/31/2015	44.024453	-71.685138	64	19	5	2/17/2016	B-39B	Core	39' - 40'	ROCK	39	56	<1	166	
BB (Trenchless)	Terracon	B-39B	1/1/2016	44.024453	-71.685138	64	19	5	2/17/2016	B-39B	Core - R7	49' - 50'	ROCK	45	67	<1	164	
BB (Trenchless)	Terracon	B-39B	1/2/2016	44.024453	-71.685138	64	19	5	2/17/2016	B-39B	Core - R9	59' - 60'	ROCK	38	58	<1	151	
WBR3	H&A	B-49A	12/14/2015	43.772011	-71.685088	66		47.7	1/4/2016	B-49A	S4/5	14’-16’, 19’-21’	SOIL (SP)	58	263	20	110	
WBR3	H&A	B-49A	12/16/2015	43.772011	-71.685088	66		47.7	1/4/2016	B-49A	S8/9	34’-36’, 39’-41’	SOIL (SP)	60	269	20	110	
WBR3	H&A	BH-049B	12/15/2015	43.770482	-71.685248	66		39	1/6/2016	BH-049B	S5	19'-21'	SOIL (SP)	53	258	23	110	
WBR3	H&A	BH-049B	12/16/2015	43.770482	-71.685248	66		39	1/6/2016	BH-049B	S9	39'-41'	SOIL (SP)	54	266	23	110	
WBR3	H&A	BH-050A	12/18/2015	43.769195	-71.685629	67		16.5	1/6/2016	BH-050A	S5	20'-22'	SOIL (SW)	52	137	9	120	
WBR3	H&A	BH-050A	12/19/2015	43.769195	-71.685629	67		16.5	1/6/2016	BH-050A	S8 & S9	35'-37' & 40'-42'	SOIL (SP)	49	245	17	110	
WBR3	H&A	BH-050B	12/16/2015	43.767829	-71.686364	65		8.9	1/6/2016	BH-050B	S5	20'-22'	SOIL (SP)	57	307	28	110	
WBR3	H&A	BH-050B	12/17/2015	43.767829	-71.686364	65		8.9	1/6/2016	BH-050B	S11	50'-52'	SOIL (SP/SM)	55	324	25	115	
WBR3	H&A	BH-050C	12/14/2015	43.767187	-71.686835	65	45.5	9.2	1/6/2016	BH-050C	S5 & S6	20'-22' & 25'-27'	SOIL (SP)	62	432	40	109	
WBR3	H&A	BH-050C	12/15/2015	43.767187	-71.686835	65	45.5	9.2	1/6/2016	BH-050C	C2	56'-57'	ROCK	36	51	0.5	169	
Route 3 Crossing	H&A	HA-2	11/24/2013	45.018367	-71.464639	41		18	12/19/2013	HA-2	S3	9'-11'	SOIL (SM)	35	98	10	129	
Route 3 Crossing	H&A	HA-2	11/24/2013	45.018367	-71.464639	41		18	12/19/2013	HA-2	S5	19'-21'	SOIL (SP/SM)	34	93	10	127	
Route 3 Crossing	H&A	HA-2	11/24/2013	45.018367	-71.464639	41		18	12/19/2013	HA-2	S7	29'-29.5'	SOIL (SP/SM)	37	95	11	125	
Route 3 Crossing	H&A	HA-2	11/24/2013	45.018367	-71.464639	41		18	12/19/2013	HA-2	S9	39'-39.2'	SOIL (GP)	35	88	8	130	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	S3	9'-11'	SOIL (SM)	40	125	10	124	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	S5 & S6	19'-23'	SOIL (SP/SM)	42	131	13	112	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	S8	29'-31'	SOIL (SM)	43	143	15	113	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	S10	39'-41'	SOIL (SM)	40	123	11	125	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	S12	49'-49.3'	SOIL (SM)	39	107	9	128	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	C2	55'-55.7'	ROCK	35	73	0.8	167	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	C3	63'-63.5'	ROCK	34	65	0.5	175	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	C4	69'-70'	ROCK	37	64	0.5	179	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	C7	80'-80.6'	ROCK	36	69	0.5	176	
Route 3 Crossing	H&A	HA-3 (OW)	11/18/2013	45.019393	-71.464572	50	39	22.7	12/19/2013	HA-3 (OW)	C8	89'-89.5'	ROCK	35	67	0.5	176	
Route 3 Crossing	H&A	HA-5	12/4/2013	45.021646	-71.463937	80	44.8	9	12/31/2013	HA-5	S3	9'-10'	SOIL (GP)	35	90	8	129	
Route 3 Crossing	H&A	HA-5	12/4/2013	45.021646	-71.463937	80	44.8	9	12/31/2013	HA-5	S5	19’-22’	SOIL (GP)	37	93	8	129	

Norther Pass Transmission Line Project
Trenchless Thermal Resitivity Study
Nov-16

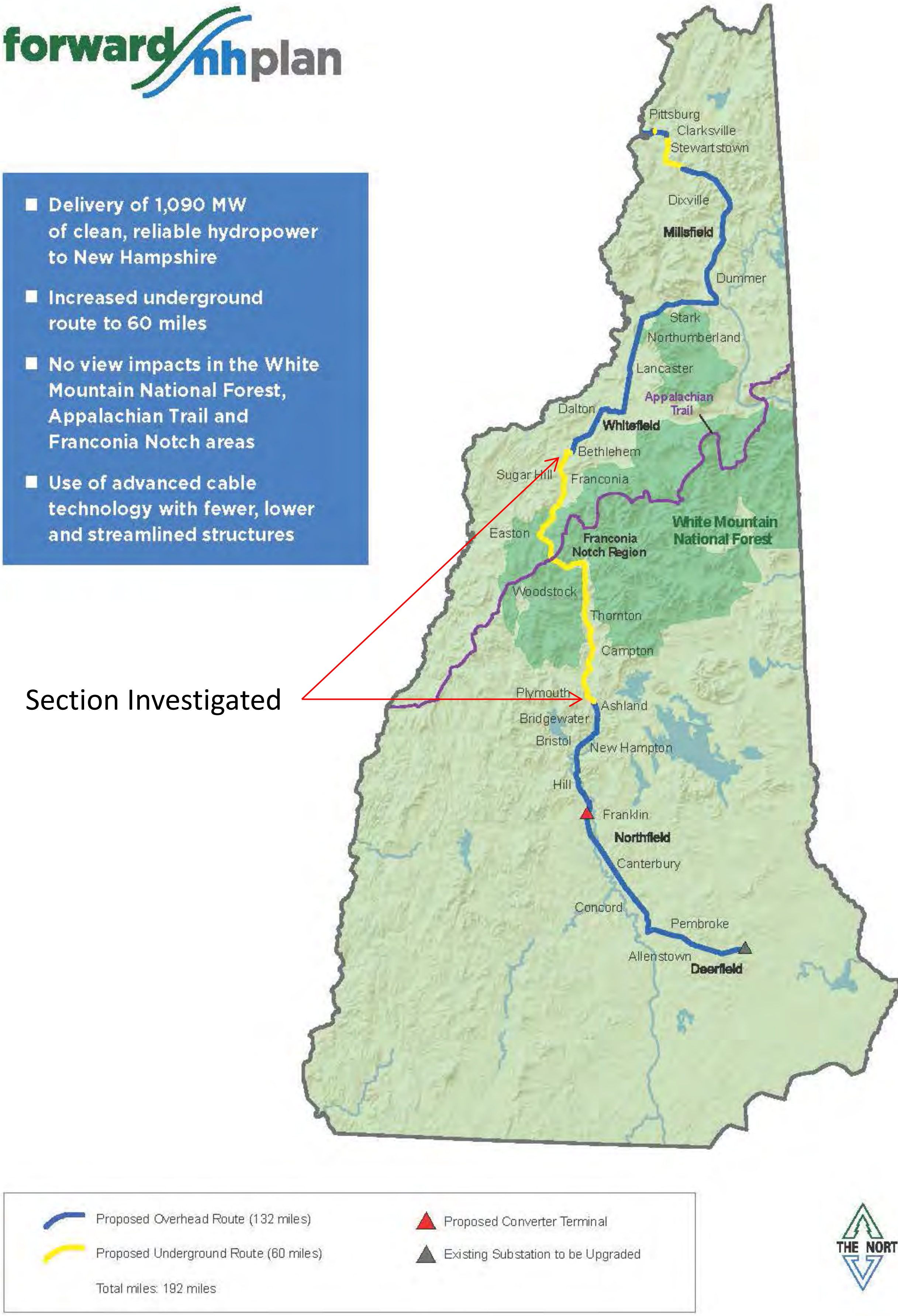
Alignment Name	Geotech Company	Borehole ID	Date Drilled	Borehole Coordinates		Borehole Depth (ft)	Depth to Rock (ft)	Depth to Groudwater (ft)	GeoTherm Report Date	Sample ID	Sample Type	Sample Depth (ft)	Material Type	Lab Determined Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (pcf)	Notes
				Latitude	Longitude									Wet	Dry			
Route 3 Crossing	H&A	HA-5	12/4/2013	45.021646	-71.463937	80	44.8	9	12/31/2013	HA-5	S7	29'-29.5'	SOIL (SP)	38	101	9	129	
Route 3 Crossing	H&A	HA-5	12/4/2013	45.021646	-71.463937	80	44.8	9	12/31/2013	HA-5	S9	39'-39.5'	SOIL (SP/SM)	37	116	13	119	
Route 3 Crossing	H&A	HA-5 C-2		45.021646	-71.463937				12/31/2013	HA-5 C-2	C2	51.3'-52'	ROCK	36	67	0.4	180	
Route 3 Crossing	H&A	HA-5 C-3		45.021646	-71.463937				12/31/2013	HA-5 C-3	C4	60'-60.5'	ROCK	34	72	0.4	179	
Route 3 Crossing	H&A	HA-5 C-5		45.021646	-71.463937				12/31/2013	HA-5 C-5	C6	70.3'-71'	ROCK	33	68	0.7	181	
Route 3 Crossing	H&A	HA-5 C-7		45.021646	-71.463937				12/31/2013	HA-5 C-7	C7	79.1'-79.5'	ROCK	35	71	1.7	179	
Northern Pass	Quanta Subsurface	BH-10A	9/14/2016	44.25831	-71.75735	55	25	8	10/26/2016	S3	sleeve	15	Soil (SW)	65	212	7	126	
Northern Pass	Quanta Subsurface	BH-10A	9/15/2016	44.25831	-71.75735	55	25	8	10/11/2016	RC 1	Core	28.3	Rock	44	60	< 1	167	
Northern Pass	Quanta Subsurface	BH-10B	8/25/2016	44.25834	-71.75711	34.5	13.5	9	10/26/2016	S2	sleeve	10	Soil (SM)	46	131	11	133	
Northern Pass	Quanta Subsurface	BH-10B	8/26/2016	44.25834	-71.75711	34.5	13.5	9	10/11/2016	RC 1	Core	27.5	Rock	40	67	< 1	163	
Northern Pass	Quanta Subsurface	BH-11A	8/25/2016	44.246844	-71.762787	55.5		Not Observed	10/26/2016	S3	sleeve	14	Soil (SM)	42	120	8	136	
Northern Pass	Quanta Subsurface	BH-11A	8/26/2016	44.246844	-71.762787	55.5		Not Observed	10/26/2016	S6	sleeve	29	Soil (ML)	59	142	12	117	
Northern Pass	Quanta Subsurface	BH-11B	8/24/2016	44.246276	-71.762695	49	45	Not Observed	10/26/2016	S2	sleeve	9	Soil (SC)	58	167	15	123	
Northern Pass	Quanta Subsurface	BH-11B	8/25/2016	44.246276	-71.762695	49	45	Not Observed	10/26/2016	S5	sleeve	24	Soil (SM)	47	157	11	122	
Northern Pass	Quanta Subsurface	BH-12A	8/25/2016	44.23011	-71.7542	52.5	44.5	7.5	10/26/2016	S4	sleeve	20	Soil (ML)	56	331	23	102	
Northern Pass	Quanta Subsurface	BH-12A	8/26/2016	44.23011	-71.7542	52.5	44.5	7.5	10/26/2016	S7	sleeve	35	Soil (SP)	51	244	23	106	
Northern Pass	Quanta Subsurface	BH-12B(A)	9/19/2016	44.2295	-71.75355	65	49.5	8	10/26/2016	S3	sleeve	15	Soil (SW)	107	386	7	93	
Northern Pass	Quanta Subsurface	BH-12B(A)	8/25/2016	44.22956	-71.75351	65	49.5	8	10/26/2016	S7	sleeve	35	Soil (ML)	61	325	35	96	
Northern Pass	Quanta Subsurface	BH-13A	8/30/2016	44.22727	-71.748035	55.5		10	10/26/2016	S3	sleeve	20	Soil (SM)	55	341	27	100	
Northern Pass	Quanta Subsurface	BH-13A	8/31/2016	44.22727	-71.748035	55.5		10	10/26/2016	S7	sleeve	39	Soil (SM)	56	325	24	104	
Northern Pass	Quanta Subsurface	BH-13B	8/25/2016	44.226402	-71.748031	66.5		8	10/26/2016	S3	sleeve	15	Soil (GW)	38	149	28	111	
Northern Pass	Quanta Subsurface	BH-13B	8/26/2016	44.226402	-71.748031	66.5		8	10/26/2016	S3	sleeve	35.5	Soil (SP)	40	161	30	114	
Northern Pass	Quanta Subsurface	BH-14A	8/18/2016	44.188953	-71.749505	55	52	Not Observed	10/26/2016	S4	sleeve	19	Soil (SP)	58	205	20	108	
Northern Pass	Quanta Subsurface	BH-14A	8/19/2016	44.188953	-71.749505	55	52	Not Observed	10/26/2016	S5	sleeve	24	Soil (GW)	54	133	8	123	
Northern Pass	Quanta Subsurface	BH-14B	8/19/2016	44.188386	-71.74947	68	58.5	Not Observed	10/26/2016	S3	sleeve	14	Soil (GW)	48	115	10	130	
Northern Pass	Quanta Subsurface	BH-14B	8/20/2016	44.188386	-71.74947	68	58.5	Not Observed	10/26/2016	S5	sleeve	24	Soil (SP)	50	196	20	109	
Northern Pass	Quanta Subsurface	BH-15A	8/22/2016	44.176802	-71.759432	54	43.5	7	11/9/2016	S1	sleeve	4	Soil (SM)	53	270	19	110	
Northern Pass	Quanta Subsurface	BH-15A	8/23/2016	44.176802	-71.759432	54	43.5	7	10/26/2016	S7	sleeve	34	Soil (SW)	52	318	26	102	
Northern Pass	Quanta Subsurface	BH-15B	8/22/2016	44.175619	-71.760083	65		9	10/26/2016	S1	sleeve	4	Soil (SW)	58	377	22	98	
Northern Pass	Quanta Subsurface	BH-15B	8/23/2016	44.175619	-71.760083	65		9	10/26/2016	S8	sleeve	34	Soil (SP)	56	258	24	104	
Northern Pass	Quanta Subsurface	BH-16A	8/12/2016	44.170527	-71.763182	56		15	10/26/2016	S3	sleeve	15	Soil (CL)	78	231	18	109	
Northern Pass	Quanta Subsurface	BH-16A	8/13/2016	44.170527	-71.763182	56		15	10/26/2016	S8	sleeve	40.5	Soil (SC-SM)	48	366	25	101	
Northern Pass	Quanta Subsurface	BH-16B	8/11/2016	44.16875	-71.76424	65	43.5	16	10/26/2016	S6	sleeve	29	Soil (ML)	68	288	24	100	
Northern Pass	Quanta Subsurface	BH-16B	8/12/2016	44.16875	-71.76424	65	43.5	16	10/26/2016	S8	sleeve	39	Soil (ML)	64	270	25	104	
Northern Pass	Quanta Subsurface	BH-17A	8/24/2016	44.163945	-71.768159	59.5		14	10/26/2016	S3	sleeve	15.5	Soil (SP)	65	193	13	123	
Northern Pass	Quanta Subsurface	BH-17A	8/25/2016	44.163945	-71.768159	59.5		14	10/26/2016	S9	sleeve	45.5	Boulder	52	119	9	132	
Northern Pass	Quanta Subsurface	BH-17B	8/24/2016	44.162901	-71.769364	65		Not Observed	10/24/2016	S5	Sleeve	24	Soil (SM)	42	145	10	133	
Northern Pass	Quanta Subsurface	BH-17B	8/25/2016	44.162901	-71.769364	65		Not Observed	10/24/2016	S8	Sleeve	39	Soil (SW)	39	177	15	117	
Northern Pass	Quanta Subsurface	BH-18A	8/22/2016	44.160754	-71.772223	60	42	5	10/24/2016	S5	Sleeve	25.5	Soil (GM)	38	113	10	132	
Northern Pass	Quanta Subsurface	BH-18A	8/23/2016	44.160754	-71.772223	60	42	5	10/24/2016	S7	Sleeve	34.5	Soil (SM/GM)	52	184	19	110	
Northern Pass	Quanta Subsurface	BH-18B	8/17/2016	44.160278	-71.773119	65	38.5	8	10/24/2016	S8	Sleeve	39	Soil (SM)	48	191	20	112	
Northern Pass	Quanta Subsurface	BH-18B	8/18/2016	44.160278	-71.773119	65	35.5	8	10/11/2016	RC 1	Core	55.5	Rock	38	66	< 1	165	
Northern Pass	Quanta Subsurface	BH-19A	8/16/2016	44.159863	-71.774448	64.5	34	14	10/24/2016	S3	Sleeve	15	Soil (SM)	41	209	24	100	
Northern Pass	Quanta Subsurface	BH-19A	8/17/2016	44.159863	-71.774448	64.5	34	14	10/11/2016	RC 1	Core	41.2	Rock	42	63	< 1	160	
Northern Pass	Quanta Subsurface	BH-19B	8/16/2016	44.159021	-71.776425	65	40	5	11/3/2016	S2	sleeve	9	Soil (SM)	74	274	6	109	
Northern Pass	Quanta Subsurface	BH-19B	8/17/2016	44.159021	-71.776425	65	40	5	10/24/2016	S6	Sleeve	30	Soil (SM)	44	249	23	90	
Northern Pass	Quanta Subsurface	BH-19C	8/16/2016	44.158117	-71.778291	55.5		6	10/24/2016	S4	Sleeve	19	Soil (CL)	51	129	15	119	
Northern Pass	Quanta Subsurface	BH-19C	8/17/2016	44.158117	-71.778291	55.5		6	10/24/2016	S8	Sleeve	40	Soil (SP)	39	212	21	110	
Northern Pass	Quanta Subsurface	BH-20A	8/15/2016	44.148089	-71.788438	65	3.5	4	10/11/2016	RC 2	Core	17	Rock	36	69	< 1	164	
Northern Pass	Quanta Subsurface	BH-20A	8/15/2016	44.148089	-71.788438	65	3.5	4	10/11/2016	RC 6	Core	35.8	Rock	35	66	< 1	166	
Northern Pass	Quanta Subsurface	BH-20B	8/15/2016	44.146662	-71.789704	64.5	43.5	7	10/24/2016	S5	Sleeve	24	Soil (ML)	57	231	20	108	
Northern Pass	Quanta Subsurface	BH-20B	8/16/2016	44.146662	-71.789704	64.5	43.5	7	10/24/2016	S8	Sleeve	39	Soil (SM)	45	168	16	119	
Northern Pass	Quanta Subsurface	BH-21A	8/8/2016	44.134289	-71.785108	60		Not Observed	10/24/2016	S5	Sleeve	24	Soil (SW)	45	182	10	129	
Northern Pass	Quanta Subsurface	BH-21A	8/9/2016	44.134289	-71.785108	60		Not Observed	10/24/2016	S8	Sleeve	39	Soil (SP)	38	250	23	101	
Northern Pass	Quanta Subsurface	BH-21B	8/8/2016	44.133542	-71.785373	60.5		Not Observed	10/24/2016	S3	Sleeve	14	Soil (GM)	43	128	8	132	
Northern Pass	Quanta Subsurface	BH-21B	8/9/2016	44.133542	-71.785373	60.5		Not Observed	10/24/2016	S8	Sleeve	39	Soil (SC)	55	192	22	107	
Northern Pass	Quanta Subsurface	BH-22A	8/8/2016	44.132478	-71.786794	60.5		4	10/24/2016	S6	Sleeve	29	Soil (SC)	61	247	20	91	
Northern Pass	Quanta Subsurface	BH-22A	8/9/2016	44.132478	-71.786794	60.5		4	10/24/2016	S9	Sleeve	44	Soil (SM)	48	152	14	124	
Northern Pass	Quanta Subsurface	BH-22B	8/9/2016	44.131465	-71.788498	60.5		8	10/24/2016	S5	Sleeve	24	Soil (SM)	46	229	21	98	
Northern Pass	Quanta Subsurface	BH-22B	8/10/2016	44.131465	-71.788498	60.5		8	10/24/2016	S8	Sleeve	39	Soil (ML)	54	169	23	92	
Northern Pass	Quanta Subsurface	BH-22C	8/9/2016	44.130473	-71.79014	61		19	10/24/2016	S4	Sleeve	20	Soil (ML)	45	206	27	96	
Northern Pass	Quanta Subsurface	BH-22C	8/10/2016	44.130473	-71.79014	61		19	10/24/2016	S9	Sleeve	45	Soil (SC/SM)	37	115	17	117	
Northern Pass	Quanta Subsurface	BH-23A	8/10/2016	44.121873	-71.80201	65	13	Not Observed	10/24/2016	S2	Sleeve	10	Soil (GM)	46	141	12	124	
Northern Pass	Quanta Subsurface	BH-23B	8/10/2016	44.121202	-71.802866	50	21	Not Observed	10/24/2016	S1	Sleeve	4	Soil (SM)	54	167	8	115	
Northern Pass	Quanta Subsurface	BH-23B	8/11/2016	44.121202	-71.802866	50	21	Not Observed	10/24/2016	S4	Sleeve	19	Soil (SM)	49	180	12	112	
Northern Pass	Quanta Subsurface	BH-23B	8/11/2016	44.121873	-71.80201	50	21	Not Observed	11/9/2016	S9	Core	44	Rock	44	63	<1	173	
Northern Pass	Quanta Subsurface	BH-24A	8/5/2016	44.080709	-71.80487	59.1	52.5	8	11/3/2016	S3	sleeve	14	Soil (SM)	68	336	23	101	
Northern Pass	Quanta Subsurface	BH-24A	8/6/2016	44.080709	-71.80487	59.1	52.5	8	10/21/2016	S9	Sleeve	44	Soil (SW)	51	167	22	106	
Northern Pass	Quanta Subsurface	BH-24B	8/5/2016	44.07939	-71.8028	60	32	Not Observed	10/21/2016	S3	Sleeve	14	Soil (SP)	44	184	23	106	
Northern Pass	Quanta Subsurface	BH-24B	8/6/2016	44.07939	-71.8028	60	32	Not Observed	10/21/2016	S6	Sleeve	29	Soil (SP)	48	217	24	100	
Northern Pass	Quanta Subsurface	BH-25A	8/4/2016	44.077212	-71.796636	64.5	61.5	Not Observed	10/26/2016	S2	sleeve	9.5	Soil (SM)	48	151	11	121	
Northern Pass	Quanta Subsurface	BH-25A	8/5/2016	44.077212	-71.796636	64.5	61.5	Not Observed	10/21/2016	S7	Sleeve	34	Soil (ML)	63	292	26	98	
Northern Pass	Quanta Subsurface	BH-25B	8/4/2016	44.076661	-71.795868	59.4		Not Observed	10/21/2016	S4	Sleeve	19	Soil (SW)	49	210	11	136	
Northern Pass	Quanta Subsurface	BH-25B	8/5/2016	44.076661	-71.795868	59.4		Not Observed	10/21/2016	S7	Sleeve	34	Soil (ML)	58	313	27	97	
Northern Pass	Quanta Subsurface	BH-26A	8/9/2016	44.075701	-71.795224	65	58.5	14	10/21/2016	S3	Sleeve	14	Soil (GW)	46	94	7	135	
Northern Pass	Quanta Subsurface	BH-26A	8/10/2016	44.075701	-71.795224	65	58.5	14	10/21/2016	S7	Sleeve	34	Soil (SP)	41	245	29	96	

Norther Pass Transmission Line Project
Trenchless Thermal Resitivity Study
Nov-16

Alignment Name	Geotech Company	Borehole ID	Date Drilled	Borehole Coordinates		Borehole Depth (ft)	Depth to Rock (ft)	Depth to Groudwater (ft)	GeoTherm Report Date	Sample ID	Sample Type	Sample Depth (ft)	Material Type	Lab Determined Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (pcf)	Notes
				Latitude	Longitude									Wet	Dry			
Northern Pass	Quanta Subsurface	BH-26B	8/9/2016	44.074412	-71.794962	56		9.5	10/21/2016	S3	Sleeve	15	Soil (SC)	55	189	21	109	
Northern Pass	Quanta Subsurface	BH-26B	8/10/2016	44.074412	-71.794962	56		9.5	10/21/2016	S7	Sleeve	35	Soil (SM)	56	224	23	103	
Northern Pass	Quanta Subsurface	BH-27A	8/3/2016	44.071945	-71.79349	60.5		21	10/21/2016	S4	Sleeve	19	Soil (GM)	42	98	10	130	
Northern Pass	Quanta Subsurface	BH-27A	8/4/2016	44.071945	-71.79349	60.5		21	10/21/2016	S8	Sleeve	39	Soil (SW)	53	227	10	127	
Northern Pass	Quanta Subsurface	BH-27B	8/3/2016	44.070541	-71.79307	64.5		Not Observed	10/21/2016	S4	Sleeve	19	Soil (SM)	50	138	13	122	
Northern Pass	Quanta Subsurface	BH-27B	8/4/2016	44.070541	-71.79307	64.5		Not Observed	10/21/2016	S8	Sleeve	39	Soil (SP)	62	189	16	117	
Northern Pass	Quanta Subsurface	BH-28A	8/1/2016	44.064102	-71.791791	55.4	12.5	13	10/21/2016	S2	Sleeve	9	Soil (SM)	48	137	12	129	
Northern Pass	Quanta Subsurface	BH-28A	8/2/2016	44.064102	-71.791791	55.4	12.5	13	10/11/2016	RC 5	Core	39.7	Rock	38	66	< 1	157	
Northern Pass	Quanta Subsurface	BH-28B	8/9/2016	44.0634	-71.792078	64.8	13	12	10/11/2016	RC 1	Core	21.8	Rock	30	62	< 1	157	
Northern Pass	Quanta Subsurface	BH-28B	8/9/2016	44.0634	-71.792078	64.8	13	12	10/11/2016	RC 7	Core	41	Rock	32	71	< 1	155	
Northern Pass	Quanta Subsurface	BH-29A	8/1/2016	44.062078	-71.792366	55	5.2	3	10/11/2016	RC 4	Core	18	Rock	37	73	< 1	162	
Northern Pass	Quanta Subsurface	BH-29A	8/1/2016	44.062078	-71.792366	55	5.2	3	10/11/2016	RC 7	Core	35	Rock	44	70	< 1	165	
Northern Pass	Quanta Subsurface	BH-29B	7/30/2016	44.06086	-71.79262	65	4.5	5	10/11/2016	RC 3	Core	20	Rock	39	69	< 1	163	
Northern Pass	Quanta Subsurface	BH-29B	7/30/2016	44.06086	-71.79262	65	4.5	5	10/11/2016	RC 6	Core	36	Rock	40	63	< 1	163	
Northern Pass	Quanta Subsurface	BH-30A	8/1/2016	44.05728	-71.79368	75.3	11.5	Not Observed	10/11/2016	RC 4	Core	23	Rock	32	60	< 1	168	
Northern Pass	Quanta Subsurface	BH-30A	8/1/2016	44.05728	-71.79368	75.3	11.5	Not Observed	10/11/2016	RC 9	Core	50	Rock	36	59	< 1	165	
Northern Pass	Quanta Subsurface	BH-31A	7/28/2016	44.05224	-71.79299	75	8.5	Not Observed	10/11/2016	RC 3	Core	19	Rock	39	61	< 1	158	
Northern Pass	Quanta Subsurface	BH-31A	7/28/2016	44.05224	-71.79299	75	8.5	Not Observed	10/11/2016	RC 11	Core	54	Rock	46	65	< 1	165	
Northern Pass	Quanta Subsurface	BH-31B	7/29/2016	44.05091	-71.79307	70	33	Not Observed	10/21/2016	S5	Sleeve	24	Soil (SP)	40	151	21	117	
Northern Pass	Quanta Subsurface	BH-31B	7/30/2016	44.05091	-71.79307	70	33	Not Observed	10/11/2016	RC 4	Core	52.7	Rock	35	66	< 1	162	
Northern Pass	Quanta Subsurface	BH-32A	7/27/2016	44.04594	-71.79316	65	9	Not Observed	10/11/2016	RC 7	Core	36	Rock	41	62	< 1	166	
Northern Pass	Quanta Subsurface	BH-32A	7/28/2016	44.04594	-71.79316	65	9	Not Observed	10/11/2016	RC 12	Core	63	Rock	45	69	< 1	168	
Northern Pass	Quanta Subsurface	BH-32B	7/27/2016	44.04503	-71.79238	65.8	7.5	Not Observed	10/11/2016	RC 4	Core	26	Rock	38	65	< 1	164	
Northern Pass	Quanta Subsurface	BH-32B	7/28/2016	44.04503	-71.79238	65.8	7.5	Not Observed	10/11/2016	RC 12	Core	63.7	Rock	50	72	< 1	162	
Northern Pass	Quanta Subsurface	BH-33A	7/24/2016	44.037962	-71.788749	65	23	13	10/21/2016	S6	Sleeve	30	Soil (GW)	46	108	12	133	
Northern Pass	Quanta Subsurface	BH-33A	7/25/2016	44.037962	-71.788749	65	23	13	10/11/2016	RC 2	Core	51	Rock	44	70	< 1	158	
Northern Pass	Quanta Subsurface	BH-33B	7/25/2016	44.037574	-71.787038	65.3	18	Not Observed	10/11/2016	RC 2	Core	26.6	Rock	40	75	< 1	160	
Northern Pass	Quanta Subsurface	BH-33B	7/26/2016	44.037574	-71.787038	65.3	18	Not Observed	10/11/2016	RC 8	Core	51	Rock	39	65	< 1	155	
Northern Pass	Quanta Subsurface	BH-34A	7/21/2016	44.03458	-71.776303	75	24	Not Observed	10/11/2016	RC 2	Core	33	Rock	49	67	< 1	154	
Northern Pass	Quanta Subsurface	BH-34A	7/22/2016	44.03458	-71.776303	75	24	Not Observed	10/11/2016	RC 5	Core	47	Rock	51	70	< 1	158	
Northern Pass	Quanta Subsurface	BH-34B	7/17/2016	44.034284	-71.774499	64.5	17	Not Observed	10/21/2016	S2	Sleeve	9	Soil (SW)	42	214	22	120	
Northern Pass	Quanta Subsurface	BH-34B	7/18/2016	44.034284	-71.774499	64.5	17	Not Observed	10/11/2016	RC 6	Core	47	Rock	38	73	< 1	165	
Northern Pass	Quanta Subsurface	BH-35A	7/19/2016	44.031741	-71.767429	60	16	Not Observed	10/21/2016	S2	Sleeve	9	Soil (SM)	51	149	12	119	
Northern Pass	Quanta Subsurface	BH-35A	7/20/2016	44.031741	-71.767429	60	16	Not Observed	10/11/2016	RC 9	Core	55	Rock	35	66	< 1	160	
Northern Pass	Quanta Subsurface	BH-35B	7/14/2016	44.03088	-71.765988	75	15.5	Not Observed	10/21/2016	S1	Sleeve	4	Soil (SM)	54	140	8	118	
Northern Pass	Quanta Subsurface	BH-35B	7/15/2016	44.03088	-71.765988	75	15.5	Not Observed	10/11/2016	RC 11	Core	56	Rock	37	71	< 1	159	
Northern Pass	Quanta Subsurface	BH-36A	7/11/2016	44.026654	-71.755236	64.3		22	10/21/2016	S5	Sleeve	29	Soil (SP)	43	158	11	118	
Northern Pass	Quanta Subsurface	BH-36A	7/12/2016	44.026654	-71.755236	64.3		22	10/21/2016	S10	Sleeve	54	Soil (ML)	54	308	15	119	
Northern Pass	Quanta Subsurface	BH-36B	7/11/2016	44.025879	-71.753953	63	27	Not Observed	10/18/2016	S3	Sleeve	14	Soil (SW)	54	198	26	97	
Northern Pass	Quanta Subsurface	BH-36B	7/12/2016	44.025879	-71.753953	63	27	Not Observed	10/11/2016	RC 6	Core	54	Rock	37	74	< 1	163	
Northern Pass	Quanta Subsurface	BH-36C	7/13/2016	44.024846	-71.752797	45	12	Not Observed	10/18/2016	S4	Sleeve	19	Soil (SM)	50	142	21	123	
Northern Pass	Quanta Subsurface	BH-36C	7/14/2016	44.024846	-71.752797	45	12	Not Observed	10/11/2016	RC 3	Core	40.6	Rock	41	68	< 1	159	
Northern Pass	Quanta Subsurface	BH-37A	7/10/2016	44.021807	-71.731939	61.5	52	Not Observed	10/18/2016	S3	Sleeve	14	Soil (SM)	83	248	16	113	
Northern Pass	Quanta Subsurface	BH-37A	7/11/2016	44.021807	-71.731939	61.5	52	Not Observed	10/18/2016	S6	Sleeve	29	Soil (SW)	61	167	10	111	
Northern Pass	Quanta Subsurface	BH-37B	7/10/2016	44.022703	-71.730831	65.5		Not Observed	10/18/2016	S2	Sleeve	9	Soil (SC)	50	137	9	129	
Northern Pass	Quanta Subsurface	BH-37B	7/11/2016	44.022703	-71.730831	65.5		Not Observed	10/18/2016	S6	Sleeve	29	Soil (CL)	65	188	10	114	
Northern Pass	Quanta Subsurface	BH-39A	8/31/2016	44.026477	-71.684915	64.5	37.5	14	10/18/2016	S2	Sleeve	15	Soil (SM)	54	142	12	117	
Northern Pass	Quanta Subsurface	BH-39A	9/1/2016	44.026477	-71.684915	64.5	37.5	14	10/18/2016	S6	Sleeve	35	Soil (SP)	64	198	12	115	
Northern Pass	Quanta Subsurface	BH-40A	7/8/2016	43.959632	-71.681034	60		Not Observed	10/18/2016	S2	Sleeve	10	Soil (SW)	213	494	7	112	
Northern Pass	Quanta Subsurface	BH-40A	7/9/2016	43.959632	-71.681034	60		Not Observed	10/18/2016	S5	Sleeve	24	Soil (SP)	59	213	15	110	
Northern Pass	Quanta Subsurface	BH-40B	7/6/2016	43.959002	-71.680658	65.5		Not Observed	10/18/2016	S2	Sleeve	10	Soil (SW)	187	265	2	124	
Northern Pass	Quanta Subsurface	BH-40B	7/7/2016	43.959002	-71.680658	65.5		Not Observed	10/18/2016	S4	Sleeve	19	Soil (SW)	57	302	19	110	
Northern Pass	Quanta Subsurface	BH-41A	6/27/2016	43.933037	-71.685085	59	36	10	10/18/2016	S5	Sleeve	23.5	Soil (ML)	72	239	25	97	
Northern Pass	Quanta Subsurface	BH-41A	6/28/2016	43.933037	-71.685085	59	36	10	10/11/2016	RC 2	Core	42	Rock	39	68	< 1	158	
Northern Pass	Quanta Subsurface	BH-41B	6/28/2016	43.932136	-71.684899	65	43	3	10/18/2016	S4	Sleeve	20	Soil (SM)	55	204	25	90	
Northern Pass	Quanta Subsurface	BH-41B	6/29/2016	43.932136	-71.684899	65	43	3	10/18/2016	S8	Sleeve	40	Soil (SW)	64	364	21	104	
Northern Pass	Quanta Subsurface	BH-42A	6/29/2016	43.91228	-71.685617	65	58	9	10/18/2016	S2	Sleeve	9	Soil (GW)	48	170	12	109	
Northern Pass	Quanta Subsurface	BH-42A	6/30/2016	43.91228	-71.685617	65	58	9	10/18/2016	S7	Sleeve	34	Soil (CL)	77	278	21	102	
Northern Pass	Quanta Subsurface	BH-42B	6/23/2016	43.911429	-71.685413	75.2	13.5	9.5	10/11/2016	RC 2	Core	17	Rock	42	63	< 1	164	
Northern Pass	Quanta Subsurface	BH-42B	6/24/2016	43.911429	-71.685413	75.2	13.5	9.5	10/11/2016	RC 5	Core	34.4	Rock	46	61	< 1	165	
Northern Pass	Quanta Subsurface	BH-43A	6/22/2016	43.907335	-71.683611	64.5		12	10/18/2016	S2	Sleeve	10	Soil (SM)	69	214	8	100	
Northern Pass	Quanta Subsurface	BH-43A	6/23/2016	43.907335	-71.683611	64.5		12	10/18/2016	S9	Sleeve	35	Soil (SP)	55	355	26	101	
Northern Pass	Quanta Subsurface	BH-43B	6/21/2016	43.906264	-71.683279	64	37.5	12	10/18/2016	S2	Sleeve	9	Soil (SW)	55	183	5	111	
Northern Pass	Quanta Subsurface	BH-43B	6/22/2016	43.906264	-71.683279	64	37.5	12	10/18/2016	S6	Sleeve	29	Soil (SP)	60	198	17	108	
Northern Pass	Quanta Subsurface	BH-44A	6/16/2016	43.852522	-71.666688	65.5		4	10/18/2016	S5	Sleeve	24	Soil (CH)	51	139	15	119	
Northern Pass	Quanta Subsurface	BH-44A	6/17/2016	43.852522	-71.666688	65.5		4	10/18/2016	S11	Sleeve	55	Soil (GM)	58	151	10	131	
Northern Pass	Quanta Subsurface	BH-44B	6/14/2016	43.851987	-71.66675	65.5		9	10/17/2016	S5	Sleeve	24	Soil (CH)	65	182	18	111	
Northern Pass	Quanta Subsurface	BH-44B	6/15/2016	43.851987	-71.66675	65.5		9	10/17/2016	S11	Sleeve	54	Soil (CH)	62	166	20	114	
Northern Pass	Quanta Subsurface	BH-45A	6/15/2016	43.851604	-71.666945	65.5		9	10/17/2016	S6	Sleeve	29	Soil (CH)	49	206	21	110	
Northern Pass	Quanta Subsurface	BH-45A	6/16/2016	43.851604	-71.666945	65.5		9	10/17/2016	S12	Sleeve	59	Soil (SM)	64	181	12	109	
Northern Pass	Quanta Subsurface	BH-45B	6/13/2016	43.851019	-71.666825	65.5		9	10/17/2016	S1	Sleeve	4	Soil (GW)	44	129	8	126	
Northern Pass	Quanta Subsurface	BH-45B	6/14/2016	43.851019	-71.666825	65.5		9	10/17/2016	S11	Sleeve	54	Soil (CL)	58	142	11	118	
Northern Pass	Quanta Subsurface	BH-46A	6/12/2016	43.847311	-71.665164	75.4		9	10/17/2016	S3	Sleeve	14.5	Soil (SM)	68	192	11	108	
Northern Pass	Quanta Subsurface	BH-46A	6/13/2016	43.847311	-71.665164	75.4		9	10/17/2016	S11	Sleeve	54	Soil (SM)	60	180	15	110	
Northern Pass	Quanta Subsurface	BH-46B	6/8/2016	43.846835	-71.665082	65.5		13	10/17/2016	S3	Sleeve	14.5	Soil (ML)	81	270	32	93	
Northern Pass	Quanta Subsurface	BH-46B	6/9/2016	43.846835	-71.665082	65.5		13	10/26/2016	S10	Sleeve	56	Soil (SM)	46	274	19	106	
Northern Pass	Quanta Subsurface	BH-47A	6/6/2016	43.803143	-71.673827	61	54.5	12	10/17/2016	S2	Sleeve	9	Soil (SM/GM)	55	160	7	114	

Norther Pass Transmission Line Project
Trenchless Thermal Resitivity Study
Nov-16

Alignment Name	Geotech Company	Borehole ID	Date Drilled	Borehole Coordinates		Borehole Depth (ft)	Depth to Rock (ft)	Depth to Groudwater (ft)	GeoTherm Report Date	Sample ID	Sample Type	Sample Depth (ft)	Material Type	Lab Determined Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (pcf)	Notes
				Latitude	Longitude									Wet	Dry			
Northern Pass	Quanta Subsurface	BH-47A	6/7/2016	43.803143	-71.673827	61	54.5	12	10/17/2016	S5	Sleeve	24	Soil (SM/GM)	48	153	17	113	
Northern Pass	Quanta Subsurface	BH-47B	6/6/2016	43.802948	-71.673913	65	40	12	10/17/2016	S3	Sleeve	14	Soil (GW)	41	109	10	132	
Northern Pass	Quanta Subsurface	BH-47B	6/7/2016	43.802948	-71.673913	65	40	12	10/17/2016	S6	Sleeve	29.5	Soil (GM)	60	174	8	117	
Northern Pass	Quanta Subsurface	BH-48A	6/5/2016	43.798943	-71.673911	65.5		13	10/17/2016	S5	Sleeve	24	Soil (SC)	54	145	10	129	
Northern Pass	Quanta Subsurface	BH-48A	6/6/2016	43.798943	-71.673911	65.5		13	10/17/2016	S12	Sleeve	64	Soil (SM)	61	152	9	125	
Northern Pass	Quanta Subsurface	BH-48B	6/2/2016	43.797593	-71.673646	65		22	10/17/2016	S6	Sleeve	29	Soil (GM)	54	168	16	118	
Northern Pass	Quanta Subsurface	BH-48B	6/3/2016	43.797593	-71.673646	65		22	10/17/2016	S13	Sleeve	64	Soil (ML)	65	177	12	125	
Northern Pass	Quanta Subsurface	BH-51A	6/1/2016	43.750602	-71.686727	65.3		9	10/17/2016	S3	Sleeve	14	Soil (SW)	42	109	11	125	
Northern Pass	Quanta Subsurface	BH-51A	6/2/2016	43.750602	-71.686727	65.3		9	10/17/2016	S6	Sleeve	29	Soil (PT)	86	643	69	57	
Northern Pass	Quanta Subsurface	BH-51B	6/1/2016	43.750292	-71.686417	65		8	10/17/2016	S4	Sleeve	18	Soil (SM/GM)	55	134	11	120	
Northern Pass	Quanta Subsurface	BH-51B	6/2/2016	43.750292	-71.686417	65		8	10/17/2016	S7	Sleeve	33	Soil (SM/GM)	48	118	13	126	
Northern Pass	Quanta Subsurface	BH-52A	5/31/2016	43.729822	-71.675867	60	12.5	9	10/11/2016	RC 2	Core	22.8	Rock	38	70	< 1	159	
Northern Pass	Quanta Subsurface	BH-52A	6/1/2016	43.729822	-71.675867	60	12.5	9	10/11/2016	RC 5	Core	38.5	Rock	40	67	< 1	162	
Northern Pass	Quanta Subsurface	BH-52B	5/30/2016	43.728816	-71.676103	60	41.7	7.5	10/17/2016	S5	Sleeve	24	Soil (SM)	58	177	19	99	
Northern Pass	Quanta Subsurface	BH-52B	5/31/2016	43.728816	-71.676103	60	41.7	7.5	10/11/2016	RC 4	Core	49.5	Rock	44	74	< 1	160	



THE NORTHERN PASS™

Figure 1

Site Location Map

Reference: http://www.northernpass.us/route-info.htm

ATTACHMENT A

Exploratory Test Boring Logs

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors | PROJECT NAME Northern Pass
PROJECT NUMBER 16004 | PROJECT LOCATION Bethlehem, NH

DATE STARTED 9/15/16 | COMPLETED 9/15/16 | GROUND ELEVATION | HOLE SIZE 4 in
DRILLING CONTRACTOR SW Cole | LATITUDE 44.25831 | LONGITUDE -71.75735
DRILLING METHOD Solid Stem Auger/Mud Rotary / NX/Series 8 | DRILLING EQUIPMENT CME 850 | SPT HAMMER 140 lb Auto
LOGGED BY S. Tiger | CHECKED BY S. Kearney | GROUND WATER LEVEL:
NOTES | AT TIME OF DRILLING 8.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP		POORLY GRADED SAND (SP), dusky brown, wet, loose, fine to medium grained sand	solid stem auger to 5 ft
3.0				SM		SILTY SAND WITH GRAVEL (SM), dark yellowish brown to dark grayish brown, loose to medium dense, fine to coarse grained gravel, fine to coarse grained sand, subangular	
5	SPT 1	0	2-3-4 (7)				begin mud rotary 4 inch casing advanced to 20 ft
8.0							
10	SPT 2	33	21-10-13 (23)				
15	SPT 3	75	46-50	SM		-becomes very dense, silt content increases	quartz fragment stuck in sampler shoe in SPT 3
19.5							no sample
20							

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Bethlehem, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	100	50/2"			BEDROCK: Moderately weathered (III) to highly weathered (IV), light gray to dark gray, fine to coarse grained, strong (R4) to very strong (R5), GRANODIORITE GNEISS, with hornblende, foliated *(continued)*	recovered for SPT 4 roller bit drilled 20 to 25 ft to confirm bedrock
25						Fresh (I), strong (R4) to very strong (R5)	NX Double Tube coring started at 25 ft
	RC 1	92 (82)				5 natural discontinuities per run 0 mechanical breaks per run	3.13 min/ft
30						Fresh (I) to slightly weathered (II), strong (R4) to very strong (R5)	
	RC 2	100 (88)				4 natural discontinuities per run 2 mechanical breaks per run	3.10 min/ft
35						Fresh (I) to slightly weathered (II), strong (R4) to very strong (R5) -becomes dark greenish gray to medium light gray, with chlorite and epidote alteration	
	RC 3	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run	3.03 min/ft
40						Fresh (I) to slightly weathered (II), strong (R4) to very strong (R5)	
	RC	100				3 natural discontinuities per run	3.03 min/ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-10A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Bethlehem, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
	4	(96)				1 mechanical break per run Fresh (I) to slightly weathered (II), strong (R4) to very strong (R5) *(continued)*	
45						Fresh (I), strong (R4) to very strong (R5) -becomes dark gray to medium light gray	
	RC 5	98 (98)				0 natural discontinuities per run 3 mechanical breaks per run	3.83 min/ft
50						Fresh (I), strong (R4) to very strong (R5) -becomes medium light gray to dark greenish gray	
	RC 6	92 (92)				4 natural discontinuities per run 4 mechanical breaks per run	4.53 min/ft
55					55.0		Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 55.0 feet
Groundwater estimated at 8.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-10B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Bethlehem, NH
DATE STARTED 8/26/16 **COMPLETED** 8/30/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.25834 **LONGITUDE** -71.75711
DRILLING METHOD Solid Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 9.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), trace clay, yellowish gray, damp, dense, fine to medium grained, subangular	
5	SPT 1	90	18-50	SM			4 inch casing advanced to 5 ft begin mud rotary
9						∇ -becomes yellowish gray to light olive gray	
10	SPT 2	67	18-27-19 (46)	SM			
10.5						-10.5 to 13.0 ft, encountered highly weathered granitic boulders	
13.5						BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger until coring starts at 24.5 ft, very dense, with lenses of silty clay	
15	SPT 3	100	50/4"				no sample recovered
20	SPT 4	0	50/1"				no sample recovered 3 inch inner casing advanced

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GENERAL BH / TP / WELL - GINT STD US LAB.GPJ - 11/7/16 17:07 - C:\USERS\LGSCHWIND\DESKTOP\BETH.GPJ

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-10B

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Bethlehem, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger until coring starts at 24.5 ft, very dense, with lenses of silty clay *(continued)*	to 19.5 ft
	SPT 5		50/0"			Fresh (I), grayish blue green to pale blue, very fine to fine grained, very strong (R5), SCHIST, foliated	no sample recovered
25						Fresh (I), very strong (R5)	NX Double Tube coring begins at 24.5 ft
	RC 1	100 (88)				1 natural discontinuity per run 4 mechanical breaks per run	2.55 min/ft poor water circulation
30						Fresh (I), very strong (R5)	installed new drill bit
	RC 2	100 (93)				1 natural discontinuity per run 7 mechanical breaks per run	2.65 min/ft abandoned hole due to presence of hydrocarbon odor Backfilled with 96 lbs cement, 5 lbs bentonite, 10 gal water
34.5							

Bottom of Borehole at 34.5 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-11A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Sugar Hill, NH
DATE STARTED 8/25/16 **COMPLETED** 8/25/16
GROUND ELEVATION **HOLE SIZE** 4.25 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.246844 **LONGITUDE** -71.762787
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP		POORLY GRADED SAND WITH GRAVEL (SP), moderate brown, moist, fine grained gravel, fine to medium grained sand, subrounded, trace amounts of coarse grained sand	hollow stem auger to 9 ft
2.5				SM		SILTY SAND WITH GRAVEL (SM), brownish yellow to pale olive, moist, dense, fine grained gravel, fine to medium grained sand, subangular to subrounded	
5	SPT 1	89	12-23-25 (48)				
10	SPT 2	61	8-8-10 (18)	SM		-becomes medium dense, little to trace gravel, with fine grained sand	4 inch casing advanced to 9 ft, begin mud rotary
15	SPT 3	59	30-50-50/5"	SM		-becomes very dense with gravel	
17.8				ML		SANDY SILT WITH GRAVEL (ML), light olive gray, hard, fine grained gravel, fine grained sand, angular to subangular	
20	SPT 4	33	40-50/3"				

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-11A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Sugar Hill, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				ML		SANDY SILT WITH GRAVEL (ML), light olive gray, hard, fine grained gravel, fine grained sand, angular to subangular *(continued)*	
						-from approximately 23 to 28 ft, increase in gravel content, becomes SANDY GRAVELLY SILT	
25	SPT 5	50	50/1"	ML			no sample recovered
						-28 to 29 ft encountered boulder	
30	SPT 6	60	50/5"	ML			cobble collapsed into hole and lodged at 15 ft, had to drill out
35	SPT 7	67	50/3"	ML			no sample recovered
40	SPT 8	67	70	ML		-decrease in gravel content	multiple cobbles collapsing into hole when tripping out resulting in increased drill time

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-11A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Sugar Hill, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
				ML			SANDY SILT WITH GRAVEL (ML), light olive gray, hard, fine grained gravel, fine grained sand, angular to subangular *(continued)*	
45	SPT 9	91	47-50/5"	ML		46.0		
				SM			SAND WITH SILT (SM), light olive gray, very dense, fine grained sand	
50	SPT 10	90	46-50/4"	SM				
						54.5	-52 to 55 ft encountered boulder	
55	SPT 11	100	50	CL		55.5	LEAN CLAY WITH SAND (CL), light olive gray, hard, medium plasticity, fine grained sand	SPT sample taken at 55 ft, below boulder Backfilled with 188 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 55.5 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-11B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Sugar Hill, NH

DATE STARTED 8/25/16 **COMPLETED** 8/26/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.246276 **LONGITUDE** -71.762695
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 55 **SPT HAMMER** 140 lb Auto
LOGGED BY T. Vernon **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES casing grouted into drill hole from 44 to 49 ft bgs
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), trace gravel, moderate brown, fine grained sand	solid stem auger to 9 ft
	GB 4						
2.5				SM		SILTY SAND (SM), moderate brown, moist, very loose, fine grained sand, micaceous	
5	SPT 1	11	2-1-1 (2)				
						-becomes dark greenish gray, medium dense, with silt/clay lenses, oxidized zones	
10	SPT 2	67	4-11-18 (29)	SM			4 inch casing advanced to 9 ft, begin mud rotary
12.0				SM		SILTY SAND WITH GRAVEL (SM), moderate brown, moist, very dense, fine to medium grained, coarse grained gravel, subangular to subrounded, minor oxidation	
15	SPT 3	56	25-40-50 (90)				
20	SPT	67	30-44-50	SM			

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Sugar Hill, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(94)	SM		SILTY SAND WITH GRAVEL (SM), moderate brown, moist, very dense, fine to medium grained, coarse grained gravel, subangular to subrounded, minor oxidation *(continued)*	
25	SPT 5	83	50-40-50 (90)	SM			
30	SPT 6	67	50/3"	SM		-possible contact with weathered bedrock becoming less weathered and stronger until confirmed at 45 ft, light gray to moderate brown	
35	SPT 7	0	50/1"	SM		-34 to 36 ft encountered boulder	no sample recovered
40	SPT 8	70	29-50/4"	SM		-becomes moderate gray	

(Continued Next Page)

BORING NUMBER BH-11B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Sugar Hill, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
				SM			SILTY SAND WITH GRAVEL (SM), moderate brown, moist, very dense, fine to medium grained, coarse grained gravel, subangular to subrounded, minor oxidation *(continued)*	
	SPT 9	0	50/3"				Casing stuck and could not be removed, hole abandoned, casing was grouted into borehole from 44 to 49 ft, may present an issue for horizontal directional drilling equipment	no sample recovered
45						45.0	BEDROCK: Slightly weathered (II) to moderately weathered (III), SCHIST	roller bit drilling from 45 to 49 ft advanced 3 inch casing from 9 to 49 ft casing stuck at 49 ft and could not be removed, hole abandoned, may present an issue for horizontal directional drilling equipment Backfilled with 264 lbs cement, 15 lbs bentonite, 30 gal water
	SPT 10		50/0"			49.0		

Bottom of Borehole at 49.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-12A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DATE STARTED 9/20/16 **COMPLETED** 9/20/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.23008 **LONGITUDE** -71.75426
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING 7.5ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				OL		ORGANIC SOIL WITH SAND (OL), with organics, trace gravel, black, moist, soft, fine grained gravel, subangular to subrounded	solid stem auger to 15 ft
				SM	4.0	SILTY SAND WITH GRAVEL (SM), brownish gray, moist, medium dense, fine to coarse grained gravel, subangular to subrounded	
5	SPT 1	44	20-10-5 (15)				
							original borehole abandoned due to hydrocarbon odors moved hole 2 ft southwest due to crooked hole
10	SPT 2	100	14-50/3"	SM		-becomes very dense	possible cobble blocking sampler in SPT 2
							4 inch casing advanced to 15 ft, mud rotary started moved hole 4 ft northeast due to boulder at 15 ft
15	SPT 3	87	30-50/6"	SM		-becomes light brown, with gravel	
				ML	18.0	SILT WITH SAND (ML), light brown, very stiff	
20							4 inch casing advanced to 20 ft

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	78	6-8-8 (16)	ML		SILT WITH SAND (ML), light brown, very stiff *(continued)*	
25	SPT 5	72	5-4-7 (11)	ML		-becomes olive gray, stiff	
30	SPT 6	78	5-5-6 (11)	ML			
					33.0	SAND WITH SILT (SM), medium dark gray, medium dense, micaceous	poor circulation at 33 ft
35	SPT 7	44	7-5-6 (11)				
						-boulders and cobbles at 38 ft	
40	SPT 8	72	11-8-16 (24)	SM		-increase in gravel and silt content	

(Continued Next Page)

Quanta Subsurface
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Telephone: 509-892-9409

BORING NUMBER BH-12A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		-increase in gravel and silt content *(continued)*	
					44.5	BEDROCK: Fresh (I), light gray to medium dark gray, fine to medium grained, strong (R4), SCHIST	
45	SPT 9	100	50/1"				new roller bit installed
50	SPT 10	100	50/1"				wheels on bit locked up/worn flat at 52.5 Backfilled with 188 lbs cement, 10 lbs bentonite, 25 gal water
					52.5		

Bottom of Borehole at 52.5 feet
Groundwater estimated at 7.5 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-12B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DATE STARTED 9/19/16 **COMPLETED** 9/19/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.2295 **LONGITUDE** -71.75355
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 850 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 8.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				OL		ORGANIC SOIL WITH SAND (OL), with organics, grayish brown, moist, soft, low plasticity, fine to medium grained sand	solid stem auger to 15 ft
5	SPT 1	6	7-9-6 (15)	OL		-becomes moderate olive brown, stiff -becomes wet	poor sample recovery, wood stuck in sampler cuttings turn black in color original borehole abandoned due to hydrocarbon odors
				ML	8.0	▽ SILT WITH SAND (ML), trace lean clay, and organics, light olive gray, wet, stiff, low plasticity, fine to medium grained sand	
10	SPT 2	83	5-7-5 (12)				
				SM	13.0	SAND WITH SILT AND GRAVEL (SM), greenish gray, moist, dense, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded	4 inch casing advanced to 15 ft, begin mud rotary
15	SPT 3	78	6-9-32 (41)				
20				GW-GM	19.0	WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM), greenish gray, dense, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded	4 inch casing advanced to 20 ft

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	56	14-30-16 (46)	GW-GM		WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM), greenish gray, dense, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded *(continued)*	
				ML	22.5	SILT WITH SAND (ML), trace gravel, medium dark gray, medium stiff, low plasticity, fine grained gravel, subangular to subrounded	
25	SPT 5	44	4-4-3 (7)				
30	SPT 6	56	3-5-5 (10)	ML		-becomes stiff	
35	SPT 7	72	5-4-5 (9)	ML		-becomes light olive gray	
40	SPT 8	72	6-8-22 (30)	ML		-becomes hard, with fine to coarse grained sand	4 inch casing advanced to 42 ft

(Continued Next Page)

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BORING NUMBER BH-12B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML		-becomes hard, with fine to coarse grained sand *(continued)*	
45	SPT 9	100	13-10-21 (31)	ML		-increase in fine to coarse grained gravel content	
49.5						BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth, light olive gray	
50	SPT 10	100	50/4"				
						Fresh (I) to slightly weathered (II), light gray to dark gray, fine to medium grained, strong (R4) to medium strong (R3), SCHIST, trace pyrite	roller bit drilled from 54 to 65 ft, description from cuttings no sample recovered
55	SPT 11	0	50/2"				
60	SPT 12	100	50/1"				coring not possible due to hole conditions
65	SPT 13	100	50/5"			65.0	sample recovered likely cave in material Backfilled with 180 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 8.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
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Telephone: 509-892-9409

BORING NUMBER BH-13A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DATE STARTED 8/30/16 **COMPLETED** 8/30/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.22727 **LONGITUDE** -71.748035
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 10.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		SILTY GRAVEL WITH SAND AND COBBLES (GM), with asphalt, dusky yellowish brown, damp, very fine to fine grained, fine to very coarse grained gravel, subangular to rounded	backfill from vacuum truck to 9 ft
9.5				GM-GP		∇ COBBLES AND POORLY GRADED GRAVEL WITH SAND (GM-GP), coarse grained gravel, subangular to subrounded	4 inch casing advanced to 10 ft, begin mud rotary
10	SPT 1	67	28-46-43 (89)				
	SPT 2	0	50/4"	GM-GP			no sample recovered
18.5				SM-ML		SILTY SAND AND SANDY SILT (SM-ML), trace clay, light olive gray, medium dense to stiff, fine grained sand	
20	SPT	50	6-6-6				

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	3		(12)	SM-ML		SILTY SAND AND SANDY SILT (SM-ML), trace clay, light olive gray, medium dense to stiff, fine grained sand *(continued)*	
25	SPT 4	100	6-7-9 (16)	SM-ML			
30	SPT 5	67	4-5-10 (15)	SM-ML		-with minor zones of oxidation	
					32.5		
				ML		SANDY SILT (ML), light olive gray, very stiff, non plastic, fine grained sand	
35	SPT 6	89	5-7-12 (19)				
40	SPT 7	100	5-6-5 (11)	ML		-becomes stiff, with minor zones of oxidation	
					42.0		
				ML-CL		SILT AND CLAY (ML-CL), light olive gray, stiff, low plasticity	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-13A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML-CL		SILT AND CLAY (ML-CL), light olive gray, stiff, low plasticity *(continued)*	
45	SPT 8	100	4-8-3 (11)				
					48.0		
				SM-ML		SILTY SAND TO SANDY SILT (SM-ML), trace clay, light olive gray, medium dense to stiff, minor zones of oxidation	
50	SPT 9	100	4-5-6 (11)				
55	SPT 10	89	8-12-14 (26)	SM-ML	55.5		Backfilled with 93 lbs cement, 5 lbs bentonite, 10 gal water

Bottom of Borehole at 55.5 feet
Groundwater estimated at 10.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
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BORING NUMBER BH-13B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DATE STARTED 9/14/16 **COMPLETED** 9/14/16
GROUND ELEVATION
HOLE SIZE 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.226402 **LONGITUDE** -71.748031
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 850 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 8.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP-SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), moderate brown, moist to wet, loose, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded	
5	SPT 1	58	4-12-8 (20)	SP-SM		-becomes medium dense, hydrocarbon odor	
8.0				SP		▽ POORLY GRADED SAND WITH GRAVEL (SP), moderate brown, moist, dense, fine to coarse grained gravel, fine to coarse grained sand, subangular	
10	SPT 2	67	10-17-27 (44)				
13.0				GM		GRAVEL WITH SILT AND SAND (GM), dusky yellowish brown, moist, very dense, fine to coarse grained gravel, fine to coarse grained sand, subangular -14 to 18 ft encountered boulders	4 inch casing advanced to 14.5 ft, begin mud rotary 4 inch casing advanced to 15 ft due to bad seal casing sheared off, drilled offset hole
15	SPT 3	100	50/5"				
						-becomes light olive gray, fine to medium grained gravel, subangular to subrounded	
20							

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-13B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	78	20-16-12 (28)	GM GM		GRAVEL WITH SILT AND SAND (GM), dusky yellowish brown, moist, very dense, fine to coarse grained gravel, fine to coarse grained sand, subangular *(continued)*	
25	SPT 5	50	11-9-11 (20)	GM		-increase in coarse grained sand	
					27.0	SAND WITH SILT (SM), trace gravel, pale olive, medium dense, fine grained gravel, fine to medium grained sand, subangular to subrounded, zones of oxidation	
30	SPT 6	67	8-5-6 (11)	SM			
35	SPT 7	78	5-6-8 (14)	SM		-increase in silt content	
40	SPT 8	78	5-6-9 (15)	SM		-with layers of medium grained sand	

(Continued Next Page)

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4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-13B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SAND WITH SILT (SM), trace gravel, pale olive, medium dense, fine grained gravel, fine to medium grained sand, subangular to subrounded, zones of oxidation *(continued)*	
45	SPT 9	72	7-7-8 (15)	SM			
50	SPT 10	83	10-9-8 (17)	SM			
55	SPT 11	0	5-6-7 (13)	SM		-gravel becomes angular to subrounded	
60	SPT 12	94	5-6-7 (13)	SM		-without gravel	
65	SPT		21-24-40	SM		-becomes very dense, with fine to coarse grained sand, with fine grained, subangular to subrounded gravel, decrease in silt content	rock fragment caught in end of sampler

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-13B

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
	13	72	(64)	SM	66.5		Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 66.5 feet
Groundwater estimated at 8.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-14A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DATE STARTED 8/18/16 **COMPLETED** 8/18/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.188953 **LONGITUDE** -71.749505
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), dark yellowish brown, moist, dense, fine grained gravel, fine to medium grained sand, angular to subangular	hollow stem auger to 14 ft
5	SPT 1	61	16-21-26 (47)	SM	5.3		
				GP		POORLY GRADED GRAVEL WITH SAND AND COBBLES (GP), grayish brown, moist, very dense, coarse grained gravel, fine to medium grained sand, subrounded	cobbles and boulders influencing blow counts and recovery
10	SPT 2	0	16-23-21 (44)	GP			no sample recovered
15	SPT 3	0	13-9-18 (27)	GP	18.0		4 inch casing advanced to 14 ft, begin mud rotary
				SP-GP		POORLY GRADED SAND WITH GRAVEL (SP-GP), moderate yellowish brown, dense, fine grained gravel, fine grained sand, subangular	
20	SPT	83	13-13-30				

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-14A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(43)	SP-GP		POORLY GRADED SAND WITH GRAVEL (SP-GP), moderate yellowish brown, dense, fine grained gravel, fine grained sand, subangular *(continued)*	
				GP	21.5	POORLY GRADED GRAVEL WITH SAND (GP), dark yellowish orange, dense, fine grained gravel, fine to medium grained sand, subangular	
25	SPT 5	39	20-20-18 (38)				
				SM	27.4	SILTY SAND WITH GRAVEL (SM), dark yellowish brown, medium dense, fine grained gravel, fine grained sand, angular	
30	SPT 6	61	13-8-14 (22)				
35	SPT 7	56	14-7-11 (18)	SM		-becomes micaceous	
						-with trace gravel, fine to medium grained sand	
40	SPT 8	61	4-7-11 (18)	SM			

(Continued Next Page)

BORING NUMBER BH-14A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						-with trace gravel, fine to medium grained sand *(continued)*	
45	SPT 9	83	6-4-8 (12)	SM			
50	SPT 10	83	8-6-11 (17)	SM		-with weak laminations	
					52.0	BEDROCK: Banded GNEISS or SCHIST, with quartz and chlorite, boulder or possible bedrock encountered at 52 ft	
55	SPT 11	0	50/1"				no sample recovered Backfilled with 188 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 55.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-14B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DATE STARTED 8/19/16 **COMPLETED** 8/19/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.188386 **LONGITUDE** -71.74947
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), dark yellowish brown, moist, very dense, fine grained gravel, fine to medium grained sand, subrounded	hollow stem auger to 14 ft
5	SPT 1	67	39-42-30 (72)	SM			
7.5				SP		POORLY GRADED SAND WITH GRAVEL (SP), moderate yellowish brown, very dense, fine to coarse grained gravel, medium to coarse grained sand, subrounded	
10	SPT 2	94	23-32-22 (54)				
15	SPT 3	50	20-16-19 (35)	SP		-becomes dense	4 inch casing advanced to 14 ft, begin mud rotary
20	SPT	50	14-10-15	SP		-becomes medium dense	

(Continued Next Page)

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BORING NUMBER BH-14B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
20	4		(25)	SP			-becomes dense *(continued)*	
						22.0		
				SP-SM			POORLY GRADED SAND WITH SILT (SP-SM), moderate yellowish brown, dense, fine to medium grained sand, weak bedding	
25	SPT 5	0	14-15-18 (33)	SP-SM				
30	SPT 6	78	5-6-11 (17)	SP-SM			-becomes medium dense, dark yellowish orange, minor amounts of subangular gravel	
35	SPT 7	89	11-12-17 (29)	SP-SM				
40	SPT 8	83	14-15-18 (33)	SP-SM			-becomes dense, yellowish brown, micaceous	
						41.0		
				SM			SAND WITH SILT AND GRAVEL (SM), moderate yellowish brown, very dense, fine grained gravel, fine to medium grained sand, subangular	

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BORING NUMBER BH-14B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SAND WITH SILT AND GRAVEL (SM), moderate yellowish brown, very dense, fine grained gravel, fine to medium grained sand, subangular *(continued)*	
45	SPT 9	67	49-40-48 (88)	SM			
					48.0	POORLY GRADED GRAVELLY SAND (SP-GP), dark yellowish brown, medium dense, fine grained gravel, fine to medium grained sand, subangular	hole caved from 25 to 49 ft, 3 inch casing advanced to 49 ft lost circulation
50	SPT 10	33	23-13-10 (23)	SP-GP			
55	SPT 11	0	23-50/5"	SP-GP		-becomes very dense, gravel content increases,	3 inch casing advanced to 54 ft lost circulation
					58.5	BEDROCK: Possible contact with weathered GNEISS bedrock becoming less weathered and stronger with depth	3 inch casing advanced to 59 ft no sample recovered
60	SPT 12	60	50/5"				
						GNEISS, contains quartz, chlorite	
65							

(Continued Next Page)

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BORING NUMBER BH-14B

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
						68.0	GNEISS, contains quartz, chlorite *(continued)*	Backfilled with 188 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 68.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
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BORING NUMBER BH-15A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DATE STARTED 8/22/16 **COMPLETED** 8/22/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.176802 **LONGITUDE** -71.759432
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT CME 55 **SPT HAMMER** 140 lb Auto
LOGGED BY T. Vernon **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING 7.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), trace gravel, brownish gray to gray, moist, fine grained gravel, fine to medium grained sand, subangular	hollow stem auger to 14 ft
3.0				SM		SILTY SAND WITH GRAVEL (SM), greenish gray to gray, moist, medium dense, fine grained gravel, fine to medium grained sand, subangular	
5	SPT 1	67	1-5-6 (11)				
7.0						∇	
10	SPT 2	44	14-26-13 (39)	SM		-becomes dense	
						-becomes dark green to gray, medium dense, silt content decreases	
15	SPT 3	33	9-9-13 (22)	SM			4 inch casing advanced to 14 ft, begin mud rotary rock fragment caught in end of sampler
						-becomes gray, loose, with fine grained sand, weak bedding, silt content increases	
20	SPT	44	4-4-4	SM			

(Continued Next Page)

Quanta Subsurface
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BORING NUMBER BH-15A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(8)	SM		SILTY SAND WITH GRAVEL (SM), greenish gray to gray, moist, medium dense, fine grained gravel, fine to medium grained sand, subangular *(continued)*	
25	SPT 5	56	5-8-7 (15)	SM		-becomes medium dense	
30	SPT 6	56	5-3-4 (7)	SM		-becomes loose, without gravel	
35	SPT 7	67	4-3-4 (7)	SM		-becomes brown, with low plasticity clay laminations	
40	SPT 8	56	3-2-3 (5)	SM		-becomes light olive brown	

GENERAL BH / TP / WELL - GINT STD US LAB.GPJ - 11/7/16 17:18 - C:\USERS\LGSCHWIND\DESKTOP\FRANC.GPJ

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Telephone: 509-892-9409

BORING NUMBER BH-15A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM	43.5		
45	SPT 9	75	4-50/2"			BEDROCK: Possible contact with weathered GNEISS bedrock becoming less weathered and stronger with depth, light olive brown and moderate reddish orange	
	SPT 10		50/0"				no sample recovered
50	RC 1	94 (94)			54.0	Fresh (I), dusky blue, medium to coarse grained, strong (R4) to very strong (R5), GRANODIORITE GNEISS, moderately foliated, minor oxidation on surfaces 0 natural discontinuities per run 3 mechanical breaks per run	1.96 min/ft Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 54.0 feet
Groundwater estimated at 7.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
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BORING NUMBER BH-15B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DATE STARTED 8/22/16 **COMPLETED** 8/22/16
GROUND ELEVATION
HOLE SIZE 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.175619
LONGITUDE -71.760083
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75
SPT HAMMER 140 lb Auto
LOGGED BY S. Laing **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 9.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP		POORLY GRADED SAND WITH SILT (SP), moderate brown, moist, fine to medium grained sand	hollow stem auger to 9 ft
3.0				SP		POORLY GRADED SAND WITH GRAVEL (SP), moderate yellowish brown, moist, medium dense, fine grained gravel, fine to medium grained sand, subangular	
5	SPT 1	67	5-8-8 (16)				
8.5				SM		▽ SAND WITH SILT (SM), trace gravel, moderate yellowish brown, loose, fine grained gravel, fine to medium grained sand, subrounded	4 inch casing advanced to 9 ft, begin mud rotary
10	SPT 2	11	3-4-4 (8)				
15	SPT 3	6	6-6-6 (12)	SM		-becomes medium dense	4 inch casing advanced to 14 ft
20	SPT	0	5-5-5	SM			no sample recovered

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-15B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(10)	SM		SAND WITH SILT (SM), trace gravel, moderate yellowish brown, loose, fine grained gravel, fine to medium grained sand, subrounded *(continued)*	
25	SPT 5	0	4-4-6 (10)	SM			no sample recovered, changed sample catcher
30	SPT 6	50	6-11-11 (22)	SM		-becomes micaceous, with weak bedding	
35	SPT 7	0	3-4-4 (8)	SM		-becomes loose	
40	SPT 8	72	5-3-4 (7)	SM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-15B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Franconia, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SAND WITH SILT (SM), trace gravel, moderate yellowish brown, loose, fine grained gravel, fine to medium grained sand, subrounded *(continued)*	
45	SPT 9	17	20-8-15 (23)	SM		-becomes medium dense	
						-48 to 49 ft encountered boulder, possible contact with weathered bedrock becoming less weathered and stronger with depth	
50	SPT 10	50	50/4"				
55	SPT 11	82	43-50/5"	SM		-with fine grained sand	
60	SPT 12	67	50	SM		-becomes dark yellowish orange to dark yellow	
65	SPT 13	0	49-50/2"	SM	65.0	-becomes light olive gray	Backfilled with 188 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
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BORING NUMBER BH-16A

CLIENT	PAR Electrical Contractors	**PROJECT NAME**	Northern Pass
PROJECT NUMBER	16004	**PROJECT LOCATION**	Easton, NH

DATE STARTED	8/12/16	**COMPLETED**	8/12/16	**GROUND ELEVATION**		**HOLE SIZE**	4 in
DRILLING CONTRACTOR	SW Cole			**LATITUDE**	44.170527	**LONGITUDE**	-71.763182
DRILLING METHOD	Solid Stem Auger/Mud Rotary			**DRILLING EQUIPMENT**	Diedrich D50	**SPT HAMMER**	140 lb Auto
LOGGED BY	J. Melton	**CHECKED BY**	S. Kearney	**GROUND WATER LEVEL:**			
NOTES				∇ **AT TIME OF DRILLING**	15.0ft*		

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		SILTY GRAVEL WITH SAND (GM), trace organics, dark yellowish brown, moist, medium to coarse grained gravel, very fine to fine grained sand, angular	solid stem auger to 5 ft
						-becomes yellowish brown and light brown, dry, subangular to angular gravels, oxidation throughout	
5	SPT 1	100	22-50/5"	GM			4 inch casing advanced to 5 ft, begin mud rotary
7.5				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray, moist, medium dense, fine grained sand	
10	SPT 2	100	23-36-34 (70)				
13.0				CL		LEAN CLAY WITH SAND (CL), yellowish gray, moist, hard, non plastic, very fine grained	
15 ∇	SPT 3	100	13-15-15 (30)				
18.0				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray, medium dense, fine grained sand	
20				SP-			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-16A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	83	8-9-11 (20)	SM SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray, medium dense, fine grained sand *(continued)*	
25	SPT 5	100	9-10-10 (20)	SP-SM			
30	SPT 6	100	8-9-9 (18)	SP-SM			
					33.3	CLAYEY SAND (SC), light olive brown, medium dense, very fine to fine grained	
35	SPT 7	78	5-5-5 (10)	SC			
				SC	40.0		
40	SPT 8	100	8-8-9 (17)	SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray, medium dense, fine grained	

(Continued Next Page)

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4308 N Barker RD
Spokane Valley, WA 99027
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BORING NUMBER BH-16A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray, medium dense, fine grained *(continued)*	
45	SPT 9	89	11-10-12 (22)	SP-SM			
50	SPT 10	100	11-11-12 (23)	SP-SM	52.0		
				CL		SANDY CLAY (CL), light olive gray to light olive brown, stiff, very fine to fine grained	
55	SPT 11	100	7-7-9 (16)		56.0		Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 56.0 feet
Groundwater estimated at 15.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-16B

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/11/16 **COMPLETED** 8/11/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.16875 **LONGITUDE** -71.76424
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 16.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		WELL GRADED GRAVEL WITH SILT AND SAND (GM), trace organics, dark reddish brown, moist, loose, fine to coarse grained gravel, fine to coarse grained sand	hollow stem auger to 10.5 ft
5	SPT 1	50	7-3-2 (5)	GM			
10				ML	10.0	SANDY SILT (ML), olive gray, very stiff, non plastic, fine grained sand	4 inch casing advanced to 11 ft
	SPT 2	67	8-7-13 (20)				
15	SPT 3	72	6-6-13 (19)	ML	15.0		
				SM		SILTY SAND (SM), olive, medium dense, fine grained sand ∇	
20	SPT	72	3-3-3	SM		-becomes loose	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-16B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(6)	SM		SILTY SAND (SM), olive, medium dense, fine grained sand *(continued)*	
21.5				ML		SANDY SILT (ML), olive to olive gray, stiff, non plastic, fine grained sand	
25	SPT 5	61	5-5-6 (11)				
30	SPT 6	78	4-3-5 (8)	ML		-becomes medium stiff, olive	4 inch casing advanced to 30 ft
35	SPT 7	0	5-5-5 (10)	ML		-becomes stiff	
40	SPT 8	78	6-5-6 (11)	ML			

GENERAL BH / TP / WELL - GINT STD US LAB.GPJ - 11/7/16 17:14 - C:\USERS\LGSCHWIND\DESKTOP\EAST.GPJ

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CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
43.5				ML		SANDY SILT (ML), olive to olive gray, stiff, non plastic, fine grained sand *(continued)*	
43.5						BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth, olive gray to reddish yellow, fine grained	
45	SPT 9	0	50/1"				3 inch casing advanced where it was damaged, casing pulled and 4 inch casing reinstalled to 35 ft lost circulation at 47 ft
50	SPT 10	100	30-50/5"				
55	SPT 11	0	50/3"				hole collapsing, advanced 3 inch casing to 54 ft
60	SPT 12	88	40-50/2"				
65	SPT 13	100	49-50/3"			65.0	Backfilled with 188 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 16.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-17A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/24/16 **COMPLETED** 8/24/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.163945 **LONGITUDE** -71.768159
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 14.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), trace clay, and organics, dark yellowish brown, moist, loose, fine grained gravel, fine grained sand, subangular	solid stem auger to 4.5 ft
							4 inch casing advanced to 4.5 ft, begin mud rotary
5	SPT 1	88	20-25-50/5"	SM		-becomes dusky yellow, dense, moisture content increases	
						-with subrounded gravel, fine to medium grained sand, occasional silty clay lenses	
10	SPT 2	67	28-29-26 (55)	SM			
					13.5		
				SP-SM		▽ POORLY GRADED SAND WITH SILT (SP-SM), light olive gray, dense, fine grained	
15	SPT 3	100	21-15-17 (32)				
20				SP-		-becomes medium dense	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-17A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	100	9-7-9 (16)	SM SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray, dense, fine grained *(continued)*	
25	SPT 5	83	21-27-30 (57)	SP-SM		-with fine grained, subangular gravels, becomes very dense	
					28.0	SILTY SAND WITH GRAVEL (SM), trace clay, light olive gray, medium dense, fine grained, fine grained gravel, subangular	
30	SPT 6	100	10-13-14 (27)	SM			
35	SPT 7	67	16-23-31 (54)	SM		-becomes very dense, with grayish blue green silt lenses	
					38.5	SAND AND SILT (SM-ML), grayish blue green, hard, low plasticity, very fine grained, stratified with 1/4 inch lenses of silty sand with fine grained gravel	
40	SPT 8	100	22-29-18 (47)	SM-ML			
				SM-ML		-42.5 to 47.5 ft encountered boulder, possible contact with weathered bedrock becoming less weathered and stronger with depth	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-17A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM-ML		SAND AND SILT (SM-ML), grayish blue green, hard, low plasticity, very fine grained, stratified with 1/4 inch lenses of silty sand with fine grained gravel *(continued)*	
45	SPT 9	72	33-41-49 (90)				
					47.5		
				SM		SILTY SAND WITH GRAVEL (SM), moderate yellowish brown, very dense, fine grained, subangular, iron oxide staining	
50	SPT 10	100	21-41-50 (91)				
55	SPT 11	100	43-50/3"	SM		-with lenses of silt, coarse grained gravel	
					59.5		
	SPT 12	0	50/1"			Bottom of Borehole at 59.5 feet Groundwater estimated at 14.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.	no sample recovered Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

BORING NUMBER BH-17B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH
DATE STARTED 8/24/16 **COMPLETED** 8/24/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.162901 **LONGITUDE** -71.769364
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 55 **SPT HAMMER** 140 lb Auto
LOGGED BY T. Vernon **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), trace gravel, brownish gray, dry to moist, fine grained	solid stem auger to 9 ft
	GB 1					-becomes moist, medium dense, with minor oxidation, minor clay lenses with low plasticity	
5	SPT 1	78	7-11-5 (16)	SM			hole collapsed at 6 ft
				SM	8.0	GRAVELLY SAND WITH SILT (SM), light gray to moderate reddish brown, moist, very dense, fine to medium grained, coarse grained gravel, subangular	4 inch casing advanced to 9 ft, begin mud rotary
10	SPT 2	56	51-76-81 (157)				
15	SPT 3	44	27-25-44 (69)	SM		-becomes light gray	
				SM	18.0	SILTY SAND WITH GRAVEL (SM), light olive gray, dense, fine grained, coarse grained gravel, subangular	
20	SPT	44	18-20-21				

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-17B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(41)	SM		SILTY SAND WITH GRAVEL (SM), light olive gray, dense, fine grained, coarse grained gravel, subangular *(continued)*	
25	SPT 5	56	19-24-25 (49)	SM			
30	SPT 6	50	9-9-10 (19)	SM		-becomes medium dense, micaceous, without gravel	
35	SPT 7	61	5-5-8 (13)	SM		-becomes medium gray, very dense, with minor clay lenses of low plasticity	
40	SPT 8	59	8-9-50/5"	SM		-40 to 43 ft encountered boulder, possible contact with weathered bedrock becoming less weathered and stronger with depth	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
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BORING NUMBER BH-17B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SC-SM		43.0 SILTY TO CLAYEY SAND WITH GRAVEL (SC-SM), medium light gray, dense, fine grained, subangular	
45	SPT 9	56	9-19-30 (49)				
50	SPT 10	67	30-50/3"			-becomes light gray to dusky yellow, increase in clay content	
						-becomes brownish gray, increase in gravel content	
55	SPT 11	83	28-50-50 (100)	SC-SM			
						-decrease in gravel content	
60	SPT 12	0	28-29-34 (63)	SC-SM			
65							no sample due to hole instability Backfilled with 188 lbs cement, 15 lbs bentonite, 25 gal water

Bottom of Borehole at 65.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-18A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH
DATE STARTED 8/22/16 **COMPLETED** 8/22/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.160754 **LONGITUDE** -71.772223
DRILLING METHOD Solid Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING 5.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), and asphalt, brown, moist, very fine to fine grained, medium to coarse grained gravel, subangular	solid stem auger to 5 ft
5	SPT 1	78	16-50/6"	SM			4 inch casing advanced to 5 ft, begin mud rotary
5.5				GM		SILTY GRAVEL WITH SAND (GM), trace clay, light olive gray, dense, very fine to fine grained, medium to coarse grained gravel, subangular 5.5 to 7.5 ft encountered granitic boulder	
10	SPT 2	72	23-29-32 (61)	GM			
15	SPT 3	56	21-18-11 (29)	GM			
15.3				ML		SANDY SILT (ML), light olive gray, very fine to fine grained, laminated, iron oxide staining	
20				ML		-with trace clay	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-18A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	67	8-7-7 (14)	ML		-with trace clay *(continued)*	
23.5				SM-GM		SANDY GRAVEL WITH SILT (SM-GM), trace clay, yellowish brown to light olive gray, dense, very fine to fine grained, medium to coarse grained gravel, subangular	
25	SPT 5	50	13-16-17 (33)				
						-becomes medium dense, GRAVELLY SAND WITH SILT	
30	SPT 6	100	7-6-11 (17)	SM-GM			
						-1/4 inch layers of silty gravel with sand	
35	SPT 7	100	7-10-11 (21)	SM-GM			
40	SPT 8	100	28-21-9 (30)	SM-GM			
42.0							

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-18A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						BEDROCK: Possible contact with weathered GNEISS bedrock becoming less weathered and stronger with depth, white and grayish black, medium grained, extremely weak, feldspars weathered to clay *(continued)*	
45	SPT 9	100	50/1"				no sample recovered
50	SPT 10	100	50/1"				no sample recovered 3 inch casing advanced to 49.5 ft
							NX Double Tube coring started at 52 ft
	RC 1	100 (100)				Fresh (I), very light gray and grayish black, medium to coarse grained, strong (R4), GRANODIORITE GNEISS, granular, with minor zones of chlorite mineralization, foliated 0 natural discontinuities per run 0 mechanical breaks per run	2.19 min/ft
55						Fresh (I), strong (R4)	
	RC 2	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run	2.01 min/ft Backfilled with 279 lbs cement, 15 lbs bentonite, 30 gal water
60					60.0		

Bottom of Borehole at 60.0 feet
Groundwater estimated at 5.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-18B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/18/16 **COMPLETED** 8/18/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.160278 **LONGITUDE** -71.773119
DRILLING METHOD Solid Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 8.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), and asphalt, brown, moist, dense, very fine to fine grained, coarse grained gravel, angular	solid stem auger to 5 ft
5	SPT 1	88	21-26-50/5"	SM		-with medium to coarse grained, angular to subangular gravel	4 inch casing advanced to 5 ft, begin mud rotary
					∇		
10	SPT 2	100	6-6-10 (16)	SM		-with subangular gravel, minor zones of oxidation	
					13.0	POORLY GRADED SAND (SP), light olive gray to light olive brown, medium dense, fine grained	
15	SPT 3	100	8-8-12 (20)	SP			
20	SPT	83	6-4-4	SP		-with minor zones of oxidation	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-18B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
20	4		(8)	SP			-with minor zones of oxidation *(continued)*	
						23.5		
				ML-SM			SILT AND SAND (ML-SM), light olive gray, medium dense to stiff, low plasticity, very fine grained	
25	SPT 5	100	5-5-5 (10)					
						28.5		
				GM			SILTY GRAVEL WITH SAND (GM), dark yellow to light olive gray, dense, very fine to fine grained, medium to coarse grained gravel, subangular	contact based on drill action
30	SPT 6	22	18-13-15 (28)					
35	SPT 7	67	20-12-22 (34)	GM			-angular to subangular gravel	
						38.5		
							BEDROCK: Possible contact with weathered GNEISS bedrock becoming less weathered and stronger with depth, light olive gray	
40	SPT 8	100	31-50					

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-18B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

<table>
<tr><th>DEPTH (ft)</th><th>SAMPLE TYPE NUMBER</th><th>RECOVERY % (RQD)</th><th>BLOW COUNTS (N VALUE)</th><th>U.S.C.S.</th><th>GRAPHIC LOG</th><th>MATERIAL DESCRIPTION</th><th>REMARKS</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>BEDROCK: Possible contact with weathered GNEISS bedrock becoming less weathered and stronger with depth, light olive gray (continued)</td><td>3 inch casing advanced to 44 ft</td></tr>
<tr><td>45</td><td>SPT 9</td><td>0</td><td>50/2"</td><td></td><td></td><td></td><td>no sample recovered</td></tr>
<tr><td>50</td><td>SPT 10</td><td>0</td><td>50/1"</td><td></td><td></td><td></td><td>roller bit through highly weathered zone of rock</td></tr>
<tr><td>55</td><td></td><td></td><td></td><td></td><td></td><td>Fresh (I), very light gray and dark gray, medium to coarse grained, strong (R4), GRANODIORITE GNEISS, granular, foliated</td><td></td></tr>
<tr><td></td><td>RC 1</td><td>98 (98)</td><td></td><td></td><td></td><td>Fresh (I), strong (R4)

-becomes weakly foliated, minor zones of chlorite mineralization

0 natural discontinuities per run
7 mechanical breaks per run</td><td>1.68 min/ft</td></tr>
<tr><td>60</td><td>RC 2</td><td>100 (100)</td><td></td><td></td><td></td><td>Fresh (I), strong (R4), strong gneissic foliation

0 natural discontinuities per run
3 mechanical breaks per run</td><td>1.97 min/ft

Backfilled with 279 lbs cement, 15 lbs bentonite, 30 gal water</td></tr>
<tr><td>65</td><td></td><td></td><td></td><td></td><td>65.0</td><td></td><td></td></tr>
</table>

Bottom of Borehole at 65.0 feet
Groundwater estimated at 8.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-19A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH
DATE STARTED 8/17/16 **COMPLETED** 8/18/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.159863 **LONGITUDE** -71.774448
DRILLING METHOD Solid Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 14.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), and asphalt, brown, moist, dense, very fine to fine grained, coarse grained gravel	solid stem auger to 6 ft
5	SPT 1	83	7-16-29 (45)	SM		-with medium grained, subangular gravel	4 inch casing advanced to 6 ft, begin mud rotary
10	SPT 2	67	8-9-11 (20)	SM		-with medium to coarse grained gravel	
15	SPT 3	89	8-6-7 (13)	SM	∇	-becomes medium dense, light olive gray, without gravel	
				SP-SM	18.3	POORLY GRADED SAND (SP-SM), light olive gray to dark yellowish orange, medium dense, fine grained, with lenses of silty clay	
20	SPT	100	4-6-9				

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-19A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(15)	SP-SM		POORLY GRADED SAND (SP-SM), light olive gray to dark yellowish orange, medium dense, fine grained, with lenses of silty clay *(continued)*	
25	SPT 5	100	5-7-6 (13)	SP-SM		-with medium grained, subangular, gravel	
30	SPT 6	100	7-7-8 (15)	SP-SM			
					33.5	BEDROCK: Moderately weathered (III), very light gray and dusky yellowish green, medium to coarse grained, very weak (R1) to medium weak (R2), GRANODIORITE GNEISS, granular, moderately foliated, with chlorite mineralization	
35	SPT 7		50/0"				no sample recovered
	SPT 8	0	50/1"				no sample recovered 3 inch casing advanced to 39 ft
40						Fresh (I), strong (R4)	
	RC 1	100 (100)				0 natural discontinuities per run 5 mechanical breaks per run	1.98 min/ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-19A

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						Fresh (I), strong (R4) *(continued)*	
45						Fresh (I), strong (R4)	
	RC 2	100 (100)				0 natural discontinuities per run 5 mechanical breaks per run	1.58 min/ft
50						Fresh (I), strong (R4) -strong gneissic foliation between 49.9 to 50.8 ft	
	RC 3	100 (100)				0 natural discontinuities per run 3 mechanical breaks per run	2.66 min/ft
55						Fresh (I), strong (R4), with alkali feldspar grains	
	RC 4	100 (100)				0 natural discontinuities per run 3 mechanical breaks per run	2.62 min/ft
60						Fresh (I), strong (R4), gneissic foliation weakens	
	RC 5	100 (100)				0 natural discontinuities per run 2 mechanical breaks per run	2.29 min/ft
					64.5		Backfilled with 279 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 64.5 feet
Groundwater estimated at 14.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-19B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/16/16 **COMPLETED** 8/18/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.159021 **LONGITUDE** -71.776425
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY T. Vernon **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 5.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GP		POORLY GRADED GRAVEL WITH SAND (GP), reddish brown to dark brown, wet, very dense, medium to coarse grained sand, subrounded	solid stem auger to 14 ft
5	SPT 1	44	22-34-26 (60)	GP		∇	
					7.0		
				SM		SILTY SAND WITH GRAVEL (SM), light olive brown, moist, medium dense, fine to medium grained, coarse grained gravel, subrounded	
10	SPT 2	56	5-7-6 (13)				
15	SPT 3	22	12-15-17 (32)	SM			4 inch casing advanced to 14 ft, begin mud rotary
					18.5		
				GP		POORLY GRADED GRAVEL WITH SAND (GP), dark brown, very dense, medium to coarse grained, subangular	
20	SPT 4	33	24-50/3"				4 inch casing

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-19B

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
20				GP			POORLY GRADED GRAVEL WITH SAND (GP), dark brown, very dense, medium to coarse grained, subangular *(continued)*	advanced to 20 ft due to leakage
							-22 ft encountered boulder	
								4 inch casing advance to 23 ft
						24.5		
25				SM			SAND WITH SILT (SM), trace gravel, brown, medium dense, medium to coarse grained, coarse grained gravel, subangular	
	SPT 5	56	7-6-5 (11)					
						29.5		
30							BEDROCK: Possible contact with weathered GNEISS bedrock becoming less weathered and stronger with depth, light gray, fine to medium grained	
	SPT 6	73	50/6"					
35	SPT 7	0	50/5"					no sample recovered 4 inch casing advanced to 35 ft
40	SPT 8		50/0"				Fresh (I), very light gray, medium to coarse grained, strong (R4), GRANODIORITE GNEISS, granular, foliated, with large quartz veins	
								begin mud rotary to 45 ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-19B

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						Fresh (I), very light gray, medium to coarse grained, strong (R4), GRANODIORITE GNEISS, granular, foliated, with large quartz veins *(continued)*	
45							NQ Double Tube coring started at 45 ft
	RC 1	98 (98)				0 natural discontinuities per run 10 mechanical breaks per run	4.07 min/ft
50						-50 to 52 ft core loss	
	RC 2	60 (44)				Fresh (I), strong (R4), with chlorite alteration, without quartz veins 0 natural discontinuities per run 6 mechanical breaks per run	3.09 min/ft
						Highly weathered (IV), extremely weak (R0)	
55						-55 to 58.5 ft core loss	
	RC 3	22 (22)				0 natural discontinuities per run 9 mechanical breaks per run	6.31 min/ft drilling issues caused hole to be abandoned at 59.5 ft mechanically fractured zone from 58.6 to 59.35 ft Backfilled with 188 lbs cement, 15 lbs bentonite, 35 gal water
					59.5	Slightly weathered (II), light gray to medium dark gray, medium strong (R3), moderate foliation, increase in biotite	

Bottom of Borehole at 59.5 feet
Groundwater estimated at 5.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-19C

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/16/16 **COMPLETED** 8/16/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.158117 **LONGITUDE** -71.778291
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 6.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		SILTY GRAVEL WITH SAND (GM), trace asphalt, light brown, moist, very fine to fine grained, medium to coarse grained gravel, subangular, extensive oxidation	solid stem auger to 5 ft
5	SPT 1	100	26-36-49 (85)	GM	5.5		4 inch casing advanced to 5 ft, begin mud rotary
				SM		▽ SILTY SAND WITH GRAVEL (SM), yellowish brown to light brown, very dense, very fine to fine grained, medium to coarse grained gravel, subangular, zones of oxidation throughout	
10	SPT 2	100	6-10-11 (21)	SM			
				CL-ML	13.8	SILTY CLAY (CL-ML), grayish blue to grayish green, very stiff, low plasticity	
15	SPT 3	100	8-11-14 (25)				
20				CL-ML		-becomes hard, high dry strength, with medium to coarse grained, subangular, gravel	

(Continued Next Page)

BORING NUMBER BH-19C

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
20	SPT 4	100	12-23-23 (46)	CL-ML			SILTY CLAY (CL-ML), grayish blue to grayish green, very stiff, low plasticity *(continued)*	
25	SPT 5	100	31-50	CL-ML				
				SM		28.5	SILTY SAND WITH GRAVEL (SM), light olive gray, very dense, very fine to fine grained, medium to coarse grained gravel, possible weathered bedrock contact, locally gneiss and schist, highly to moderately weathered	
30	SPT 6	100	38-50/3"					
35	SPT 7	100	50/4"				-with trace clay	no sample recovered
							-with silt	
40	SPT 8	100	43-50/4"					
				GM		42.0	SILTY GRAVEL WITH SAND (GM), trace clay, yellowish brown, very dense, very fine to fine grained, medium to coarse grained gravel, subangular	contact based on drill action, high amount of vibration in drill stem

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-19C

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				GM		SILTY GRAVEL WITH SAND (GM), trace clay, yellowish brown, very dense, very fine to fine grained, medium to coarse grained gravel, subangular *(continued)*	
45	SPT 9	100	50/4"				no sample recovered
50	SPT 10	100	50/4"	GM		-minor zones of oxidation throughout	
					53.0		
				SM		SILTY SAND WITH GRAVEL (SM), light olive gray, very dense, very fine to fine grained, medium grained gravel, subangular, with clay lenses	Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water
55	SPT 11	100	48-50/5"		55.5		

Bottom of Borehole at 55.5 feet
Groundwater estimated at 6.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-20A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/15/16 **COMPLETED** 8/15/16
GROUND ELEVATION
HOLE SIZE 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.148089
LONGITUDE -71.788438
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Mobil B-53
SPT HAMMER 140 lb Auto
LOGGED BY T. Vernon **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 4.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SANDY SILT (SM), medium brown, moist, very dense, fine to medium grained	solid stem auger to 4 ft
	GB 1						
3.5							4 inch casing advanced to 4 ft, begin mud rotary
	SPT 1		50/0"			∇ BEDROCK: Slightly weathered (II) to moderately weathered (III), light gray and black, medium to coarse grained, strong (R4), GRANODIORITE GNEISS, weak foliation, biotite	no sample recovered 4 inch casing advanced to 5ft
5							
10							mud rotary to 10 ft NQ Double Tube coring started at 10 ft
	RC 1	98 (98)				Fresh (I), strong (R4) 0 natural discontinuities per run 11 mechanical breaks per run	2.49 min/ft
15	RC 2	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 5 mechanical breaks per run	2.14 min/ft
20							

(Continued Next Page)

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BORING NUMBER BH-20A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	RC 3	100 (100)				Fresh (I), strong (R4) to very strong (R5) 0 natural discontinuities per run 5 mechanical breaks per run	minor water loss around casing, no water loss in borehole 2.32 min/ft
25	RC 4	87 (87)				-25 to 25.7 ft core loss Fresh (I), strong (R4), with pyrite filled veins, coarse grained 0 natural discontinuities per run 8 mechanical breaks per run Fresh (I), medium strong (R3)	3.35 min/ft
30	RC 5	96 (96)				-30 to 30.2 ft core loss Fresh (I), strong (R4), becomes medium to coarse grained, without pyrite 1 natural discontinuity per run 12 mechanical breaks per run	3.58 min/ft
35	RC 6	100 (100)				Strong (R4) to very strong (R5) 0 natural discontinuities per run 11 mechanical breaks per run	3.28 min/ft
40	RC 7	100 (100)				Fresh (I), strong (R4) 2 natural discontinuities per run	casing issues causing slow drill time 4.76 min/ft

(Continued Next Page)

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BORING NUMBER BH-20A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						2 mechanical breaks per run Fresh (I), strong (R4) *(continued)*	
45	RC 8	100 (100)				Fresh (I), strong (R4) to very strong (R5), with feldspar, decrease in biotite 0 natural discontinuities per run 7 mechanical breaks per run	3.41 min/ft
50	RC 9	98 (98)				-50 to 50.1 ft core loss Fresh (I), strong (R4) 0 natural discontinuities per run 8 mechanical breaks per run	3.23 min/ft
55	RC 10	100 (100)				Fresh (I), strong (R4) to very strong (R5), increase in biotite content 0 natural discontinuities per run 2 mechanical breaks per run	2.01 min/ft
60	RC 11	88 (88)				-60 to 60.6 ft core loss Fresh (I), strong (R4) to very strong (R5) 0 natural discontinuities per run >20 mechanical breaks per run	mechanically fractured zone from 60.6 to 65 ft from drill 2.70 min/ft Backfilled with 188 lbs cement, 10 lbs bentonite, 20 gal water
65					65.0		

Bottom of Borehole at 65.0 feet
Groundwater estimated at 4.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-20B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/15/16 **COMPLETED** 8/15/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.146662 **LONGITUDE** -71.789704
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING 7.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		SILTY GRAVEL WITH SAND (GM), trace asphalt, moderate brown, moist, fine to coarse grained gravel, fine grained sand, angular to subangular	solid stem auger to 11 ft
5	SPT 1	72	3-4-11 (15)	GM		-becomes medium dense	
						-becomes moderate yellowish brown, very dense, with subangular gravel	
10	SPT 2	100	50/6"	GM		-11 to 15.5 ft encountered boulder	4 inch casing advanced to 11 ft, begin mud rotary contact with boulder based on drill action and cuttings
15	SPT 3	100	50/3"	GM		-becomes light olive gray, with weak cementation	no sample recovered
20	SPT 4	88	45-48-50/4"	GM		-with low plasticity clay lenses	

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				GM		-with low plasticity clay lenses *(continued)*	
				ML	23.0	SILT WITH SAND (ML), light olive brown, hard, low plasticity, very fine grained	
	SPT 5	100	50/5"				
25							
				SM	28.0	SILTY SAND WITH GRAVEL (SM), moderate yellowish brown, very dense, fine grained gravel, fine to medium grained sand, subangular	
	SPT 6	100	50/3"				no sample recovered
30							
35	SPT 7	100	31-50/5"	SM			
40	SPT 8	100	29-30-50 (80)	SM			

(Continued Next Page)

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BORING NUMBER BH-20B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM	43.5		
45	SPT 9	100	50/3"			BEDROCK: Possible weathered GNEISS bedrock encountered between 45 and 50 ft bgs, becoming less weathered and stronger with depth -45 to 48.5 ft encountered boulders	no sample recovered contact with boulder based on drill action and cuttings
50	SPT 10	100	50/6"				
55	SPT 11	100	50/4"				
60	SPT 12	100	50/2"				no sample recovered
	SPT 13		50/0"		64.5		no sample recovered Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 64.5 feet
Groundwater estimated at 7.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-21A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/8/16 **COMPLETED** 8/8/16
GROUND ELEVATION **HOLE SIZE** 4.25 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.134289 **LONGITUDE** -71.785108
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), olive and reddish yellow, moist, loose, fine grained sand	hollow stem auger to 12 ft
5	SPT 1	72	8-5-4 (9)	SP-SM			
10	SPT 2	39	18-14-14 (28)	SP-SM		-becomes medium dense, olive brown, with trace subangular to angular gravel, fine to medium grained sand	
						-12 to 14 ft encountered boulder	4 inch casing advanced to 12 ft, begin mud rotary
14.0	SPT 3	75	50/4"	SW-SM		WELL GRADED SAND (SW-SM), little silt, and gravel, olive gray, very dense, fine to coarse grained sand, subangular, weak cementation	
15							
20	SPT	67	48-23-29	SW-SM		-becomes olive gray to olive	

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-21A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(52)	SW-SM		-becomes olive gray to olive *(continued)*	
25	SPT 5	67	9-10-12 (22)	SW-SM		-without gravel, medium dense	
30	SPT 6	67	10-10-15 (25)	SW-SM			
32.5				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), olive gray, medium dense, fine to medium grained sand, weak cementation	
35	SPT 7	78	12-12-15 (27)				
40	SPT 8	72	5-6-10 (16)	SP-SM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-21A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), olive gray, medium dense, fine to medium grained sand, weak cementation *(continued)*	
45	SPT 9	72	12-11-12 (23)	SP-SM			
					47.5	SANDY SILT OR CLAY (CL-ML), olive to olive gray, stiff, low plasticity	
				CL-ML			
50	SPT 10	78	8-6-8 (14)				
	SPT 11	0	50/2"	CL-ML		-54 to 56 ft encountered boulder	no sample recovered
55							
					56.0	SAND AND SILT (ML-SM), olive gray, hard, low plasticity, fine grained sand	
				ML-SM			
60	SPT 12	92	37-50	ML-SM	60.0		Backfilled with 188 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 60.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-21B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/8/16 **COMPLETED** 8/8/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.133542 **LONGITUDE** -71.785373
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	MATERIAL DESCRIPTION	REMARKS
0				GM	SILTY GRAVEL WITH SAND (GM), trace organics, dusky brown and medium blueish gray, moist, very fine to fine grained, medium to coarse grained gravel, angular	
1.0				GP	POORLY GRADED GRAVEL WITH SAND (GP), moderate yellowish brown, damp, loose, fine grained, fine grained gravel, subangular	solid stem auger to 5 ft
5	SPT 1	28	3-3-4 (7)	GP		4 inch casing advanced to 5 ft, begin mud rotary
7.0				GM	GRAVEL WITH SAND AND SILT (GM), dusky yellowish brown, very dense, fine grained, fine to coarse grained gravel, subangular, with lenses of clay	
10	SPT 2	50	27-50/4"			4 inch casing advanced to 10 ft
					-10.5 to 12 ft encountered boulder	
					-becomes moderate yellowish brown to dark yellowish brown, weak cementation	
15	SPT 3	67	39-50	GM		
20	SPT 4	50	50/4"		-becomes light olive gray, increase in silt/clay content	no sample recovered

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-21B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						-becomes light olive gray, increase in silt/clay content *(continued)*	
						- 21 to 22.5 ft schistose boulder encountered	
25	SPT 5	33	50	GM			no sample recovered
					28.0	POORLY GRADED SAND (SP-SM), moderate yellowish brown, medium dense, fine grained	
				SP-SM			
30	SPT 6	89	9-11-13 (24)				
					34.5	SAND WITH SILT (SM), yellowish gray, dense, very fine to fine grained	
35	SPT 7	83	22-15-15 (30)	SM			
40	SPT 8	100	12-11-11 (22)	SM		-becomes medium dense	

(Continued Next Page)

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4308 N Barker RD
Spokane Valley, WA 99027
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BORING NUMBER BH-21B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		-becomes medium dense *(continued)*	
45	SPT 9	89	7-8-10 (18)	SM	45.0		
				CH-CL	47.0	FAT CLAY (CH-CL), light olive gray, very stiff, medium plasticity, very fine grained, minor zones of oxidation	
				CL		SILTY CLAY (CL), light olive gray, very stiff, low to medium plasticity, very fine grained, laminated, iron oxide staining	
50	SPT 10	89	7-9-20 (29)				
55	SPT 11	0	50/1"	CL	58.0	-with gravel	no sample recovered
60	SPT 12	44	12-14-15 (29)	SP-SM	60.5	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), light olive gray, medium dense, very fine to fine grained, fine grained gravel	Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 60.5 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-22A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/8/16 **COMPLETED** 8/9/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.132478 **LONGITUDE** -71.786794
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 850 **SPT HAMMER** 140 lb Auto
LOGGED BY T. Vernon **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 4.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), dark brown, moist, loose, fine to medium grained	solid stem auger to 9 ft
3.0				GM		SILTY GRAVEL WITH SAND (GM), yellowish brown, wet, medium dense, very fine to fine grained, medium to very coarse grained gravel, angular to subangular ▽	
5	SPT 1	28	8-16-12 (28)				
10	SPT 2	22	21-11-18 (29)	GM			4 inch casing advanced to 9 ft, begin mud rotary
15	SPT 3	33	19-19-12 (31)	GM		-becomes dark yellowish brown, dense	4 inch casing advanced to 15 ft
18.0				SM		SILTY SAND (SM), grayish red to reddish brown, medium dense, very fine to fine grained	
20	SPT	44	9-6-6				

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(12)	SM		SILTY SAND (SM), grayish red to reddish brown, medium dense, very fine to fine grained *(continued)*	
25	SPT 5	44	5-5-7 (12)	SM			
30	SPT 6	50	5-5-7 (12)	SM			
35	SPT 7	56	3-4-6 (10)	SM			
38.0				SM		SILTY SAND WITH GRAVEL (SM), dark gray, medium dense, very fine to fine grained, subangular	
40	SPT 8	67	9-8-12 (20)				hole collapsed from 20 to 40 ft, 4 inch casing advanced to 25 ft

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-22A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SILTY SAND WITH GRAVEL (SM), dark gray, medium dense, very fine to fine grained, subangular *(continued)*	
45	SPT 9	67	17-37-47 (84)	SM		-becomes dense	
50	SPT 10	100	50/3"	SM		-with coarse grained gravel	
55	SPT 11	56	32-30-38 (68)	SM-ML		-becomes dark gray to brown, fine to medium grained, increasing silt content	
					58.5		
60	SPT 12	56	15-29-30 (59)	ML	60.5	SANDY SILT (ML), brown, hard, laminated	Backfilled with 188 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 60.5 feet
Groundwater estimated at 4.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-22B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/9/16 **COMPLETED** 8/9/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.131465 **LONGITUDE** -71.788498
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 850 **SPT HAMMER** 140 lb Auto
LOGGED BY T. Vernon **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 8.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), dark brown, moist, loose, fine to medium grained, medium to coarse grained gravel, subangular, organic material present	solid stem auger to 14 ft
5	SPT 1	33	18-12-15 (27)	SM			
7.5				SC-SM		▽ CLAYEY TO SILTY SAND (SC-SM), brown, dense, medium plasticity, fine to medium grained, medium grained gravel	
10	SPT 2	44	12-19-14 (33)				refusal on boulder at 10 ft, drilled offset hole
14.0				SM-ML		INTERBEDDED SILTY SAND AND SANDY SILT (SM-ML), brown, medium dense, fine to medium grained, with clay lenses	4 inch casing advanced to 14 ft, begin mud rotary
15	SPT 3	0	11-11-12 (23)				
20	SPT	56	5-5-6	SM-ML		-very fine to fine grained, decrease in silt content	

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(11)	SM-ML		-very fine to fine grained, decrease in silt content *(continued)*	
25	SPT 5	50	4-4-3 (7)	SM-ML		-becomes loose	
30	SPT 6	33	5-5-7 (12)	SM-ML		-becomes medium dense	
35	SPT 7	44	5-5-8 (13)	SM-ML			
					37.5		
				ML		SILT (ML), little sand, moderate brown, very stiff, low plasticity, laminated, iron oxide staining, clay lenses	
40	SPT 8	44	5-6-10 (16)				increase in drill rate

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-22B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML		SILT (ML), little sand, moderate brown, very stiff, low plasticity, laminated, iron oxide staining, clay lenses *(continued)*	
45	SPT 9	56	11-11-12 (23)	ML		-slight increase in clay lenses,	
					45.3		
				SM		SILTY SAND (SM), moderate brown, dense, very fine to fine grained, -minor clay lenses	
50	SPT 10	44	13-35-11 (46)	SM			
55	SPT 11	44	18-16-10 (26)	SM		-becomes medium dense	
60	SPT 12	0	50	SM	60.5		no sample recovered, difficult drilling due to borehole instability Backfilled with 188 lbs cement, 15 lbs bentonite, 25 gal water

Bottom of Borehole at 60.5 feet
Groundwater estimated at 8.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-22C

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/9/16 **COMPLETED** 8/10/16
GROUND ELEVATION
HOLE SIZE 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.130473
LONGITUDE -71.79014
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50
SPT HAMMER 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 19.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), trace organics, dark yellowish brown, moist, medium dense, very fine to fine grained, fine grained gravel, angular	solid stem auger to 4.5 ft
						-becomes light olive brown to dark yellowish brown, very dense, fine to medium grained sand, fine to coarse grained gravel, subangular, with weak cementation	
5	SPT 1	56	3-10-50 (60)	SM			4 inch casing advanced to 4.5 ft, begin mud rotary
10	SPT 2	72	30-24-26 (50)	SM			
13.5				GW-GM		WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM), light olive gray, moist, dense, fine to coarse grained gravel, fine to medium grained sand, subangular	
15	SPT 3	78	17-17-19 (36)				
18.5				ML		▽ SANDY SILT (ML), dark yellow, stiff, low plasticity, fine grained	
20							

(Continued Next Page)

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Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-22C

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	100	6-5-8 (13)	ML		SANDY SILT (ML), dark yellow, stiff, low plasticity, fine grained *(continued)*	
					23.5		
				SM		SILTY SAND (SM), light olive gray, medium dense, low plasticity, very fine to fine grained	
25	SPT 5	83	9-7-9 (16)				
30	SPT 6	89	7-7-7 (14)	SM		- with zones of oxidation	
					33.0		
				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray, medium dense, fine to medium grained	
35	SPT 7	100	6-7-9 (16)				
					38.5		
				ML		SANDY SILT (ML), light olive gray, stiff, medium plasticity, very fine grained, laminated bedding, minor oxidation along bedding planes	
40	SPT 8	100	5-5-7 (12)				

(Continued Next Page)

QUANTA SUBSURFACE
Engineering + Construction
Quanta Subsurface
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Telephone: 509-892-9409

BORING NUMBER BH-22C

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML	43.5		
				SC-SM		CLAYEY TO SILTY SAND WITH GRAVEL (SC-SM), yellowish brown to light olive gray, dense, low plasticity, fine grained gravel, fine to medium grained sand, subangular	
45	SPT 9	83	12-16-15 (31)				
				SM	48.5	SILTY SAND (SM), dark yellow to light olive gray, dense, fine grained, spotty oxidation throughout	
50	SPT 10	100	18-25-21 (46)				hole caved at 50 ft
55	SPT 11	100	11-19-31 (50)	SM		-becomes light olive gray, laminated with oxidized layers	3 inch casing advanced to 55 ft
						-becomes light olive gray to dark yellow, medium dense, with oxidized layers	Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water
60	SPT 12	100	8-10-15 (25)	SM	61.0		

Bottom of Borehole at 61.0 feet
Groundwater estimated at 19.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-23A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/10/16 **COMPLETED** 8/11/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.121873 **LONGITUDE** -71.80201
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		SILTY GRAVEL WITH SAND (GM), trace organics, dark yellowish brown, moist, very dense, fine grained, fine to coarse grained gravel, angular	solid stem auger to 5 ft
5	SPT 1	83	6-31-50 (81)	GM		-becomes yellowish gray, with medium grained, subangular gravel, weak cementation	4 inch casing advanced to 5 ft, begin mud rotary
						-6.5 to 8.5 ft encountered boulder	
10	SPT 2	89	11-25-29 (54)	GM			
13.0						BEDROCK: Possible contact with weathered SCHIST becoming less weathered and stronger with depth	
15	SPT 3	75	50/4"				no sample recovered
20	SPT 4		50/0"				no sample recovered

(Continued Next Page)

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BORING NUMBER BH-23A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						BEDROCK: Possible contact with weathered SCHIST becoming less weathered and stronger with depth *(continued)*	
25	SPT 5		50/0"			-becomes massive, gray to dark gray, medium grained, extremely weak	no sample recovered
							rock is not strong enough to core, mud rotary drilling for remainder of boring
30	SPT 6	100	50/1"			Highly weathered (IV), gray to dark gray, medium to coarse grained, very weak (R1) to medium weak (R2), SCHIST, granular	no sample recovered
35	SPT 7	100	50/1"				no sample recovered
40	SPT 8	100	50/1"			-with minor zones of oxidation	no sample recovered

(Continued Next Page)

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						BEDROCK: Possible contact with weathered SCHIST becoming less weathered and stronger with depth *(continued)*	
45	SPT 9	67	40-26-27 (53)				
50	SPT 10	100	50/3"				no sample recovered
55	SPT 11	100	50/1"				no sample recovered
60	SPT 12	0	50/1"				no sample recovered
65	SPT 13	100	50/1"		65.0	Bottom of Borehole at 65.0 feet Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.	no sample recovered Backfilled with 279 lbs cement, 15 lbs bentonite, 30 gal water

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BORING NUMBER BH-23B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/10/16 **COMPLETED** 8/12/16
GROUND ELEVATION
HOLE SIZE 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.121202 **LONGITUDE** -71.802866
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT CME 850 **SPT HAMMER** 140 lb Auto
LOGGED BY T. Vernon **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES had to stop short of 60 ft due to drilling issues
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), trace gravel, brown, moist, fine grained gravel, fine to medium grained sand, subrounded	solid stem auger to 14 ft
						-becomes olive brown, very dense, fine to coarse grained gravel, subangular	
5	SPT 1	44	10-12-50 (62)	SM			
10	SPT 2	50	11-50/4"	SM		-becomes brown	
							4 inch casing advanced to 14 ft, begin mud rotary
15	SPT 3	50	50	SM		-14.6 to 15.5 ft encountered boulder	
						-becomes reddish brown to brown	
							hole caved, 4 inch casing advanced to 18 ft
							decrease in drill rate
20	SPT	56	23-19-20	SM			

(Continued Next Page)

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BORING NUMBER BH-23B

CLIENT PAR Electrical Contractors | **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 | **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(39)	SM		SILTY SAND WITH GRAVEL (SM), trace gravel, brown, moist, fine grained gravel, fine to medium grained sand, subrounded *(continued)*	
21.0						BEDROCK: Highly weathered (IV), very weak (R1), GRANODIORITE GNEISS, possible contact with weathered GNEISS bedrock becoming less weathered and stronger with depth, black and white	
25	SPT 5		50/0"				no sample recovered attempted to spin 3 inch casing to 24 ft, broke off at 10 ft, casing removed rock is not strong enough to core, mud rotary drilling for remainder of boring
30	SPT 6	0	50/1"				no sample recovered 1.5-2 min/ft
35	SPT 7	0	50/2"				no sample recovered
40	SPT 8		50/0"				no sample recovered 1.5-2 min/ft

(Continued Next Page)

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BORING NUMBER BH-23B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
							BEDROCK: Highly weathered (IV), very weak (R1), GRANODIORITE GNEISS, possible contact with weathered GNEISS bedrock becoming less weathered and stronger with depth, black and white *(continued)*	
45	SPT 9		50/0"				-becomes stronger	no sample recovered
							Fresh (I) to slightly weathered (II), black and white, medium to coarse grained, strong (R4) to very strong (R5), becomes black and white, medium to coarse grained, biotite rich	
	RC 1	84 (84)					0 natural discontinuities per run 3 mechanical breaks per run	2.46 min/ft
50						50.0		Backfilled with 188 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 50.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-24A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/5/16 **COMPLETED** 8/5/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.080709 **LONGITUDE** -71.80487
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 8.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
0				SP			POORLY GRADED SAND WITH GRAVEL (SP), olive brown, moist, medium dense, fine to medium grained sand, angular to subangular	hollow stem auger to 15 ft
5	SPT 1	39	10-11-11 (22)	SP				
				SP-SM		7.5	∇ POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), olive to olive brown, dense, fine to coarse grained sand, subangular to subrounded	
10	SPT 2	33	19-14-22 (36)					
15	SPT 3	100	5-5-7 (12)	SP-SM			-becomes medium dense	
20	SPT	0	23-17-19	SP-SM			-becomes dense	no sample recovered 4 inch casing

(Continued Next Page)

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BORING NUMBER BH-24A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(36)	SP-SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), olive to olive brown, dense, fine to coarse grained sand, subangular to subrounded *(continued)*	advanced to 20 ft, begin mud rotary
							lost circulation
							4 inch casing advanced to 24 ft
25	SPT 5	67	5-6-9 (15)	SP-SM		-becomes olive gray and red, medium dense, without silt, with zones of oxidation	
				ML	25.3	SILT WITH SAND (ML), medium dense, medium plasticity	
				SP-SM	28.5	POORLY GRADED SAND WITH SILT (SP-SM), olive gray, medium dense, fine grained sand	
30	SPT 6	56	6-7-8 (15)				
35	SPT 7	72	7-8-11 (19)	SP-SM		-becomes olive, very micaceous	
40	SPT 8	78	7-12-15 (27)	SP-SM			

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-24A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), olive gray, medium dense, fine grained sand *(continued)*	
45	SPT 9	83	7-11-15 (26)	SP-SM		-increasing gravel content	
50	SPT 10	0	16-50-50/5"	SM-GM		-becomes very dense, olive gray and reddish brown, with subangular to subrounded gravel	adapter cap sheared at 49 ft, replaced
					52.5	BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth, quartz biotite rich, foliated	
55	SPT 11	60	50/5"				
					59.1		Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water
	SPT 12	100	50/1"			Bottom of Borehole at 59.1 feet Groundwater estimated at 8.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.	

BORING NUMBER BH-24B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH
DATE STARTED 8/5/16 **COMPLETED** 8/5/16
GROUND ELEVATION
HOLE SIZE 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.07939
LONGITUDE -71.8028
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50
SPT HAMMER 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, medium dense, fine grained gravel, fine to medium grained sand, subangular to subrounded	solid stem auger to 5 ft
3.0				SP-SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), reddish yellow to reddish gray, moist, medium dense, fine grained gravel, fine to medium grained sand, subrounded	4 inch casing advanced to 5 ft, begin mud rotary
5	SPT 1	39	7-7-10 (17)				
10	SPT 2	72	38-33-36 (69)	SP-SM		-becomes yellowish brown, very dense, with weathered rock fragments, iron oxide laminations	
14.0				SM		SILTY SAND (SM), moderate yellowish brown, medium dense, fine grained sand	
15	SPT 3	72	6-7-8 (15)				
20				SM			3 inch casing

(Continued Next Page)

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BORING NUMBER BH-24B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	67	15-10-10 (20)	SM		SILTY SAND (SM), moderate yellowish brown, medium dense, fine grained sand *(continued)*	advanced to 20 ft
25	SPT 5	72	6-8-10 (18)	SM		-becomes micaceous	
30	SPT 6	78	13-20-13 (33)	SM		-becomes dense, with trace gravel, oxidized laminations	
					32.0	BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth	
35	SPT 7	100	50/1"				poor sample recovery
40	SPT 8	100	50/1"				poor sample recovery

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-24B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						Fresh (I), dark gray, fine to medium grained, strong (R4), SCHIST, with pyrite and chlorite alteration	
45	SPT 9		50/0"			Fresh (I), strong (R4)	no sample recovered NQ Double Tube coring started at 44.8
	RC 1	80 (80)				0 natural discontinuities per run 13 mechanical breaks per run -48.8 to 49.8 ft core loss	1.97 min/ft
50						Fresh (I), dark gray, fine to medium grained, strong (R4), SCHIST	
					51.4	Fresh (I), white and gray, coarse grained, strong (R4) to very strong (R5), PEGMATITE, intrusion with garnet, chlorite and epidote alteration 1 natural discontinuity per run 1 mechanical break per run	
	RC 2	100 (98)					2.10 min/ft
					53.2	Fresh (I), strong (R4) Fresh (I), dark gray, fine to medium grained, strong (R4), SCHIST	
55					55.6	Fresh (I), strong (R4), PEGMATITE, intrusion with garnet, muscovite, and chlorite alteration	
					56.4	Fresh (I), dark gray, fine to medium grained, strong (R4), SCHIST, chlorite filled fractures 0 natural discontinuities per run 2 mechanical breaks per run	
	RC 3	100 (100)					1.89 min/ft
60					60.0		Backfilled with 188 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 60.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
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BORING NUMBER BH-25A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/4/16 **COMPLETED** 8/4/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.077212 **LONGITUDE** -71.796636
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, medium dense, fine grained gravel, fine to medium grained sand, subangular to subrounded	solid stem auger to 5 ft
						-becomes moderate brown	
5	SPT 1	33	4-4-16 (20)	SM			4 inch casing advanced to 5 ft, begin mud rotary
						-7 to 8 ft encountered boulders	
							rock fragment caught in end of sampler
10	SPT 2	100	50/4"	SM			
						-12 to 13 ft encountered boulders	
						-becomes light olive gray, dense, with iron oxide zones	
15	SPT 3	67	20-16-14 (30)	SM			
20						-without oxidation	

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	67	8-9-11 (20)	SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, medium dense, fine grained gravel, fine to medium grained sand, subangular to subrounded *(continued)*	
25	SPT 5	56	8-12-13 (25)	SM		-with trace gravel	
30	SPT 6	67	10-11-13 (24)	SM		-with iron oxide laminations	
				ML	33.0	SILT (ML), little sand, light olive gray, very stiff, fine grained, laminated bedding, iron oxide bedding planes	
35	SPT 7	72	9-10-12 (22)				
40	SPT 8	67	9-9-10 (19)	ML			

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML		SILT (ML), little sand, light olive gray, very stiff, fine grained, laminated bedding, iron oxide bedding planes *(continued)*	
45	SPT 9	72	8-8-10 (18)	ML		-becomes micaceous	
50	SPT 10	72	6-9-7 (16)	ML			
55	SPT 11	44	9-10-10 (20)	ML		-without iron oxide laminations	
					58.0	-gravel layer	
				SP-SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dark yellowish brown, very dense, fine grained gravel, medium to coarse grained sand, angular to subangular	
60	SPT 12	0	38-37-30 (67)				
					61.5	BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth	
	SPT 13		50/0"			-contains schistose fragments	poor sample recovery
					64.5		Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 64.5 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-25B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Easton, NH

DATE STARTED 8/4/16 **COMPLETED** 8/4/16

GROUND ELEVATION **HOLE SIZE** 4 in

DRILLING CONTRACTOR Geosearch

LATITUDE 44.076661 **LONGITUDE** -71.795868

DRILLING METHOD Hollow Stem Auger/Mud Rotary

DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto

LOGGED BY S. Laing **CHECKED BY** S. Kearney

GROUND WATER LEVEL:

NOTES started new hole at 14 ft due to boulders

∇ **AT TIME OF DRILLING** Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), brown, moist, medium dense, fine to coarse grained gravel, fine to medium grained sand, subrounded	4 inch casing advanced to 4 ft, begin mud rotary
						-becomes olive brown, very dense, fine grained gravel, subangular	lost circulation
5	SPT 1	50	18-36-40 (76)	SM			
						-cobbles present	4 inch casing advanced to 6 ft
10	SPT 2	61	16-26-30 (56)	SM		-weakly cemented	
15	SPT 3	33	14-50	SM		-becomes gray to olive gray, angular gravel, zones of oxidation	no sample recovered
						-boulders present	casing bent due to boulders, started offset hole
20	SPT	83	23-27-40	SM		-with angular to subangular gravel	

(Continued Next Page)

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4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-25B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(67)	SM		SILTY SAND WITH GRAVEL (SM), brown, moist, medium dense, fine to coarse grained gravel, fine to medium grained sand, subrounded *(continued)*	
25	SPT 5	78	12-10-16 (26)	SM		-becomes olive gray, medium dense, decrease in gravel content	
26.5				ML		SILT WITH SAND (ML), olive gray, very stiff, low plasticity, micaceous	
30	SPT 6	72	10-10-15 (25)	ML			
35	SPT 7	100	7-10-10 (20)	ML			
40	SPT 8	100	5-6-10 (16)	ML		-very micaceous	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-25B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML		SILT WITH SAND (ML), olive gray, very stiff, low plasticity, micaceous *(continued)*	
45	SPT 9	72	8-8-12 (20)	ML			
50	SPT 10	89	5-5-10 (15)	ML		-becomes olive, with minor amounts of clay	
				ML	52.0	SANDY SILT WITH GRAVEL (ML), olive gray, hard	
55	SPT 11	100	50	ML		-becomes dark brown -54.5 to 56.5 ft encountered boulder with quartz and mica, possible contact with weathered bedrock becoming less weathered and stronger with depth	rock fragment caught in end of sampler
	SPT 12	100	50/5"		59.4		Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water no sample recovered

Bottom of Borehole at 59.4 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-26A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH
DATE STARTED 8/9/16 **COMPLETED** 8/9/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.075701 **LONGITUDE** -71.795224
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES 1 ft from digsafe arrow
▽ **AT TIME OF DRILLING** 14.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), brown, moist, medium dense, fine to coarse grained gravel, fine to medium grained sand, subrounded	hollow stem auger to 19 ft
5	SPT 1	72	27-27-18 (45)	SM	4.5	SAND WITH SILT (SM), olive gray, moist, dense, fine grained	
10	SPT 2	78	6-6-8 (14)	SM		-with fine to medium grained sand	
15	SPT 3	72	13-22-22 (44)	GP-GM	11.5	POORLY GRADED GRAVEL WITH SAND (GP-GM), reddish brown, moist, dense, coarse grained gravel, fine to medium grained sand, subrounded	
20	SPT	56	23-25-16	SP-SM	18.0	SAND WITH GRAVEL AND SILT (SP-SM), reddish brown, moist, dense, fine to coarse grained gravel, fine to medium grained sand, subrounded	4 inch casing advanced to 19 ft, begin mud rotary

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(41)	SP-SM		SAND WITH GRAVEL AND SILT (SP-SM), reddish brown, moist, dense, fine to coarse grained gravel, fine to medium grained sand, subrounded *(continued)*	
25	SPT 5	0	18-17-22 (39)	SP-SM			no sample recovered, damaged sampler basket
						-28 to 32 ft encountered biotite schist boulder	
30	SPT 6		50/0"	SP-SM			no sample recovered
					32.0	SAND WITH SILT (SM), olive to olive gray, medium dense, fine grained sand, micaceous	
				SM		-increasing silt content and decreasing in gravel content	
35	SPT 7	78	9-10-15 (25)				
40	SPT 8	78	8-10-16 (26)	SM		-becomes olive gray	

(Continued Next Page)

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4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-26A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SAND WITH SILT (SM), olive to olive gray, medium dense, fine grained sand, micaceous *(continued)*	
45	SPT 9	72	18-15-15 (30)	SM		-becomes dense	
50	SPT 10	72	5-10-16 (26)	SM		-becomes medium dense	
					51.5		
				ML		SILT WITH SAND (ML), olive, stiff, minor amounts of micaceous sand	
55	SPT 11	0	4-5-7 (12)	ML			
					58.5		
	SPT 12	0	50/3"			BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth	no sample recovered
60							
65	SPT 13	0	50/1"		65.0		no sample recovered Backfilled with 188 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 14.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-26B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DATE STARTED 8/9/16 **COMPLETED** 8/9/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.074412 **LONGITUDE** -71.794962
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 9.5ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), dark yellowish brown, moist, medium dense, fine to coarse grained gravel, fine to medium grained sand, subrounded	solid stem auger to 5 ft
5	SPT 1	56	7-39-50/4"	SM			
				GC-GM	4.8	CLAYEY GRAVEL WITH SAND (GC-GM), light olive gray, very dense, medium plasticity, very fine to fine grained, coarse grained gravel, angular to subangular	4 inch casing advanced to 5 ft, begin mud rotary
10	SPT 2	78	48-50/3"	GC-GM	▽	-11 to 12 ft encountered boulder	
15	SPT 3	83	7-10-12 (22)	SC-SM	14.0	CLAYEY TO SILTY SAND (SC-SM), light olive gray, medium dense, low plasticity, fine grained, minor zones of oxidation	
20				CL-ML	19.0	LEAN CLAY (CL-ML), light olive gray, stiff, low to medium plasticity, oxidized laminations	

(Continued Next Page)

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	100	7-8-7 (15)	CL-ML		LEAN CLAY (CL-ML), light olive gray, stiff, low to medium plasticity, oxidized laminations *(continued)*	
				SC-SM	23.8	CLAYEY TO SILTY SAND (SC-SM), light olive gray, medium dense, low plasticity, fine grained, minor zones of oxidation	
25	SPT 5	100	7-9-9 (18)				
				SM	28.0	SILTY SAND (SM), light olive gray, medium dense, fine grained, oxidized	
30	SPT 6	100	6-6-7 (13)				
35	SPT 7	89	7-7-7 (14)	SM			
40	SPT 8	89	8-9-10 (19)	SM		-becomes dark yellow, fine to medium grained	

(Continued Next Page)

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4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-26B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Easton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SILTY SAND (SM), light olive gray, medium dense, fine grained, oxidized *(continued)*	
45	SPT 9	78	8-8-10 (18)	SM			
50	SPT 10	100	7-9-9 (18)	SM		-becomes highly oxidized	
55	SPT 11	100	8-12-13 (25)	SM	56.0	-becomes light olive gray	Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 56.0 feet
Groundwater estimated at 9.5 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

QUANTA SUBSURFACE
Engineering + Construction
Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-27A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 8/3/16 **COMPLETED** 8/3/16
GROUND ELEVATION
HOLE SIZE 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.071945 **LONGITUDE** -71.79349
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled 2 ft from tip of Digsafe arrow
▽ **AT TIME OF DRILLING** 21.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), pale brown, moist, dense, fine grained gravel, fine grained sand, angular	4 inch casing advanced to 4 ft, begin mud rotary
5	SPT 1	40	17-40-50/3"	SM			low recovery, rock fragment in spoon tip
5.0				SM		SAND WITH SILT AND GRAVEL (SM), pale orange to dark yellowish brown, medium dense, fine to coarse grained gravel, fine grained sand, subrounded, moderate cementation, zones of oxidation	
10	SPT 2	100	50	SM			
12.0				SP		POORLY GRADED SAND (SP), little to trace silt, pale yellowish brown to dark yellowish orange, medium dense, fine to medium grained	
15	SPT 3	83	14-10-10 (20)				
18.0				SM-GM		POORLY GRADED GRAVEL AND SAND WITH SILT (SM-GM), yellowish brown to pale yellowish brown, dense, fine to coarse grained gravel, fine to coarse grained sand, subrounded	
20	SPT	89	19-15-26				

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-27A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(41)	SM-GM		POORLY GRADED GRAVEL AND SAND WITH SILT (SM-GM), yellowish brown to pale yellowish brown, dense, fine to coarse grained gravel, fine to coarse grained sand, subrounded *(continued)*	
25	SPT 5	33	9-11-21 (32)	SM-GM		-with zones of oxidation	
30	SPT 6	94	10-11-18 (29)	SM-GM			
35	SPT 7	56	20-16-25 (41)	SM-GM		-becomes moderately cemented	
					38.5		
40	SPT 8	100	13-19-17 (36)	SP-SM		POORLY GRADED SAND (SP-SM), little to trace silt, pale yellowish brown to yellowish brown, dense, fine to medium grained	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-27A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM	44.0	POORLY GRADED SAND (SP-SM), little to trace silt, pale yellowish brown to yellowish brown, dense, fine to medium grained *(continued)*	
45	SPT 9	100	33-21-27 (48)	SM-GM		SILTY SAND AND GRAVEL (SM-GM), pale yellowish brown to yellowish brown, dense, fine to coarse grained gravel, fine grained sand, subangular, zones of oxidation	
50	SPT 10	67	26-20-21 (41)	SM-GM		-without oxidation, with small clay lenses, moderate cementation	
55	SPT 11	100	29-25-39 (64)	SM-GM		-minor zones of oxidation, moderate to weak cementation, very dense	
							poor circulation at 58 ft
60	SPT 12	100	19-16-19 (35)	SM-GM	60.5	-becomes dense	cave in at 60 ft
						Bottom of Borehole at 60.5 feet Groundwater estimated at 21.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.	Backfilled with 186 lbs cement, 15 lbs bentonite, 35 gal water

BORING NUMBER BH-27B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 8/3/16 **COMPLETED** 8/3/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.070541 **LONGITUDE** -71.79307
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, medium dense, fine to coarse grained gravel, fine to medium grained sand, subangular to subrounded	solid stem auger to 5 ft
5	SPT 1	44	5-7-8 (15)	SM			4 inch casing advanced to 5 ft, begin mud rotary
				SP-SM	6.5	POORLY GRADED SAND WITH GRAVEL (SP-SM), little silt, olive gray, medium dense, fine grained gravel, fine to coarse grained sand, subangular to subrounded, iron oxide staining	
10	SPT 2	39	6-12-13 (25)	SP-SM			
				SM	13.5	SILTY SAND WITH GRAVEL (SM), pale brown, medium dense, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded	
15	SPT 3	67	50/3"				rock fragment caught in end of sampler
				SM-SW	17.0	SAND WITH SILT AND GRAVEL (SM-SW), light olive gray, very dense, fine grained gravel, fine to coarse grained sand, micaceous	
20				SM-			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-27B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	44	31-44-26 (70)	SW SM-SW		SAND WITH SILT AND GRAVEL (SM-SW), light olive gray, very dense, fine grained gravel, fine to coarse grained sand, micaceous *(continued)*	
					23.0	POORLY GRADED SAND WITH GRAVEL (SP-SM), little silt, moderate yellowish brown, very dense, fine grained gravel, fine to medium grained sand, subangular, zones of iron oxidation	
				SP-SM			
25	SPT 5	44	28-22-32 (54)				
30	SPT 6	50	5-10-12 (22)	SP-SM		-becomes medium dense, without iron oxidation	
35	SPT 7	39	9-25-22 (47)	SP-SM		-becomes dense, contains bedded gravel	
40	SPT 8	72	28-33-48 (81)	SP-SM	40.5		
				SM		SAND WITH SILT AND GRAVEL (SM), dark yellowish brown, very dense, fine grained gravel, fine to medium grained sand, subangular	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-27B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SAND WITH SILT AND GRAVEL (SM), dark yellowish brown, very dense, fine grained gravel, fine to medium grained sand, subangular *(continued)*	
45	SPT 9	100	50/4"	SM			
50	SPT 10	100	50/4"	SM			
55	SPT 11	100	39-50/4"	SM		-with subangular to rounded, fine grained gravel	
						-with zones of oxidation	
60	SPT 12	67	47-43-32 (75)	SM			
	SPT 13	72	39-45-50 (95)	SM	64.5	-with iron oxide laminations	Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 64.5 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-28A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 8/2/16 **COMPLETED** 8/2/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.064102 **LONGITUDE** -71.791791
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING 13.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), moderate yellowish brown, dry, medium dense, fine grained gravel, fine to medium grained sand, subangular to subrounded	solid stem auger to 5 ft
5					5.0		4 inch casing advanced to 5 ft, begin mud rotary
	SPT 1	56	8-15-13 (28)	SM		SAND WITH SILT AND GRAVEL (SM), trace organics, dusky brown, medium dense, fine grained gravel, fine to medium grained sand, subangular to subrounded	
						-becomes dark yellowish brown, very dense	
10	SPT 2	45	19-50/5"	SM			gravel in end of sampler
					12.5	BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth	
15	SPT 3	100	50/5"				
						Fresh (I), dark gray and white, fine to medium grained, strong (R4), PYRITIC SCHIST, foliated, with felsic inclusions	3 inch casing advanced to 19.5 ft
20	RC	100				0 natural discontinuities per run	NQ Double Tube

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-28A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	1	(100)				0 mechanical breaks per run Fresh (I), strong (R4) *(continued)*	coring started at 19.7 ft 1.83 ft/min
	RC 2	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 6 mechanical breaks per run	2.40 ft/min
25	RC 3	100 (100)				Fresh (I), very strong (R5) 0 natural discontinuities per run 5 mechanical breaks per run	2.47 ft/min
30	RC 4	100 (90)				Fresh (I), dark gray, fine to coarse grained, very strong (R5) 2 natural discontinuities per run 5 mechanical breaks per run	3.26 ft/min
35	RC 5	100 (100)				Fresh (I), strong (R4) to very strong (R5) 0 natural discontinuities per run 3 mechanical breaks per run	2.57 ft/min
					39.0	BEDROCK: Fresh (I), very strong (R5), QUARTZ MONZONITE, porphyritic, feldspar phenocrysts up to 2 inches long	
40	RC	100				Fresh (I), very strong (R5) 0 natural discontinuities per run	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-28A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
	6	(100)				5 mechanical breaks per run Fresh (I), very strong (R5) *(continued)*	2.37 ft/min
45							
						Fresh (I), very strong (R5)	
	RC 7	100 (100)				0 natural discontinuities per run 3 mechanical breaks per run	2.20 ft/min
50							
						Fresh (I), very strong (R5), with felsic lenses	
	RC 8	100 (98)				1 natural discontinuity per run 5 mechanical breaks per run	2.33 ft/min
55					55.4		Backfilled with 188 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 55.4 feet
Groundwater estimated at 13.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-28B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 8/9/16 **COMPLETED** 8/11/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.0634 **LONGITUDE** -71.792078
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES 1.5 ft from digsafe arrow
∇ **AT TIME OF DRILLING** 12.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), yellowish brown, moist, dense, fine grained gravel, fine to medium grained sand, subangular to subrounded	hollow stem auger to 15 ft
5	SPT 1	61	23-16-20 (36)	SM			
6.0				SM		SAND WITH SILT AND GRAVEL (SM), reddish yellow, moist, medium dense, fine grained gravel, fine to medium grained sand, subrounded	
10	SPT 2	28	13-9-9 (18)	SM			no sample recovered
12.0 ∇							
13.0						BEDROCK: Possible contact with weathered PEGMATITE bedrock becoming less weathered and stronger with depth	
15	SPT 3	40	50/5"			Fresh (I), medium to coarse grained, very strong (R5), PEGMATITE, with quartz, muscovite, and garnet	3 inch casing advanced to 15 ft slough in sampler, no sample recovered 3 inch casing advanced to 15.5 ft
20	SPT 4	0	50/0"			Fresh (I), very strong (R5)	begin mud rotary to 19 ft NX Double Tube coring started at 19 ft no sample

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-28B

CLIENT PAR Electrical Contractors | **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 | **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	RC 1	92 (72)				2 natural discontinuities per run 8 mechanical breaks per run Fresh (I), very strong (R5) *(continued)*	recovered 11.32 min/ft; drilled in low gear
	RC 2	100 (100)				Fresh (I), very strong (R5) -becomes medium to very coarse grained 0 natural discontinuities per run 12 mechanical breaks per run -24.5 to 24.6 ft core loss	27.87 min/ft installed new drill bit
25	RC 3	87 (87)				Fresh (I), very strong (R5) 0 natural discontinuities per run 9 mechanical breaks per run	6.33 min/ft
	RC 4	90 (55)				Fresh (I), very strong (R5) -fractured, iron oxidized zone between 26.3 to 27.4 ft -with chlorite mineralization 7 natural discontinuities per run 16 mechanical breaks per run	8.60 min/ft
30							
	RC 5	80 (46)				Fresh (I), very strong (R5) -with quartz, muscovite, biotite, chlorite, and garnet 3 natural discontinuities per run 16 mechanical breaks per run	8.37 min/ft
35							
	RC 6	100 (86)				Fresh (I), very strong (R5) -becomes pale yellowish green and very light gray -with iron staining, fracture zone between 37.8 to 38.6 ft 5 natural discontinuities per run 12 mechanical breaks per run	7.70 min/ft
40							
						Fresh (I), very strong (R5) -becomes very pale green and very light gray	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-28B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
45	RC 7	100 (100)				Fresh (I), very strong (R5) *(continued)* 0 natural discontinuities per run 9 mechanical breaks per run	7.61 min/ft
50	RC 8	100 (100)				Fresh (I), very strong (R5) -with feldspar 0 natural discontinuities per run 8 mechanical breaks per run	7.50 min/ft
55	RC 9	90 (90)				-51 to 51.5 ft core loss Fresh (I), very strong (R5) -becomes very pale green, pale yellowish green, very light gray, and brownish gray 0 natural discontinuities per run 8 mechanical breaks per run	6.09 min/ft
60	RC 10	100 (100)				Fresh (I), very strong (R5) -becomes yellowish gray, very light gray, brownish gray 0 natural discontinuities per run 10 mechanical breaks per run	14.15 min/ft
	RC 11	100 (100)				Fresh (I), very strong (R5) -becomes yellowish gray and very light gray -becomes yellowish gray, very light gray, and very pale green -becomes yellowish gray, very light gray, and reddish orange 0 natural discontinuities per run 13 mechanical breaks per run -becomes yellowish gray, very light gray, and very pale green	10.66 min/ft Backfilled with 94 lbs cement, 15 lbs bentonite, 20 gal water

Bottom of Borehole at 64.8 feet
Groundwater estimated at 12.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-29A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 8/1/16 **COMPLETED** 5/2/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.062078 **LONGITUDE** -71.792366
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing/J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled 3 ft from point of digsafe arrow
▽ **AT TIME OF DRILLING** 3.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		SILTY GRAVEL WITH SAND (GM), trace organics, trace asphalt, dark brown, wet, very fine to fine grained, coarse grained gravel, subangular	hollow stem auger to 5 ft
2.0				SM		SILTY SAND (SM), brown, wet, very loose, fine to medium grained, micaceous ▽	
5	SPT 1	20	1-1-50/3"				unable to obtain undisturbed sample rock fragments caught in end of sampler 4 inch casing advanced to 5.5 ft, begin mud rotary
5.2						BEDROCK: Fresh (I), grayish black and very light gray, medium to very coarse grained, strong (R4), QUARTZ MONZONITE, with feldspar phenocrysts, biotite and pyrite mafics	mud rotary to 9 ft NX Double Tube coring started at 9 ft
10	RC 1	93 (93)				-9 to 9.2 ft core loss Fresh (I), strong (R4) 0 natural discontinuities per run 3 mechanical breaks per run	3.20 min/ft
	RC 2	88 (88)				-12 to 12.2 ft core loss -feldspar phenocrysts up to 30mm, biotite, pyrite, minor amounts of muscovite Fresh (I), strong (R4) 0 natural discontinuities per run 1 mechanical break per run	3.85 min/ft slowed drilling rate to control water discharge
15	RC 3	97 (97)				-14 to 14.1 ft core loss Fresh (I), strong (R4) 0 natural discontinuities per run 1 mechanical break per run	6.82 min/ft
20	RC 4	100 (100)				Fresh (I), strong (R4) -chlorite fracture fill zone between 18 to 19 ft -with biotite and pyrite 1 natural discontinuity per run	4.35 min/ft

(Continued Next Page)

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4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-29A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						2 mechanical breaks per run Fresh (I), strong (R4) *(continued)*	
						Fresh (I), strong (R4) -with feldspar phenocrysts, biotite and pyrite	
25	RC 5	100 (100)				0 natural discontinuities per run 1 mechanical break per run	3.45 min/ft
						-quartz vein with medium grained garnets throughout	
						Fresh (I), strong (R4) -weakly to moderately foliated	
30	RC 6	100 (100)				0 natural discontinuities per run 1 mechanical break per run	3.56 min/ft
						Fresh (I), strong (R4) -becomes very weakly foliated, porphyritic	
35	RC 7	96 (96)				0 natural discontinuities per run 3 mechanical breaks per run	3.47 min/ft
						Fresh (I), strong (R4) -becomes weakly foliated	
40	RC 8	100 (100)				0 natural discontinuities per run 4 mechanical breaks per run	3.64 min/ft
						Fresh (I), strong (R4) to very strong (R5) -becomes massive	

(Continued Next Page)

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4308 N Barker RD
Spokane Valley, WA 99027
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BORING NUMBER BH-29A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
45	RC 9	100 (100)				Fresh (I), strong (R4) to very strong (R5) *(continued)* 0 natural discontinuities per run 1 mechanical break per run -smaller feldspar phenocrysts between 45.6 to 48 ft	4.04 min/ft
50	RC 10	100 (100)				Fresh (I), strong (R4) to very strong (R5) -massive to weakly foliated 0 natural discontinuities per run 2 mechanical breaks per run -weakly foliated	4.66 min/ft
55	RC 11	100 (100)				Fresh (I), strong (R4) to very strong (R5) 0 natural discontinuities per run 1 mechanical break per run -transitions to weakly to moderately foliated	3.77 min/ft Backfilled with 186 lbs cement, 25 lbs bentonite, 30 gal water

Bottom of Borehole at 55.0 feet
Groundwater estimated at 3.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-29B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors		**PROJECT NAME** Northern Pass	
PROJECT NUMBER 16004		**PROJECT LOCATION** Thornton, NH	
DATE STARTED 7/30/16	**COMPLETED** 8/1/16	**GROUND ELEVATION**	**HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole		**LATITUDE** 44.06086	**LONGITUDE** -71.79262
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NX/Series 8		**DRILLING EQUIPMENT** CME 75	**SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing	**CHECKED BY** S. Kearney	**GROUND WATER LEVEL:**	
NOTES		∇ **AT TIME OF DRILLING** 5.0ft*	

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), moderate yellowish brown to moderate brown, moist, dense, fine grained gravel, fine to medium grained sand, subangular to subrounded	hollow stem auger to 9 ft
4.5	SPT 1	44	7-11-50/4"	SM			
4.5–5					4.5	∇ BEDROCK: Fresh (I), grayish black and very light gray, medium to very coarse grained, strong (R4), QUARTZ MONZONITE, with feldspar phenocrysts, biotite and pyrite mafics, porphyritic	4 inch casing advanced to 8 ft, begin mud rotary
9	SPT 2	0	50/1"				3 inch inner casing advanced to 9 ft no sample recovered
10						-10 to 10.5 ft core loss	NX Double Tube coring started at 10 ft
	RC 1	83 (83)				0 natural discontinuities per run 3 mechanical breaks per run	0.37 min/ft
						Fresh (I), strong (R4) -becomes weakly foliated	
15	RC 2	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run	0.36 min/ft
						Fresh (I), strong (R4) -porphyritic	
20							

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-29B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	RC 3	100 (100)				Fresh (I), strong (R4) *(continued)* 0 natural discontinuities per run 2 mechanical breaks per run	2.82 min/ft
25	RC 4	100 (100)				Fresh (I), strong (R4) -massive to weakly foliated 0 natural discontinuities per run 1 mechanical break per run	2.82 min/ft
30	RC 5	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 1 mechanical break per run -increase in phenocryst size	3.02 min/ft
35	RC 6	100 (97)				Fresh (I), strong (R4) 0 natural discontinuities per run 1 mechanical break per run -vein of mafic minerals, including pyrite and biotite -becomes massive, without foliation	3.40 min/ft
40	RC 7	100 (100)				Fresh (I), strong (R4) -large feldspar phenocrysts 0 natural discontinuities per run 4 mechanical breaks per run -becomes weakly foliated	3.26 min/ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-29B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
45	RC 8	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 3 mechanical breaks per run -increase in feldspar phenocrysts and pyrite	3.74 min/ft
50	RC 9	100 (100)				Fresh (I), strong (R4) -becomes very weakly foliated, massive 0 natural discontinuities per run 1 mechanical break per run -large feldspar phenocrysts, with biotite, quartz, and pyrite	3.25 min/ft
55	RC 10	100 (100)				Fresh (I), strong (R4) -becomes weakly foliated, with quartz phenocrysts, biotite and pyrite mafics 0 natural discontinuities per run 2 mechanical breaks per run	
60	RC 11	100 (100)				Fresh (I), strong (R4) -becomes massive, quartz phenocrysts 0 natural discontinuities per run 1 mechanical break per run	3.37 min/ft
65	RC 12	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	4.29 min/ft Backfilled with 282 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 5.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-30A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 8/1/16 **COMPLETED** 8/2/16
GROUND ELEVATION
HOLE SIZE 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.05728
LONGITUDE -71.79368
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50
SPT HAMMER 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), moderate brown to pale red, dry, medium dense, fine grained gravel, fine to medium grained sand, subangular to subrounded	solid stem auger to 4.5 ft
5	SPT 1	67	22-11-8 (19)	SM			4 inch casing advanced to 5 ft, begin mud rotary
6.0				SM		SAND WITH SILT (SM), trace gravel, pale red, medium dense, fine to medium grained sand, subangular to subrounded	
9.5				GM		GRAVEL WITH SILT AND SAND (GM), brownish gray, medium dense, fine to coarse grained gravel, fine to coarse grained sand, subangular	lost circulation 3 inch casing advanced to 9.5 ft
10	SPT 2	22	11-8-15 (23)				
11.5						BEDROCK: Fresh (I), dark gray, fine to medium grained, strong (R4), SCHIST	3 inch casing advanced to 11.5 ft
15	RC 1	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run Fresh (I), strong (R4) Fresh (I), strong (R4), with garnet, pyrite, and hornblende	NQ Double Tube coring started at 14.5 ft 0.50 min/ft
	RC 2	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run	2.30 min/ft
20							

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	RC 3	100 (100)				Fresh (I), strong (R4), siliceous alteration, with quartz, pyrite, garnet, amphibole, and muscovite 0 natural discontinuities per run 2 mechanical breaks per run	2.50 min/ft
25	RC 4	100 (100)				Fresh (I), strong (R4) -becomes fine to coarse grained, with pyrite and chlorite filled fractures 1 natural discontinuity per run 0 mechanical breaks per run	2.20 min/ft
30	RC 5	100 (100)				Fresh (I), strong (R4) Fresh (I), strong (R4), with chlorite alteration 1 natural discontinuity per run 4 mechanical breaks per run	2.30 min/ft
35	RC 6	100 (100)				Fresh (I), strong (R4) -with garnet and hornblende 1 natural discontinuity per run 4 mechanical breaks per run	2.00 min/ft
40	RC 7	100 (100)				Fresh (I) to slightly weathered (II), strong (R4) -with pyrite, garnet, and chlorite alteration, weak foliation 0 natural discontinuities per run 2 mechanical breaks per run	2.40 min/ft

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-30A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
45						Fresh (I) to slightly weathered (II), strong (R4) *(continued)*	
	RC 8	100 (100)				Fresh (I) to slightly weathered (II), strong (R4) -without pyrite 1 natural discontinuity per run 4 mechanical breaks per run	2.30 min/ft
50	RC 9	100 (100)				Fresh (I), strong (R4) -with garnet and hornblende 0 natural discontinuities per run 1 mechanical break per run	2.40 min/ft
55	RC 10	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 2 mechanical breaks per run	2.30 min/ft
60	RC 11	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 2 mechanical breaks per run	2.29 min/ft
65	RC 12	100 (100)				Fresh (I), strong (R4) 1 natural discontinuity per run 1 mechanical break per run	1.94 min/ft
						Fresh (I), strong (R4)	

(Continued Next Page)

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BORING NUMBER BH-30A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
70	RC 13	100 (100)				-with pyrite Fresh (I), strong (R4) *(continued)* 1 natural discontinuity per run 3 mechanical breaks per run	2.10 min/ft
75	RC 14	100 (100)				Fresh (I) to slightly weathered (II), strong (R4) -chlorite healed fracture from 72.2 to 75 ft 1 natural discontinuity per run 2 mechanical breaks per run	2.20 min/ft Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 75.3 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-31A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/28/16 **COMPLETED** 7/29/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.05224 **LONGITUDE** -71.79299
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, medium dense, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded	solid stem auger to 3 ft
3.0				GM-SM		GRAVEL AND SAND WITH SILT (GM-SM), dusky brown, moist, medium dense, fine to coarse grained gravel, fine to medium grained sand, subangular	4 inch casing advanced to 3 ft
5							lost circulation at 7 ft 3 inch casing advanced to 7.5 ft
	SPT 1	100	17-50/4"	GM-SM			
8.5						BEDROCK: Fresh (I), very light gray and dark gray, fine to coarse grained, strong (R4) to very strong (R5), QUARTZ MONZONITE, porphyritic, feldspar phenocrysts, foliated	NQ Double Tube coring started at 9.5 ft
10	RC 1	100 (100)				0 natural discontinuities per run 3 mechanical breaks per run	3 min/ft
						Fresh (I), strong (R4) to medium strong (R3), with schistose lenses and granitic intrusion containing feldspar, muscovite, and garnet	
	RC 2	100 (80)				4 natural discontinuities per run 6 mechanical breaks per run	2.50 min/ft
15						Fresh (I), medium strong (R3)	
	RC 3	100 (98)				1 natural discontinuity per run 3 mechanical breaks per run	3.50 min/ft
19.4						BEDROCK: Fresh (I), medium strong (R3), SCHIST	
20							

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						BEDROCK: Fresh (I), medium strong (R3), SCHIST *(continued)* Fresh (I), strong (R4)	
					21.6	BEDROCK: Fresh (I), very light gray and dark gray, fine to coarse grained, strong (R4) to very strong (R5), QUARTZ MONZONITE, foliated, porphyritic, feldspar phenocrysts up to 2 inches long	
	RC 4	100 (100)				0 natural discontinuities per run 2 mechanical breaks per run	2.60 min/ft
25	RC 5	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run Fresh (I), strong (R4) to very strong (R5), with schistose lenses	switched to series 7 drill bit
	RC 6	100 (100)				0 natural discontinuities per run 2 mechanical breaks per run	3.00 min/ft
30						Fresh (I), strong (R4) to very strong (R5), without schistose lenses	
	RC 7	100 (100)				0 natural discontinuities per run 1 mechanical break per run	2.30 min/ft
35						Fresh (I), strong (R4) to very strong (R5)	
	RC 8	100 (100)			38.5	0 natural discontinuities per run 1 mechanical break per run	3.50 min/ft
					39.0	Fresh (I), strong (R4) to very strong (R5), PEGMATITE, granitic, pegmatitic intrusion with garnet	
40					40.0	Fresh (I), very light gray and dark gray, fine to coarse grained, strong (R4) to very strong (R5), QUARTZ MONZONITE, feldspar phenocrysts	
					42.0	Fresh (I), strong (R4) to very strong (R5), PEGMATITE, granitic, pegmatitic intrusion Fresh (I), strong (R4)	switched to series 8 drill bit

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-31A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
45	RC 9	100 (96)					BEDROCK: Fresh (I), very light gray and dark gray, fine to coarse grained, strong (R4) to very strong (R5), QUARTZ MONZONITE, porphyritic, feldspar phenocrysts *(continued)* 2 natural discontinuities per run 0 mechanical breaks per run Fresh (I), strong (R4)	2.90 min/ft
50	RC 10	100 (98)				50.2	1 natural discontinuity per run 4 mechanical breaks per run	2.40 min/ft
							BEDROCK: Fresh (I), dark gray black, fine grained, strong (R4), SCHIST, with pyrite and chlorite, foliated Fresh (I), medium strong (R3) to strong (R4)	
55	RC 11	100 (100)					0 natural discontinuities per run 4 mechanical breaks per run Fresh (I), medium strong (R3) to strong (R4), with chlorite alteration	2.30 min/ft
60	RC 12	100 (70)					6 natural discontinuities per run 2 mechanical breaks per run Fresh (I), medium strong (R3) to strong (R4)	2.10 min/ft
65	RC 13	100 (98)					1 natural discontinuity per run 3 mechanical breaks per run	1.90 min/ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-31A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
66.0–71.0 (70)	RC 14	100 (98)				BEDROCK: Fresh (I), medium to coarse grained, very strong (R5), PEGMATITE, quartz rich, with feldspar and biotite, pegmatite zone 2 natural discontinuities per run 2 mechanical breaks per run	2.20 min/ft
71.0–75.0 (75)	RC 15	100 (83)				BEDROCK: Fresh (I), dark gray, fine to medium grained, medium strong (R3) to strong (R4), SCHIST, foliated 6 natural discontinuities per run 0 mechanical breaks per run	2.00 min/ft Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 75.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-31B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/30/16 **COMPLETED** 7/30/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.05091 **LONGITUDE** -71.79307
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), moderate brown, moist, medium dense, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded	auger to 5 ft
					4.0		
				GM-SM		POORLY GRADED GRAVEL AND SILT WITH SAND (GM-SM), grayish brown, moist, medium dense, fine grained gravel, fine to medium grained sand, subangular	4 inch casing advanced to 5 ft, begin mud rotary
5	SPT 1	56	17-13-10 (23)				
							large gravel in end of sampler
10	SPT 2	67	32-30-29 (59)	GM-SM		-becomes very dense, subangular to subrounded gravel	
						-becomes dusky yellowish brown, fine to coarse grained sand, fine to coarse grained gravel, subangular to subrounded, with zones of iron oxidation	
15	SPT 3	67	20-22-46 (68)	GM-SM			
						-16 to 18 ft encountered boulders	
					18.0		
				SM		SILTY SAND WITH GRAVEL (SM), dusky yellowish brown, dense, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded, zones of iron oxidation	
20							

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-31B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	39	28-21-15 (36)	SM		SILTY SAND WITH GRAVEL (SM), dusky yellowish brown, dense, fine to coarse grained gravel, fine to coarse grained sand, subangular to subrounded, zones of iron oxidation *(continued)*	
						-becomes moderate brown, medium dense, fine to medium grained sand, decrease in gravel content	
25	SPT 5	67	11-11-11 (22)	SM			
30	SPT 6	39	4-5-4 (9)	SM		-becomes trace, fine grained gravel	
33.0						BEDROCK: Fresh (I), moderate orangeish pink to very light gray, medium to coarse grained, strong (R4), QUARTZ MONZONITE, porphyritic, with feldspar phenocrysts up to 2 inches	
35	SPT 7		50/0"				3 inch casing advanced to 34.5 ft no sample recovered
							NQ Double Tube coring started at 39 ft
40	RC 1	100 (0)				1 natural discontinuity per run Fresh (I), strong (R4) 0 mechanical breaks per run Fresh (I), strong (R4) to very strong (R5) -becomes orangeish pink to white, with muscovite, garnet, and pyrite, fractures filled with chlorite	2.50 min/ft
	RC 2	100 (84)				1 natural discontinuity per run 10 mechanical breaks per run	5.67 min/ft

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
45						Fresh (I), strong (R4) to very strong (R5) *(continued)*	
	RC 3	100 (98)				Fresh (I), strong (R4) to very strong (R5) 46.0 BEDROCK: Fresh (I), moderate orangeish pink to very light gray, medium to coarse grained, very strong (R5), PEGMATITE -with garnet and epidote mineralization, chlorite alteration 0 natural discontinuities per run 4 mechanical breaks per run Fresh (I), strong (R4)	3.20 min/ft
50	RC 4	100 (96)				Fresh (I) to slightly weathered (II), medium strong (R3) to strong (R4) 51.5 BEDROCK: Fresh (I) to slightly weathered (II), medium strong (R3) to strong (R4), GNEISS, with chlorite, epidote 1 natural discontinuity per run 0 mechanical breaks per run	3.50 min/ft
55	RC 5	100 (94)				Fresh (I) to slightly weathered (II), medium strong (R3) to strong (R4) 1 natural discontinuity per run 1 mechanical break per run	2.70 min/ft
60	RC 6	100 (96)				Fresh (I) to slightly weathered (II), medium strong (R3) to strong (R4), with chlorite, epidote, and pyrite 1 natural discontinuity per run 0 mechanical breaks per run	3.00 min/ft
65						65.0 BEDROCK: Fresh (I) to slightly weathered (II), medium strong (R3) to strong (R4), QUARTZ MONZONITE	

(Continued Next Page)

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BORING NUMBER BH-31B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
	RC 7	100 (80)				68.0	BEDROCK: Fresh (I) to slightly weathered (II), medium strong (R3) to strong (R4), QUARTZ MONZONITE *(continued)* 4 natural discontinuities per run 6 mechanical breaks per run	2.10 min/ft
70						70.0	Fresh (I) to slightly weathered (II), grayish green, medium grained, medium strong (R3) to strong (R4), GNEISS, with chlorite, epidote	Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 70.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-32A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 7/27/16 **COMPLETED** 7/29/16
GROUND ELEVATION
HOLE SIZE 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.04594
LONGITUDE -71.79316
DRILLING METHOD Solid Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT CME 75
SPT HAMMER 140 lb Auto
LOGGED BY S. Laing/J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled 3 ft 11 in from digsafe arrow
∇ **AT TIME OF DRILLING** Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, fine grained gravel, fine to medium grained sand, subrounded to subangular	solid stem auger to 7 ft
						-becomes light olive gray, dense	4 inch casing advanced to 4 ft, begin mud rotary
5	SPT 1	50	21-19-17 (36)	SM			
							4 inch casing advanced to 7 ft
9.0						BEDROCK: Fresh (I), blueish gray and medium light gray, fine to medium grained, strong (R4), SCHIST, veins or zones of extensive pyritic and mafic mineralization, foliated	NX Double Tube coring started at 9 ft
10	RC 1	100 (100)				1 natural discontinuity per run 9 mechanical breaks per run	4.00 min/ft
						Fresh (I), strong (R4) -extensive pyrite and biotite	
15	RC 2	100 (90)				-becomes blueish gray, light gray 3 natural discontinuities per run 8 mechanical breaks per run -becomes highly silicified -zone of vertical healed fractures with quartz and orthoclase infilling	6.25 min/ft
20						Fresh (I), strong (R4)	changed drill bit to series 9 poor circulation

(Continued Next Page)

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BORING NUMBER BH-32A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						Fresh (I), strong (R4) *(continued)*	
	RC 3	100 (92)				Fresh (I), very strong (R5), becomes blueish gray and medium light gray, highly silicified with vertical fractures healed with quartz and orthoclase, zones of extensive pyritic and mafic mineralization from 20.8 to 22.6 ft, foliated 2 natural discontinuities per run 9 mechanical breaks per run	4.00 min/ft
25						Fresh (I), very strong (R5)	poor circulation
	RC 4	100 (100)				3 natural discontinuities per run 6 mechanical breaks per run Fresh (I), extremely strong (R6)	3.45 min/ft
						Fresh (I), very strong (R5) Fresh (I), very strong (R5), becomes light gray to dark gray, very fine to medium grained with zones of pyritic and mafic mineralization	
30							poor circulation
	RC 5	100 (96)				2 natural discontinuities per run 6 mechanical breaks per run	5.00 min/ft
35	RC 6	100 (100)				Fresh (I), very strong (R5) 0 natural discontinuities per run 3 mechanical breaks per run	installed new drill bit 3.45 min/ft
						Fresh (I), medium dark gray to dark gray, very fine grained, strong (R4) to very strong (R5), SCHIST, zone of pyrite concentration	
	RC 7	100 (100)				1 natural discontinuity per run 4 mechanical breaks per run	3.85 min/ft
40						Fresh (I), strong (R4) to very strong (R5)	

(Continued Next Page)

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BORING NUMBER BH-32A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
45	RC 8	100 (100)				Fresh (I), strong (R4) to very strong (R5) *(continued)* 1 natural discontinuity per run -vertical quartz microfractures 3 mechanical breaks per run	3.57 min/ft
50	RC 9	100 (100)				Fresh (I), strong (R4) to very strong (R5) 2 natural discontinuities per run 4 mechanical breaks per run -becomes weakly foliated	poor circulation 3.57 min/ft
55	RC 10	100 (100)				Fresh (I), strong (R4) to very strong (R5) 0 natural discontinuities per run 6 mechanical breaks per run	poor circulation 3.23 min/ft
60	RC 11	100 (100)				Fresh (I), strong (R4) to very strong (R5) 0 natural discontinuities per run 4 mechanical breaks per run -quartz veins and microfractures between 59.6 to 62 ft	poor circulation 3.57 min/ft
65	RC 12	100 (100)				Fresh (I), strong (R4) to very strong (R5) 1 natural discontinuity per run 2 mechanical breaks per run	4.55 min/ft Backfilled with 282 lbs cement, 15 lbs bentonite, 35 gal water

Bottom of Borehole at 65.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-32B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 7/27/16 **COMPLETED** 7/27/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.04503 **LONGITUDE** -71.79238
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, fine grained gravel, fine to medium grained sand, subangular to subrounded	solid stem auger to 5 ft
5	SPT 1	39	15-45-25 (70)	SM		-becomes very dense	4 inch casing advanced to 5 ft, begin mud rotary
7.5						BEDROCK: Possible contact with weathered QUARTZ MONZONITE bedrock becoming less weathered and stronger with depth, light olive gray	
10	SPT 2		50/0"			Fresh (I), very light gray and dark gray, fine to coarse grained, strong (R4) to very strong (R5), QUARTZ MONZONITE, foliated, porphyritic, feldspar phenocrysts up to 2 inches long	lost circulation 3 inch casing advanced to 11 ft
	SPT 3		50/0"				no sample recovered begin mud rotary to 14.5 ft
15	RC 1	100 (100)				0 natural discontinuities per run 3 mechanical breaks per run	NQ Double Tube coring started at 14.5 ft 2.00 min/ft
	RC 2	100 (98)				Fresh (I), strong (R4) to very strong (R5) 1 natural discontinuity per run 0 mechanical breaks per run	3.20 min/ft
20							

(Continued Next Page)

QUANTA SUBSURFACE Engineering + Construction
Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
20	RC 3	100 (100)					Fresh (I), very strong (R5) *(continued)* -with felsic lenses 0 natural discontinuities per run 0 mechanical breaks per run	4.00 min/ft
25	RC 4	100 (100)					Fresh (I), very strong (R5) 0 natural discontinuities per run 2 mechanical breaks per run	3.60 min/ft
30	RC 5	100 (100)					Fresh (I), very strong (R5) 0 natural discontinuities per run 1 mechanical break per run	3.10 min/ft
35	RC 6	100 (90)					Fresh (I), very strong (R5) -with felsic lenses 2 natural discontinuities per run 0 mechanical breaks per run	3.10 min/ft
40							Fresh (I), very strong (R5)	
	RC 7	100 (100)				41.7	BEDROCK: Fresh (I), medium dark gray grayish black, fine to coarse grained, strong (R4), SCHIST 0 natural discontinuities per run	2.00 min/ft

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-32B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						2 mechanical breaks per run BEDROCK: Fresh (I), medium dark gray grayish black, fine to coarse grained, strong (R4), SCHIST *(continued)*	
45	RC 8	100 (98)				Fresh (I), strong (R4) 1 natural discontinuity per run 4 mechanical breaks per run	2.90 min/ft
					48.8	BEDROCK: Fresh (I), medium dark gray grayish black, fine to coarse grained, very strong (R5), QUARTZ MONZONITE, porphyritic, with felsic lenses, and chlorite alteration	
50	RC 9	100 (100)				Fresh (I), very strong (R5) 0 natural discontinuities per run 2 mechanical breaks per run	3.00 min/ft
55	RC 10	80 (80)				Fresh (I), very strong (R5) -with amphibole 0 natural discontinuities per run 2 mechanical breaks per run	1 ft of core broken off downhole, retrieved on next run 2.60 min/ft
60						Fresh (I), strong (R4)	
					61.0	BEDROCK: Fresh (I), grayish black, fine to coarse grained, strong (R4), SCHIST, with amphibole and weak schistose foliation	
	RC 11	100 (100)				0 natural discontinuities per run 3 mechanical breaks per run	1.88 min/ft
65	RC 12	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 1 mechanical break per run	Backfilled with 188 lbs cement, 10 lbs bentonite, 20 gal water

(Continued Next Page)

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BORING NUMBER BH-32B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
					65.8	Bottom of Borehole at 65.8 feet Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.	

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BORING NUMBER BH-33A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/25/16 **COMPLETED** 7/26/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR Geosearch
LATITUDE 44.037962 **LONGITUDE** -71.788749
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT CME 75 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Laing/J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled 3.75 ft from digsafe arrow
▽ **AT TIME OF DRILLING** 13.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, fine grained gravel, fine to medium grained sand, subangular to subrounded	
3.0				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), grayish red, wet, medium dense, fine grained	
5	SPT 1	28	6-7-4 (11)				
7.0				SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SM), grayish red, wet, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular, weak cementation	
10	SPT 2	100	14-30-50 (80)				gravel influencing blow counts
13.0 ▽							
15	SPT 3	33	17-27-39 (66)	SM		-with lenses of silty sand throughout	
16.3				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray to dark yellowish orange, wet, medium dense, fine to medium grained, iron oxide staining	
20	SPT	100	9-7-8				

(Continued Next Page)

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(15)	SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), light olive gray to dark yellowish orange, wet, medium dense, fine to medium grained, iron oxide staining *(continued)*	
					23.0	BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth	4 inch casing advanced to 24 ft, begin mud rotary
25	SPT 5	100	45-50/2"				
30	SPT 6	83	48-50-42 (92)			-minor zones of oxidation	poor circulation
35	SPT 7	100	42-50			-oxidation throughout	
40	SPT 8	100	50/3"				

(Continued Next Page)

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4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-33A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth *(continued)*	3 inch casing advanced to 44 ft
45	RC 1	100 (100)				Fresh (I), grayish green and yellowish green, very fine to fine grained, very strong (R5), GRANITE, chlorite and epidote present, highly silicified Fresh (I) to slightly weathered (II), strong (R4), becomes yellowish green and light greenish gray, medium to coarse grained, with chlorite and pyrite mineralization, granular 4 natural discontinuities per run 3 mechanical breaks per run	NX Double Tube coring started at 44 ft vertical healed joints with visual offsets from 46 to 50.3 ft 6.25 min/ft
50	RC 2	100 (98)				Fresh (I), strong (R4), with epidote, pyrite, and minor potassium feldspar mineralization 3 natural discontinuities per run 4 mechanical breaks per run	3.57 min/ft poor circulation
55	RC 3	100 (100)				Fresh (I), strong (R4), becomes medium grained, pyrite and potassium feldspar mineralization 0 natural discontinuities per run 7 mechanical breaks per run	3.03 min/ft
60	RC 4	100 (100)				Fresh (I), strong (R4) 2 natural discontinuities per run 8 mechanical breaks per run	3.23 min/ft
65	RC 5	100 (100)			65.0	Fresh (I), strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	5.88 min/ft Backfilled with 228 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 13.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-33B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 7/25/16 **COMPLETED** 7/25/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.037574 **LONGITUDE** -71.787038
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), moderate brown, moist, fine grained gravel, fine to medium grained sand, subrounded to rounded	solid stem auger to 5 ft
4.0				SP-SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), brown, moist, medium dense, fine grained gravel, fine to medium grained sand, subrounded	4 inch casing advanced to 5 ft, begin mud rotary
5	SPT 1	44	9-12-10 (22)				
						-8 to 10.5 ft encountered boulder	
	SPT 2	0	50/1"	SP-SM			SPT on boulder
10							
15	SPT 3	25	23-45-50/4"	SP-SM			
15.0				GP		POORLY GRADED GRAVEL WITH SAND (GP), brown, very dense, fine to coarse grained gravel, fine to medium grained sand, subrounded	
18.0						BEDROCK: Possible contact with weathered QUARTZ MONZONITE bedrock becoming less weathered and stronger with depth	3 inch casing advanced to 18.5 ft
20	SPT 4	0	50/1"				

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-33B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						BEDROCK: Possible contact with weathered QUARTZ MONZONITE bedrock becoming less weathered and stronger with depth *(continued)*	
							roller bit to 24 ft to confirm bedrock
	SPT 5	0	50/1"			0 natural discontinuities per run 0 mechanical breaks per run	poor sample recovery
25	RC 1	100 (100)				Fresh (I), medium dark gray, fine to coarse grained, strong (R4) to very strong (R5), QUARTZ MONZONITE, porphyritic, with 2 inch feldspar phenocrysts Fresh (I), strong (R4) to very strong (R5) -with chlorite alteration and pyrite mineralization	3.00 min/ft NQ Double Tube coring started at 24 ft
	RC 2	100 (93)				1 natural discontinuity per run 0 mechanical breaks per run	2.70 min/ft
	RC 3	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run Fresh (I), strong (R4) to very strong (R5) -without pyrite mineralization	3.33 min/ft
30	RC 4	100 (98)				1 natural discontinuity per run 0 mechanical breaks per run	3.30 min/ft
35						Fresh (I), strong (R4) -oxidized joint fractures and felsic inclusion 2 inches wide, no chlorite alteration	
	RC 5	98 (96)				-felsic intrusion 7 inches wide 1 natural discontinuity per run 0 mechanical breaks per run	3.10 min/ft
						Fresh (I), very strong (R5)	
40	RC 6	100 (88)				2 natural discontinuities per run 0 mechanical breaks per run -pegmatitic siliceous alteration with garnet, muscovite, pyrite, and chlorite alteration between 42 to 43.6 ft	5.20 min/ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-33B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						Fresh (I), very strong (R5) *(continued)*	
45	RC 7	98 (90)				Fresh (I), strong (R4) to very strong (R5) -with chlorite and epidote alteration 2 natural discontinuities per run 0 mechanical breaks per run	3.60 min/ft
50	RC 8	100 (88)				Fresh (I) to slightly weathered (II), strong (R4) -becomes green, with epidote and chlorite alteration 3 natural discontinuities per run 0 mechanical breaks per run	2.70 min/ft
55	RC 9	80 (76)				-becomes gray, no alteration Fresh (I), strong (R4) 3 natural discontinuities per run 0 mechanical breaks per run	2.80 min/ft
60	RC 10	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	3.40 min/ft
65	RC 11	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	3.00 min/ft Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 65.3 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-34A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/21/16 **COMPLETED** 7/22/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.03458 **LONGITUDE** -71.776303
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), dark yellowish brown, moist, loose, fine grained gravel, fine to medium grained sand, subrounded to rounded	
5	SPT 1	100	50/4"	SM			gravel influencing blow counts 4 inch casing advanced to 5 ft, begin mud rotary
6.0				SP-SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dark brown, dense, fine to medium grained sand, subangular to subrounded, cobbles present -7 to 9 ft encountered boulder	
10	SPT 2	6	6-13-24 (37)	SP-SM			poor recovery, gravel in end of sampler
15	SPT 3	0	0-0-0 (0)				no sample recovered
	SPT 4	22	1-4-8 (12)	SP-SM		-becomes medium dense	
20				SP-			

(Continued Next Page)

CLIENT PAR Electrical Contractors | **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 | **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 5	0	7-6-5 (11)	SM SP-SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dark brown, dense, fine to medium grained sand, subangular to subrounded, cobbles present *(continued)*	
24.0	SPT 6		50/0"			BEDROCK: Fresh (I), medium dark gray, fine to coarse grained, strong (R4), QUARTZ MONZONITE, porphyritic	3 inch casing advanced to 24.5 ft
25						8 natural discontinuities per run 0 mechanical breaks per run	
	SPT 7		50/0"				no sample recovered
30	RC 1	100 (100)				0 natural discontinuities per run Fresh (I), strong (R4) to very strong (R5) 0 mechanical breaks per run	2.14 min/ft NQ Double Tube coring started at 29 ft
	RC 2	94 (86)				6 natural discontinuities per run 0 mechanical breaks per run -silicic alteration present Fresh (I), very strong (R5)	3.10 min/ft
35	RC 3	100 (62)				Fresh (I), very strong (R5) -with silicic alteration zone 0.7 ft wide with muscovite, quartz, and garnet mineralization Fresh (I), strong (R4) to very strong (R5) -silicic alteration -without silicic alteration	1.80 min/ft
40	RC 4	100 (88)				Fresh (I), strong (R4) to very strong (R5) -silicic alteration zone 3.2 ft thick with quartz, muscovite, garnet, and epidote mineralization 6 natural discontinuities per run 0 mechanical breaks per run	1.80 min/ft

(Continued Next Page)

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						Fresh (I), strong (R4) to very strong (R5) -silicic alteration Fresh (I), strong (R4) to very strong (R5) *(continued)*	
45	RC 5	100 (82)				Fresh (I), strong (R4) to very strong (R5) -without silicic alteration, with zones of oxidation 6 natural discontinuities per run 0 mechanical breaks per run	1.50 min/ft
50	RC 6	100 (84)				Fresh (I), strong (R4) to very strong (R5) -without zones of oxidation 5 natural discontinuities per run 0 mechanical breaks per run	1.50 min/ft
55	RC 7	90 (90)			59.0	Fresh (I), strong (R4) to very strong (R5) 1 natural discontinuity per run 0 mechanical breaks per run	2.60 min/ft
60	RC 8	100 (100)				BEDROCK: Fresh (I), white grayish black, fine grained, very strong (R5), PEGMATITE DIKE, porphyritic, silicic alteration 1 natural discontinuity per run 0 mechanical breaks per run	installed series 10 drill bit
	RC 9	100 (100)				-possible fault between 61.5 to 62.5 ft 0 natural discontinuities per run 0 mechanical breaks per run	clayey material blocking core barrel 13.70 min/ft
	RC 10	100 (0)				0 natural discontinuities per run 0 mechanical breaks per run	
	RC 11	100 (100)				1 natural discontinuity per run 0 mechanical breaks per run	
65	RC 12	100 (100)			65.5	0 natural discontinuities per run 0 mechanical breaks per run -becomes light gray Fresh (I), very strong (R5)	installed new drill bit

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-34A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
70	RC 13	100 (42)			70.3	BEDROCK: Fresh (I), dark gray, fine to medium grained, strong (R4), SCHIST *(continued)* 0 natural discontinuities per run 0 mechanical breaks per run	2.30 min/ft
75	RC 14	100 (80)			75.0	BEDROCK: Fresh (I), medium dark gray, fine to coarse grained, strong (R4), QUARTZ MONZONITE, chlorite alteration 9 natural discontinuities per run 0 mechanical breaks per run	2.65 min/ft

Bottom of Borehole at 75.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-34B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/18/16 **COMPLETED** 7/19/16
GROUND ELEVATION
HOLE SIZE 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.034284
LONGITUDE -71.774499
DRILLING METHOD SSA/HSA/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50
SPT HAMMER 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SM), moderate brown, moist, loose, fine grained gravel, fine to medium grained sand, subangular to subrounded	
5	SPT 1	33	5-8-13 (21)	SM		-becomes medium dense	
				SM	7.0	SAND WITH SILT AND GRAVEL (SM), moderate brown, moist, very dense, fine to coarse grained gravel, fine to medium grained sand, subrounded	4 inch advanced to 7 ft, begin mud rotary
10	SPT 2	47	38-49-50/3"				
						-12 ft encountered boulders	
15	SPT 3	63	13-33-50/4"	SM			
					17.0	BEDROCK: Possible contact with weathered QUARTZ MONZONITE bedrock becoming less weathered and stronger with depth	
20	SPT 4	0	50/1"				no sample recovered 3 inch casing advanced to 19.5

(Continued Next Page)

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BORING NUMBER BH-34B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						BEDROCK: Possible contact with weathered QUARTZ MONZONITE bedrock becoming less weathered and stronger with depth *(continued)*	ft
						Fresh (I), medium dark gray, medium to coarse grained, strong (R4), QUARTZ MONZONITE, porphyritic	
	SPT 5	0	50/1"			Fresh (I), strong (R4)	no sample recovered
25	RC 1	100 (100)				Fresh (I), strong (R4) to very strong (R5) -becomes fine to coarse grained	NQ Double Tube coring started at 24 ft 3.00 min/ft
	RC 2	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run	1.90 min/ft
30						Fresh (I), strong (R4) to very strong (R5)	
	RC 3	100 (100)				0 natural discontinuities per run 1 mechanical break per run	2.30 min/ft
35						Fresh (I) to slightly weathered (II), strong (R4)	
	RC 4	100 (86)				5 natural discontinuities per run 0 mechanical breaks per run	4.20 min/ft
40						Fresh (I), strong (R4) to very strong (R5)	
	RC 5	100 (86)				4 natural discontinuities per run 0 mechanical breaks per run	6.40 min/ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-34B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						Fresh (I), strong (R4) to very strong (R5) *(continued)*	
45	RC 6	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	1.90 min/ft
50	RC 7	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	1.70 min/ft
55	RC 8	96 (94)				Fresh (I), strong (R4) to very strong (R5) 1 natural discontinuity per run 0 mechanical breaks per run	2.20 min/ft
60	RC 9	100 (94)				Fresh (I), strong (R4) -1 ft felsic intrusion Fresh (I), strong (R4) to very strong (R5) 5 natural discontinuities per run 0 mechanical breaks per run	3.90 min/ft Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 64.5 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-35A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/20/16 **COMPLETED** 7/20/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.031741 **LONGITUDE** -71.767429
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SAND WITH SILT (SM), trace gravel, grayish brown, moist, loose, fine grained gravel, fine to medium grained sand, subangular to subrounded	
5	SPT 1	67	6-4-4 (8)	SM			4 inch casing advanced to 5 ft, begin mud rotary
						-7 ft boulders encountered	
10	SPT 2	100	50	SM		-becomes very dense, with fine to coarse grained gravel, subangular to subrounded, cobbles present, possible contact with weathered QUARTZ MONZONITE bedrock becoming less weathered and stronger with depth	possible boulder blocking SPT
15	SPT 3	17	50/3"	SM			no sample recovered, possible boulder blocking SPT
16.0						BEDROCK: Fresh (I), medium dark gray, fine to coarse grained, strong (R4), QUARTZ MONZONITE	
20	RC	100				1 natural discontinuity per run	no sample recovered NQ Double Tube coring started at

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	1	(100)				0 mechanical breaks per run	19.5 ft
						Fresh (I), medium strong (R3)	2.00 min/ft
						Fresh (I), medium strong (R3) to strong (R4)	
	RC 2	96 (80)				4 natural discontinuities per run 1 mechanical break per run	1.50 min/ft
25						Fresh (I), medium strong (R3) to strong (R4) -minor veins of chlorite alteration from 25 to 30 ft	
	RC 3	100 (92)				3 natural discontinuities per run 0 mechanical breaks per run	2.13 min/ft
30						Fresh (I), strong (R4)	
	RC 4	100 (100)				1 natural discontinuity per run 0 mechanical breaks per run	2.30 min/ft
35						Fresh (I), strong (R4)	
	RC 5	100 (100)				1 natural discontinuity per run 0 mechanical breaks per run	3.60 min/ft
40						Fresh (I), strong (R4)	
	RC 6	100 (92)				4 natural discontinuities per run 0 mechanical breaks per run	4.10 min/ft

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-35A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						Fresh (I), strong (R4) *(continued)*	
45	RC 7	100 (100)				Fresh (I), strong (R4) -zones of chlorite alteration from 45 to 50 ft 0 natural discontinuities per run 0 mechanical breaks per run	5.50 min/ft
50	RC 8	100 (84)				Fresh (I), strong (R4) 7 natural discontinuities per run 0 mechanical breaks per run	3.50 min/ft
55	RC 9	100 (82)				Fresh (I), strong (R4) 9 natural discontinuities per run 0 mechanical breaks per run	2.20 min/ft Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water
60							

Bottom of Borehole at 60.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-35B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/15/16 **COMPLETED** 7/25/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.03088 **LONGITUDE** -71.765988
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), trace gravel, brown, moist, loose, fine grained gravel, fine to medium grained sand, subangular to subrounded	solid stem auger to 5 ft
5	SPT 1	56	10-9-16 (25)	SP-SM	5.0		
				SM		SAND WITH GRAVEL AND SILT (SM), grayish brown, medium dense, fine grained gravel, fine to coarse grained sand, angular	begin mud rotary
10	SPT 2	61	19-14-14 (28)	SM			4 inch casing advanced to 10 ft
				GM	12.5	3 to 12 in granular, white and black, medium to coarse grained, strong, granitic boulders with mafic cobbles encountered	
15	RC 1	100 (87)			15.5	BEDROCK: Possible contact with weathered QUARTZ MONZONITE bedrock becoming less weathered and stronger with depth	
	RC 2	100 (61)					lost circulation
	SPT 3	100	50/3"				
20							

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-35B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						BEDROCK: Possible contact with weathered QUARTZ MONZONITE bedrock becoming less weathered and stronger with depth *(continued)*	
25	SPT 4	0	50/2"				no sample recovered, granitic fragments in spoon tip
							3 inch casing advanced to 27 ft begin mud rotary started at 27.5 ft
30							
							NQ Double Tube coring started at 33 ft
35	RC 3	100 (83)				Slightly weathered (II), pale blueish green and white, coarse grained, medium strong (R3) to strong (R4), QUARTZ MONZONITE, epidote and chlorite rich, highly oxidized joints, foliated	
35.5						CLAY, tan, high plasticity, possible fault	
36.5						Slightly weathered (II), medium strong (R3) to strong (R4)	
							started getting fluid return
40	RC 4	100 (75)				0 natural discontinuities per run 0 mechanical breaks per run	2.50 min/ft
	RC 5	83 (78)				Slightly weathered (II), medium strong (R3) to strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	3.89 min/ft
	RC	100				Slightly weathered (II), medium strong (R3) to strong (R4) >20 natural discontinuities per run	7.00 min/ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-35B

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
	6	(0)				0 mechanical breaks per run	changed drill bit from series 8 to series 6 9.38 min/ft
	RC 7	88 (63)				Slightly weathered (II), medium strong (R3) to strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	
45	RC 8	100 (100)				Fresh (I), medium strong (R3) to strong (R4), becomes porphyritic, with chlorite and pyrite mineralization 0 natural discontinuities per run 0 mechanical breaks per run	
50	RC 9	100 (58)				Fresh (I) to slightly weathered (II), medium strong (R3) to strong (R4) -becomes blueish gray to green, with chlorite, epidote, and pyrite mineralization 8 natural discontinuities per run 0 mechanical breaks per run	4.10 min/ft
						Fresh (I) to slightly weathered (II), medium strong (R3) to strong (R4)	
51.0							
55	RC 10	100 (72)				BEDROCK: Fresh (I), light gray to medium dark gray, medium strong (R3) to strong (R4), PEGMATITE -becomes green to greenish gray, with chlorite, epidote, and garnet mineralization 8 natural discontinuities per run 0 mechanical breaks per run	2.80 min/ft
60	RC 11	100 (66)				Fresh (I), medium strong (R3) to strong (R4) 5 natural discontinuities per run 0 mechanical breaks per run -becomes grayish green to light gray, with chlorite and epidote	2.38 min/ft
65	RC 12	94 (60)				Fresh (I), strong (R4), becomes light gray to very pale brown, fine to coarse grained, with feldspar phenocrysts 8 natural discontinuities per run 0 mechanical breaks per run	2.40 min/ft
						Fresh (I), strong (R4) -minor chlorite alteration and garnet mineralization	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-35B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
	RC 13	100 (78)				Fresh (I), strong (R4) *(continued)* 5 natural discontinuities per run 0 mechanical breaks per run	4.70 min/ft
70	RC 14	100 (100)				Fresh (I), strong (R4) -with garnet mineralization 0 natural discontinuities per run 0 mechanical breaks per run	15.94 min/ft installed new drill bit
75	RC 15	100 (94)			75.0	Fresh (I), strong (R4) 2 natural discontinuities per run 0 mechanical breaks per run	2.94 min/ft Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 75.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-36A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/12/16 **COMPLETED** 7/13/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.026654 **LONGITUDE** -71.755236
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 22.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), dark brown, moist, very dense, coarse grained gravel, fine to coarse grained sand, subrounded	solid stem auger to 10 ft
	SPT 1		50/0"	SM	4.5		
5				GM		SILTY GRAVEL (GM), brown and dark gray, very dense, fine to coarse grained gravel, angular to subangular, broken, medium to coarse grained, boulder fragments -possible contact with weathered bedrock becoming less weathered and stronger with depth -encountered fresh to slightly weathered, medium strong to strong granite boulder with argillite cobbles	abandoned hole at 9.1 ft, drilled offset hole 1.5 ft N
10	SPT 2	0	50/2"	GM			no sample recovered 4 inch casing advanced to 10 ft, begin wet rotary
							cored through boulder from 13.5 to 16 ft using series 8 bit
15	RC 1	100 (100)					
							switched to roller bit
							begin mud rotary
20	SPT 3	60	50/5"	GM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-36A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				GM			
					21.0		
				SW-SM		SAND WITH SILT (SW-SM), brown, very dense, medium grained sand	
25	SPT 4	83	27-32-36 (68)	SW-SM			
30	SPT 5	100	37-50/5"	SW-SM		-silt content increases with trace gravel	
					31.0		
				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, very dense, coarse grained gravel, fine to medium grained sand, subangular	
35	SPT 6	100	50/3"	SM			
					39.0		
40	SPT 7	67	33-50/3"	SW-SM		WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), brown, very dense, fine to coarse grained gravel, fine to coarse grained sand, subrounded, iron oxide staining	hole collapsed from 34 to 39 ft, 3 inch casing advanced to 39 ft
					42.0		
				SP-SM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-36A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), trace gravel, brown and orange, very dense, fine to coarse grained gravel, fine to medium grained sand, subrounded, iron oxide staining *(continued)*	
45	SPT 8	100	28-42-58 (100)				
	SPT 9	100	50	SP-SM		-becomes dark gray	3 inch casing advanced to 49 ft
50							
				ML	53.0	SANDY SILT WITH GRAVEL (ML), dark gray, hard, fine to coarse grained gravel, fine to coarse grained sand, angular	
	SPT 10	100	50/4"				
55							
							roller bit to determine if bedrock present
60							
	SPT 11	100	50/4"	ML		-with fine subangular gravel	
	SPT 12	25	50/4"	ML	64.3		no sample recovered Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 64.3 feet
Groundwater estimated at 22.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-36B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/12/16 **COMPLETED** 7/4/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.025879 **LONGITUDE** -71.753953
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), trace gravel, pale yellowish brown, dry, loose, fine to medium grained sand, subrounded	hole relocated 2 ft N after casing shifted
5	SPT 1	100	50/5"	SM		-becomes medium dense, fine to coarse grained sand -6 to 7 ft encountered boulders	4 inch casing advanced to 5 ft possible boulder blocking SPT
7.0				SM		SAND WITH SILT AND GRAVEL (SM), grayish brown, very dense, fine to coarse grained gravel, fine to coarse grained sand, subangular	
	SPT 2	80	50/5"	SM		-possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth	poor sample recovery, blow counts possibly impacted by gravel
10							
	SPT 3	80	50/5"	SM			poor sample recovery
15							
	SPT 4	0	50/5"	SM			no sample recovered
20							

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4308 N Barker RD
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BORING NUMBER BH-36B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				SM		SAND WITH SILT AND GRAVEL (SM), grayish brown, very dense, fine to coarse grained gravel, fine to coarse grained sand, subangular *(continued)*	
21.0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, very dense, fine to coarse grained gravel, fine to coarse grained sand, subangular	
25	SPT 5	10	50/5"				poor sample recovery
27.0						BEDROCK: Fresh (I), white grayish black, medium strong (R3) to strong (R4), PEGMATITE, pyrite and galena mineralization, quartz veins 0.5 inch thick	
						Fresh (I), medium strong (R3) to strong (R4)	3 inch casing advanced to 29 ft NQ Double Tube coring started at 29 ft
30	RC 1	100 (85)				5 natural discontinuities per run 8 mechanical breaks per run	4.34 min/ft
35						Fresh (I), medium strong (R3) to strong (R4)	
	RC 2	43 (0)				0 natural discontinuities per run 0 mechanical breaks per run -37 to 39 ft core loss	6.38 min/ft
39.0						BEDROCK: Fresh (I), dark gray and white, fine to coarse grained, strong (R4), QUARTZ MONZONITE, with feldspar phenocrysts	
40	RC 3	100 (98)				3 natural discontinuities per run 0 mechanical breaks per run	5.40 min/ft

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Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-36B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						BEDROCK: Fresh (I), dark gray and white, fine to coarse grained, strong (R4), QUARTZ MONZONITE, with feldspar phenocrysts *(continued)*	
45	RC 4	100 (94)				Fresh (I), strong (R4) to very strong (R5) 3 natural discontinuities per run 0 mechanical breaks per run	4.60 min/ft
50	RC 5	100 (100)				Fresh (I), strong (R4) to very strong (R5) -quartz veins 1mm thick from 49-54 ft 0 natural discontinuities per run 1 mechanical break per run	4.50 min/ft
55	RC 6	100 (100)				Fresh (I), strong (R4) to very strong (R5) -quartz veins absent 0 natural discontinuities per run 0 mechanical breaks per run	5.20 min/ft
60	RC 7	100 (98)			63.0	Fresh (I), strong (R4) to very strong (R5) -feldspar content increases 1 natural discontinuity per run	8.75 min/ft bit worn out at 63 ft

Bottom of Borehole at 63.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-36C

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 7/14/16 **COMPLETED** 7/15/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.024846 **LONGITUDE** -71.752797
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), trace organics, dark brown, moist, loose, fine grained gravel, fine to coarse grained sand, subrounded to subangular	
5	SPT 1	33	5-45-40 (85)	SM		-becomes very dense	4 inch casing advanced to 5 ft 4 inch casing advanced to 6 ft due to lost circulation
						-6.5-7.5 ft encountered boulders	
7.5				ML		SANDY SILT WITH GRAVEL (ML), medium dark gray, hard, non plastic, fine grained gravel, fine to coarse grained sand, subangular, iron oxide staining	
10	SPT 2	90	25-50/4"				
12.0						BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth	
15	SPT 3	60	50/5"				poor sample recovery
20	SPT 4	80	50/5"				

(Continued Next Page)

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Telephone: 509-892-9409

BORING NUMBER BH-36C

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth *(continued)*	
25	SPT 5	75	50/4"				
30						Fresh (I), white grayish black, strong (R4), QUARTZ MONZONITE, foliated, porphyritic	3 inch casing advanced to 29 ft no sample recovered NQ Double Tube coring started at 29 ft
	RC 1	100 (78)				8 natural discontinuities per run 0 mechanical breaks per run	5.10 min/ft original hole, 2.00 min/ft new hole
35						Fresh (I), strong (R4) -becomes grayish black below 34 ft.	bit worn out at 34 ft, new bit installed hole abandoned at 34 ft, Backfilled with 188 lbs cement, 10 lbs bentonite, 20 gal water offset hole drilled 2 ft N
	RC 2	88 (84)				4 natural discontinuities per run 0 mechanical breaks per run	3.00 min/ft
40						Fresh (I), strong (R4) -foliation absent from 39 to 41 ft.	
	RC 3	100 (90)				5 natural discontinuities per run 0 mechanical breaks per run	4.65 min/ft

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BORING NUMBER BH-36C

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						Fresh (I), strong (R4) *(continued)*	
45	RC 4	100 (100)				Fresh (I), strong (R4) 0 natural discontinuities per run 0 mechanical breaks per run	5.25 min/ft Backfilled with 188 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 45.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-37A

CLIENT PAR Electrical Contractors | **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 | **PROJECT LOCATION** Thornton, NH

DATE STARTED 7/11/16 **COMPLETED** 7/12/16 | **GROUND ELEVATION** | **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole | **LATITUDE** 44.021807 | **LONGITUDE** -71.731939
DRILLING METHOD Solid Stem Auger/Mud Rotary | **DRILLING EQUIPMENT** Diedrich D50 | **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney | **GROUND WATER LEVEL:**
NOTES | ∇ **AT TIME OF DRILLING** Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), trace organics, grayish brown, moist, loose, coarse grained gravel, fine to medium grained sand, subrounded	solid stem auger to 5 ft
5	SPT 1	57	50	SM		-becomes dense	4 inch casing advanced to 5 ft
					8.0		
				SM-ML		SILTY SAND (SM-ML), trace to little gravel, light olive gray, dense, fine grained gravel, fine to medium grained sand, subrounded, gravel interbedded	
10	SPT 2	83	8-17-21 (38)				hole relocated 2 ft E after casing shifted
						-boulders present at 12 ft	
15	SPT 3	100	27-40-50/2"	SM-ML		-becomes very dense, and iron oxide staining	
						-boulders present at 16 ft	
20	SPT	72	32-45-15	SM-ML		-interbedded with fine to coarse grained sand (2 inches thick)	

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CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(60)	SM-ML		-interbedded with fine to coarse grained sand (2 inches thick) *(continued)*	
25	SPT 5	100	45-50/5"	SM-ML		-with trace fine grained subangular gravel; iron staining and stratified sand absent	
				SM	28.0	SAND WITH SILT (SM), trace gravel, medium dark gray, very dense, fine grained gravel, fine to coarse grained sand, subrounded	
30	SPT 6	91	41-50/5"				
35	SPT 7	80	50/5"	SM			no sample recovered
				CL-ML	37.0	SILT OR CLAY WITH SAND AND GRAVEL (CL-ML), medium dark gray, hard, low plasticity, fine grained gravel, fine to coarse grained sand, subangular	no sample recovered, gravel caught in sampler
40	SPT 8	100	50/4"				

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BORING NUMBER BH-37A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
43.5							
45	SPT 9	89	47-50/3"	ML-SM		SAND AND SILT (ML-SM), trace gravel, medium dark gray, hard, low plasticity, fine grained gravel, fine grained sand	
50	SPT 10	71	50	ML-SM			
52.0						BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth	
55	SPT 11	50	50/2"				poor sample recovery
60	SPT 12	0	50/1"				no sample recovered Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water
61.5							

Bottom of Borehole at 61.5 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-37B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 7/11/16 **COMPLETED** 7/12/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.022703 **LONGITUDE** -71.730831
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), dark brown, moist, medium dense, coarse grained gravel, fine to medium grained sand, subrounded	solid stem auger to 10 ft
5	SPT 1	0	3-4-7 (11)	SM			no sample recovered
7.0				SC-SM		SILTY OR CLAYEY SAND WITH GRAVEL (SC-SM), dark gray, moist, very dense, coarse grained gravel, fine to medium grained sand, subrounded, laminated clay bedding, micaceous	
10	SPT 2	100	17-23-38 (61)				begin wet rotary
12.5				ML		SANDY SILT WITH GRAVEL (ML), dark gray, hard, low plasticity, fine grained gravel, fine to medium grained sand, subangular	
15	SPT 3	89	13-40-32 (72)				
20	SPT	83	17-38-42	ML		-with medium to coarse grained sand, fine to coarse grained gravel	

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CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(80)	ML		-with medium to coarse grained sand, fine to coarse grained gravel *(continued)*	
						-drilled through cobble zones at 21 ft	
						-gravel content increases	
25	SPT 5	72	14-26-44 (70)	ML			
						-cobble zone at 26-28 ft	
30	SPT 6	50	16-30-38 (68)	ML			
35	SPT 7	89	38-41-50 (91)	ML			
40	SPT 8	78	19-25-32 (57)	ML		-with fine grained sand, subrounded gravel	

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Spokane Valley, WA 99027
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BORING NUMBER BH-37B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML		-with fine grained sand, subrounded gravel *(continued)*	
45	SPT 9	83	23-31-41 (72)	ML		-sand content increases	
50	SPT 10	89	17-26-34 (60)	ML		-gravel content decreases	
55	SPT 11	78	16-28-45 (73)	ML			
60	SPT 12	83	21-44-58 (102)	ML		-with fine to coarse grained sand, subangular gravel	sand plugging up drill rod
65	SPT 13	94	5-26-47 (73)	ML	65.5		Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 65.5 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method

Quanta Subsurface
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Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-39A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 9/1/16 **COMPLETED** 9/2/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 44.026477 **LONGITUDE** -71.684915
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NX/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 14.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0					0.3	ASPHALT	
				SM		SILTY SAND WITH GRAVEL AND COBBLES (SM), brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded	
5				GP	5.0	GRAVELS WITH COBBLES AND SAND (GP), medium to coarse grained gravel, subangular	4 inch casing advanced to 7.5 ft, begin mud rotary
10	SPT 1	0	50/1"	GP			
				SM	11.0	SILTY SAND WITH GRAVEL (SM), light olive brown, dense, fine grained gravel, fine to medium grained sand, subangular	contact based on drill action and cuttings
15	SPT 2	67	21-18-13 (31)	SM		∇	
20	SPT	0	12-11-9	SM		-becomes medium dense	no sample recovered

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BORING NUMBER BH-39A

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	3		(20)	SM		-becomes medium dense *(continued)* -becomes moderate yellowish brown	
25	SPT 4	28	8-10-9 (19)	SM			no sample recovered
30	SPT 5	50	7-8-7 (15)	SM		-with trace medium to coarse grained subangular gravel	
35	SPT 6	50	9-11-12 (23)	SM		-with trace clay	
					37.5	BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth	roller bit to confirm bedrock
40	SPT 7		50/0"				no sample recovered 3 inch casing advanced to 40 ft

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Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-39A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth *(continued)*	no sample recovered
45	SPT 8		50/0"			Fresh (I), very light gray and dark gray, medium to coarse grained, strong (R4), GRANITE	NX Double Tube coring started at 44.5 ft
	RC 1	100 (93)				3 natural discontinuities per run 2 mechanical breaks per run	1.75 min/ft
50						Fresh (I), strong (R4)	
	RC 2	100 (100)				0 natural discontinuities per run 3 mechanical breaks per run -with very coarse grained feldspar phenocrysts	2.06 min/ft
55						Fresh (I), strong (R4)	
	RC 3	100 (94)				2 natural discontinuities per run 1 mechanical break per run -with extensive pyrite mineralization from 57 to 59.5 ft	1.86 min/ft
60						Fresh (I), strong (R4)	
	RC 4	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run	1.95 min/ft
					64.5		Backfilled with 289 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 64.5 feet
Groundwater estimated at 14.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
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BORING NUMBER BH-40A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 7/8/16 **COMPLETED** 7/11/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.959632 **LONGITUDE** -71.681034
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), brownish black to light brownish gray, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded	solid stem auger to 10 ft
5	SPT 1	44	4-3-3 (6)	SM		-becomes light brownish gray	
6.5				SP-SM		SAND (SP-SM), little silt, and gravel, moderate brown, moist, dense, fine to coarse grained gravel, fine to coarse grained sand, subrounded	
10	SPT 2	78	16-20-29 (49)	SP-SM		-boulders and cobbles encountered	4 inch casing advanced to 10 ft
15	SPT 3	0	5-6-8 (14)	SP-SM		-becomes medium dense	no sample recovered
							3 inch casing advanced to 18 ft
20	SPT	0	7-4-4	SP-SM		-becomes loose	no sample recovered

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CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(8)	SP-SM		-becomes medium dense *(continued)*	
25	SPT 5	44	8-7-7 (14)	SP-SM		-with fine, subrounded gravel	
30	SPT 6	50	8-8-8 (16)	SP-SM		-with subrounded to subangular gravel	
35	SPT 7	0	20-20-13 (33)	SP-SM		-becomes dense	hole collapsed from 29 to 34 ft no sample recovered 3 inch casing advanced to 35 ft
40	SPT 8	44	8-8-9 (17)	SP-SM		-becomes medium dense, with trace gravel	

(Continued Next Page)

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BORING NUMBER BH-40A

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM		-becomes medium dense *(continued)*	
45	SPT 9	72	9-12-12 (24)	SP-SM			
50	SPT 10	56	14-13-15 (28)	SP-SM		-with fine to coarse grained gravel	
55	SPT 11	78	20-19-23 (42)	SP-SM			3 inch casing advanced to 55 ft
60							Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 60.0 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-40B

QUANTA SUBSURFACE Engineering + Construction
Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 7/7/16 **COMPLETED** 7/8/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.959002 **LONGITUDE** -71.680658
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
▽ **AT TIME OF DRILLING** Not Observed*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), trace organics, medium brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded to subangular	solid stem auger to 10 ft
5	SPT 1	72	5-5-5 (10)	SM		-gravel becomes subrounded	
						-becomes moderate brown, very dense, fine grained gravel, fine to coarse grained sand, angular	
10	SPT 2	50	8-27-35 (62)	SM			4 inch casing advanced to 10 ft, begin mud rotary
15	SPT 3	22	21-13-8 (21)	SM		-becomes medium dense, with fine to coarse grained gravel	no sample recovered rock fragment caught in end of sampler
17.0				SP-SM		SAND (SP-SM), little silt, and gravel, brown, medium dense, fine grained gravel, fine to medium grained sand, subrounded	
20	SPT	56	6-7-6				

(Continued Next Page)

BORING NUMBER BH-40B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(13)	SP-SM		SAND (SP-SM), little silt, and gravel, brown, medium dense, fine grained gravel, fine to medium grained sand, subrounded *(continued)*	
25	SPT 5	56	8-8-8 (16)	SP-SM		-with trace gravel	
30	SPT 6	50	8-9-8 (17)	SP-SM			
35	SPT 7	61	9-9-8 (17)	SP-SM			
40	SPT 8	72	8-9-9 (18)	SP-SM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
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BORING NUMBER BH-40B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM		SAND (SP-SM), little silt, and gravel, brown, medium dense, fine grained gravel, fine to medium grained sand, subrounded *(continued)*	
45	SPT 9	78	10-8-10 (18)	SP-SM			
50	SPT 10	72	11-10-8 (18)	SP-SM			
55	SPT 11	61	9-10-12 (22)	SP-SM		-with fine grained gravel	
60	SPT 12	67	11-14-12 (26)	SP-SM		-gravel content increases	
65	SPT 13	78	11-11-11 (22)	SP-SM	65.5		Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water

Bottom of Borehole at 65.5 feet
Groundwater not observed. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-41A

QUANTA SUBSURFACE Engineering + Construction
Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 6/28/16 **COMPLETED** 6/29/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.933037 **LONGITUDE** -71.685085
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled 1 ft from pavement
▽ **AT TIME OF DRILLING** 10.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), moderate brown, moist, loose, fine grained gravel, fine to medium grained sand, subrounded	
5	SPT 1	45	13-50/5"	SM		-becomes very dense	no sample recovered, gravel influencing blow counts
10	SPT 2	83	8-9-38 (47)	SM	▽	-becomes grayish brown, very dense, boulders present	4 inch casing advanced to 9.5 ft, begin mud rotary
							switched to tri-cone
15	SPT 3	39	25-30-30 (60)	SM			
					16.5		
				ML-SM		SAND AND SILT (ML-SM), grayish brown, stiff, non plastic, fine grained sand, laminated	
20	SPT 4	72	4-4-5 (9)				

(Continued Next Page)

QUANTA SUBSURFACE Engineering + Construction

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BORING NUMBER BH-41A

CLIENT PAR Electrical Contractors | **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 | **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				ML-SM		SAND AND SILT (ML-SM), grayish brown, stiff, non plastic, fine grained sand, laminated *(continued)*	
	SPT 5	44	3-3-8 (11)	ML		-sand content increases	changed from 3 inch bit to 3 7/8 inch bit
25							
				SM	26.0	SILTY SAND (SM), dusky yellowish green, very dense, fine to medium grained sand	changed back to 3 inch bit
	SPT 6	11	38-25-25 (50)				no sample recovered, granitic fragments in shoe
30							3 inch casing advanced to 30 ft
	SPT 7	60	50/5"	SM			no sample recovered
35							
					36.0	BEDROCK: Fresh (I), light gray to medium dark gray, medium strong (R3), PEGMATITE, porphyritic	
	SPT 8		50/0"				no sample recovered
	RC 1	100 (100)				0 natural discontinuities per run 0 mechanical breaks per run Fresh (I), medium strong (R3)	NQ Double Tube coring started at 38.5 ft 1.50 min/ft
					39.4	BEDROCK: Fresh (I), medium gray, medium to coarse grained, very strong (R5), GRANITE, porphyritic	
40							
	RC 2	98 (88)				6 natural discontinuities per run 0 mechanical breaks per run	6.61 min/ft

GENERAL BH / TP / WELL - GINT STD US LAB.GPJ - 11/7/16 17:33 - C:\USERS\LGSCHWIND\DESKTOP\THOR.GPJ

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Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-41A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						BEDROCK: Fresh (I), medium gray, medium to coarse grained, very strong (R5), GRANITE, porphyritic *(continued)*	
45	RC 3	98 (94)				Fresh (I), very strong (R5) -quartz veins up to 2 cm in width present 3 natural discontinuities per run 0 mechanical breaks per run -49 to 49.6 ft core loss	7.51 min/ft
50	RC 4	64 (52)				Fresh (I), strong (R4) -quartz veins 1 cm and 13 cm wide 4 natural discontinuities per run 0 mechanical breaks per run	3.00 min/ft
55	RC 5	100 (100)			59.0	Fresh (I), strong (R4) -becomes medium grained 0 natural discontinuities per run 0 mechanical breaks per run	3.30 min/ft Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 59.0 feet
Groundwater estimated at 10.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-41B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 6/28/16 **COMPLETED** 6/30/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.932136 **LONGITUDE** -71.684899
DRILLING METHOD Solid Stem Auger/Mud Rotary / NN/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled 2 ft from stake, 4 ft from digsafe box
AT TIME OF DRILLING 3.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), pale yellowish brown, moist, loose, fine grained gravel, fine to medium grained sand, subrounded	4 inch casing advanced to 4 ft, begin mud rotary
2.5				SM-GM		SILTY SAND AND GRAVEL AND COBBLES (SM-GM), yellowish brown, very dense, fine to coarse grained gravel, fine to medium grained sand, subrounded, weak cementation	
5	SPT 1	80	22-50/4"				
10	RC 1	20 (0)		SM-GM			3 inch casing advanced to 9 ft cored through boulder zone from 9.5 to 14.5 ft, 1 ft recovered 2.17 min/ft lost circulation reworked cobbles and boulders recovered
14.5				SM		SILTY SAND (SM), little gravel, light olive gray, loose, very fine to fine grained	
15	SPT 3	50	5-4-4 (8)				3 inch casing advanced to 15 ft
20	SPT	67	4-4-6	SM		-becomes medium dense, minor zones of oxidation	3 inch casing advanced to 19 ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-41B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(10)	SM		-becomes medium dense, minor zones of oxidation *(continued)*	
				SM	24.5		3 inch casing advanced to 24 ft
25	SPT 5	83	4-6-4 (10)	SM		SAND WITH SILT (SM), yellowish gray and yellowish brown, medium dense, fine to medium grained, iron oxide staining	
30	SPT 6	100	7-7-10 (17)	SM			
35	SPT 7	89	7-7-8 (15)	SM			
				SP-SM	38.5	POORLY GRADED SAND WITH SILT (SP-SM), yellowish brown, medium dense, highly oxidized	
40	SPT 8	94	14-15-14 (29)				3 inch casing advanced to 40 ft
							caving noted

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
43.0						BEDROCK: -43 to 44.6 ft core loss	3 inch casing stuck at 43 ft during removal
45	RC 2	68 (68)				Fresh (I), strong (R4), QUARTZ MONZONITE, with foliation zones throughout 1 natural discontinuity per run 0 mechanical breaks per run	3.22 min/ft
						-48 to 48.8 ft core loss Fresh (I), yellowish gray to light gray, strong (R4), QUARTZ MONZONITE, with feldspar phenocrysts	
50	RC 3	82 (82)				2 natural discontinuities per run 0 mechanical breaks per run	4.17 min/ft
52.0						BEDROCK: Fresh (I), yellowish gray to light gray, very strong (R5), PEGMATITE Fresh (I), very strong (R5), extensive fluorite and mica mineralization throughout below 52 ft	
54.8						BEDROCK: Fresh (I), medium light gray to greenish gray, medium strong (R3), QUARTZ MONZONITE 1 natural discontinuity per run 3 mechanical breaks per run	
55	RC 4	100 (100)					3.85 min/ft
						-57 to 57.2 ft core loss Fresh (I), medium strong (R3) 1 natural discontinuity per run 0 mechanical breaks per run	
60.0	RC 5	96 (96)				BEDROCK: Fresh (I), yellowish gray to light gray, very strong (R5), PEGMATITE Fresh (I), strong (R4)	5.26 min/ft
62.5						BEDROCK: Fresh (I), medium light gray to greenish gray, medium strong (R3), QUARTZ MONZONITE, felsic lenses throughout 0 natural discontinuities per run 0 mechanical breaks per run	
65.0	RC 6	100 (100)					7.69 min/ft Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 3.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-42A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 6/30/16 **COMPLETED** 7/6/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.91228 **LONGITUDE** -71.685617
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Tiger **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
▽ **AT TIME OF DRILLING** 9.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), grayish brown, moist, loose, fine grained gravel, fine to medium grained sand, subrounded	solid stem auger to 10 ft
5	SPT 1	17	4-7-6 (13)	SM		-becomes medium dense	no sample recovered
10	SPT 2	56	8-13-24 (37)	SM	9.0	SAND WITH SILT (SM), grayish brown, dense, coarse grained gravel, fine to coarse grained sand, subrounded	4 inch casing advanced to 10 ft
15	SPT 3	33	17-12-9 (21)	GP-GM	13.0	POORLY GRADED GRAVEL WITH SAND (GP-GM), moderate brown, medium dense, medium to coarse grained, subangular	lost circulation 3 inch casing advanced to 13 ft, switched to 3 inch bit
20	SPT	28	13-13-15	GP-GM		-with medium to coarse grained gravel, fine to medium grained sand, increasing silt content	no sample recovered

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(28)	GP-GM		POORLY GRADED GRAVEL WITH SAND (GP-GM), moderate brown, medium dense, medium to coarse grained, subangular *(continued)*	
25	SPT 5	0	8-8-8 (16)	GP-GM			no sample recovered
				ML	28.0	SILT (ML), blueish gray, stiff, non plastic, information logged from cutting return	
30	SPT 6	6	6-7-6 (13)				no sample recovered
35	SPT 7	6	7-8-9 (17)	ML			no sample recovered
				SP-SM	38.0	POORLY GRADED SAND WITH SILT (SP-SM), blueish gray, medium dense, fine grained sand, laminated bedding	
40	SPT 8	61	9-11-12 (23)				

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-42A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM		POORLY GRADED SAND WITH SILT (SP-SM), blueish gray, medium dense, fine grained sand, laminated bedding *(continued)*	
45	SPT 9	83	8-7-8 (15)	SP-SM		-with stratified bedding	
							hard layer at 47 ft
50	SPT 10	11	16-16-12 (28)	SP-SM		-coarse to medium grained, 1 inch thick layers	no sample recovered
							hard layer at 53 ft
55	SPT 11	39	25-27-15 (42)	SP-SM		-becomes medium dark gray, dense	rock fragment caught in end of sampler
					58.0	BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth or boulders and cobbles	3 inch casing advanced to 59.5 ft
60	RC 1	7				-porphyritic, white to light gray, coarse to very coarse grained, strong, granitic pegmatite with garnet phenocrysts recovered in core run 0 natural discontinuities per run 0 mechanical breaks per run	NQ Double Tube coring started at 59.5 ft 2.00 min/ft 3 inch casing advanced to 61 ft begin mud rotary from 61 to 65 ft
65					65.0	-no SPT due to hole collapse from 62 to 65 ft	Backfilled with 470 lbs cement, 25 lbs bentonite, 50 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-42B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 6/24/16 **COMPLETED** 6/27/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.911429 **LONGITUDE** -71.685413
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY B. Koons **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
∇ **AT TIME OF DRILLING** 9.5ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), brown, loose	solid stem auger to 10.5 ft
3.0				SP-SM		POORLY GRADED GRAVELLY SAND (SP-SM), little silt, pale brown, moist, dense, fine grained gravel, fine to medium grained sand, subrounded	
5	SPT 1	56	13-18-19 (37)				
10	SPT 2	67	5-8-7 (15)	SP-SM		∇	4 inch casing advanced to 10.5 ft
13.5						BEDROCK: Slightly weathered (II), medium dark gray, fine to coarse grained, very strong (R5), GABBRO, porphyritic	tri-cone from 13.5 to 14.5 ft NQ Double Tube coring started at 14.5 ft
15	RC 1	90 (90)				Fresh (I), medium dark gray, fine grained, very strong (R5), GABBRO, porphyritic, plagioclase phenocrysts 0 natural discontinuities per run 0 mechanical breaks per run	6.00 min/ft
	RC 2	100 (91)				Fresh (I), very strong (R5) -plagioclase phenocrysts 2 to 10 mm present 11 natural discontinuities per run 0 mechanical breaks per run	4.10 min/ft
20							

(Continued Next Page)

BORING NUMBER BH-42B

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20						Fresh (I), very strong (R5)	
	RC 3	100 (95)				8 natural discontinuities per run 3 mechanical breaks per run	2.40 min/ft
25						Fresh (I), very strong (R5)	
	RC 4	100 (98)				5 natural discontinuities per run 0 mechanical breaks per run	2.20 min/ft
30						Fresh (I), very strong (R5)	
	RC 5	100 (100)				4 natural discontinuities per run 0 mechanical breaks per run	2.40 min/ft
35						Fresh (I), very strong (R5)	
	RC 6	96 (82)				8 natural discontinuities per run 2 mechanical breaks per run	2.10 min/ft
40	RC 7	46 (0)				Fresh (I), very strong (R5) 2 natural discontinuities per run 0 mechanical breaks per run	core barrel plugged, redrilled several times
						Fresh (I), very strong (R5)	

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BORING NUMBER BH-42B

QUANTA SUBSURFACE Engineering + Construction
Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	REMARKS
	RC 8	95 (86)					Fresh (I), very strong (R5) *(continued)* 3 natural discontinuities per run 0 mechanical breaks per run	1.62 min/ft
45						45.2		
	RC 9	100 (84)					BEDROCK: Slightly weathered (II), light blueish gray, medium grained, strong (R4), GRANITE, trace chlorite 4 natural discontinuities per run 0 mechanical breaks per run	2.00 min/ft
	RC 10	100 (98)					Slightly weathered (II), strong (R4) -becomes light greenish gray and grayish orange with trace chlorite and 10 cm wide pegmatite dikes 3 natural discontinuities per run 1 mechanical break per run	4.80 min/ft
50								
	RC 11	100 (100)					Fresh (I), strong (R4) -becomes weakly porphyritic, dark gray, medium to coarse grained 1 natural discontinuity per run 0 mechanical breaks per run	10.00 min/ft
55								
	RC 12	90 (88)					Fresh (I), strong (R4) -becomes light gray with trace chlorite and 15 cm wide pegmatite dikes 4 natural discontinuities per run 0 mechanical breaks per run	11.00 min/ft
60								
	RC 13	83 (73)					Fresh (I), strong (R4) 5 natural discontinuities per run 0 mechanical breaks per run -becomes light gray, iron oxide stained	22.60 min/ft, running in 4th gear
						63.3		
	RC 14	100 (100)					BEDROCK: Fresh (I), light gray and pinkish gray, coarse to very coarse grained, strong (R4), PEGMATITE, porphyritic with chlorite and trace garnet 0 natural discontinuities per run 0 mechanical breaks per run	2.67 min/ft
65	RC 15	100 (65)					Slightly weathered (II), strong (R4) 4 natural discontinuities per run	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-42B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
					66.3	0 mechanical breaks per run -becomes coarse grained Slightly weathered (II), strong (R4) *(continued)*	
70	RC 16	96 (92)				BEDROCK: Slightly weathered (II), greenish gray, medium to coarse grained, strong (R4), GRANITE, porphyritic, healed fault zone between 66.3 to 68 ft 3 natural discontinuities per run 0 mechanical breaks per run -chlorite alteration present Fresh (I), strong (R4)	8.96 min/ft
75	RC 17	80 (64)			75.2	10 natural discontinuities per run 0 mechanical breaks per run	7.13 min/ft Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 75.2 feet
Groundwater estimated at 9.5 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-43A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DATE STARTED 6/23/16 **COMPLETED** 6/23/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.907335 **LONGITUDE** -71.683611
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY B. Koons **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled 1 ft from pavement
▽ **AT TIME OF DRILLING** 12.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP		POORLY GRADED SAND (SP), pale yellowish brown, moist, loose, fine grained sand	solid stem auger to 10 ft
				SM	3.5	SILTY SAND (SM), dark yellowish brown, moist, loose, very fine to fine grained, stratified	
5	SPT 1	94	1-1-1 (2)				
				GM	7.0	SILTY SAND WITH GRAVEL (GM), some cobbles, moist, medium dense, very fine to coarse grained, stratified	
						-cobbles at 9 ft	
10	SPT 2	78	5-7-22 (29)	GM			4 inch casing advanced to 10 ft begin mud rotary
					▽		
				SP-SM	13.0	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), pale yellowish brown, medium dense, fine grained, medium to coarse grained sand, angular	rock fragment caught in end of sampler
15	SPT 3	6	8-5-7 (12)				
	SPT 4	50	8-3-2 (5)	SP-SM		-becomes loose	
20	SPT	0	9-8-4	SP-SM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-43A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	5		(12)	SP-SM		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), pale yellowish brown, medium dense, fine grained, medium to coarse grained sand, angular *(continued)*	replaced sampler basket
	SPT 6	11	2-1-1 (2)				
	SPT 7	0	16-10-11 (21)	SP-SM		-becomes medium dense, gravel content increases	
25							
							fine sand and silt in return water
						-fine grained sand	
							increased SPT test to 24 inches hole open to bottom, attempted to clear out gravels causing issues
30	SPT 8	0	8-9-7 (16)	SP-SM			
							drilled open, very little cuttings from 29 to 34 ft
35	SPT 9	100	5-4-7 (11)	SP-SM		-becomes stratified, medium dense, rounded gravel	
40	SPT 10	61	7-7-7 (14)	SP-SM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-43A

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass

PROJECT NUMBER 16004

PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM			
45	SPT 11	56	6-6-8 (14)	SP-SM			
				SW-SM	47.0	WELL GRADED SAND WITH SILT (SW-SM), pale yellowish brown, medium dense, fine to coarse grained sand, stratified	
50	SPT 12	100	8-8-12 (20)	SP-SM	49.6	POORLY GRADED SAND (SP-SM), pale yellowish brown, medium dense, fine grained sand, stratified	
55	SPT 13	67	9-9-15 (24)	SP-SM		-becomes light brown, fine to medium grained, with lenses of medium to coarse grained sand	
				SM	58.0	SAND WITH SILT (SM), little gravel, gray, medium dense, fine to coarse grained gravel, fine to medium grained sand, subangular	
60	SPT 14	78	18-12-12 (24)				
	SPT 15	100	50/5"	SM	64.5		Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 64.5 feet
Groundwater estimated at 12.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-43B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH
DATE STARTED 6/21/16 **COMPLETED** 6/21/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.906264 **LONGITUDE** -71.683279
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY B. Koons **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
∇ **AT TIME OF DRILLING** 12.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), brown, moist, loose, fine to medium grained	
5	SPT 1	56	6-5-3 (8)	SM			
				SP-SM	8.0	POORLY GRADED SAND (SP-SM), little silt, and gravel, pale brown, moist, medium dense, fine to coarse grained, subangular	
10	SPT 2	78	7-11-11 (22)				casing advanced to 10 ft
					∇	-cobbles and boulders at 11.5 ft	
15	SPT 3	56	9-8-8 (16)	SP-SM			
20	SPT	61	6-5-3	SP-SM		-becomes loose, brownish gray, with coarse grained sand, fine subangular gravel	

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(8)	SP-SM		POORLY GRADED SAND (SP-SM), little silt, and gravel, pale brown, moist, medium dense, fine to coarse grained, subangular *(continued)*	
25	SPT 5	67	7-50/3"	SP-SM		-becomes medium dense, medium to coarse grained -24.5 to 26.5 ft encountered boulders	lost circulation 3 inch casing advanced to 25.5 ft
30	SPT 6	72	8-8-20 (28)	SP-SM			lost circulation 3 inch casing advanced to 30 ft tri-cone
34.0				SM		SILTY SAND WITH GRAVEL (SM), gray, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular	
35	SPT 7	67	27-44-35 (79)				
37.5						BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth	
40	SPT 8	36	22-50/5"				continued to have circulation problems, casing advanced every run

(Continued Next Page)

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BORING NUMBER BH-43B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Thornton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						BEDROCK: Possible contact with weathered GRANITIC bedrock becoming less weathered and stronger with depth *(continued)*	
45	SPT 9	0	40-50/3"				3 inch casing advanced to 44 ft
							3.17 min/ft
						Fresh (I), gray, coarse grained, very strong (R5), GRANITE, weakly foliated	NQ Double Tube coring started at 49 ft
50	RC 1	100 (98)				4 natural discontinuities per run 0 mechanical breaks per run	4.70 min/ft
						Fresh (I), very strong (R5)	
55	RC 2	100 (100)				1 natural discontinuity per run 0 mechanical breaks per run	12.30 min/ft
							lost circulation
						Fresh (I), very strong (R5)	
60	RC 3	98 (98)				Fresh (I), very strong (R5) to extremely strong (R6) -becomes dark gray, quartz content increases from 61 to 62 ft 2 natural discontinuities per run 0 mechanical breaks per run	26.60 min/ft
					64.0	Fresh (I), very strong (R5)	Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 64.0 feet
Groundwater estimated at 12.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-44A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH
DATE STARTED 6/16/16 **COMPLETED** 6/20/16
GROUND ELEVATION
HOLE SIZE 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.852522
LONGITUDE -71.666688
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50
SPT HAMMER 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
▽ **AT TIME OF DRILLING** 4.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				ML		SANDY SILT WITH GRAVEL (ML), medium to coarse grained	
				GM	3.0	GRAVEL WITH SAND AND SILT (GM), light brown to pale orange, moist, loose, fine to coarse grained, subangular, granitic-schistose composition	
5	SPT 1	28	7-7-2 (9)				casing advanced to 5 ft, begin mud rotary
				SP-SM	7.0	POORLY GRADED SAND WITH SILT (SP-SM), pale yellowish brown, very loose, fine to medium grained, fine grained gravel, fine to medium grained sand	casing advanced to 9 ft
10	SPT 2	72	5-2-1 (3)			10 to 12.5 ft high organic content	
				GM	12.5	SILTY GRAVEL WITH SAND (GM), light olive gray to dark yellowish brown, very dense, fine to coarse grained gravel, fine grained sand, angular	
15	SPT 3	54	27-50-50/1"			-15 to 18.5 ft encountered granitic boulder	3 inch casing advanced to 14 ft
20	SPT	39	22-25-19	GM		-becomes dense, medium to coarse grained gravel	3 inch casing advanced to 19 ft

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(44)	GM		-becomes dense, medium to coarse grained gravel *(continued)*	
						-higher percentage of silt in matrix	
25	SPT 5	89	33-29-41 (70)	GM / SM	24.5	SILTY SAND TO SILT AND SAND (SM), light olive gray and yellowish gray, very dense, low to medium plasticity, very fine to fine grained, alternating sand seams and silt beds	3 inch casing advanced to 25 ft
30	SPT 6	100	24-35-50 (85)	SM		-lenses of sand and silt throughout	
				GM	33.0	SILTY GRAVEL WITH SAND (GM), light olive gray, very dense, medium to coarse grained gravel, fine grained sand, subangular	3 inch casing advanced to 34 ft
35	SPT 7	83	28-44-50 (94)				
				SM	38.0	SILTY SAND (SM), light olive gray, dense, fine grained	3 inch casing advanced to 39 ft
40	SPT 8	89	16-28-41 (69)				
							3 inch casing advanced to 42 ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-44A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
					43.3		
				CL-SC		CLAYEY SAND (CL-SC), light olive gray and yellowish gray, very dense to hard, low to medium plasticity, fine grained, alternating sand seams	
45	SPT 9	100	19-33-46 (79)				
					48.0		
				SM		SILTY SAND WITH GRAVEL (SM), light olive gray, very dense, fine grained gravel, fine grained sand, subangular	
50	SPT 10	100	24-25-44 (69)				
					53.0		
				GM		SILTY GRAVEL WITH SAND (GM), light olive gray, very dense, medium to coarse grained gravel, fine grained sand, subangular	
55	SPT 11	100	45-49-50 (99)				
							3 inch casing advanced to 57 ft
					58.5		
				CL-SC		CLAYEY SAND (CL-SC), light olive gray and yellowish gray, very dense to hard, low to medium plasticity, very fine to fine grained, alternating sand seams	
60	SPT 12	100	14-27-50 (77)				
65	SPT 13	100	17-31-39 (70)	CL-SC	65.5		Backfilled with 200 lbs cement, 25 lbs bentonite, 28 gal water

Bottom of Borehole at 65.5 feet
Groundwater estimated at 4.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-44B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DATE STARTED 6/15/16 **COMPLETED** 6/15/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.851987 **LONGITUDE** -71.66675
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
∇ **AT TIME OF DRILLING** 9.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), trace asphalt, brown, moist, loose, fine grained gravel, medium to coarse grained sand, subrounded	
5	SPT 1	56	1-3-3 (6)	SM		-silt content decreases	
				SM	8.0	SILTY GRAVELLY SAND (SM), brownish gray, loose, fine grained gravel, fine grained sand, subrounded	4 inch casing advanced to 9 ft, begin mud rotary
10	SPT 2	78	3-3-6 (9)				
						- 12.5 to 14.5 ft encountered cobbles and boulders	
15						-15 to 16.5 ft encountered cobbles and boulders	
	SPT 3	0	12-9-15 (24)	SM		-becomes medium dense, decrease in gravel content	lost circulation from 18 to 19 ft
				ML	19.0	SANDY SILT (ML), dark gray, hard, low plasticity, fine grained sand, thin beds of fine grained sand	3 inch casing advanced to 20 ft
20							

(Continued Next Page)

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BORING NUMBER BH-44B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	94	16-33-50/5"	ML		SANDY SILT (ML), dark gray, hard, low plasticity, fine grained sand, thin beds of fine grained sand *(continued)*	to seal off permeable zone
25	SPT 5	75	27-50	ML		-sand content increases	
						-thin lenses of sand	drilled open hole
30	SPT 6	100	39-50	ML			
35	SPT 7	100	33-50/4"	ML			
				SM-ML	38.0	SILTY SAND TO SANDY SILT (SM-ML), dark gray, very dense, fine grained	
40	SPT 8	90	33-50/4"				
				CL-ML	41.5	SANDY CLAY TO SANDY SILT (CL-ML), little gravel, dark gray, moist, hard, low plasticity, fine grained gravel, medium to coarse grained sand, subangular	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-44B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				CL-ML		SANDY CLAY TO SANDY SILT (CL-ML), little gravel, dark gray, moist, hard, low plasticity, fine grained gravel, medium to coarse grained sand, subangular *(continued)*	
45	SPT 9	100	42-50/3"	CL-ML			
						-becomes low to medium plasticity, very weak laminated planes	
50	SPT 10	100	23-32-50/5"	CL-ML			
55	SPT 11	89	27-34-50 (84)	CL-ML			
60	SPT 12	100	22-37-50/3"	CL-ML			
65	SPT 13	100	31-37-50 (87)	CL-ML	65.5		Backfilled with 282 lbs cement, 20 lbs bentonite, 30 gal water

Bottom of Borehole at 65.5 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-45A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Campton, NH
DATE STARTED 6/16/16 **COMPLETED** 6/20/16 **GROUND ELEVATION** **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole **LATITUDE** 43.851604 **LONGITUDE** -71.666945
DRILLING METHOD Solid Stem Auger/Mud Rotary **DRILLING EQUIPMENT** Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney **GROUND WATER LEVEL:**
NOTES drilled at stake location ∇ **AT TIME OF DRILLING** 9.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP		POORLY GRADED SAND (SP), orangeish brown, moist, loose, fine grained gravel, medium to coarse grained sand, subrounded	solid stem auger to 10 ft
5	SPT 1	50	2-2-3 (5)	SP			
7.0				SM		SILTY SAND WITH GRAVEL (SM), brown and orangeish brown, moist, medium dense, fine grained gravel, medium to coarse grained sand	
9.0						∇	
10.0	SPT 2	78	5-6-11 (17)	ML		SANDY SILT (ML), brown, hard, coarse grained gravel, fine to medium grained sand, moderately indurated -12 to 13.5 ft encountered boulder	begin mud rotary
15	SPT 3	100	50/5"	ML			
17.5				CL		LEAN CLAY (CL), dark gray, hard, low plasticity, fine grained sand, varved, low to medium induration	drilled open hole
20	SPT 4	91	40-50/5"				4 inch casing

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				CL		LEAN CLAY (CL), dark gray, hard, low plasticity, fine grained sand, varved, low to medium induration *(continued)*	advanced to 20 ft
25	SPT 5	89	21-32-50 (82)	CL		-with sand, medium plasticity, moderately indurated	6 inch undisturbed sample collected
30	SPT 6	89	21-38-50 (88)	CL			
35	SPT 7	94	22-24-48 (72)	CL			
40	SPT 8	94	21-31-50 (81)	CL			

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-45A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				CL		-with sand, medium plasticity, moderately indurated *(continued)*	
45	SPT 9	100	21-27-41 (68)	CL			
50	SPT 10	100	28-32-50 (82)	CL		-sand content increases	
					52.0		
				SM		SILTY SAND (SM), dark gray, very dense, low plasticity, fine grained sand, laminated clay beds	
55	SPT 11	78	13-23-30 (53)				
60	SPT 12	83	16-26-39 (65)	SM			
65	SPT 13	94	13-28-30 (58)	SM	65.5		Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 65.5 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-45B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DATE STARTED 6/14/16 **COMPLETED** 6/15/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.851019 **LONGITUDE** -71.666825
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
∇ **AT TIME OF DRILLING** 9.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		SILTY GRAVEL WITH SAND (GM), trace organics, medium to coarse grained	
3.0				SP-SM		GRAVELLY SAND (SP-SM), little silt, dark yellowish brown, moist, loose, fine grained gravel, fine to medium grained sand, subangular, iron oxide staining	
5	SPT 1	56	5-4-2 (6)				
	SPT 2	100	50/4"	SP-SM		∇ -becomes very dense	casing advanced to 9.7 ft
10							
15	SPT 3	56	13-25-31 (56)	SP-SM			
18.5				CL		LEAN CLAY WITH SAND (CL), grayish green, hard, low plasticity, very fine grained, minor gravel/gravelly sand	3 inch casing advanced to 19 ft
20	SPT 4	100	50-50/4"				

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-45B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				CL		LEAN CLAY WITH SAND (CL), grayish green, hard, low plasticity, very fine grained, minor gravel/gravelly sand *(continued)*	
25	SPT 5	89	33-41-50 (91)	CL		-varved zones throughout	
30	SPT 6	100	31-49-50 (99)	CL		-trace medium to coarse grained angular gravel	
35	SPT 7	100	24-34-45 (79)	CL			
40	SPT 8	89	25-33-42 (75)	CL		-with granitic-schistose gravel in weakly cemented matrix	

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-45B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				CL		-with granitic-schistose gravel in weakly cemented matrix *(continued)*	
45	SPT 9	100	24-46-50/4"	CL			
50	SPT 10	100	35-46-50 (96)	CL		-increase in gravel content	
55	SPT 11	100	25-28-34 (62)	CL			
60	SPT 12	100	32-46-50 (96)	CL		-becomes grayish green to light greenish gray, granitic-schistose gravel in weakly cemented matrix	
65	SPT 13	100	13-17-33 (50)	CL	65.5	-becomes light olive green to yellowish gray, medium plastic	Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water

Bottom of Borehole at 65.5 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-46A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors		**PROJECT NAME** Northern Pass	
PROJECT NUMBER 16004		**PROJECT LOCATION** Campton, NH	
DATE STARTED 6/13/16	**COMPLETED** 6/14/16	**GROUND ELEVATION**	**HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole		**LATITUDE** 43.847311	**LONGITUDE** -71.665164
DRILLING METHOD Solid Stem Auger/Mud Rotary		**DRILLING EQUIPMENT** Diedrich D50	**SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney	**CHECKED BY** S. Kearney	**GROUND WATER LEVEL:**	
NOTES		▽ **AT TIME OF DRILLING** 9.0ft*	

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded	boulders in creek bed are up to 3 ft in diameter
							solid stem auger to 5 ft
5	SPT 1	80	11-50/4"	SM		-becomes light brown, very dense, coarse grained gravel, subangular	
						-5 to 6.5 ft encountered boulder	begin mud rotary
						▽	
10	SPT 2	6	23-20-13 (33)	SM			rock fragment caught in end of sampler
							lost circulation
15	SPT 3	67	27-40-26 (66)	SM		-becomes tan, medium to coarse grained sand, fine grained gravel, iron oxide staining	
							3 inch casing advanced to 19 ft
20							

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-46A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	40	33-50/4"	SM SM		SILTY SAND WITH GRAVEL (SM), brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded *(continued)* -gravel content increases	
25	SPT 5	81	32-46-50/4"	SM		-becomes greenish gray	
30	SPT 6	60	50/5"	SM		-mottled, fine to medium grained sand	
35	SPT 7	83	37-50	SM		-stratified, 1/2 inch lenses of fine grained sand	
40	SPT 8	50	50	SM		-becomes olive gray, increase in gravel content, medium to coarse grained sand, fine grained gravel, subrounded, mottled	no sample recovered

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-46A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SILTY SAND WITH GRAVEL (SM), brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded *(continued)*	
45	SPT 9	50	50/4"	SM			no sample recovered
50	SPT 10	67	50/3"	SM		-becomes dark gray, fine to coarse grained, angular gravel	no sample recovered
55	SPT 11	100	50/4"	SM		-with fine grained sand	
						-56 to 58 ft encountered boulder	
60	SPT 12	100	50	SM			
					62.0		
				SP-SM		POORLY GRADED SAND (SP-SM), little silt, light gray, very dense, medium grained	
65	SPT 13	89	25-34-40 (74)				highly permeable zone

(Continued Next Page)

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BORING NUMBER BH-46A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SP-SM	68.0	POORLY GRADED SAND (SP-SM), little silt, light gray, very dense, medium grained *(continued)*	
				ML		SANDY SILT (ML), tan, hard, fine grained sand, stratified, mottled, lenses of medium to coarse grained sand	
70	SPT 14	78	23-22-25 (47)				
75	SPT 15	82	11-25-50/5"	ML	75.4		Backfilled with 372 lbs cement, 20 lbs bentonite, 30 gal water

Bottom of Borehole at 75.4 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

Quanta Subsurface
4308 N Barker RD
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BORING NUMBER BH-46B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH
DATE STARTED 6/9/16 **COMPLETED** 6/9/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.846835 **LONGITUDE** -71.665082
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
▽ **AT TIME OF DRILLING** 13.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded	solid stem auger to 11 ft
				ML	2.0	SANDY SILT (ML), dark brown, fine grained, organics present	
				SP-SM	3.0	POORLY GRADED GRAVELLY SAND (SP-SM), little silt, orange and light brown, moist, medium dense, subrounded, iron oxide staining, cobbles present	
5	SPT 1	78	9-10-15 (25)				
				SM	8.0	SILTY SAND WITH GRAVEL (SM), brown, moist, coarse grained gravel, fine to medium grained sand, subrounded	4 inch casing advanced to 8 ft
10	SPT 2	80	50-50/4"				
							begin wet rotary
						▽ -12.5 to 14 ft encountered boulders	
				ML	14.0	SILT WITH SAND (ML), trace cobbles, and boulders, light brown, very stiff, fine grained sand, stratified	
15	SPT 3	100	4-5-10 (15)				
				SM	15.8	GRAVELLY SAND WITH SILT (SM), orange, very dense, medium to coarse grained	
							drilled open hole
20				SM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-46B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	SPT 4	65	23-43-50/5"	SM		GRAVELLY SAND WITH SILT (SM), orange, very dense, medium to coarse grained *(continued)* -21 to 23 ft encountered boulder	
23.0				SM		SILTY SAND WITH GRAVEL (SM), orangeish brown, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular, iron oxide staining -gravel content increases	
25	SPT 5	80	25-50/4"			-25.5 to 26.5 ft encountered boulder	
30	SPT 6	0	50/3"	SM			no sample recovered, cobble in spoon tip
35	SPT 7	100	50-50/3"	SM		-becomes light brown and gray, mottled	
40	SPT 8	0	50/5"	SM			no sample recovered slow drilling rig chatter increases

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-46B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SILTY SAND WITH GRAVEL (SM), orangeish brown, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular, iron oxide staining *(continued)* -43.5 to 46 ft encountered fresh, white and black, medium to coarse grained, strong granite boulder	
45							
50							
	SPT 9	100	50/4"	SM			3 inch casing advance to 51 ft
55							
	SPT 10	100	50/5"	SM		-with trace fine grained gravel, with gravel and cobble zones	
60							no sample attempted, cobbles and gravel present
65							Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water
	SPT 11	100	50	SM		-gravel and cobble zones	

Bottom of Borehole at 65.5 feet
Groundwater estimated at 13.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-47A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH
DATE STARTED 6/7/16 **COMPLETED** 6/8/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.803143 **LONGITUDE** -71.673827
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
AT TIME OF DRILLING 12.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), trace gravel, brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded	boulders up to 6 ft diameter observed in stream solid stem auger to 10 ft
5	SPT 1	78	15-19-16 (35)	SM		-becomes orange to brown, dense, subangular, iron oxide staining	
				SM	8.0	GRAVELLY SAND (SM), little silt, brown, moist, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular, cobbles present	
10	SPT 2	70	22-50/4"				begin wet rotary 4 inch casing advanced to 10 ft
						-cobbles up to 18 inch diameter	
15	SPT 3	91	37-50/5"	SM		-with medium to coarse grained sand	drilled open hole
				SM	16.0	SILTY SAND WITH GRAVEL (SM), orange to brown, dense, fine to coarse grained gravel, medium to coarse grained sand, subangular	
						-large cobble from 18 to 18.9 ft	
20	SPT 4	100	50/5"	SM			

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				SM		SILTY SAND WITH GRAVEL (SM), orange to brown, dense, fine to coarse grained gravel, medium to coarse grained sand, subangular *(continued)*	
25	SPT 5	100	50/4"	SM		-becomes very dense, grayish brown and orange, highly oxidized	
30	SPT 6	81	39-50-50/4"	SM		-gravel content decreases significantly	
				ML	32.0	SANDY SILT (ML), little gravel, gray, hard, fine grained gravel, fine to coarse grained sand, subangular	
35	SPT 7	80	39-50/4"				
40	SPT 8	100	50-50/4"	ML			drilled open hole
				SM	41.0	SILTY SAND WITH GRAVEL (SM), brownish gray, very dense, fine grained gravel, fine to coarse grained sand, subangular -cobbles and boulders	

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				SM		SILTY SAND WITH GRAVEL (SM), brownish gray, very dense, fine grained gravel, fine to coarse grained sand, subangular *(continued)*	
45	SPT 9	0	50/2"	SM			no sample recovered
50	SPT 10	40	50/5"	SM			
55					54.5	BEDROCK: Slightly weathered (II), dusky blueish green, medium strong (R3), SCHIST, biotite and muscovite rich, foliated -56 to 56.9 ft core loss SCHIST 6 natural discontinuities per run 1 mechanical break per run	3 inch casing advanced to 56 ft NQ Double Tube coring started at 56 ft increased rotation rate 3.60 min/ft
	RC 1	82 (54)			59.0	Fresh (I), strong (R4), bluish white, coarse grained, quartz and garnet rich felsic intrusive from 59 to 58.7 ft	
60					59.7	Fresh (I) to slightly weathered (II), medium strong (R3), SCHIST	Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water
					61.0		

Bottom of Borehole at 61.0 feet
Groundwater estimated at 12.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-47B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DATE STARTED 6/7/16 **COMPLETED** 6/13/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.802948 **LONGITUDE** -71.673913
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NN/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES 18' of 3" casing abandoned and grouted into borehole from 47-65'
▽ **AT TIME OF DRILLING** 12.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				GM		SILTY GRAVEL WITH SAND (GM), trace organics	
3.0				SM		SILTY SAND WITH GRAVEL (SM), yellowish brown to light brown, moist, loose, fine grained gravel, fine grained sand, subangular	
5	SPT 1	67	3-3-7 (10)				
10	SPT 2	63	25-50/2"	SM		-becomes very dense, medium to coarse grained	
12.0					▽		
13.0				SW-SM		WELL GRADED GRAVELLY SAND (SW-SM), little silt, yellowish brown, very dense, fine to coarse grained gravel, fine to coarse grained sand	
15	SPT 3	88	27-32-50/5"				
20	SPT 4	83	32-50	SW-SM			

(Continued Next Page)

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BORING NUMBER BH-47B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				SW-SM		WELL GRADED GRAVELLY SAND (SW-SM), little silt, yellowish brown, very dense, fine to coarse grained gravel, fine to coarse grained sand *(continued)*	
25	SPT 5	100	29-50-50 (100)	SW-SM		-matrix alternation between silty-sand and gravelly-sand	4 inch casing advanced to 24 ft
				GM	27.0	SANDY GRAVEL WITH SILT (GM), olive gray, very dense, fine to coarse grained gravel, very fine to fine grained sand, angular to subangular	
30	SPT 6	100	23-50-50/5"				4 inch casing advanced to 30 ft
35	SPT 7	73	50-50/5"	GM			
40	SPT 8	0	50/1"	GM	40.0		no sample recovered
						BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth	4 inch casing advanced to 41 ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-47B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Campton, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
						BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth *(continued)*	roller bit wheel damaged and lost down hole at 44 ft hole abandoned at 44 ft, offset hole drilled 3.1 ft E
45	SPT 9	0	50/1"				no sample recovered
50	SPT 10	100	50/2"			Highly weathered (IV) to moderately weathered (III), moderate yellowish brown and pale blue, SCHIST	
							3 inch casing advanced to 54 ft
55	RC 1	100 (32)				Fresh (I) to slightly weathered (II), fine grained, medium strong (R3), with strong foliation, grayish blue green and light greenish gray, medium grained garnets and mica mineralization from 54 to 56.4 ft 1 natural discontinuity per run 2 mechanical breaks per run Completely weathered (V) to highly weathered (IV), extremely weak (R0), faulted zone from 56.2 to 57 ft -57 to 59.6 ft core loss	poor circulation 10.00 min/ft
60	RC 2	48 (42)			59.6	2 natural discontinuities per run 0 mechanical breaks per run	5.88 min/ft 18 ft section of 3 inch casing abandoned and grout into borehole from 47 to 65 ft, may cause issues form HDD contractor
					62.0	BEDROCK: Fresh (I), yellowish gray and light gray, coarse to very coarse grained, medium strong (R3), PEGMATITE, very fine grained mica, quartz, and pyrite Slightly weathered (II)	
65	RC 3	100 (100)			65.0	BEDROCK: Slightly weathered (II), medium strong (R3), SCHIST, quartz schist transition zone from 62 to 62.5 ft Fresh (I) to slightly weathered (II), grayish blue green and light greenish gray, fine grained, medium strong (R3), strong foliation, extensive pyrite mineralization from 62.5 to 64.4 ft 2 natural discontinuities per run 0 mechanical breaks per run -becomes weakly foliated below 64.4 ft	5.26 min/ft Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 12.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-48A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH

DATE STARTED 6/6/16 **COMPLETED** 6/6/16
GROUND ELEVATION **HOLE SIZE** 6 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.798943 **LONGITUDE** -71.673911
DRILLING METHOD Solid Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
∇ **AT TIME OF DRILLING** 13.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), trace organics, brown, moist, loose, fine to medium grained sand	solid stem auger to 20 ft
5	SPT 1	83	4-4-4 (8)	SM		-without organics, fine grained sand	
7.0				SM		SILTY SAND WITH GRAVEL (SM), trace cobbles, gray to brown, moist, medium dense, coarse grained gravel, fine to medium grained sand, subrounded	
10	SPT 2	56	18-14-11 (25)				
13.0 ∇						-becomes very dense, brown, fine grained sand, trace gravel, wet	
15	SPT 3	70	24-50/4"	SM			
17.5				ML		SANDY SILT (ML), trace gravel, dark gray, hard, fine grained gravel, fine to medium grained sand, subangular	
20	SPT 4	100	50				

(Continued Next Page)

QUANTA SUBSURFACE Engineering + Construction
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BORING NUMBER BH-48A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				ML		SANDY SILT (ML), trace gravel, dark gray, hard, fine grained gravel, fine to medium grained sand, subangular *(continued)*	begin wet rotary 4 inch casing advanced to 20 ft
				SC-SM	22.0	SILTY TO CLAYEY SAND (SC-SM), trace gravel, dark gray, very dense, low to medium plasticity, fine grained gravel, fine to medium grained sand, thin clay beds	
25	SPT 5	100	36-44-50/5"				open hole drilling
30	SPT 6	90	42-50/4"	SC-SM			
				ML	33.0	SANDY SILT (ML), dark gray, hard, fine to medium grained sand, sand lenses up to 3 inches thick	
35	SPT 7	94	33-34-50/5"				
40	SPT 8	83	27-35-50 (85)	ML		-without sand lenses, laminated	

(Continued Next Page)

BORING NUMBER BH-48A

Quanta Subsurface
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Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML		SANDY SILT (ML), dark gray, hard, fine to medium grained sand, sand lenses up to 3 inches thick *(continued)*	
45	SPT 9	94	22-45-50/4"	ML			
					47.0		
				SM		SILTY SAND (SM), dark gray, very dense, fine to medium grained	hole collapsed fluid loss
50	SPT 10	100	28-39-42 (81)		50.0		
				CL		LEAN CLAY (CL), dark gray, hard, medium plasticity, laminated	
					53.0		
				SM		SILTY SAND (SM), olive brown, very dense, fine grained, laminated	
55	SPT 11	89	25-30-42 (72)				
					57.0		
				SM		SILTY SAND WITH GRAVEL (SM), dark gray, very dense, fine grained gravel, fine to medium grained sand, subangular	
60	SPT 12	100	27-37-50 (87)				
						-gravelly zone at 62 ft	
65	SPT 13	78	27-46-48 (94)	SM		-becomes gray, fine to coarse grained sand, with fine subangular gravel, gravelly zone at 62 ft	Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water
					65.5		

Bottom of Borehole at 65.5 feet
Groundwater estimated at 13.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

BORING NUMBER BH-48B

QUANTA SUBSURFACE Engineering + Construction
Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH
DATE STARTED 6/3/16 **COMPLETED** 6/6/16
GROUND ELEVATION **HOLE SIZE** 4 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.797593 **LONGITUDE** -71.673646
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
▽ **AT TIME OF DRILLING** 22.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP-SW		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SW), trace organics	
1.5				SM		SILTY SAND (SM), yellowish brown, dry, loose, very fine to fine grained, laminated, iron oxide staining	
5	SPT 1	72	4-3-3 (6)				
						-8 to 13 ft encountered cobbles and boulders	
10	SPT 2	89	19-49-32 (81)	SM			
13.0				ML-SM		SAND AND SILT (ML-SM), little to trace gravel, yellowish gray, moist, hard, fine grained gravel, fine grained sand, angular	
15	SPT 3	83	13-18-21 (39)				
20	SPT	100	20-22-25	ML-SM		-with a silty-sand to silty-gravel matrix	

(Continued Next Page)

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4308 N Barker RD
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BORING NUMBER BH-48B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(47)	ML-SM		SAND AND SILT (ML-SM), little to trace gravel, yellowish gray, moist, hard, fine grained gravel, fine grained sand, angular *(continued)* ▽	
					23.0	POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM), light greenish gray, very dense, fine grained gravel, fine grained sand, subangular	
25	SPT 5	100	15-50	GP-GM			
30	SPT 6	100	20-35-50 (85)	GP-GM			
35	SPT 7	75	24-45-50/4"	GP-GM		-increase of subangular gravels	casing advanced to 35 ft
					37.0	SAND WITH GRAVEL AND SILT (SM), light olive gray, very dense, fine grained gravel, fine to medium grained sand, subangular	
40	SPT 8	100	42-50/4"	SM			

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH-48B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				ML-SM	43.0	SILT AND SAND WITH GRAVEL (ML-SM), olive gray to yellowish gray, very dense, medium to coarse grained gravel, fine grained sand, angular	
45	SPT 9	100	50				casing advanced to 46.5 ft
				SM	48.3	POORLY GRADED SAND WITH SILT (SM), dark yellow, very dense, fine grained	
50	SPT 10	78	38-50-50 (100)				
				ML	53.5	SANDY SILT (ML), light olive gray, hard, very fine to fine grained, clay laminations	casing advanced to 54 ft
55	SPT 11	100	41-50-50/5"				
				SM	58.0	SILTY SAND WITH GRAVEL (SM), light olive gray, very dense, fine grained gravel, fine grained sand, angular, occasional clay lenses	
60	SPT 12	100	23-45-50/4"				
				ML	63.5	SANDY SILT (ML), light olive gray, hard, very fine to fine grained, clay laminations	Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water
65	SPT 13	90	50-50/4"		65.0		

Bottom of Borehole at 65.0 feet
Groundwater estimated at 22.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-51A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH
DATE STARTED 6/2/16 **COMPLETED** 6/3/16
GROUND ELEVATION **HOLE SIZE** 6 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.750602 **LONGITUDE** -71.686727
DRILLING METHOD Hollow Stem Auger/Mud Rotary
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
∇ **AT TIME OF DRILLING** 9.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SP		POORLY GRADED SAND WITH GRAVEL (SP), light brown, wet, loose, coarse grained gravel, fine grained sand, angular	
3.0				ML		SANDY SILT (ML), yellowish brown, moist, stiff, non plastic, fine grained	4 inch casing advanced to 4 ft
5	SPT 1	50	9-7-6 (13)				
9.0 ∇				ML		-becomes light greenish gray, iron oxide staining	
10	SPT 2	100	2-0-0 (0)				
12.5				SM		SILTY SAND AND SANDY SILT (SM), dark brown to brown, soft, fine grained, fibrous organic material	
15	SPT 3	89	1-1-1 (2)				
18.8				SP-SM		POORLY GRADED SAND WITH GRAVEL (SP-SM), little silt, light brown to pale orange, loose, fine grained gravel, fine grained sand, subangular	
20	SPT	44	7-5-4				

(Continued Next Page)

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BORING NUMBER BH-51A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(9)	SP-SM		POORLY GRADED SAND WITH GRAVEL (SP-SM), little silt, light brown to pale orange, loose, fine grained gravel, fine grained sand, subangular *(continued)*	
23.0				SM		SANDY GRAVEL WITH SILT (SM), light brown to pale orange, medium dense, fine to coarse grained gravel, fine to medium grained sand, granitic composition	4 inch casing advanced to 24 ft no sample recovered
25	SPT 5	0	9-9-9 (18)				
30	SPT 6	50	9-7-7 (14)	SM		-becomes medium dense, fine to coarse grained gravel, fine to medium grained sand, subangular	
33.0				GM		SILTY GRAVEL WITH SAND (GM), yellowish gray to brownish orange, medium dense, coarse grained gravel, fine grained sand, angular	
35	SPT 7	44	14-14-8 (22)				
						-37 to 41 ft encountered boulders and cobbles	
40							4 inch casing advanced to 41 ft, open hole drilling to 53 ft

(Continued Next Page)

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
				GM		SILTY GRAVEL WITH SAND (GM), yellowish gray to brownish orange, medium dense, coarse grained gravel, fine grained sand, angular *(continued)*	
44.0				SM		SILTY SAND WITH GRAVEL (SM), blueish gray, very dense, fine to coarse grained gravel, fine grained sand, subangular	
45	SPT 8	73	47-50/5"				
50	SPT 9	67	50/3"	SM		-with fine to coarse grained sand	
						-51 to 52 ft encountered boulders and cobbles	7 ft of hole collapse, 3 inch casing advanced to 52 ft
55							no sample at 55 ft due to sand flowing into casing, possible artesian conditions
	SPT 10	100	50/2"	SM		-becomes dark gray	
60							3 inch casing advanced to 60 ft
62.0				ML		SANDY SILT (ML), trace gravel, dark gray, hard, fine grained gravel, fine grained sand, subangular	
65	SPT 11	100	50/4"				Backfilled with 282 lbs cement, 15 lbs bentonite, 30 gal water
65.3							

Bottom of Borehole at 65.3 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-51B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Plymouth, NH

DATE STARTED 6/2/16 **COMPLETED** 6/2/16 **GROUND ELEVATION** **HOLE SIZE** 6 in
DRILLING CONTRACTOR SW Cole **LATITUDE** 43.750292 **LONGITUDE** -71.686417
DRILLING METHOD Solid Stem Auger/Hollow Stem Auger/Mud Rotary **DRILLING EQUIPMENT** Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING** 8.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND WITH GRAVEL (SM), dark brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, subrounded	solid stem auger to 9 ft
5	SPT 1	50	15-15-7 (22)	SM		-becomes moist, medium dense, increase in gravel content, with cobbles	
7.5				ML		SANDY SILT (ML), trace organics, dark gray, moist, very soft, fine grained	
10	SPT 2	100	0				begin wet rotary 4 inch casing advanced to 9 ft
11.5				SM		SILTY SAND (SM), with organics, grayish brown, medium dense, fine grained, high dilatancy, wood and roots present	loss of drilling fluid
15	SPT 3	61	1-7-8 (15)				
17.0				SM		SILTY SAND TO SILT AND SAND (SM), little gravel, olive gray, very dense, fine grained gravel, fine to medium grained sand, subangular, iron oxide staining	switched to 300 lbs casing hammer
20	SPT 4	61	20-22-29 (51)				

(Continued Next Page)

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BORING NUMBER BH-51B

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20				SM		SILTY SAND TO SILT AND SAND (SM), little gravel, olive gray, very dense, fine grained gravel, fine to medium grained sand, subangular, iron oxide staining *(continued)*	
	SPT 5	78	29-37-38 (75)	SM		-with fine to coarse grained sand, no iron oxide staining	4 inch casing advanced to 23 ft
25							open hole roller bit
	SPT 6	78	29-39-46 (85)	SM		-with fine to medium grained sand	
30							
	SPT 7	83	50-50-50 (100)	SM		-schist fragments present	3 inch casing advanced to 33 ft
35							
	SPT 8	80	50-50/4"	SM		-with fine to medium grained sand	3 inch casing requires 200 blows/ft
40							

(Continued Next Page)

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
	SPT 9	83	50	SM SM		SILTY SAND TO SILT AND SAND (SM), little gravel, olive gray, very dense, fine grained gravel, fine to medium grained sand, subangular, iron oxide staining *(continued)*	
45							
	SPT 10	57	50/4"	SM			no sample recovered
50							
	SPT 11	50	50/4"	SM			no sample recovered
55							
	SPT 6	100	50	SM		-with subangular gravel	
60							
65					65.0		no sample recovered due to hole collapse Backfilled with 188 lbs cement, 10 lbs bentonite, 30 gal water

Bottom of Borehole at 65.0 feet
Groundwater estimated at 8.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-52A

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass
PROJECT NUMBER 16004 **PROJECT LOCATION** Plymouth, NH

DATE STARTED 5/31/16 **COMPLETED** 6/1/16 **GROUND ELEVATION** **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole **LATITUDE** 43.729822 **LONGITUDE** -71.675867
DRILLING METHOD Hollow Stem Auger/Mud Rotary / NQ/Series 8 **DRILLING EQUIPMENT** Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY J. Melton **CHECKED BY** S. Kearney **GROUND WATER LEVEL:**
NOTES drilled at stake location ∇ **AT TIME OF DRILLING** 9.0ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), trace gravel, brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand, angular	
				ML	2.5	SANDY SILT (ML), pale yellowish brown, moist, stiff, very fine to fine grained, laminated, iron oxide staining	
5	SPT 1	100	5-5-9 (14)				
10	SPT 2	89	4-4-5 (9)	ML		∇ -becomes wet	
					12.5	BEDROCK: Possible contact with weathered SCHIST bedrock becoming less weathered and stronger with depth	
15	SPT 3	100	40-50/2"			Fresh (I) to slightly weathered (II), pale blue to medium blueish gray, fine to medium grained, strong (R4), SCHIST, foliated	casing advanced to 15 ft NQ Double Tube coring started at 15 ft
20	RC 1	52 (12)				2 natural discontinuities per run 3 mechanical breaks per run -quartz rich mineralized zone from 18-18.7 ft with coarse to very coarse grains -becomes fine grained, bands of pyrite below 18.7 ft	5.88 min/ft casing advanced to 18.4 ft due to water loss

(Continued Next Page)

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BORING NUMBER BH-52A

CLIENT PAR Electrical Contractors | **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 | **PROJECT LOCATION** Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20–25	RC 2	88 (88)				Fresh (I) to slightly weathered (II), strong (R4) to very strong (R5) -weakly foliated from 21 to 22 ft -banding at 20°-30° from 22 to 23 ft 1 natural discontinuity per run 6 mechanical breaks per run -weakly foliated from 23 to 25.2 ft	3.57 min/ft
25–30	RC 3	94 (68)				Fresh (I), strong (R4) -pyritic schist below 25 ft Slightly weathered (II), strong (R4) -zone of quartz veins from 26.1 to 26.8 ft 4 natural discontinuities per run 0 mechanical breaks per run -weakly foliated pyritic schist below 27.2 ft Fresh (I), strong (R4) Slightly weathered (II), strong (R4)	6.25 min/ft
30–35	RC 4	100 (100)			31.4	Slightly weathered (II), strong (R4) BEDROCK: Fresh (I), very strong (R5), PEGMATITE, pegmatite dike, spotty mica mineralization with pyrite veins 1 natural discontinuity per run 5 mechanical breaks per run	5.00 min/ft
35–40	RC 5	100 (100)			35.0	BEDROCK: Fresh (I), grayish red, fine grained, strong (R4), SCHIST, weakly foliated, with pyrite and epidote mineralization 2 natural discontinuities per run 8 mechanical breaks per run	3.03 min/ft
40–	RC 6	100 (100)			41.6	Fresh (I), strong (R4) -transition zone between schist and pegmatite from 40.6 to 41.6 ft BEDROCK: Fresh (I), very strong (R5), PEGMATITE, massive, pegmatite with mica and pyrite mineralization 1 natural discontinuity per run	4.35 min/ft

(Continued Next Page)

BORING NUMBER BH-52A

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

CLIENT PAR Electrical Contractors **PROJECT NAME** Northern Pass

PROJECT NUMBER 16004 **PROJECT LOCATION** Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
45						3 mechanical breaks per run BEDROCK: Fresh (I), very strong (R5), PEGMATITE, massive, pegmatite with mica and pyrite mineralization *(continued)*	
	RC 7	93 (93)			46.5	0 natural discontinuities per run 0 mechanical breaks per run	3.33 min/ft
50	RC 8	100 (100)			49.7	BEDROCK: Fresh (I) to slightly weathered (II), grayish red, strong (R4) to very strong (R5), foliated, transition zone between PEGMATITE and pyritic SCHIST from 46.5 to 49.7 ft 1 natural discontinuity per run 0 mechanical breaks per run	4.00 min/ft
55	RC 9	100 (100)			56.0	BEDROCK: Fresh (I) to slightly weathered (II), grayish red, strong (R4), SCHIST, foliated, pyritic SCHIST with extensive epidote mineralization from 49.7 to 55.2 ft Fresh (I), strong (R4) 0 natural discontinuities per run 7 mechanical breaks per run Fresh (I), strong (R4)	3.45 min/ft
					56.8	Fresh (I), strong (R4), PEGMATITE	
60	RC 10	100 (100)			60.0	Fresh (I), grayish red, strong (R4), SCHIST, foliated 0 natural discontinuities per run 4 mechanical breaks per run -inclusions of pegmatite from 56.8 to 59.8 ft	4.35 min/ft Backfilled with 186 lbs cement, 15 lbs bentonite, 40 gal water

Bottom of Borehole at 60.0 feet
Groundwater estimated at 9.0 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

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BORING NUMBER BH-52B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH

DATE STARTED 5/31/16 **COMPLETED** 5/31/16
GROUND ELEVATION **HOLE SIZE** 4.5 in
DRILLING CONTRACTOR SW Cole
LATITUDE 43.728816 **LONGITUDE** -71.676103
DRILLING METHOD Solid Stem Auger/Mud Rotary / NQ/Series 8
DRILLING EQUIPMENT Diedrich D50 **SPT HAMMER** 140 lb Auto
LOGGED BY S. Kearney **CHECKED BY** S. Kearney
GROUND WATER LEVEL:
NOTES drilled at stake location
▽ **AT TIME OF DRILLING** 7.5ft*

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
0				SM		SILTY SAND (SM), trace gravel, brown, moist, loose, fine to coarse grained gravel, fine to medium grained sand	solid stem auger to 15.2 ft
5	SPT 1	78	3-3-3 (6)	SM		-becomes gray and brown, fine grained, mottled without gravel	
				CL-ML	7.5 ▽	SILTY CLAY WITH SAND (CL-ML), olive brown, stiff, low to medium plasticity, stratified, some lenses of fine sand (<1 inch thick)	
10	SPT 2	61	3-4-4 (8)				
15	SH 3	100		CL-ML			refusal at 15.2 with shelby tube begin wet rotary
				SM	17.0	SILTY SAND (SM), olive gray, medium dense, fine grained	
20	SPT	61	11-15-15				4 inch casing advanced to 19 ft

(Continued Next Page)

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BORING NUMBER BH-52B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
20	4		(30)	SM		SILTY SAND (SM), olive gray, medium dense, fine grained *(continued)*	
25	SPT 5	56	15-14-15 (29)	SM			
					28.5		
				GM		SANDY GRAVEL (GM), grayish blue, very dense	
	SPT 6	0	50/4"			29.6 to 31.6 ft core loss	no sample recovered boulders encountered at 29.6 ft NQ Double Tube coring started at 29.6
30						-grayish blue, fresh to slightly weathered, weakly foliated, medium grained granitic rock, possible contact with weathered bedrock becoming less weathered and stronger with depth	no significant water loss
	RC 1	50 (35)				2 natural discontinuities per run 0 mechanical breaks per run -33.6 to 37.1 ft core loss	1.75 min/ft
35							
	RC 2	100 (23)				-granitic rock, minor amounts of sandy clay >20 natural discontinuities per run 0 mechanical breaks per run	
40							1.41 min/ft roller bit to advance hole 3 inch casing advanced to 41 ft
					41.7		
	RC	72				BEDROCK: -41.7 to 42.2 ft core loss Fresh (I), pale blue, fine grained, medium strong (R3), ARGILLITE, some calcite veins	5.00 min/ft

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH-52B

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass
PROJECT NUMBER 16004
PROJECT LOCATION Plymouth, NH

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	REMARKS
	3	(50)				1 natural discontinuity per run 1 mechanical break per run Fresh (I), medium strong (R3)	changed to #10 bit
44.2						Fresh (I), strong (R4), PEGMATITE, felsic intrusive (quartz, biotite, plagioclase)	
44.6						BEDROCK: Fresh (I), grayish blue, fine to medium grained, strong (R4), SCHIST, foliated	
45 (45.0)	RC 4	100 (70)				Fresh (I), white and black, coarse grained, strong (R4), PEGMATITE, felsic intrusive (quartz, biotite, pyrite rich) 5 natural discontinuities per run 7 mechanical breaks per run	2.22 min/ft
47.7						BEDROCK: Fresh (I), grayish blue, fine to medium grained, medium strong (R3), SCHIST, some zones of felsic intrusives, foliated	
50	RC 5	98 (83)				8 natural discontinuities per run 6 mechanical breaks per run	2.78 min/ft
52.2						Fresh (I), pale blue, fine grained, medium strong (R3), ARGILLITE, some calcite veins	
	RC 6	100 (76)				4 natural discontinuities per run 3 mechanical breaks per run	5.00 min/ft
54.7 / 55						BEDROCK: Fresh (I), white and black, coarse grained, medium strong (R3), GRANITE, felsic intrusive, quartz and biotite rich Fresh (I), strong (R4)	
	RC 7	100 (100)				3 natural discontinuities per run 4 mechanical breaks per run Felsic intrusive, quartz and biotite rich	5.26 min/ft Backfilled with 186 lbs cement, 10 lbs bentonite, 20 gal water
60 (60.0)							

Bottom of Borehole at 60.0 feet
Groundwater estimated at 7.5 feet below ground surface. Stable groundwater elevations are uncertain due to presence of perched water layers from clayey deposits and use of mud rotary as a drilling method.

ATTACHMENT B

Core Photograph Logs

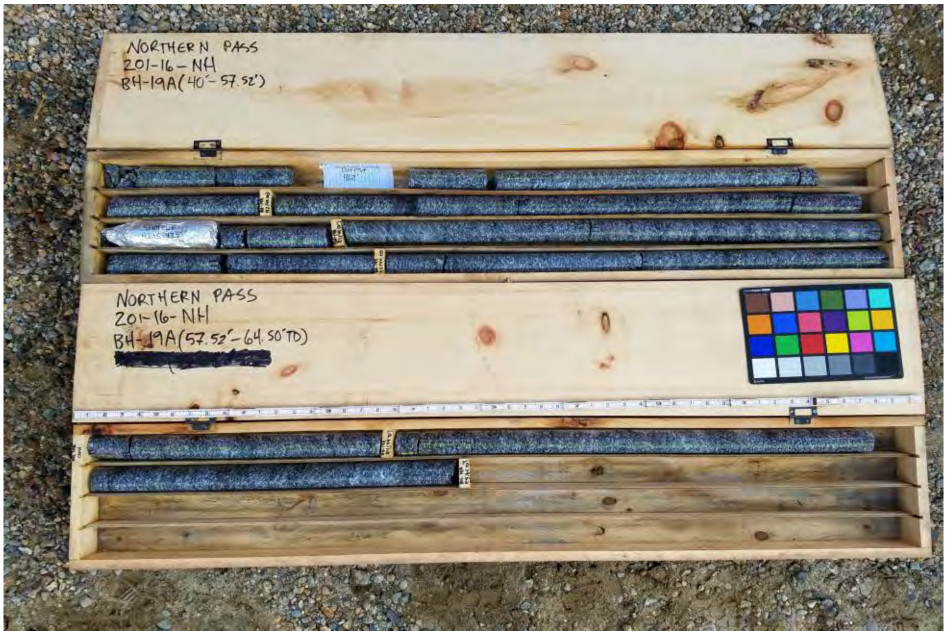
BH-10A: 25 ft – 55 ft

BH-10B: 24.5 ft – 34.5 ft

BH-15A: 49 ft – 54 ft

BH-18A: 52 ft – 60 ft
BH-18B: 55 ft – 65 ft

BH-19A: 40 ft – 64.5 ft



BH-19B: 45 ft – 59.7 ft

BH-20A: 10 ft – 40 ft

BH-20A: 40 ft – 65 ft

BH-23B: 45 ft – 50 ft

BH-24B: 44.8 ft – 60 ft

BH28A: 19.7 ft – 25.4 ft

BH-28A: 25.4 ft - 55 ft

BH-28B: 19 ft – 60.1 ft

BH-28B: 60.1 ft – 64.8 ft

BH-29A: 9 ft – 46 ft

BH-29A: 46 ft – 55 ft

BH-29B: 10 ft – 49 ft

BH-29B 49 ft – 65 ft

BH-30A: 14.5 ft – 45 ft

BH-30A: 45 ft – 75.3 ft

BH-31A: 9.5 ft – 45.4 ft

BH-31A 45.4 ft – 75 ft

BH-31B: 39.6 ft – 47.6 ft

BH-32A: 9 ft – 47 ft

BH-32A: 47 ft – 65 ft

BH-32B: 14.2 ft – 44.8 ft

BH-32B: 44.8 ft – 65.8 ft

BH-33A: 44 ft – 65 ft

BH-33B: 24 ft – 39 ft

BH-33B: 39 ft – 65 ft

BH-34A: 29 ft – 61.7 ft

BH-34A: 61.7 ft – 75 ft

BH-34B: 24.8 ft – 62.4 ft

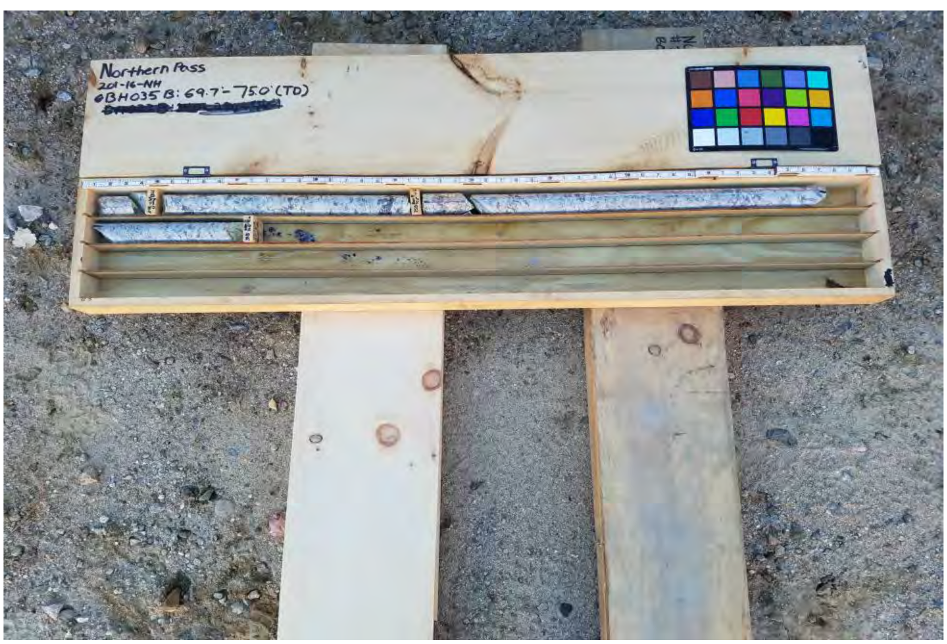
BH-34B: 62.4 ft – 64.5 ft

BH-35A: 19.5 ft – 55 ft

BH-35A: 55 ft – 60 ft

BH-35B: 14 ft – 69.7 ft

BH-35B: 69.7 ft – 75 ft



BH-36B: 29 ft – 63 ft

BH-36C: 29 ft – 45 ft

BH-39A: 44.5 ft – 64.5 ft

BH-41A: 38.5 ft – 59 ft

BH-41B: 9.2 ft – 65.6 ft

BH-42B: 14.5 ft – 37.4 ft

BH-42B: 37.4 ft – 75.2 ft

BH-43B: 49 ft – 64 ft

BH-47A: 56 ft – 61 ft

BH-47B: 54 ft – 69 ft

BH-52A: 17.5 ft – 55.8 ft

BH-52A: 55.8 ft – 60 ft

BH-52B: 29.6 ft – 60 ft

ATTACHMENT C

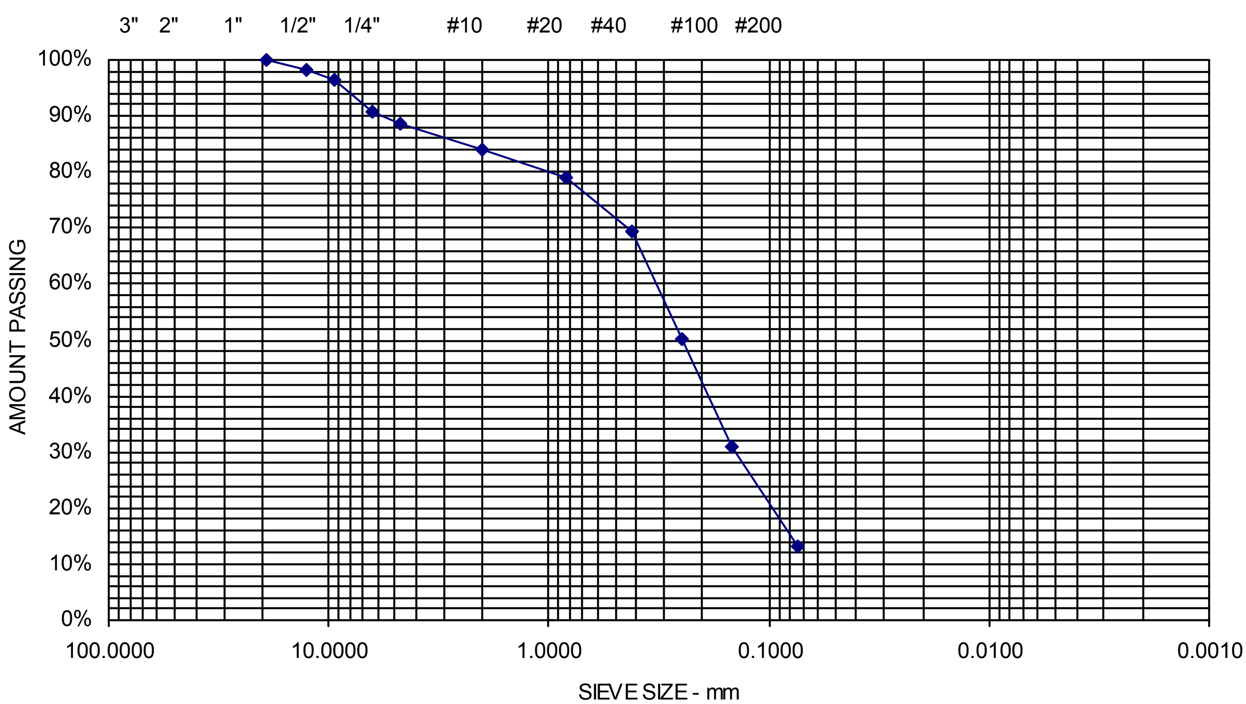
Index Testing Results

Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14883S
Exploration	**B43A**	Date Received	7/26/2016
Material Source	**S14, 59'**	Date Completed	8/5/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**98**	
9.5 mm	**3/8"**	**96**	
6.3 mm	**1/4"**	**91**	
4.75 mm	**No. 4**	**88**	11.5% Gravel
2.00 mm	**No. 10**	**84**	
850 um	**No. 20**	**79**	
425 um	**No. 40**	**69**	75.4% Sand
250 um	**No. 60**	**50**	
150 um	**No. 100**	**31**	
75 um	**No. 200**	**13.1**	13.1% Fines



Comments:

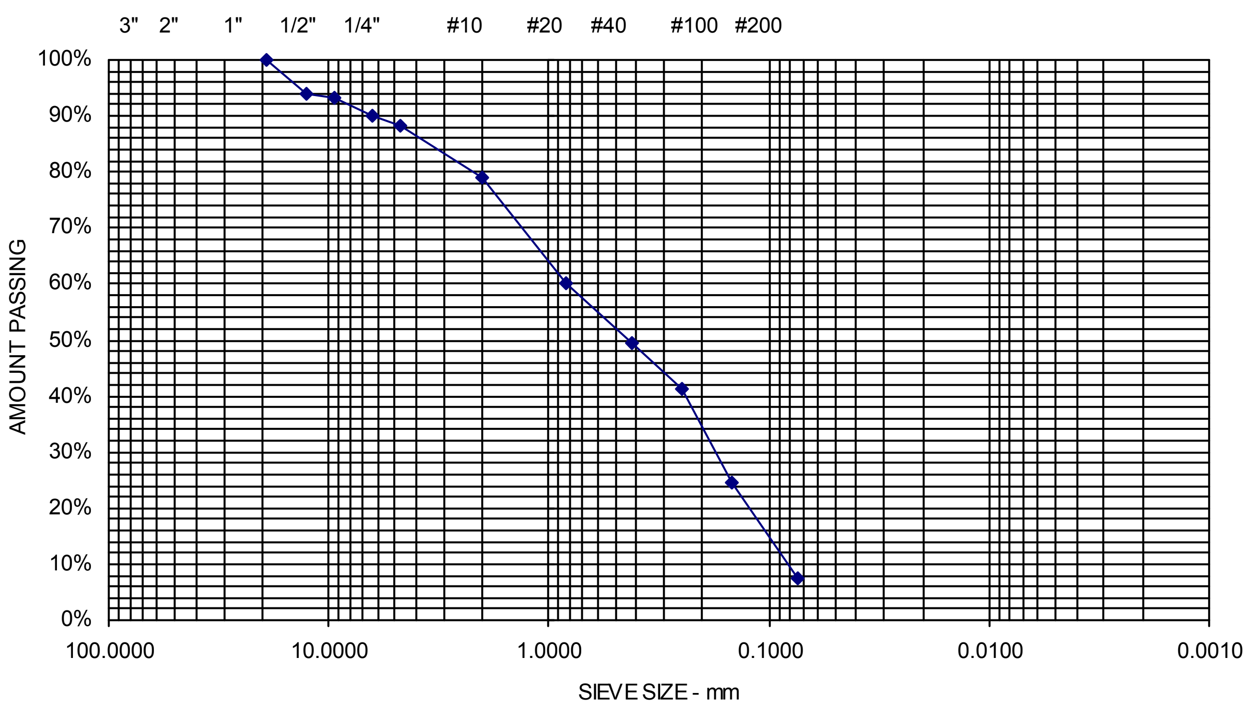
Sheet

Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14884S
Exploration	**B43B**	Date Received	7/26/2016
Material Source	**S2, 9'**	Date Completed	8/5/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**94**	
9.5 mm	**3/8"**	**93**	
6.3 mm	**1/4"**	**90**	
4.75 mm	**No. 4**	**88**	11.8% Gravel
2.00 mm	**No. 10**	**79**	
850 um	**No. 20**	**60**	
425 um	**No. 40**	**50**	80.9% Sand
250 um	**No. 60**	**41**	
150 um	**No. 100**	**24**	
75 um	**No. 200**	**7.4**	7.4% Fines



Comments:

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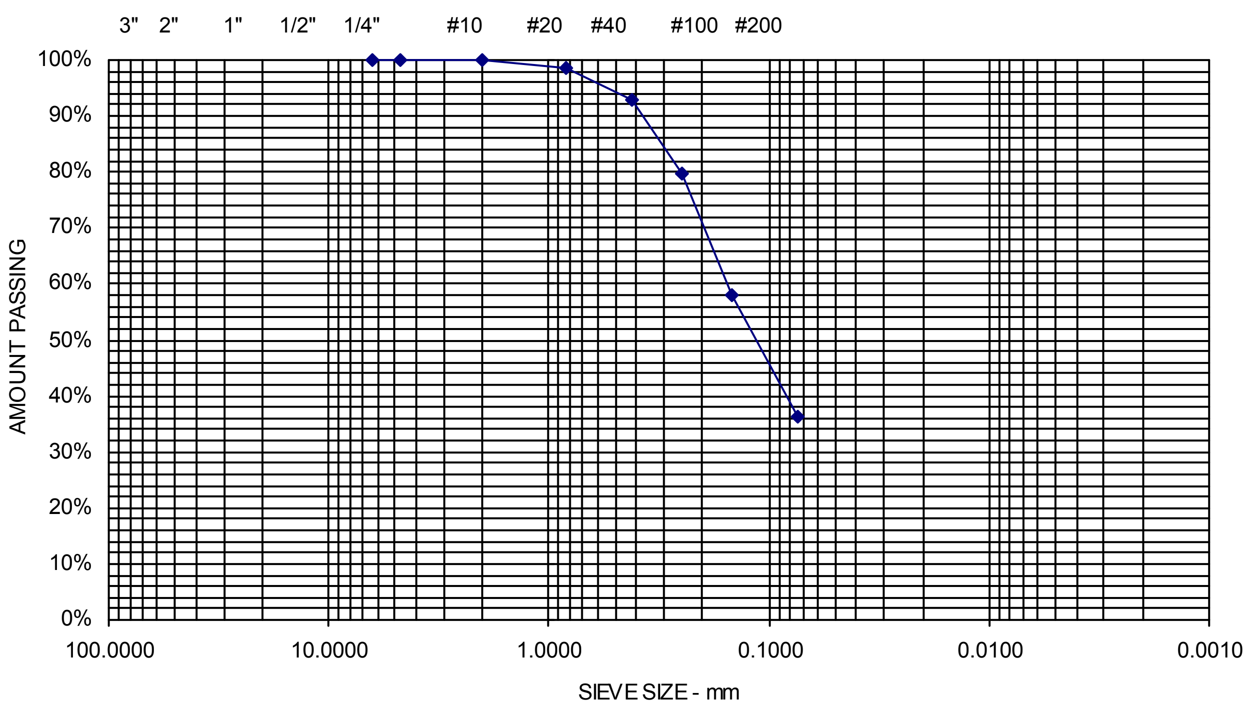
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14885S
Exploration	**B44A**	Date Received	7/26/2016
Material Source	**S6, 26'**	Date Completed	8/5/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**99**	
425 um	**No. 40**	**93**	63.6% Sand
250 um	**No. 60**	**80**	
150 um	**No. 100**	**58**	
75 um	**No. 200**	**36.4**	36.4% Fines



Comments:

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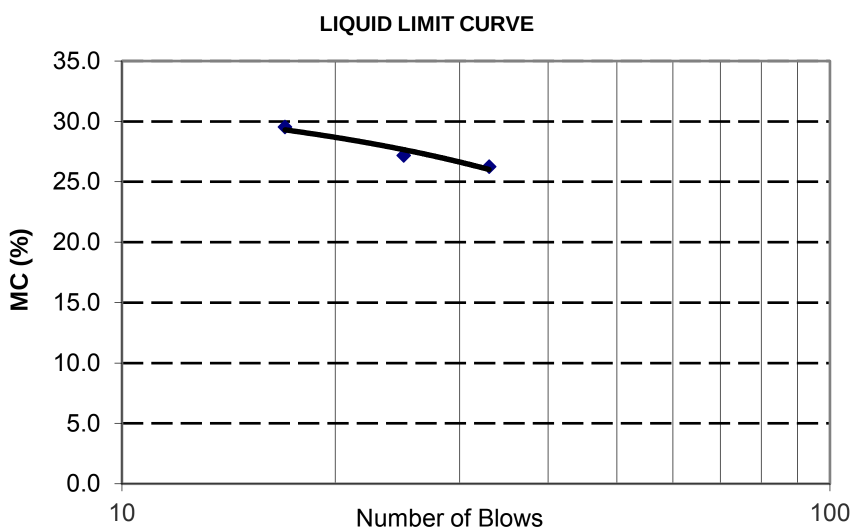
Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various NH	**Lab ID:**	14889S
Client:	Quanta Subsurface	**Date Received:**	07/26/16
Material Description:	Glaciolacustrine	**Date Completed:**	08/11/16
Material Source:	B45A, S5, 24'	**Tested By:**	BLG

Liquid Limit	**27**
Plastic Limit	**18**
Plasticity Index	**9**



Material Retained On the No. 40 Sieve: 12%

As-received Moisture Content: 23%

Comments: seams and lenses of fine sand and silt/clay

Reviewed By: ____________________

10 Centre Road, Somersworth, NH 03878-2926 • P: (603) 692.0088 • F: (603) 692.0044 • E: infosomersworth@swcole.com

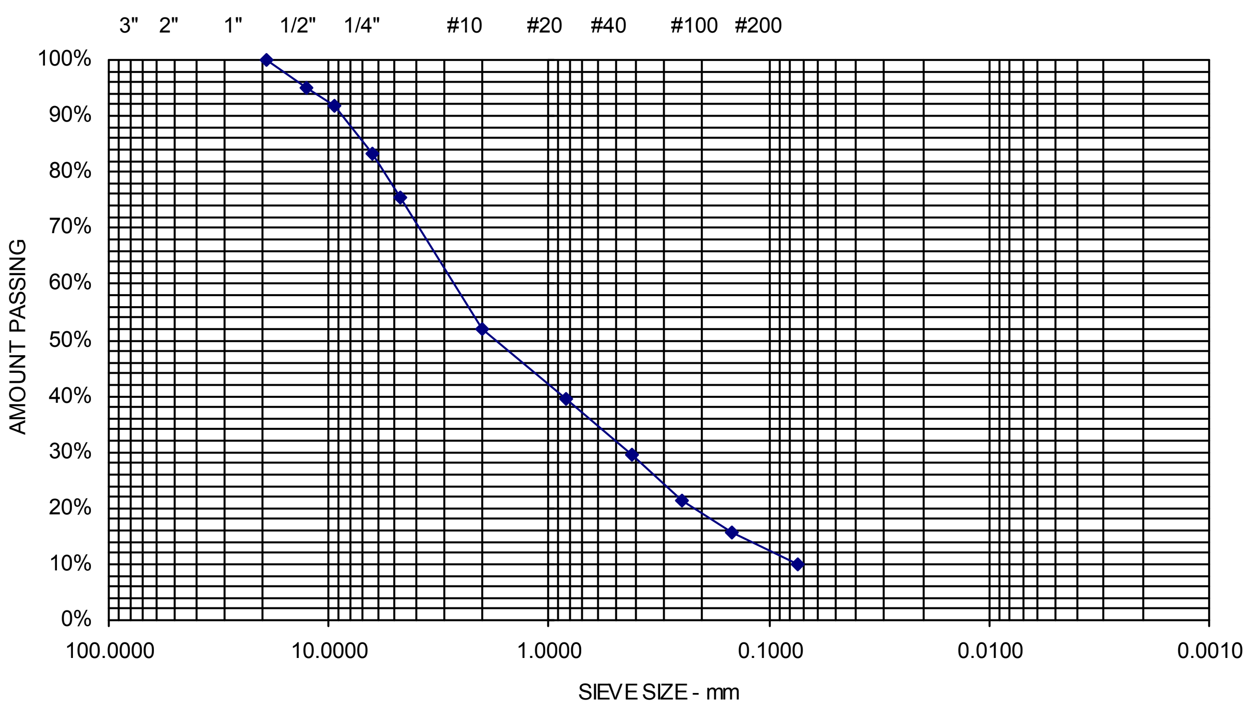
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14890S
Exploration	**B45B**	Date Received	7/26/2016
Material Source	**S3, 14'**	Date Completed	8/5/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**95**	
9.5 mm	**3/8"**	**92**	
6.3 mm	**1/4"**	**83**	
4.75 mm	**No. 4**	**75**	24.5% Gravel
2.00 mm	**No. 10**	**52**	
850 um	**No. 20**	**39**	
425 um	**No. 40**	**30**	65.4% Sand
250 um	**No. 60**	**21**	
150 um	**No. 100**	**16**	
75 um	**No. 200**	**10.1**	10.1% Fines



Comments:

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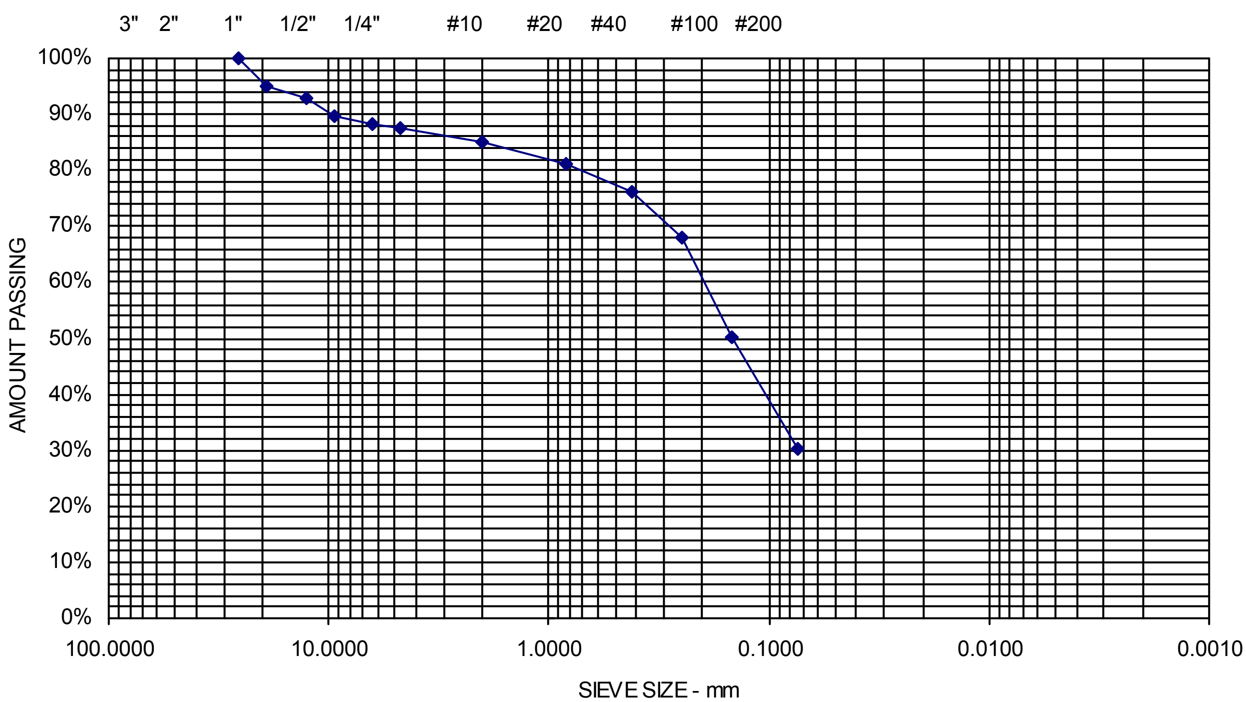
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14891S
Exploration	**B46A**	Date Received	7/26/2016
Material Source	**S5, 24.5'**	Date Completed	8/8/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**95**	
12.5 mm	**1/2"**	**93**	
9.5 mm	**3/8"**	**90**	
6.3 mm	**1/4"**	**88**	
4.75 mm	**No. 4**	**88**	12.4% Gravel
2.00 mm	**No. 10**	**85**	
850 um	**No. 20**	**81**	
425 um	**No. 40**	**76**	57.3% Sand
250 um	**No. 60**	**68**	
150 um	**No. 100**	**50**	
75 um	**No. 200**	**30.3**	30.3% Fines



Comments:

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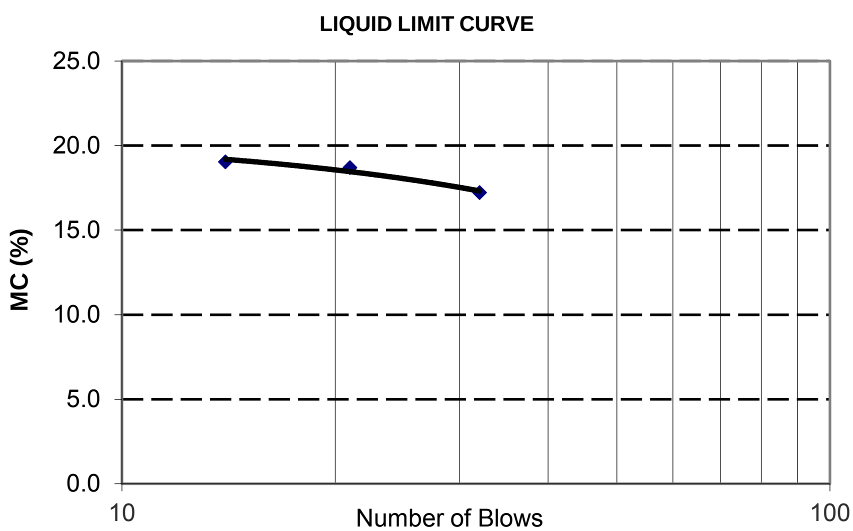
Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various NH	**Lab ID:**	14892S
Client:	Quanta Subsurface	**Date Received:**	07/26/16
Material Description:	Glaciolacustrine	**Date Completed:**	08/11/16
Material Source:	B44B, S4, 20'	**Tested By:**	BLG

Liquid Limit	**18**
Plastic Limit	
Plasticity Index	**Non-Plastic**



Material Retained On the No. 40 Sieve: 22%

As-received Moisture Content: 19%

Comments: seams and lenses of fine sand and silt/clay

Reviewed By: ______________________

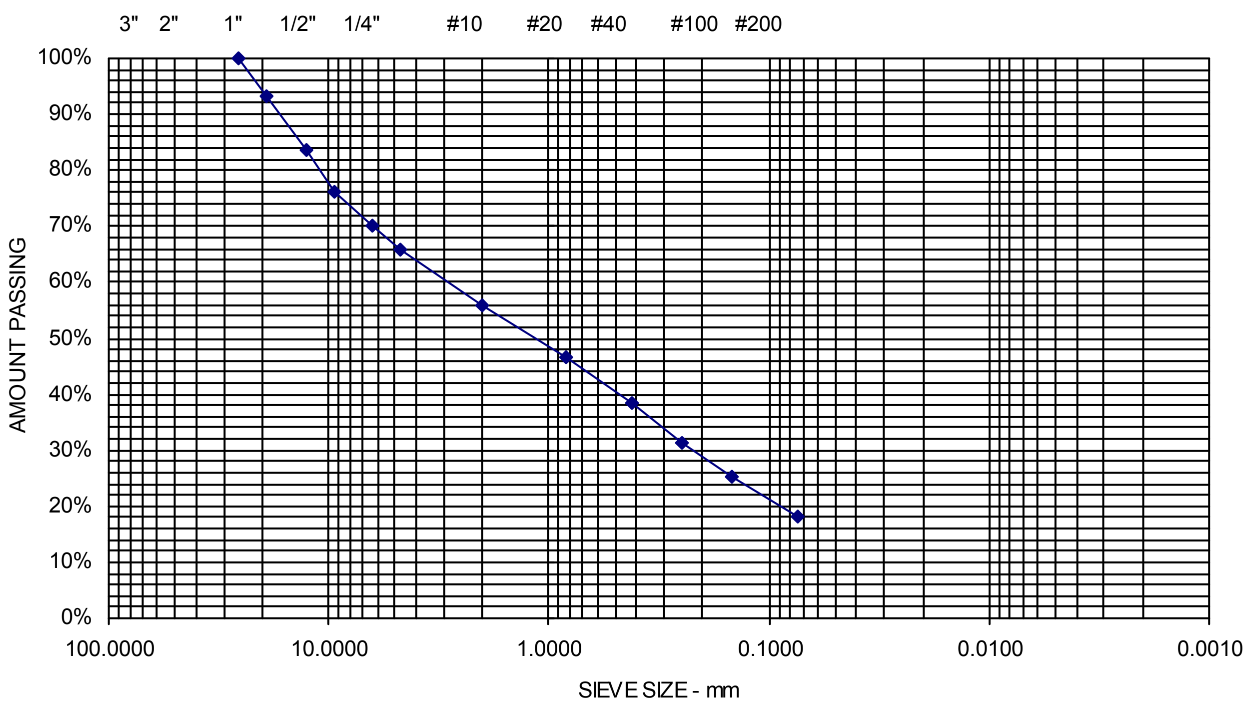
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14894S
Exploration	**B46B**	Date Received	7/26/2016
Material Source	**S4, 19.5'**	Date Completed	8/8/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**93**	
12.5 mm	**1/2"**	**83**	
9.5 mm	**3/8"**	**76**	
6.3 mm	**1/4"**	**70**	
4.75 mm	**No. 4**	**66**	34% Gravel
2.00 mm	**No. 10**	**56**	
850 um	**No. 20**	**47**	
425 um	**No. 40**	**38**	47.9% Sand
250 um	**No. 60**	**31**	
150 um	**No. 100**	**25**	
75 um	**No. 200**	**18.1**	18.1% Fines



Comments:

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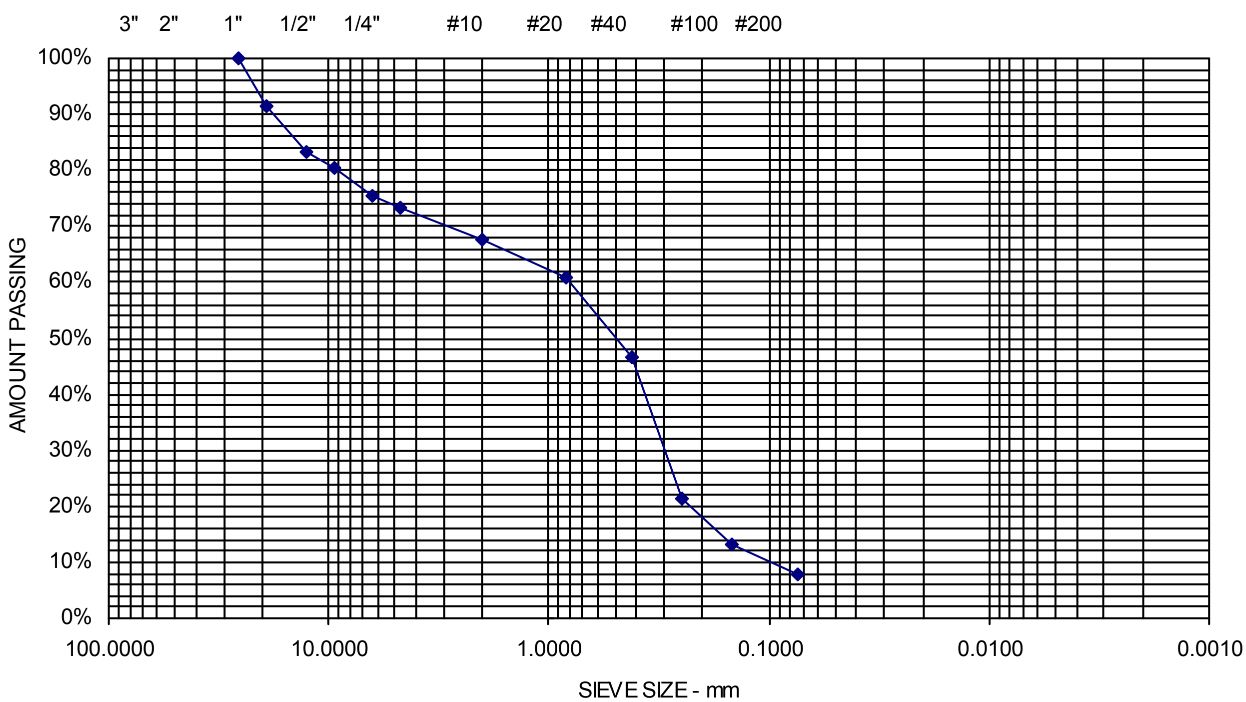
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14896S
Exploration	**B47A**	Date Received	7/26/2016
Material Source	**S3, 14'**	Date Completed	8/8/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**92**	
12.5 mm	**1/2"**	**83**	
9.5 mm	**3/8"**	**80**	
6.3 mm	**1/4"**	**76**	
4.75 mm	**No. 4**	**73**	26.7% Gravel
2.00 mm	**No. 10**	**68**	
850 um	**No. 20**	**61**	
425 um	**No. 40**	**46**	65.6% Sand
250 um	**No. 60**	**21**	
150 um	**No. 100**	**13**	
75 um	**No. 200**	**7.8**	7.8% Fines



Comments:

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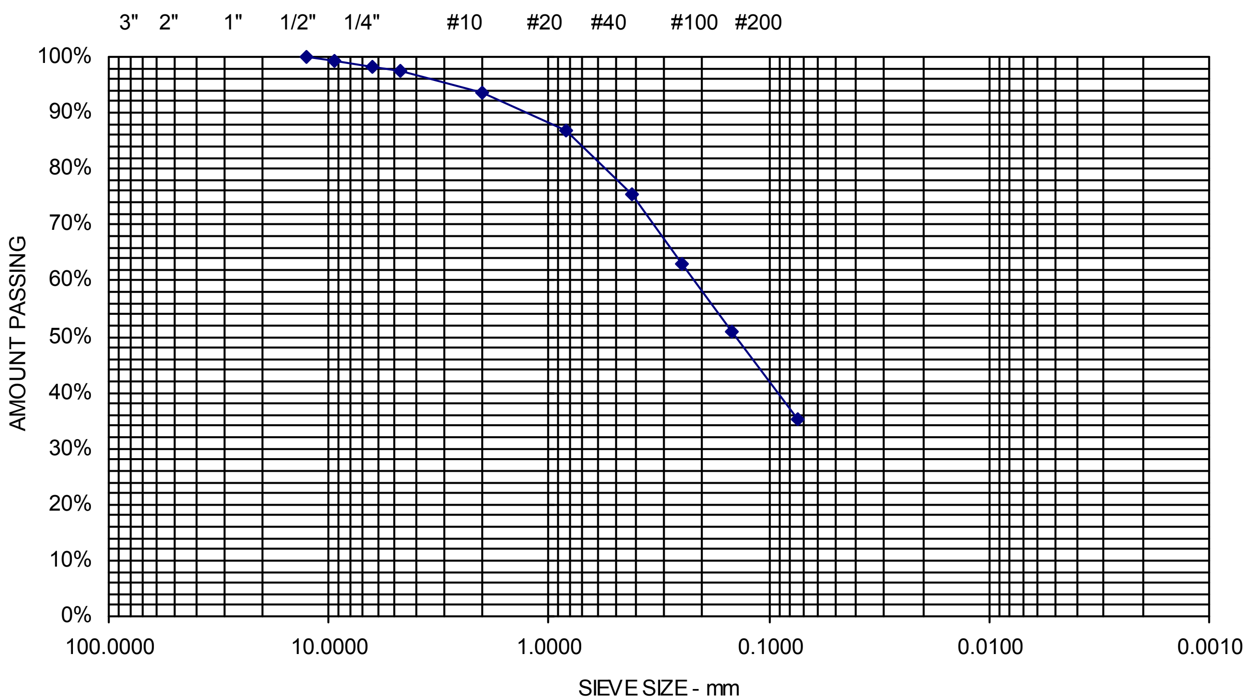
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14897S
Exploration	**B47A**	Date Received	7/26/2016
Material Source	**S6, 29'**	Date Completed	8/8/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**99**	
6.3 mm	**1/4"**	**98**	
4.75 mm	**No. 4**	**97**	2.7% Gravel
2.00 mm	**No. 10**	**94**	
850 um	**No. 20**	**87**	
425 um	**No. 40**	**76**	62% Sand
250 um	**No. 60**	**63**	
150 um	**No. 100**	**51**	
75 um	**No. 200**	**35.3**	35.3% Fines



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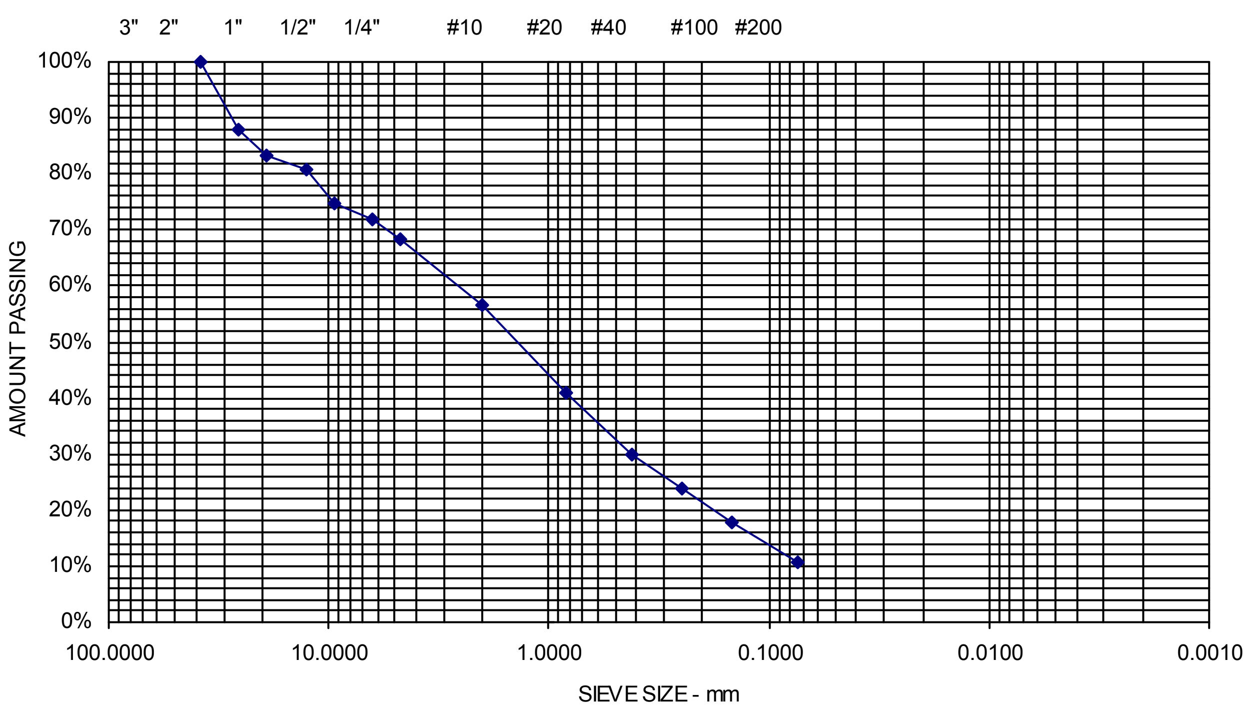
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14898S
Exploration	**B47B**	Date Received	7/26/2016
Material Source	**S4, 19'**	Date Completed	8/9/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**88**	
19.0 mm	**3/4"**	**83**	
12.5 mm	**1/2"**	**81**	
9.5 mm	**3/8"**	**75**	
6.3 mm	**1/4"**	**72**	
4.75 mm	**No. 4**	**68**	31.6% Gravel
2.00 mm	**No. 10**	**57**	
850 um	**No. 20**	**41**	
425 um	**No. 40**	**30**	57.6% Sand
250 um	**No. 60**	**24**	
150 um	**No. 100**	**18**	
75 um	**No. 200**	**10.8**	10.8% Fines



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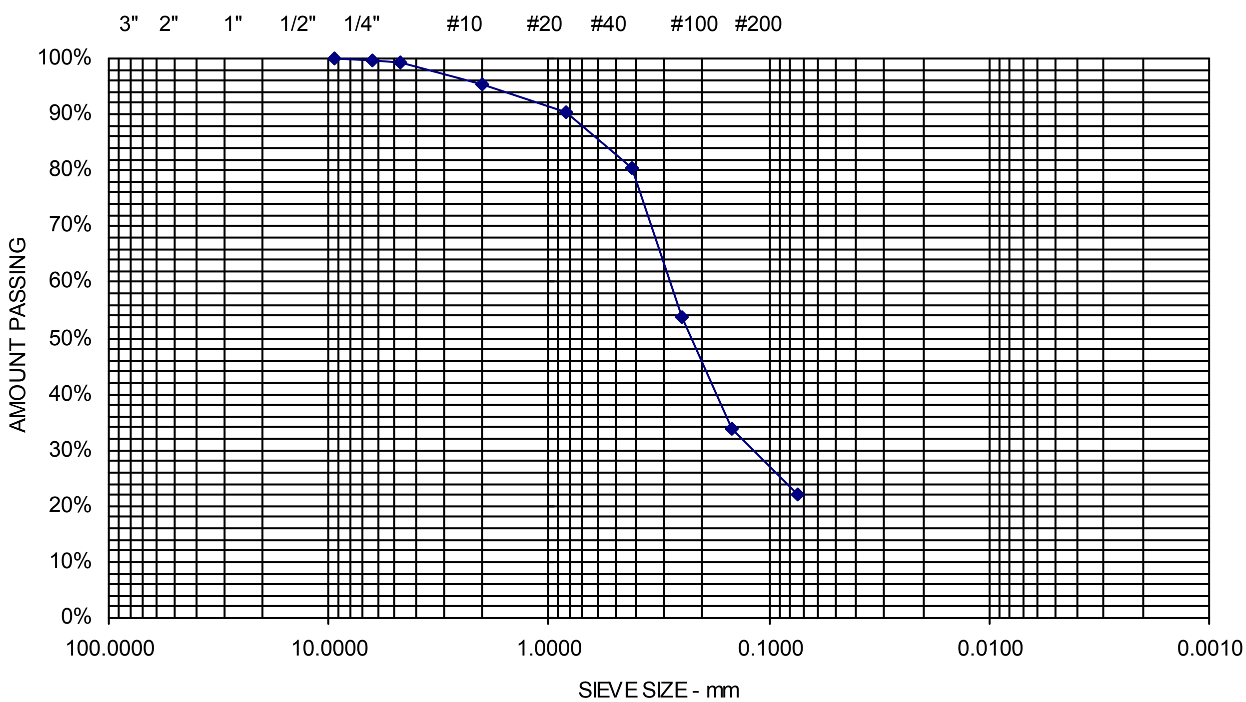
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14899S
Exploration	**B48A**	Date Received	7/26/2016
Material Source	**S5, 24'**	Date Completed	8/9/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**99**	0.7% Gravel
2.00 mm	**No. 10**	**96**	
850 um	**No. 20**	**90**	
425 um	**No. 40**	**80**	77.3% Sand
250 um	**No. 60**	**54**	
150 um	**No. 100**	**34**	
75 um	**No. 200**	**22.0**	22% Fines



Comments:

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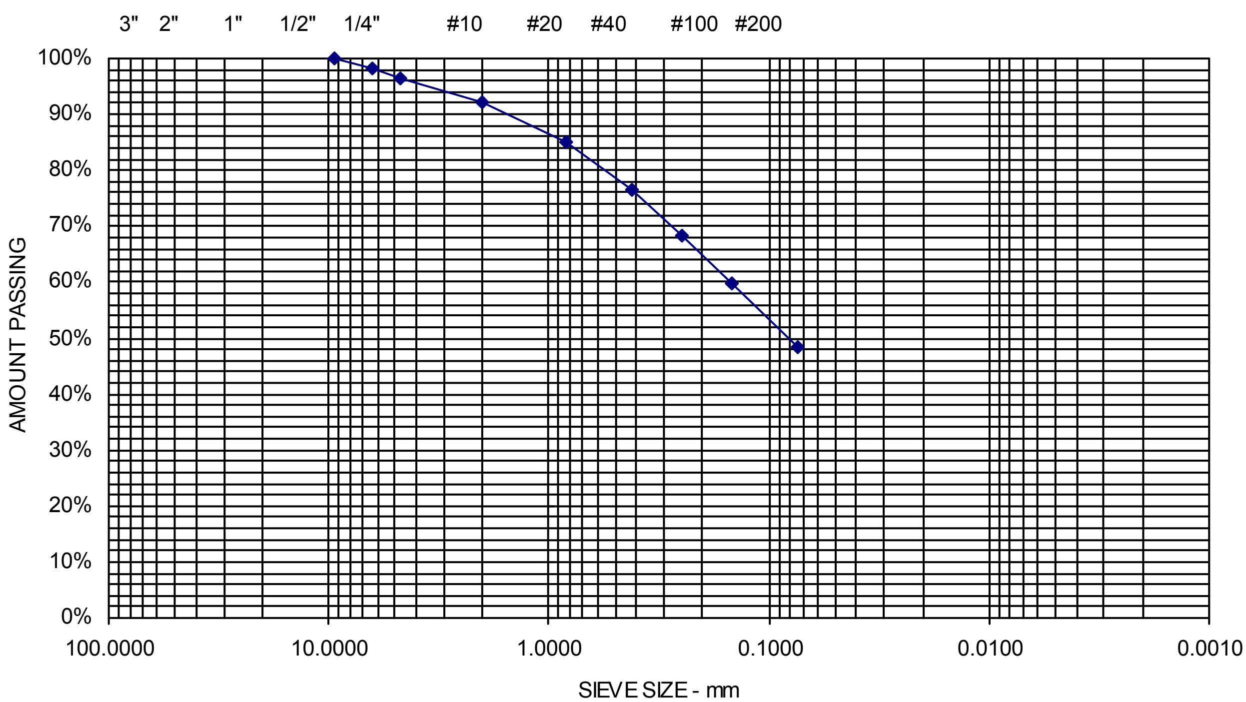
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES		Project Number	16-0600
Client	QUANTA SUBSURFACE		Lab ID	14901S
Exploration	**B48B**		Date Received	7/26/2016
Material Source	**S3, 14'**		Date Completed	8/9/2016
			Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**98**	
4.75 mm	**No. 4**	**97**	3.4% Gravel
2.00 mm	**No. 10**	**92**	
850 um	**No. 20**	**85**	
425 um	**No. 40**	**76**	48.1% Sand
250 um	**No. 60**	**68**	
150 um	**No. 100**	**60**	
75 um	**No. 200**	**48.5**	48.5% Fines



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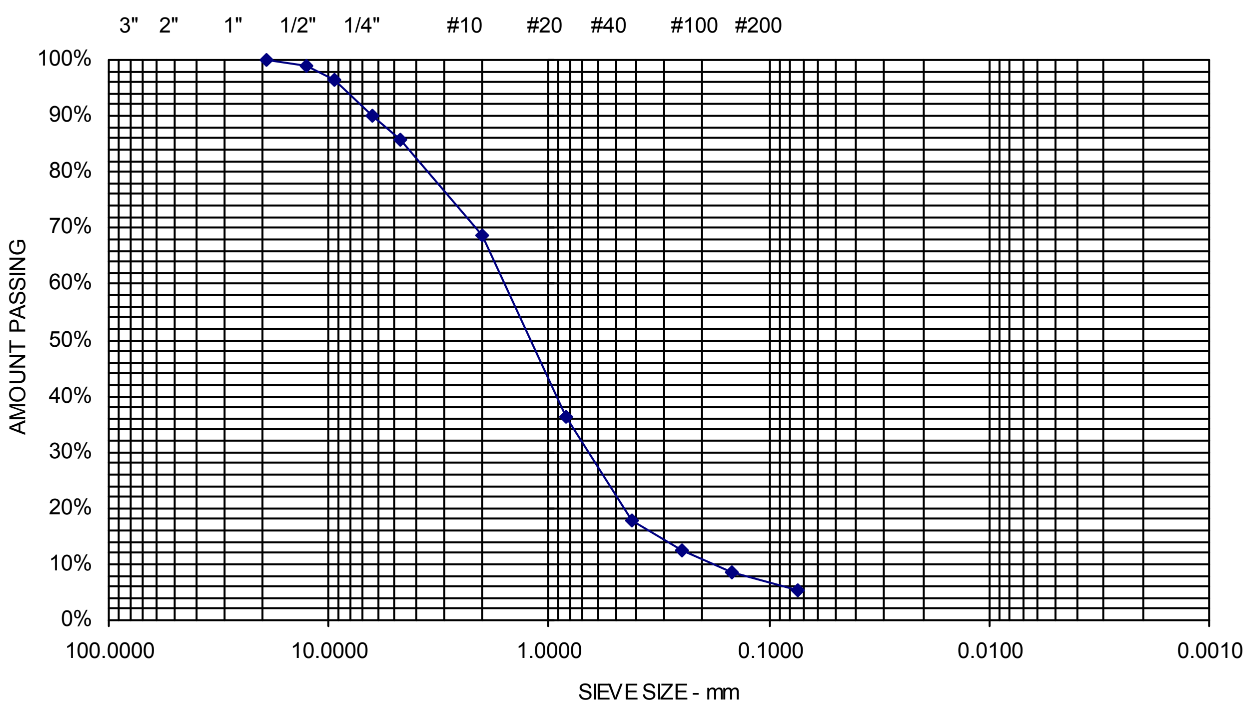
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14903S
Exploration	**B51A**	Date Received	7/26/2016
Material Source	**S4, 19'**	Date Completed	8/9/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**99**	
9.5 mm	**3/8"**	**96**	
6.3 mm	**1/4"**	**90**	
4.75 mm	**No. 4**	**86**	14.3% Gravel
2.00 mm	**No. 10**	**69**	
850 um	**No. 20**	**36**	
425 um	**No. 40**	**18**	80.5% Sand
250 um	**No. 60**	**12**	
150 um	**No. 100**	**9**	
75 um	**No. 200**	**5.2**	5.2% Fines



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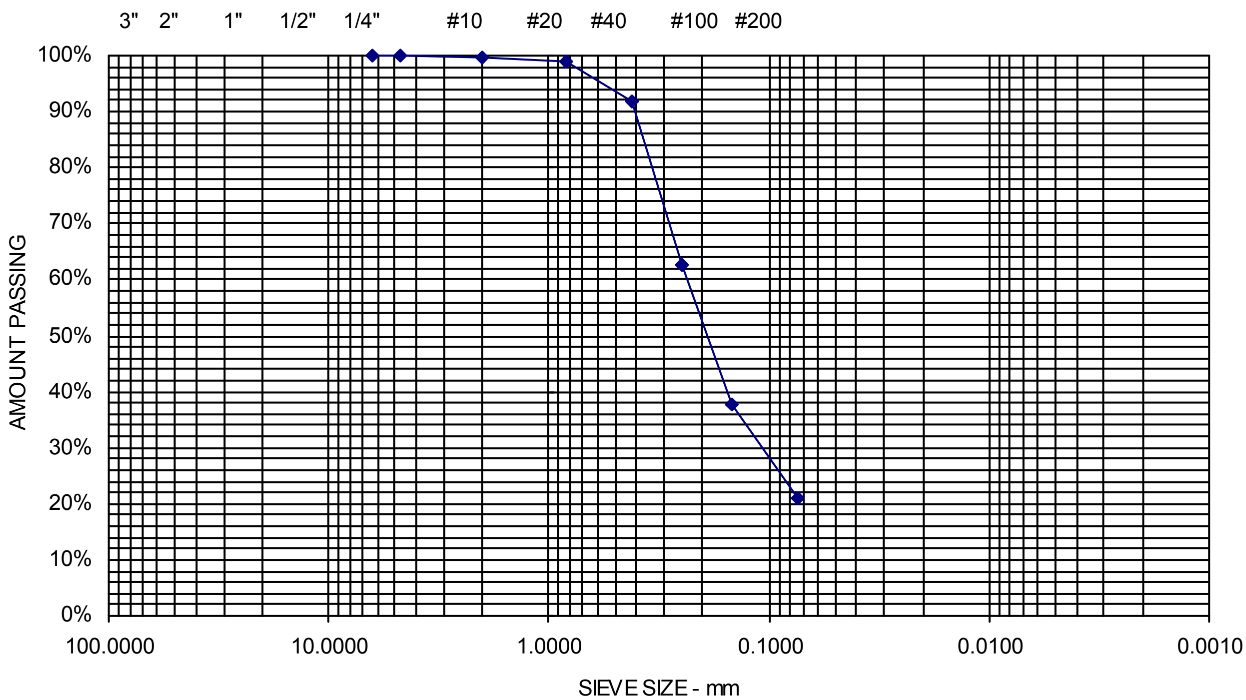
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14905S
Exploration	**B51B**	Date Received	7/26/2016
Material Source	**S3, 13'**	Date Completed	8/8/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0.1% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**99**	
425 um	**No. 40**	**92**	79% Sand
250 um	**No. 60**	**63**	
150 um	**No. 100**	**38**	
75 um	**No. 200**	**20.9**	20.9% Fines



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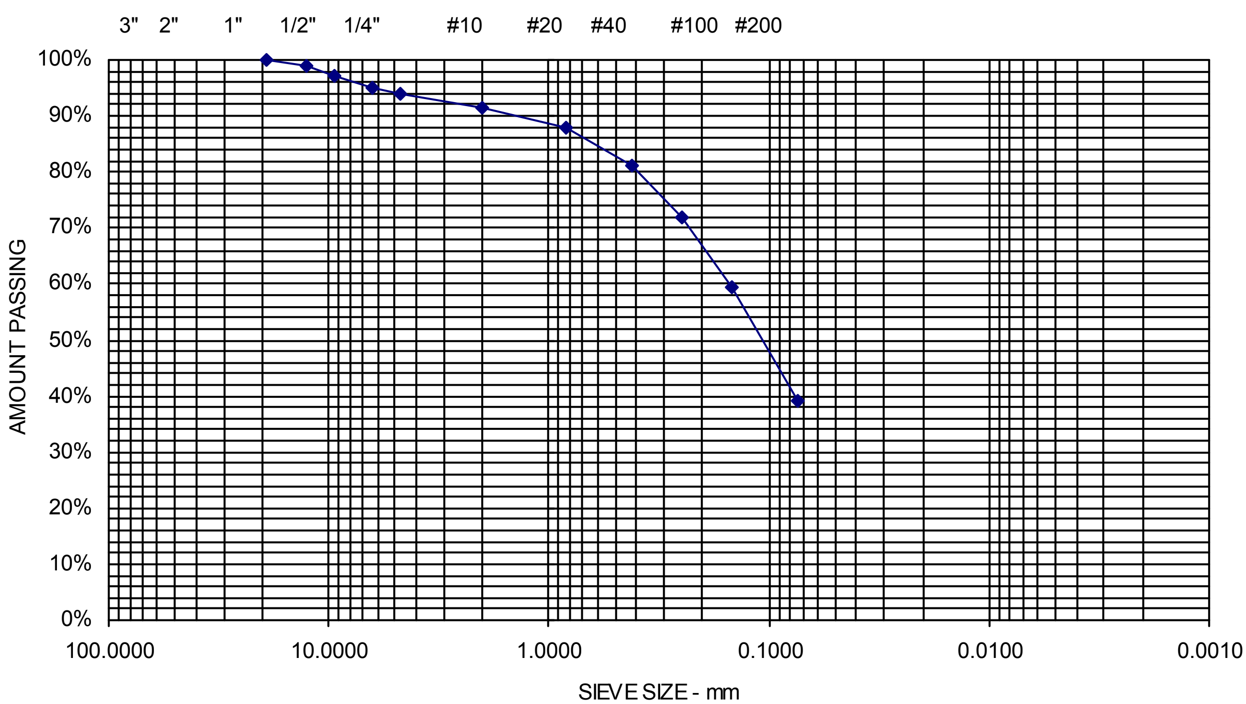
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14906S
Exploration	**B51B**	Date Received	7/26/2016
Material Source	**S6, 28'**	Date Completed	8/8/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**99**	
9.5 mm	**3/8"**	**97**	
6.3 mm	**1/4"**	**95**	
4.75 mm	**No. 4**	**94**	6.1% Gravel
2.00 mm	**No. 10**	**91**	
850 um	**No. 20**	**88**	
425 um	**No. 40**	**81**	54.8% Sand
250 um	**No. 60**	**72**	
150 um	**No. 100**	**59**	
75 um	**No. 200**	**39.1**	39.1% Fines



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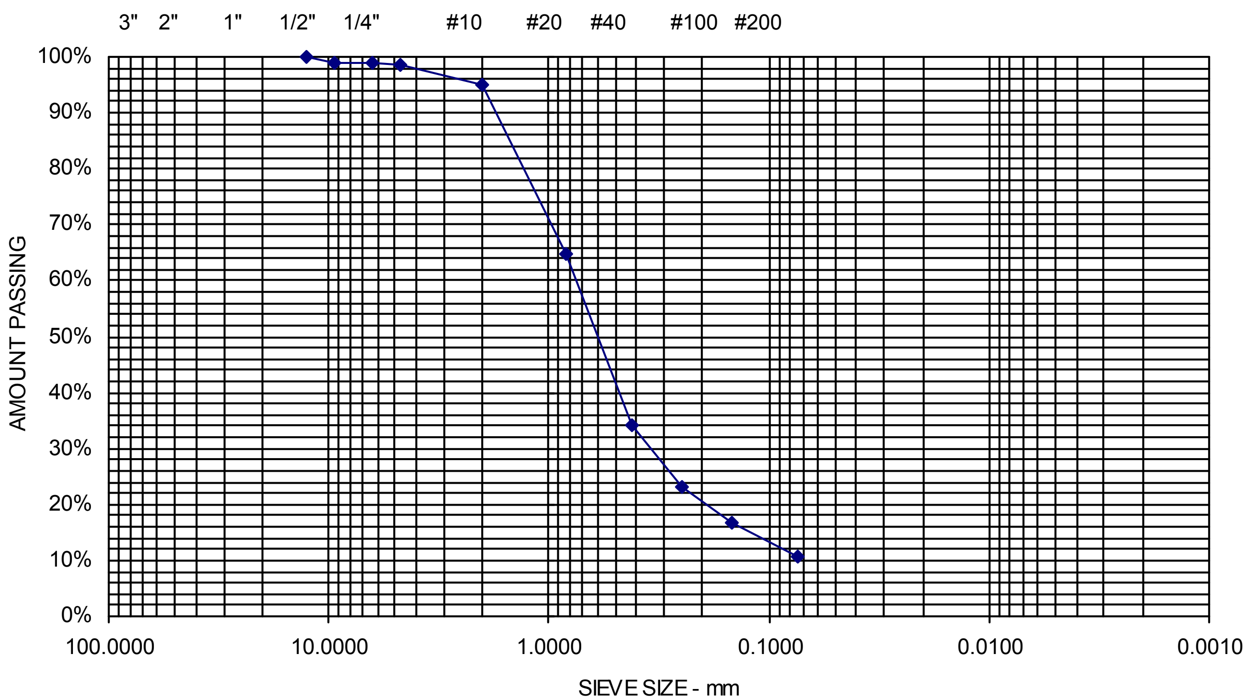
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14963S
Exploration	**BH 036A**	Date Received	8/22/2016
Material Source	**S4, 24'**	Date Completed	8/24/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**99**	
6.3 mm	**1/4"**	**99**	
4.75 mm	**No. 4**	**99**	1.4% Gravel
2.00 mm	**No. 10**	**95**	
850 um	**No. 20**	**65**	
425 um	**No. 40**	**34**	88% Sand
250 um	**No. 60**	**23**	
150 um	**No. 100**	**17**	
75 um	**No. 200**	**10.6**	10.6% Fines



Comments:

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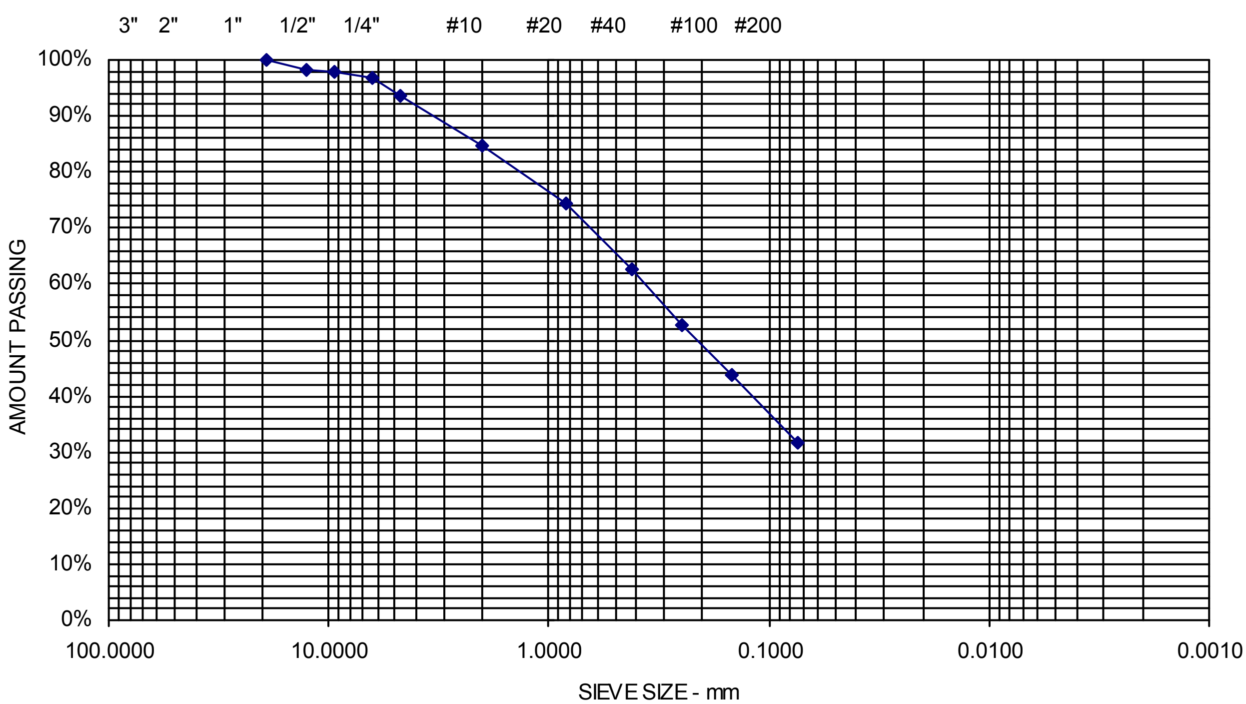
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14964S
Exploration	**BH 036C**	Date Received	8/22/2016
Material Source	**S2, 9'**	Date Completed	8/24/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/μm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**98**	
9.5 mm	**3/8"**	**98**	
6.3 mm	**1/4"**	**97**	
4.75 mm	**No. 4**	**93**	6.5% Gravel
2.00 mm	**No. 10**	**85**	
850 um	**No. 20**	**74**	
425 um	**No. 40**	**63**	61.6% Sand
250 um	**No. 60**	**53**	
150 um	**No. 100**	**44**	
75 um	**No. 200**	**31.8**	31.8% Fines



Comments: Moisture Content = 11.9%

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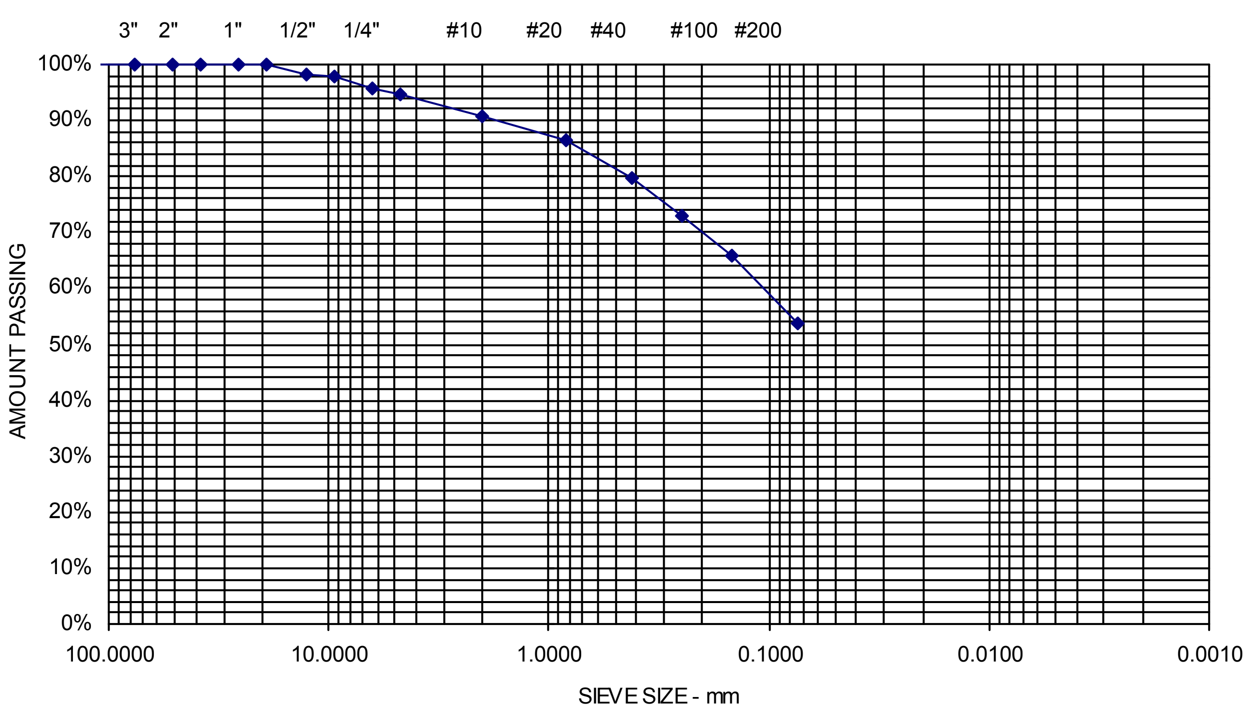
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
		Lab ID	14965S
Client	QUANTA SUBSURFACE	Date Received	8/22/2016
Exploration	**BH 037A**	Date Completed	8/24/2016
Material Source	**S4, 19'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**98**	
9.5 mm	**3/8"**	**98**	
6.3 mm	**1/4"**	**96**	
4.75 mm	**No. 4**	**95**	5.3% Gravel
2.00 mm	**No. 10**	**91**	
850 um	**No. 20**	**86**	
425 um	**No. 40**	**80**	41% Sand
250 um	**No. 60**	**73**	
150 um	**No. 100**	**66**	
75 um	**No. 200**	**53.8**	53.8% Fines



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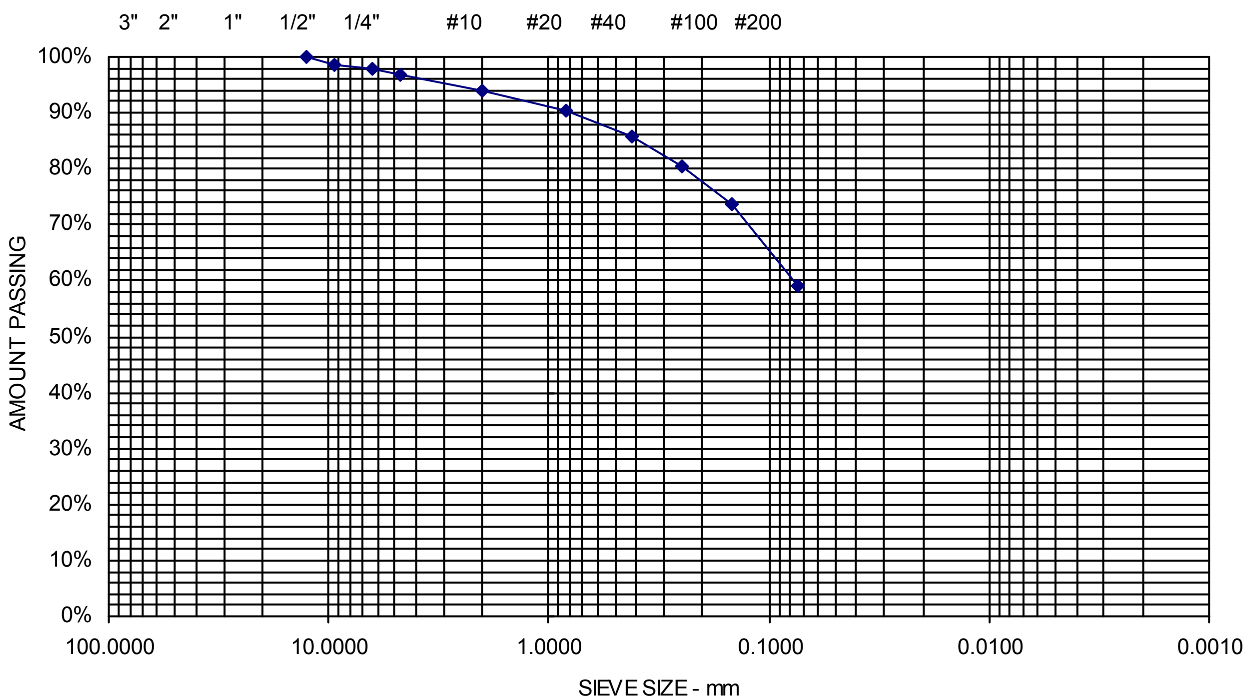
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14966S
Exploration	**BH 037A**	Date Received	8/22/2016
Material Source	**S9, 44'**	Date Completed	8/24/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**99**	
6.3 mm	**1/4"**	**98**	
4.75 mm	**No. 4**	**97**	3.2% Gravel
2.00 mm	**No. 10**	**94**	
850 um	**No. 20**	**91**	
425 um	**No. 40**	**86**	37.9% Sand
250 um	**No. 60**	**80**	
150 um	**No. 100**	**74**	
75 um	**No. 200**	**58.9**	58.9% Fines



Comments: Moisture Content = 11.6%

Sheet

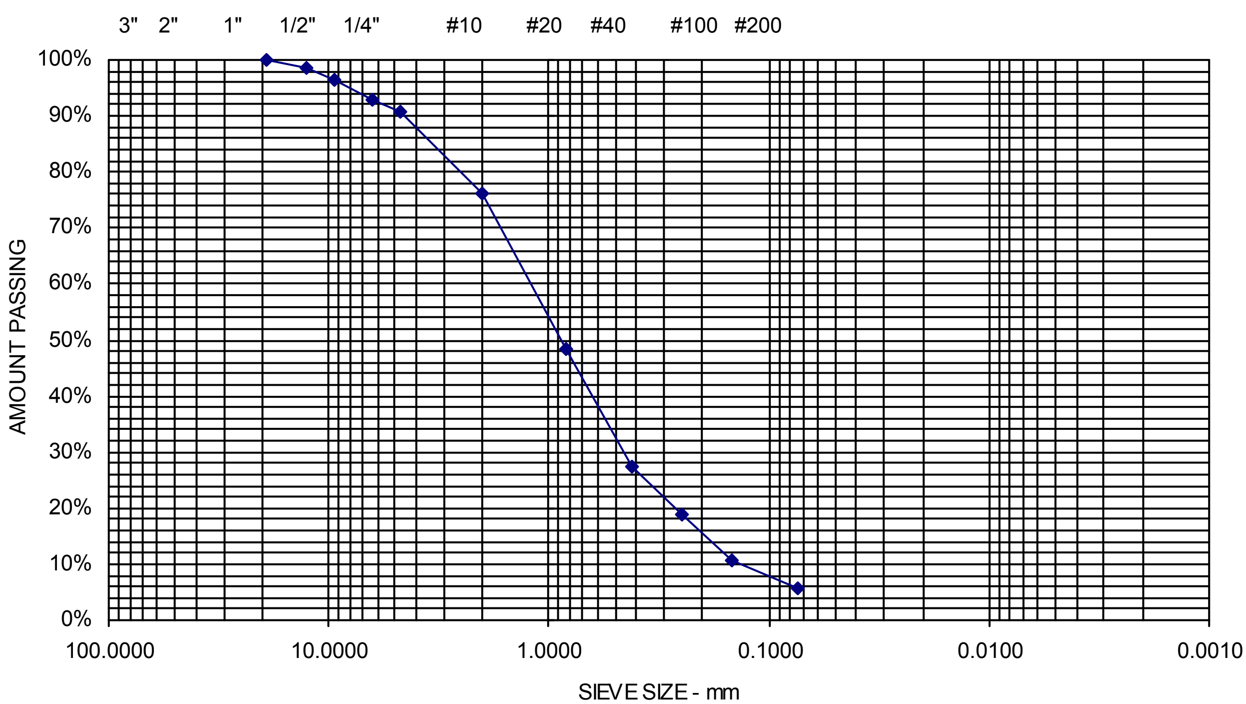
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14967S
Exploration	**BH 040A**	Date Received	8/22/2016
Material Source	**S6, 29'**	Date Completed	8/24/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**98**	
9.5 mm	**3/8"**	**96**	
6.3 mm	**1/4"**	**93**	
4.75 mm	**No. 4**	**91**	9.1% Gravel
2.00 mm	**No. 10**	**76**	
850 um	**No. 20**	**48**	
425 um	**No. 40**	**28**	85.1% Sand
250 um	**No. 60**	**19**	
150 um	**No. 100**	**11**	
75 um	**No. 200**	**5.8**	5.8% Fines



Comments:

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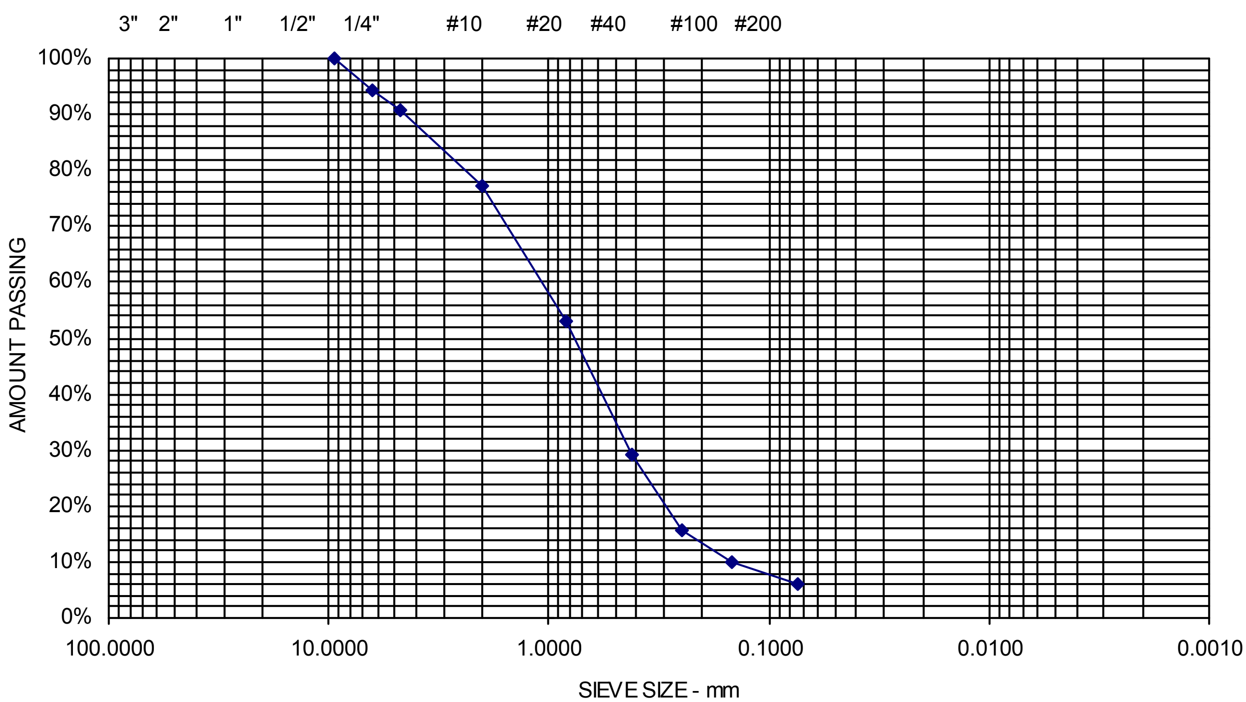
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14968S
Exploration	**BH 040B**	Date Received	8/22/2016
Material Source	**S7, 34'**	Date Completed	8/26/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**94**	
4.75 mm	**No. 4**	**91**	9.1% Gravel
2.00 mm	**No. 10**	**77**	
850 um	**No. 20**	**53**	
425 um	**No. 40**	**29**	84.9% Sand
250 um	**No. 60**	**16**	
150 um	**No. 100**	**10**	
75 um	**No. 200**	**6.0**	6% Fines



Comments:

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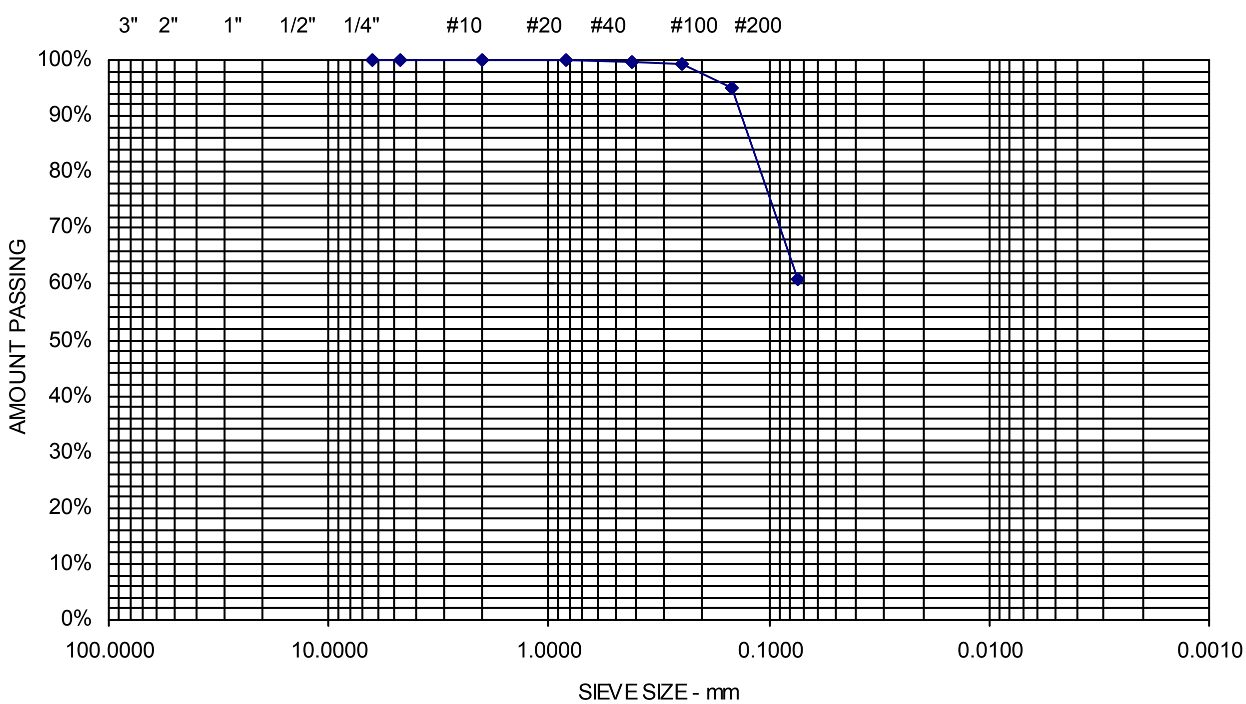
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14969S
Exploration	**BH 041A**	Date Received	8/22/2016
Material Source	**S4, 19'**	Date Completed	8/26/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	39.2% Sand
250 um	**No. 60**	**99**	
150 um	**No. 100**	**95**	
75 um	**No. 200**	**60.8**	60.8% Fines



Comments: Moisture Content = 28.2%

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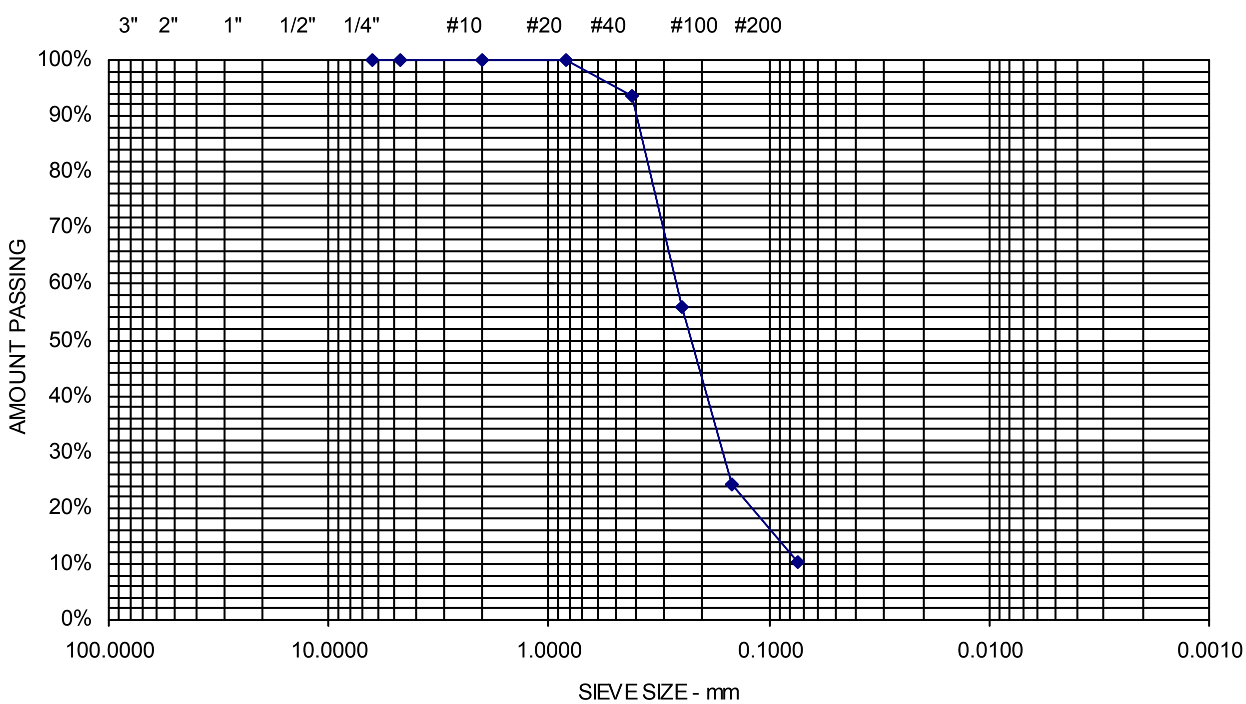
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14971S
Exploration	**BH 042A**	Date Received	8/22/2016
Material Source	**S8, 39'**	Date Completed	8/26/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**94**	89.5% Sand
250 um	**No. 60**	**56**	
150 um	**No. 100**	**24**	
75 um	**No. 200**	**10.5**	10.5% Fines



Comments:

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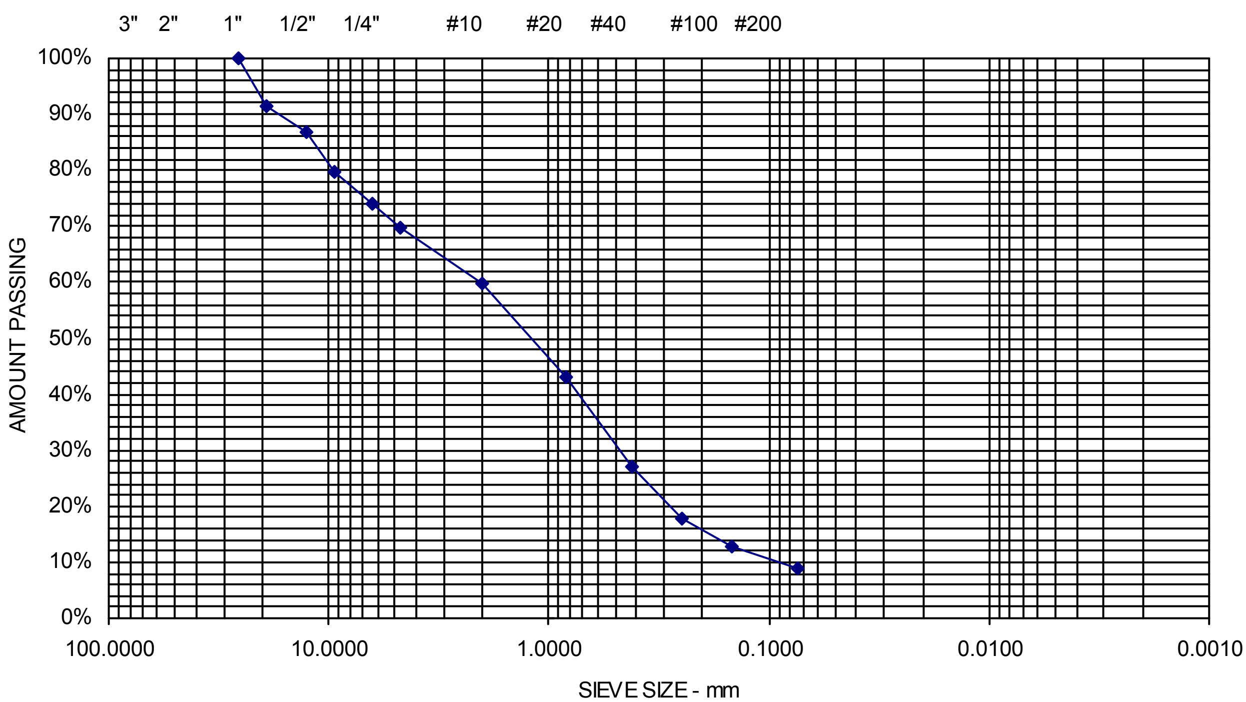
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14972S
Exploration	**BH 042B**	Date Received	8/22/2016
Material Source	**S1, 4'**	Date Completed	8/26/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**91**	
12.5 mm	**1/2"**	**87**	
9.5 mm	**3/8"**	**80**	
6.3 mm	**1/4"**	**74**	
4.75 mm	**No. 4**	**70**	30.3% Gravel
2.00 mm	**No. 10**	**60**	
850 um	**No. 20**	**43**	
425 um	**No. 40**	**27**	60.8% Sand
250 um	**No. 60**	**18**	
150 um	**No. 100**	**13**	
75 um	**No. 200**	**8.9**	8.9% Fines



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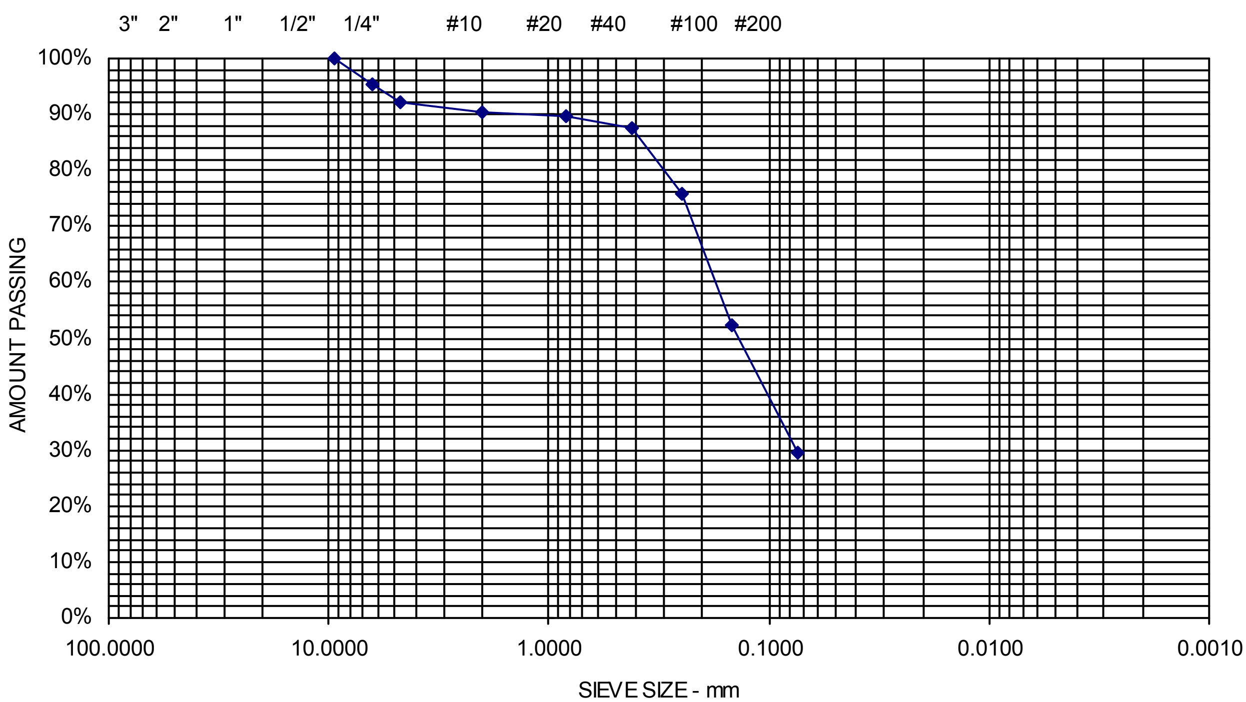
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	14973S
Exploration	**BH 052B**	Date Received	8/22/2016
Material Source	**S4, 19'**	Date Completed	8/26/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**96**	
4.75 mm	**No. 4**	**92**	7.9% Gravel
2.00 mm	**No. 10**	**91**	
850 um	**No. 20**	**90**	
425 um	**No. 40**	**88**	62.6% Sand
250 um	**No. 60**	**76**	
150 um	**No. 100**	**52**	
75 um	**No. 200**	**29.5**	29.5% Fines



Comments: Moisture Content = 16.6%

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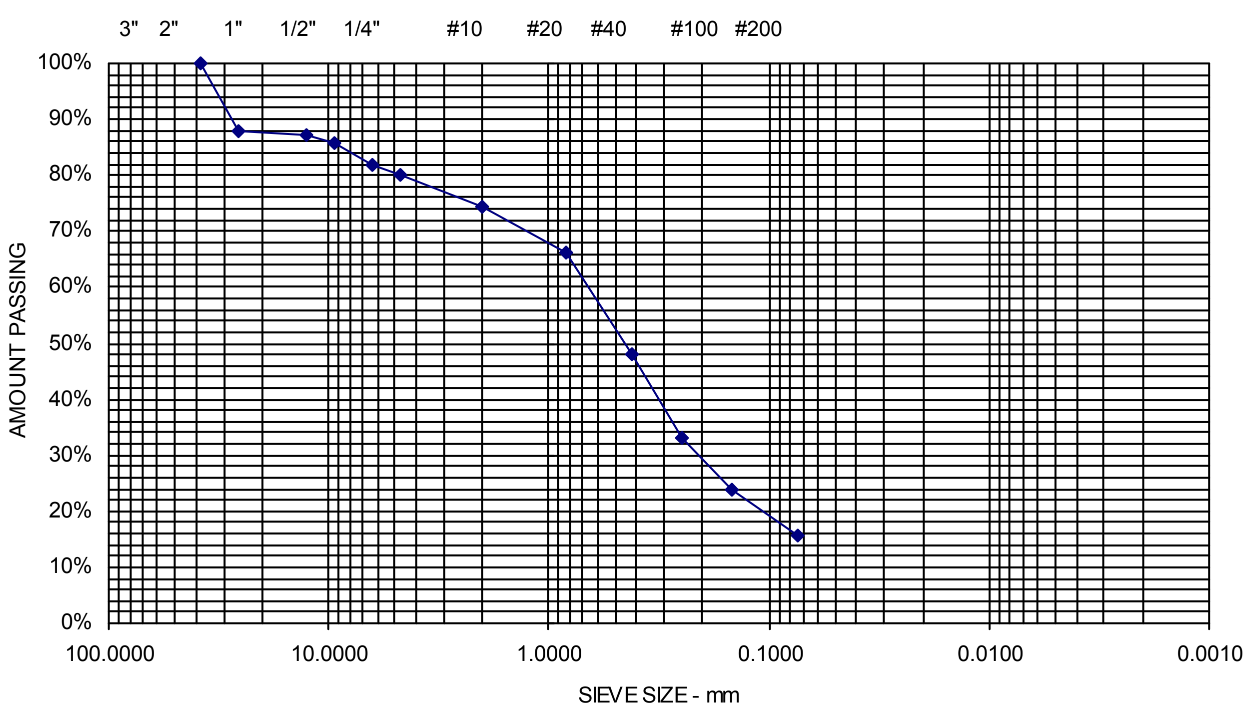
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15012S
		Date Received	9/6/2016
		Date Completed	9/8/2016
Material Source	**B14A, S6, 29'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**88**	
12.5 mm	**1/2"**	**87**	
9.5 mm	**3/8"**	**86**	
6.3 mm	**1/4"**	**82**	
4.75 mm	**No. 4**	**80**	19.8% Gravel
2.00 mm	**No. 10**	**75**	
850 um	**No. 20**	**66**	
425 um	**No. 40**	**48**	64.6% Sand
250 um	**No. 60**	**33**	
150 um	**No. 100**	**24**	
75 um	**No. 200**	**15.5**	15.5% Fines



Comments: Moisture Content = 13.2%

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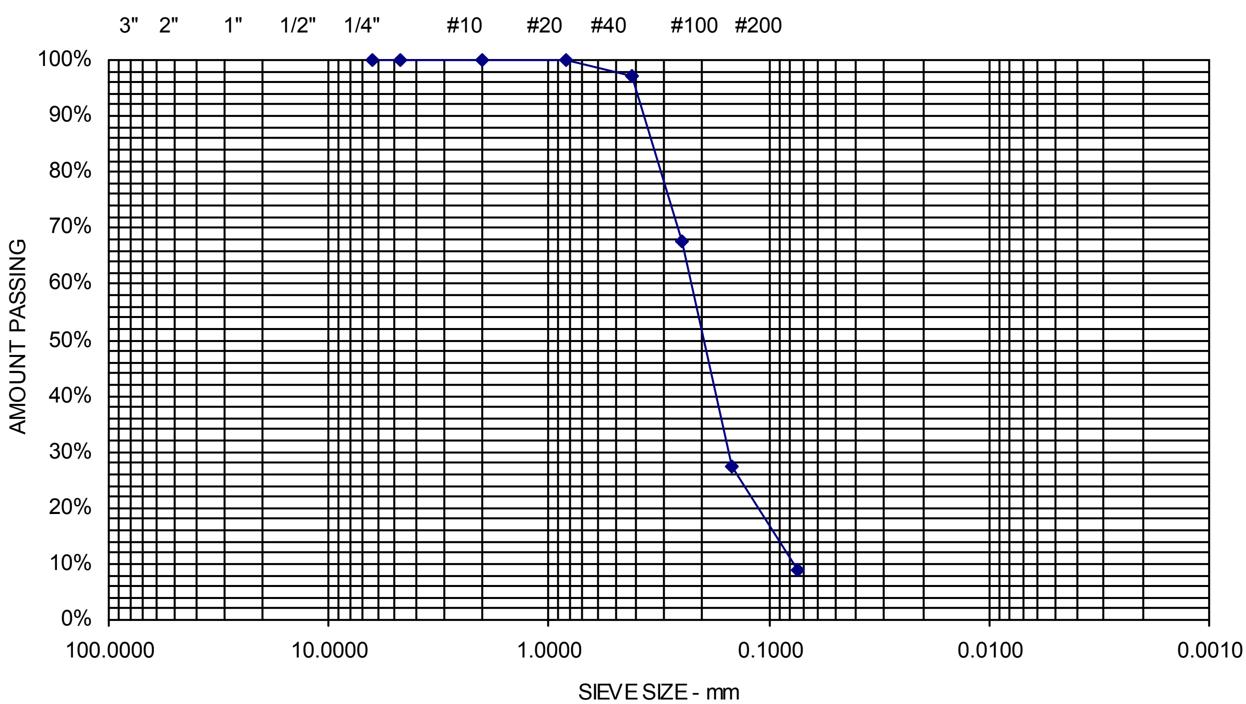
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15013S
		Date Received	9/6/2016
		Date Completed	9/8/2016
Material Source	**B14B, S7, 34'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**97**	91.2% Sand
250 um	**No. 60**	**68**	
150 um	**No. 100**	**27**	
75 um	**No. 200**	**8.8**	8.8% Fines



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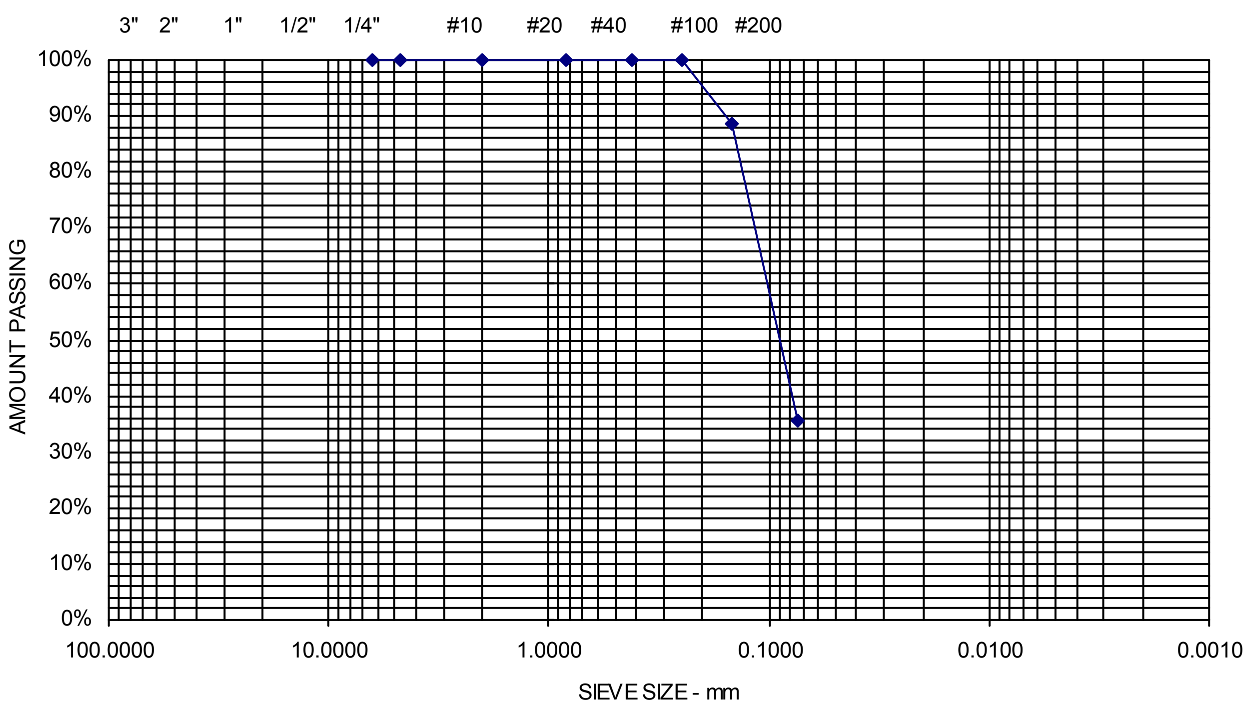
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15014S
		Date Received	9/6/2016
		Date Completed	9/8/2016
Material Source	**B15A, S6, 29'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	64.4% Sand
250 um	**No. 60**	**100**	
150 um	**No. 100**	**89**	
75 um	**No. 200**	**35.6**	35.6% Fines



Comments: Moisture Content = 21.5%

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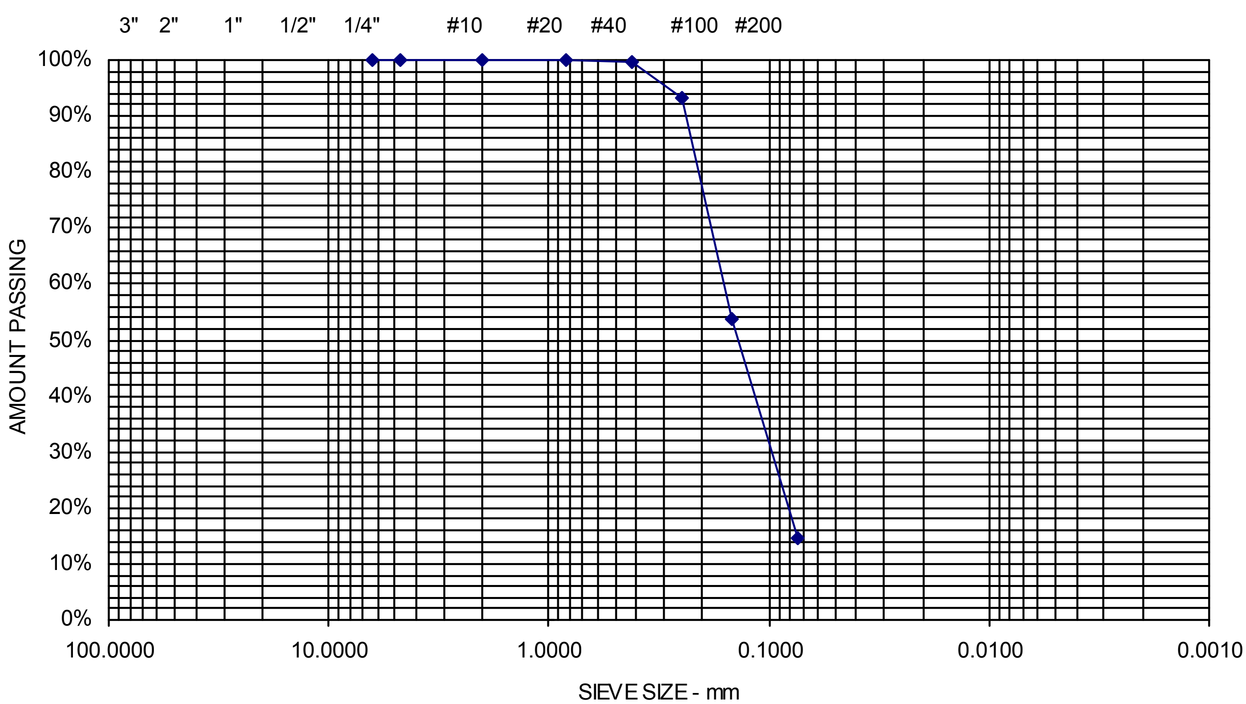
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15015S
		Date Received	9/6/2016
		Date Completed	9/8/2016
Material Source	**B16A, S5, 24.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	85.4% Sand
250 um	**No. 60**	**93**	
150 um	**No. 100**	**54**	
75 um	**No. 200**	**14.6**	14.6% Fines



Comments:

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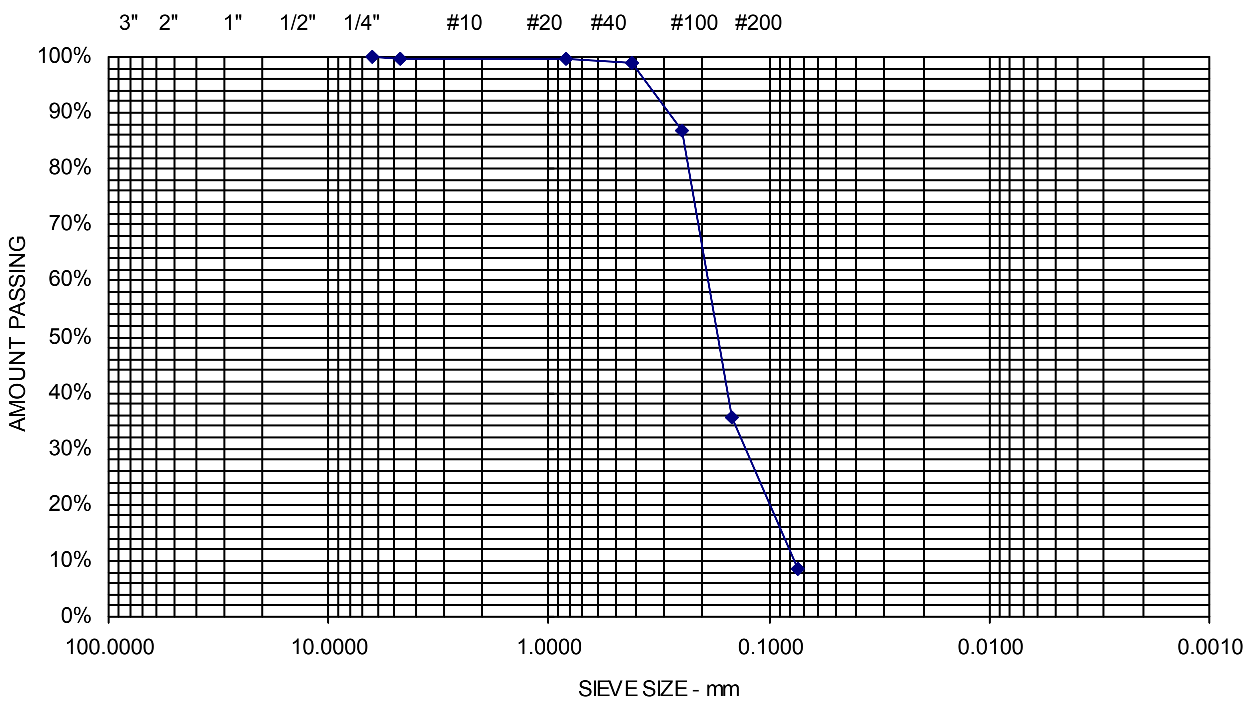
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15016S
		Date Received	9/6/2016
		Date Completed	9/8/2016
Material Source	**B16A, S9, 44.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0.4% Gravel
850 um	**No. 20**	**100**	
425 um	**No. 40**	**99**	90.9% Sand
250 um	**No. 60**	**87**	
150 um	**No. 100**	**36**	
75 um	**No. 200**	**8.7**	8.7% Fines



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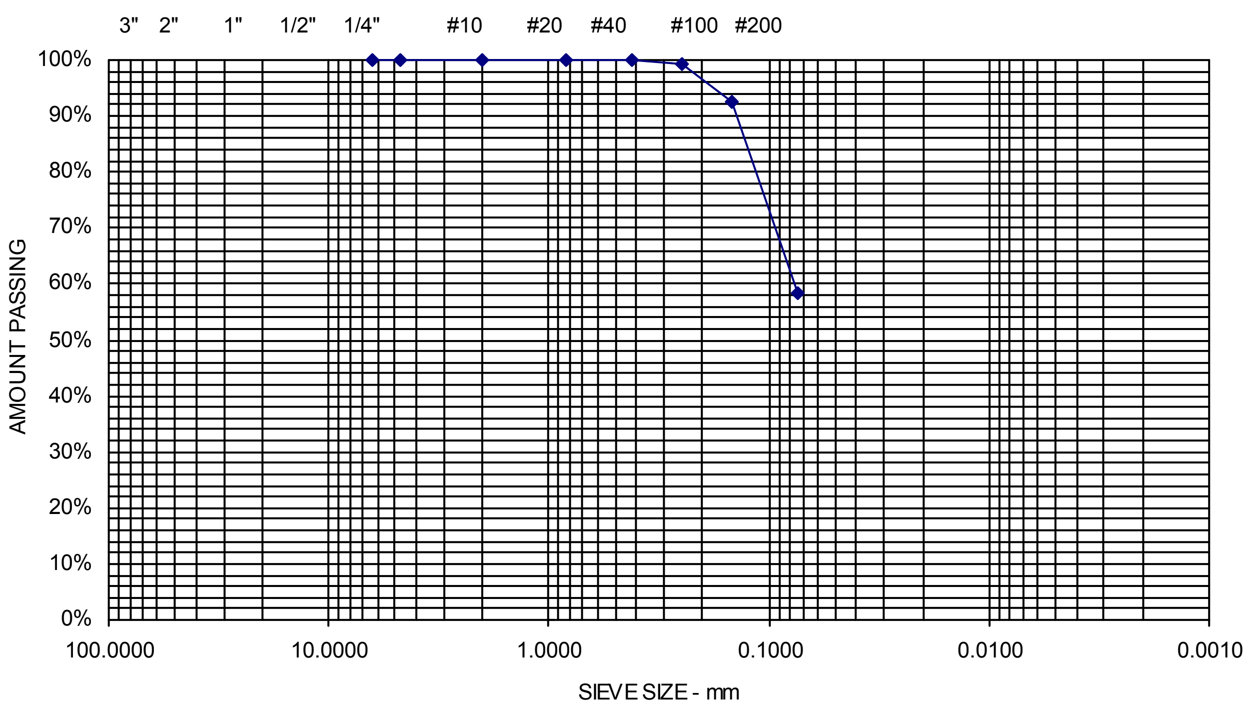
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15017S
		Date Received	9/6/2016
		Date Completed	9/8/2016
Material Source	**B16B, S5, 24'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	41.5% Sand
250 um	**No. 60**	**99**	
150 um	**No. 100**	**93**	
75 um	**No. 200**	**58.5**	58.5% Fines



Comments: Moisture Content = 25.1%

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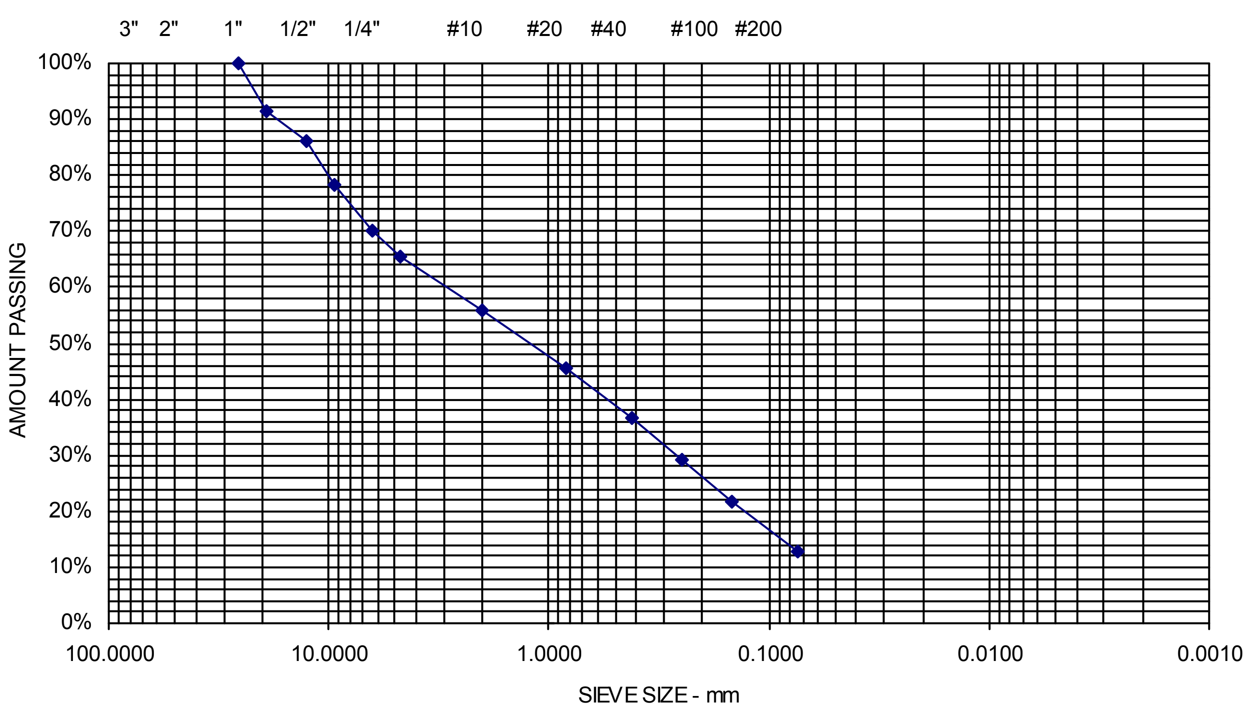
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15018S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B18A, S8, 39.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**91**	
12.5 mm	**1/2"**	**86**	
9.5 mm	**3/8"**	**78**	
6.3 mm	**1/4"**	**70**	
4.75 mm	**No. 4**	**66**	34.4% Gravel
2.00 mm	**No. 10**	**56**	
850 um	**No. 20**	**46**	
425 um	**No. 40**	**37**	52.7% Sand
250 um	**No. 60**	**29**	
150 um	**No. 100**	**22**	
75 um	**No. 200**	**12.9**	12.9% Fines



Comments:

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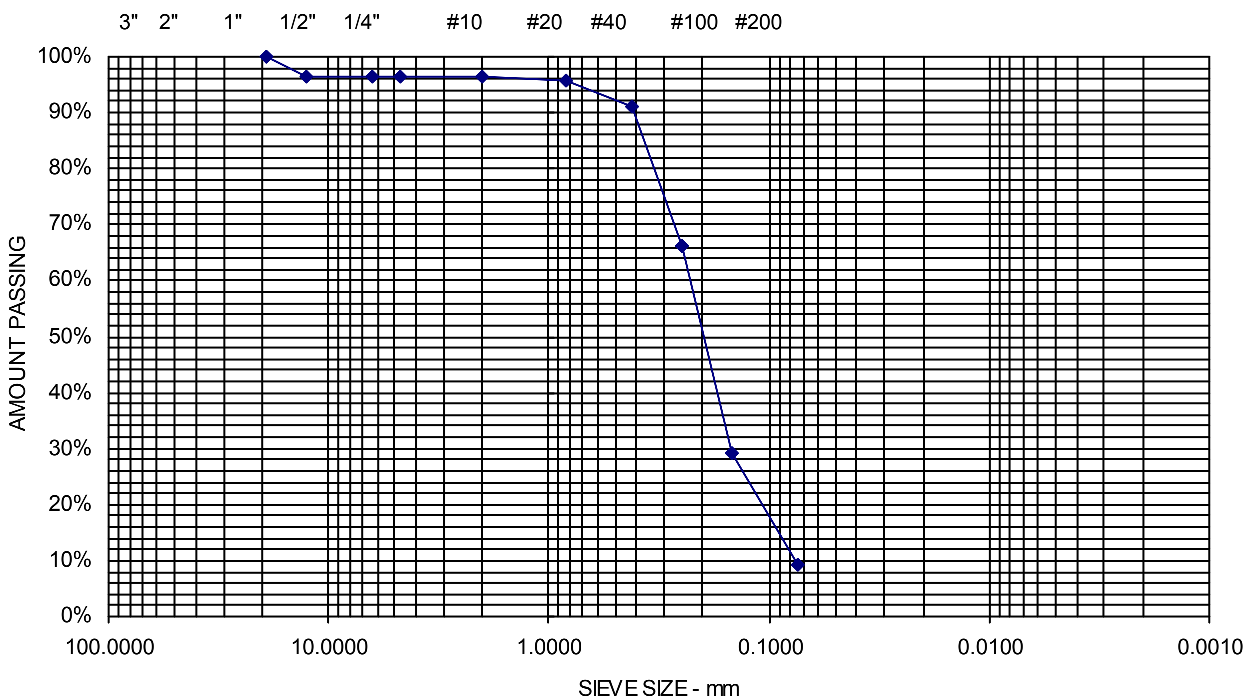
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15019S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B19A, S4, 19'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**96**	
6.3 mm	**1/4"**	**96**	
4.75 mm	**No. 4**	**96**	3.6% Gravel
2.00 mm	**No. 10**	**96**	
850 um	**No. 20**	**96**	
425 um	**No. 40**	**91**	87.2% Sand
250 um	**No. 60**	**66**	
150 um	**No. 100**	**29**	
75 um	**No. 200**	**9.2**	9.2% Fines



Comments:

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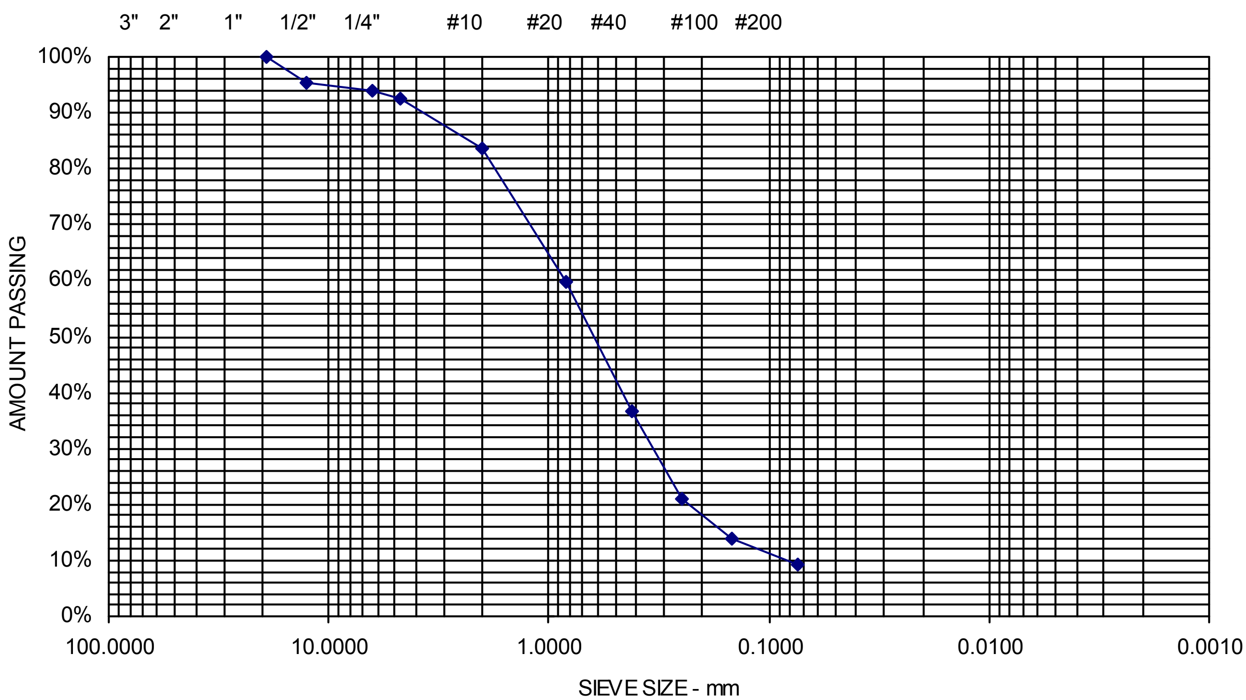
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15020S
		Date Received	9/6/2016
Material Source	**B19B, S5, 25'**	Date Completed	9/10/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**96**	
6.3 mm	**1/4"**	**94**	
4.75 mm	**No. 4**	**93**	7.4% Gravel
2.00 mm	**No. 10**	**83**	
850 um	**No. 20**	**60**	
425 um	**No. 40**	**37**	83.4% Sand
250 um	**No. 60**	**21**	
150 um	**No. 100**	**14**	
75 um	**No. 200**	**9.2**	9.2% Fines



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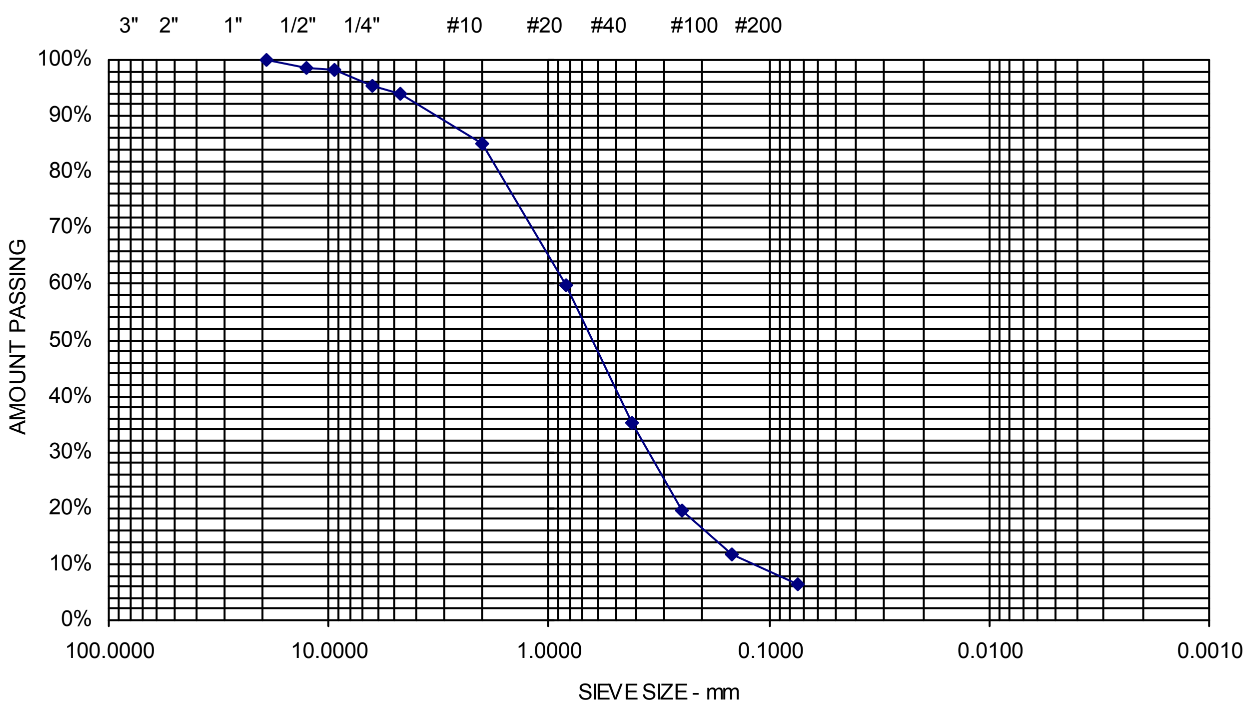
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15021S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B21A, S6, 29'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**99**	
9.5 mm	**3/8"**	**98**	
6.3 mm	**1/4"**	**95**	
4.75 mm	**No. 4**	**94**	6% Gravel
2.00 mm	**No. 10**	**85**	
850 um	**No. 20**	**60**	
425 um	**No. 40**	**35**	87.5% Sand
250 um	**No. 60**	**20**	
150 um	**No. 100**	**12**	
75 um	**No. 200**	**6.5**	6.5% Fines



Comments:

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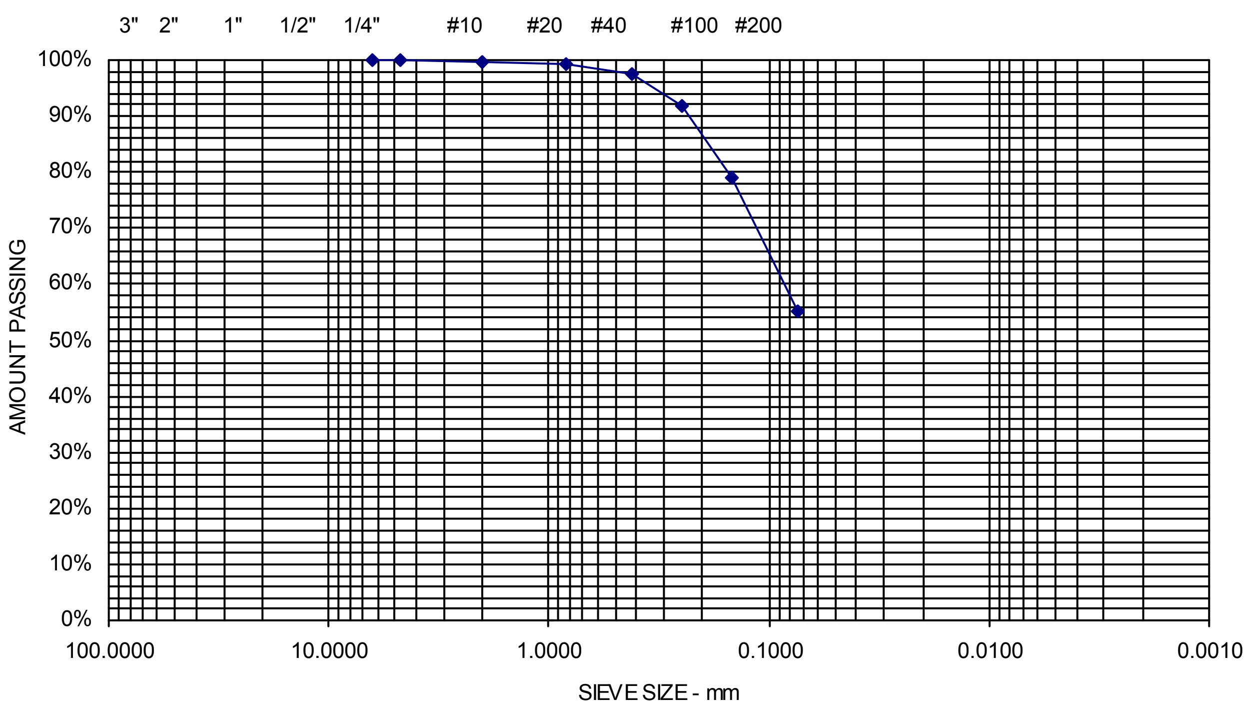
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15022S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B21A, S12, 59'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**99**	
425 um	**No. 40**	**98**	44.9% Sand
250 um	**No. 60**	**92**	
150 um	**No. 100**	**79**	
75 um	**No. 200**	**55.1**	55.1% Fines



Comments:

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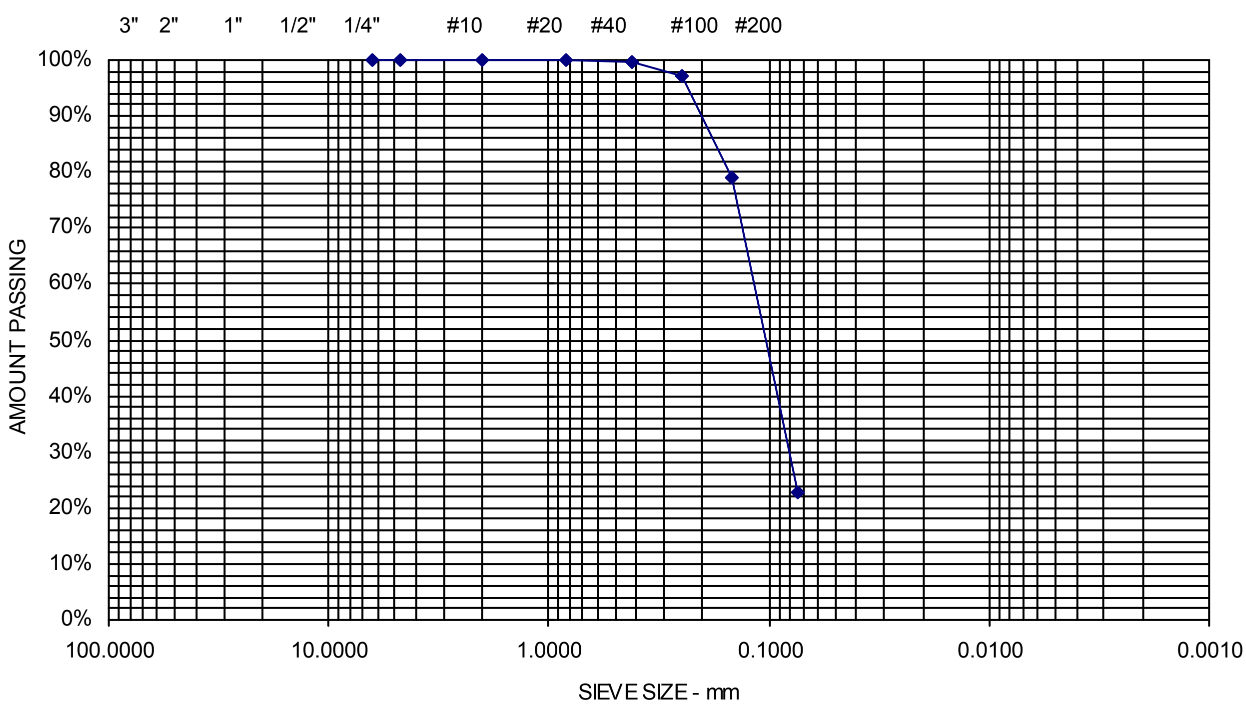
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15023S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B21B, S7, 34'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**99**	77.2% Sand
250 um	**No. 60**	**97**	
150 um	**No. 100**	**79**	
75 um	**No. 200**	**22.8**	22.8% Fines



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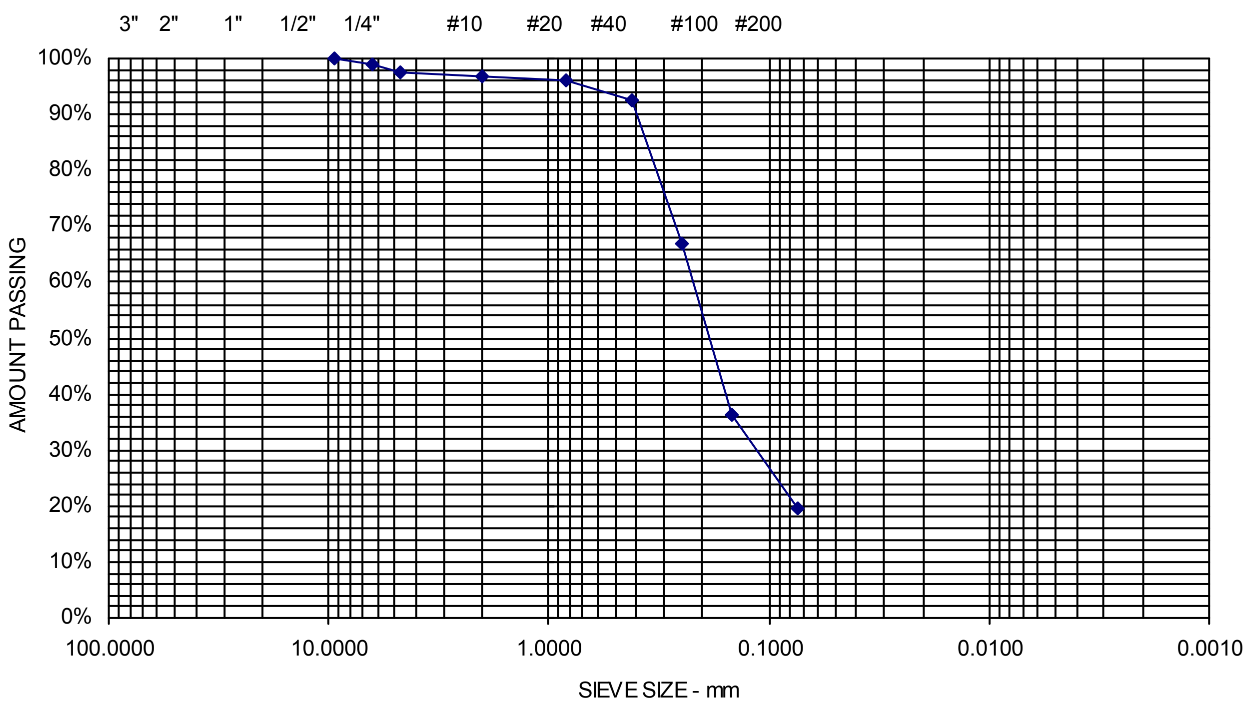
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15024S
		Date Received	9/6/2016
		Date Completed	9/12/2016
Material Source	**B22A, S5, 24'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**99**	
4.75 mm	**No. 4**	**98**	2.4% Gravel
2.00 mm	**No. 10**	**97**	
850 um	**No. 20**	**96**	
425 um	**No. 40**	**92**	78.1% Sand
250 um	**No. 60**	**67**	
150 um	**No. 100**	**36**	
75 um	**No. 200**	**19.5**	19.5% Fines



Comments: Moisture Content = 30%

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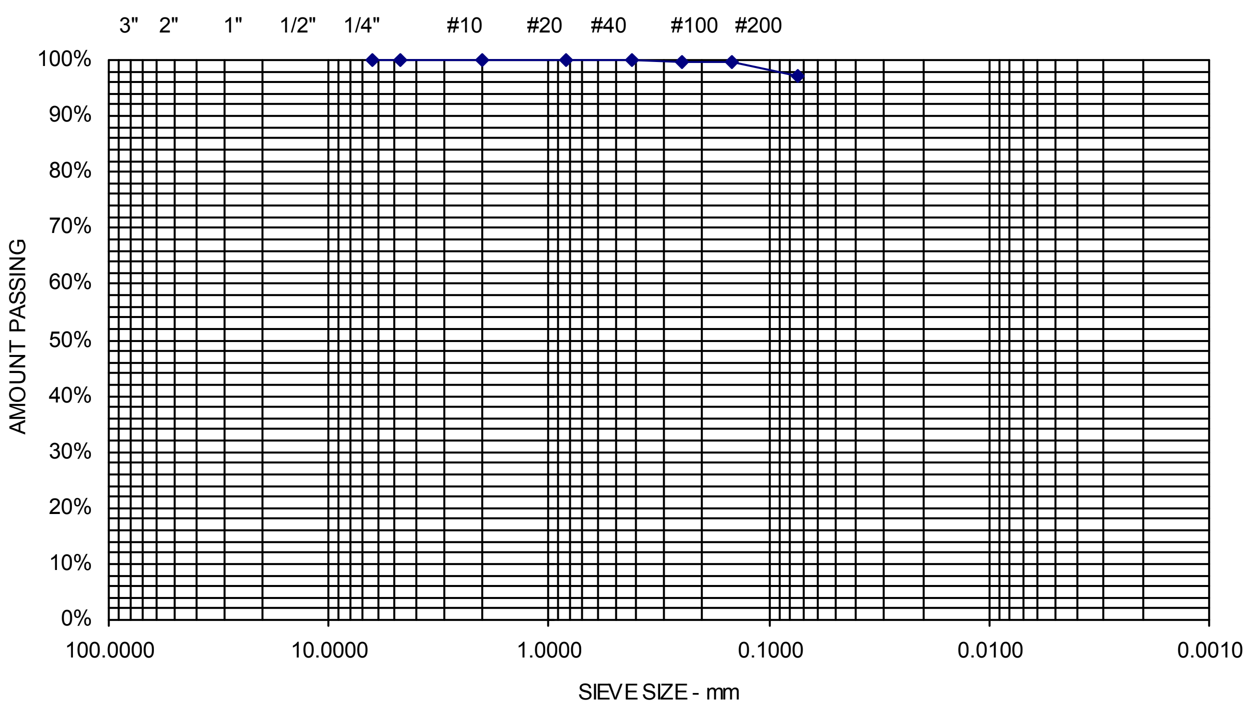
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15025S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B22B, S9, 44'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	2.8% Sand
250 um	**No. 60**	**100**	
150 um	**No. 100**	**100**	
75 um	**No. 200**	**97.2**	97.2% Fines



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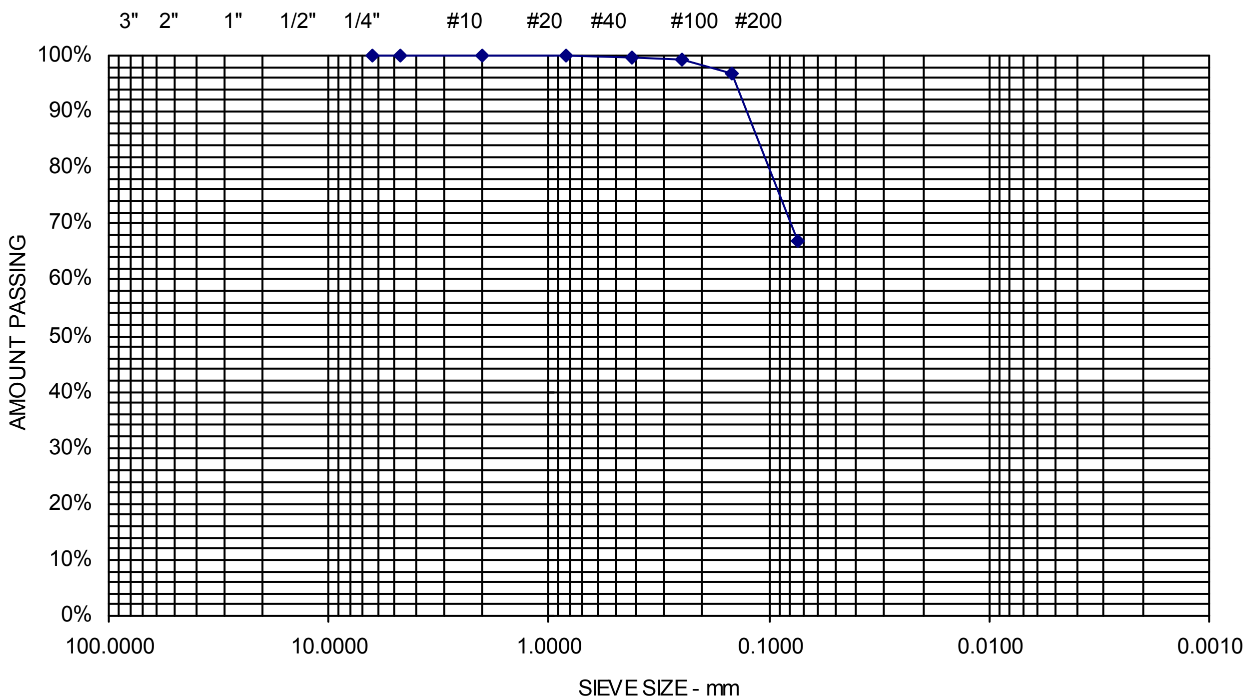
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15026S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B22C, S6, 39.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0.1% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	32.9% Sand
250 um	**No. 60**	**99**	
150 um	**No. 100**	**97**	
75 um	**No. 200**	**67.0**	67% Fines



Comments: Moisture Content = 25.5%

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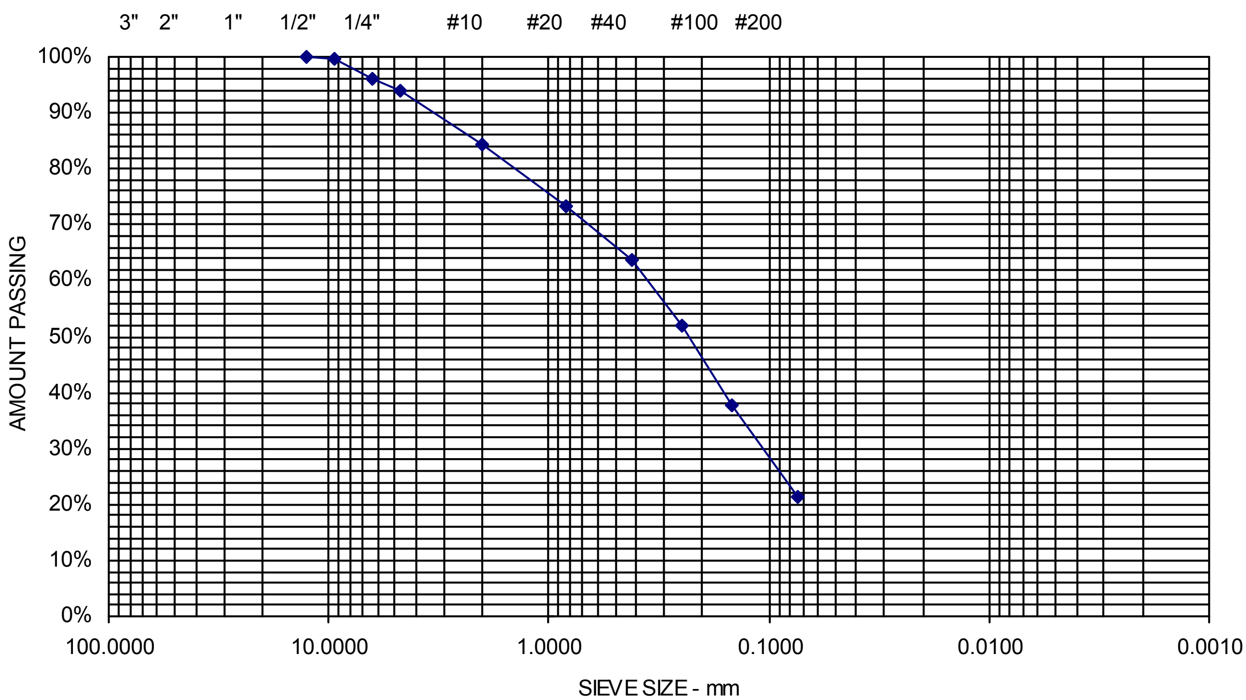
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15027S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B23A, S9, 44'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**96**	
4.75 mm	**No. 4**	**94**	6.1% Gravel
2.00 mm	**No. 10**	**84**	
850 um	**No. 20**	**73**	
425 um	**No. 40**	**64**	72.6% Sand
250 um	**No. 60**	**52**	
150 um	**No. 100**	**38**	
75 um	**No. 200**	**21.3**	21.3% Fines



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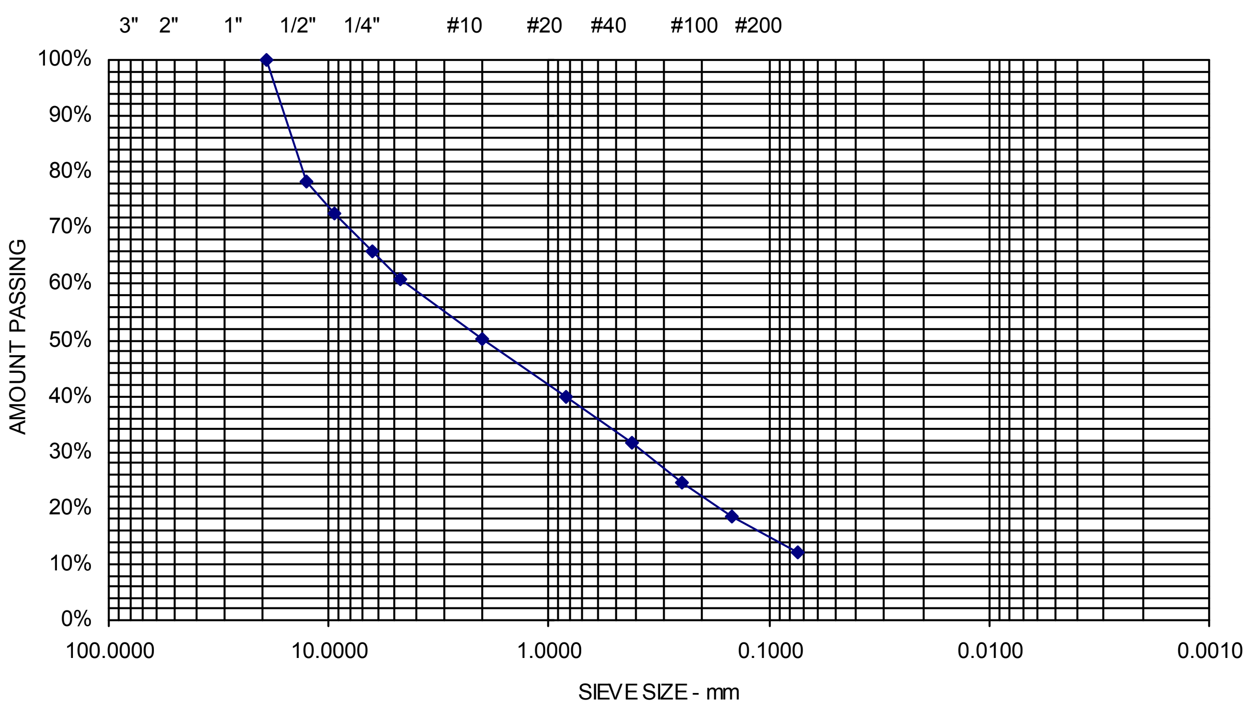
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15028S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B24A, S10, 49'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**78**	
9.5 mm	**3/8"**	**73**	
6.3 mm	**1/4"**	**66**	
4.75 mm	**No. 4**	**61**	39% Gravel
2.00 mm	**No. 10**	**50**	
850 um	**No. 20**	**40**	
425 um	**No. 40**	**32**	49.1% Sand
250 um	**No. 60**	**25**	
150 um	**No. 100**	**18**	
75 um	**No. 200**	**12.0**	12% Fines



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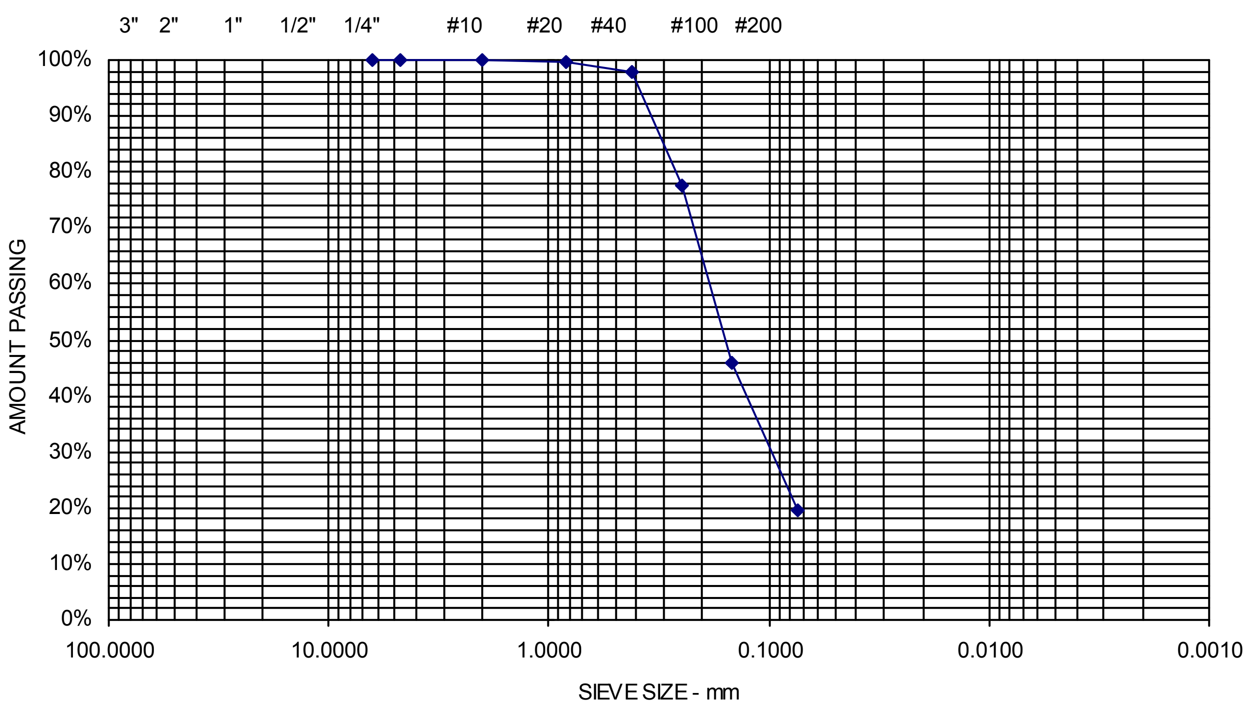
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15029S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B24B, S4, 19.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**98**	80.3% Sand
250 um	**No. 60**	**78**	
150 um	**No. 100**	**46**	
75 um	**No. 200**	**19.7**	19.7% Fines



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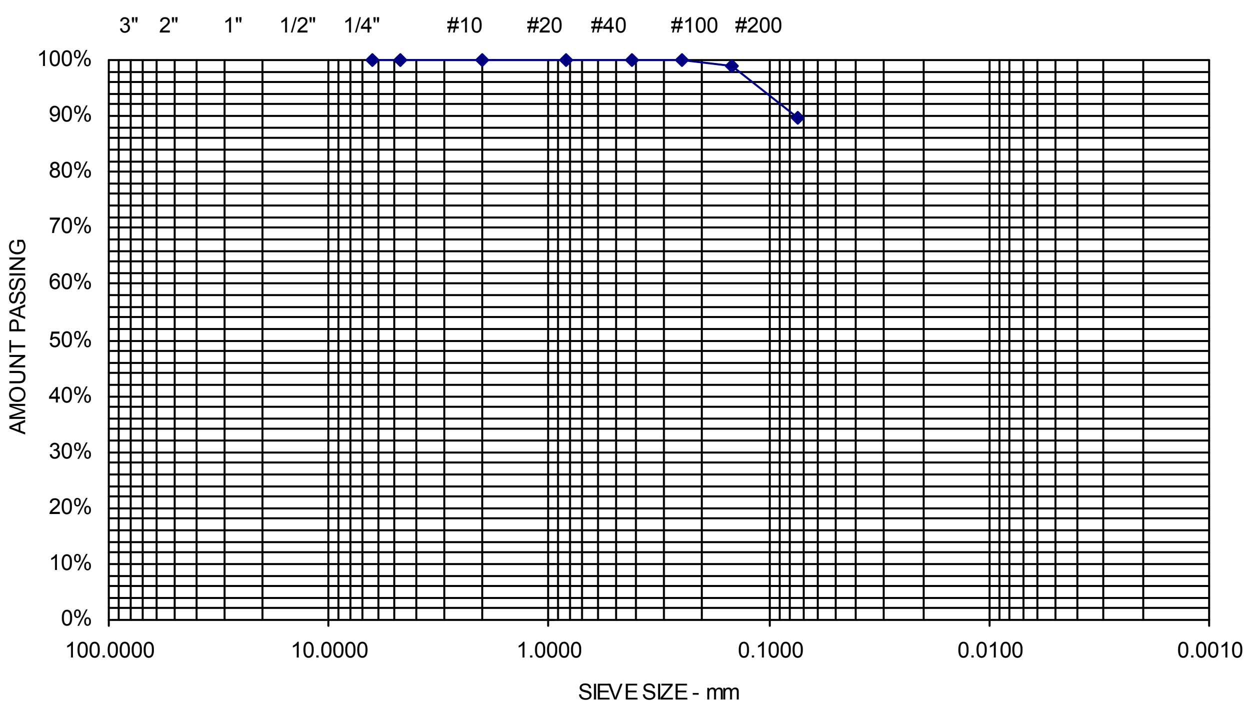
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15030S
		Date Received	9/6/2016
		Date Completed	9/10/2016
Material Source	**B25A, S8, 39.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	10.3% Sand
250 um	**No. 60**	**100**	
150 um	**No. 100**	**99**	
75 um	**No. 200**	**89.7**	89.7% Fines



Comments: Moisture Content = 28.2%

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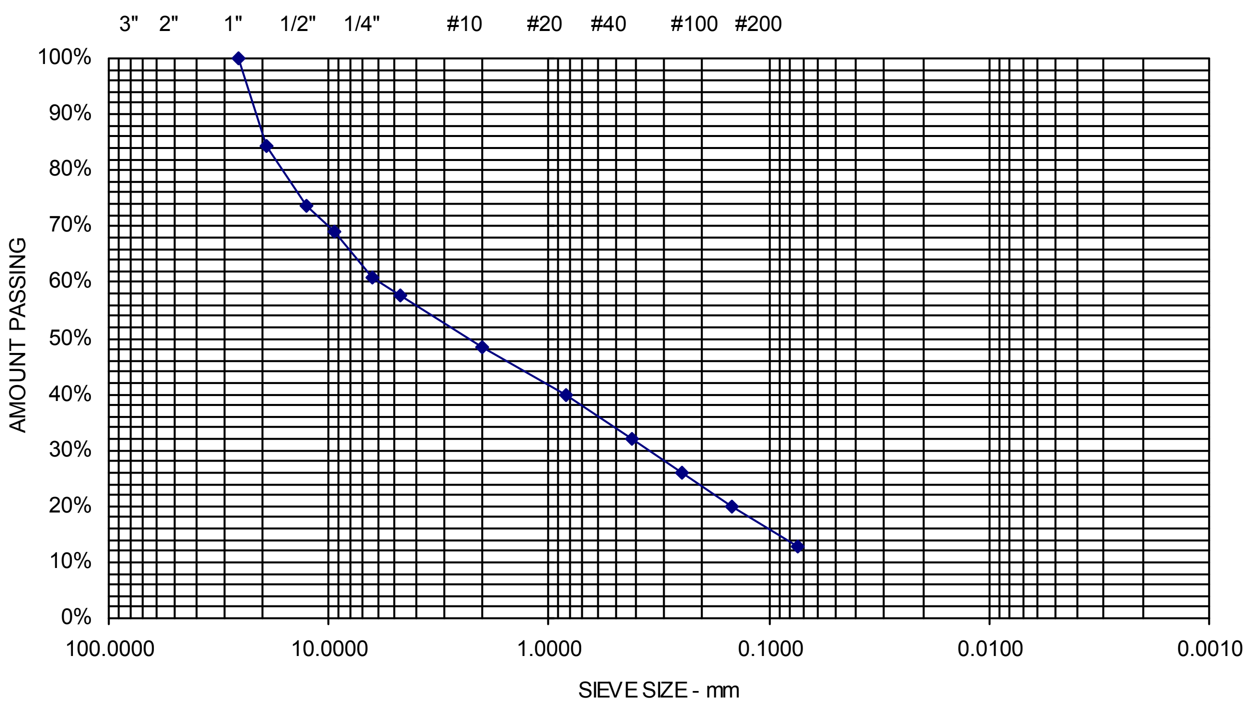
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15031S
		Date Received	9/6/2016
		Date Completed	9/12/2016
Material Source	**B27A, S7, 34'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**84**	
12.5 mm	**1/2"**	**74**	
9.5 mm	**3/8"**	**69**	
6.3 mm	**1/4"**	**61**	
4.75 mm	**No. 4**	**57**	42.5% Gravel
2.00 mm	**No. 10**	**48**	
850 um	**No. 20**	**40**	
425 um	**No. 40**	**32**	44.5% Sand
250 um	**No. 60**	**26**	
150 um	**No. 100**	**20**	
75 um	**No. 200**	**12.9**	12.9% Fines



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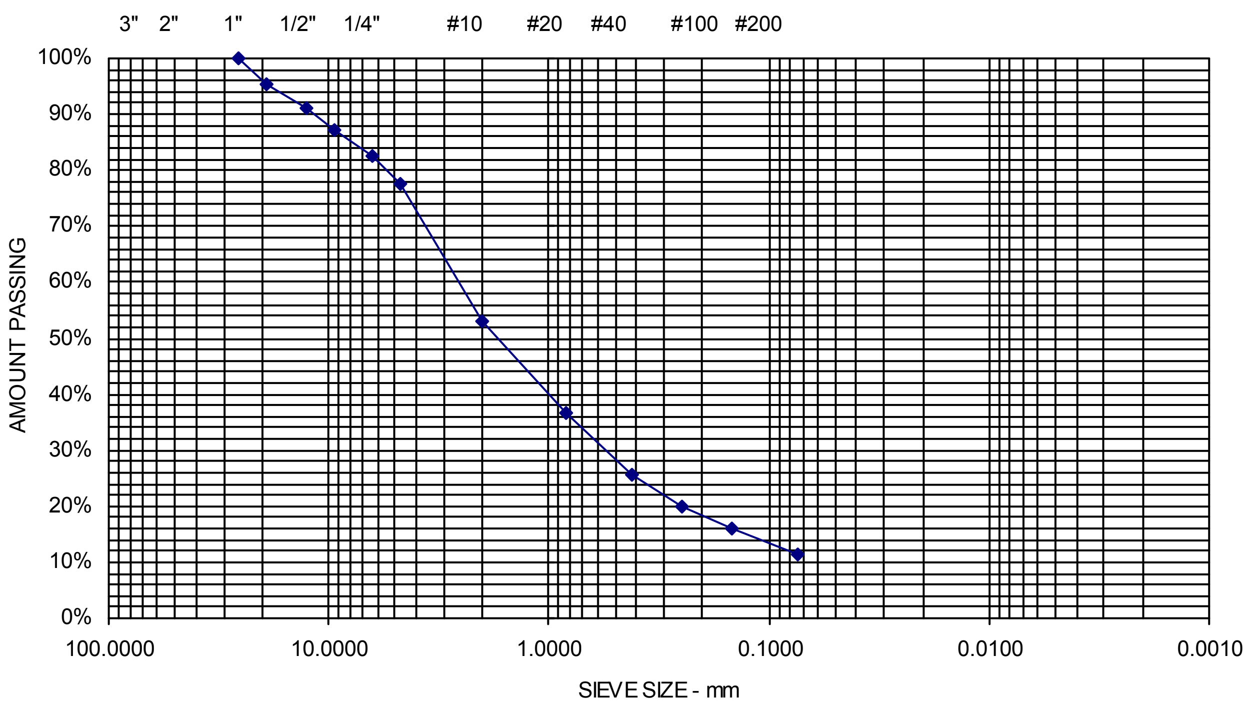
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15032S
		Date Received	9/6/2016
		Date Completed	9/12/2016
Material Source	**B27B, S5, 24.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**95**	
12.5 mm	**1/2"**	**91**	
9.5 mm	**3/8"**	**87**	
6.3 mm	**1/4"**	**83**	
4.75 mm	**No. 4**	**78**	22.4% Gravel
2.00 mm	**No. 10**	**53**	
850 um	**No. 20**	**36**	
425 um	**No. 40**	**26**	66.4% Sand
250 um	**No. 60**	**20**	
150 um	**No. 100**	**16**	
75 um	**No. 200**	**11.3**	11.3% Fines



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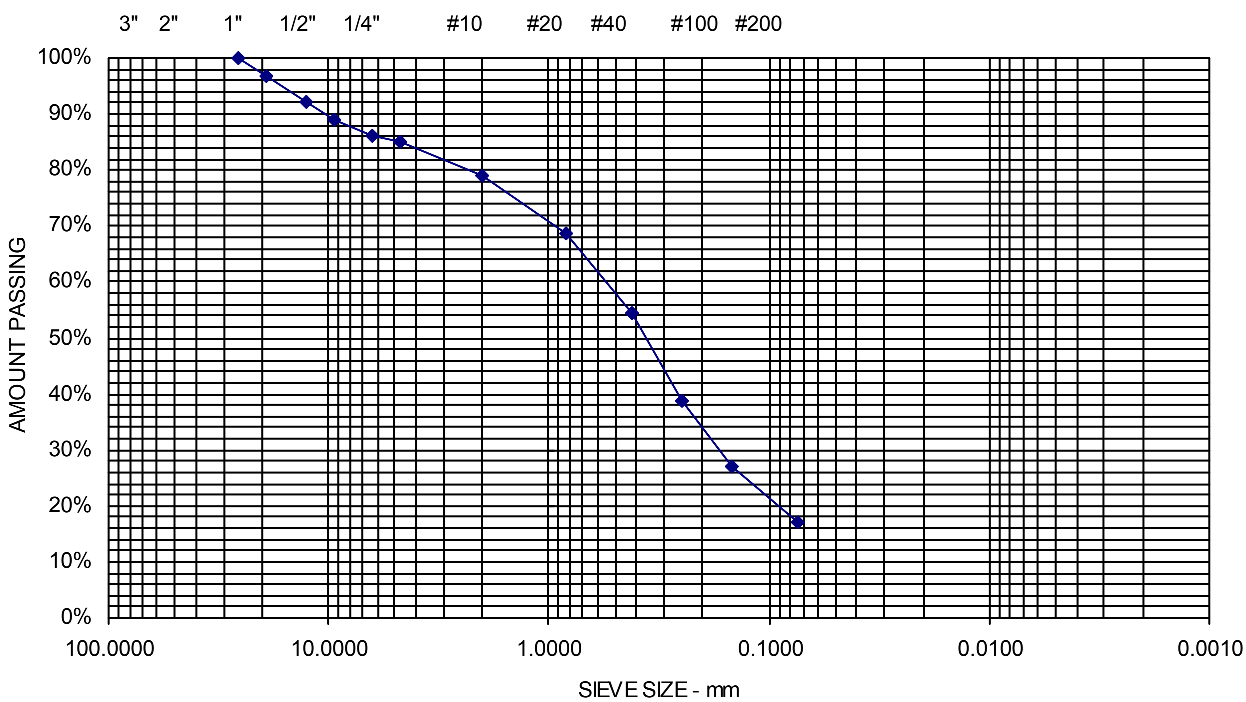
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15033S
		Date Received	9/6/2016
		Date Completed	9/12/2016
Material Source	**B27B, S11, 54.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**97**	
12.5 mm	**1/2"**	**92**	
9.5 mm	**3/8"**	**89**	
6.3 mm	**1/4"**	**86**	
4.75 mm	**No. 4**	**85**	15.1% Gravel
2.00 mm	**No. 10**	**79**	
850 um	**No. 20**	**69**	
425 um	**No. 40**	**55**	67.8% Sand
250 um	**No. 60**	**39**	
150 um	**No. 100**	**27**	
75 um	**No. 200**	**17.1**	17.1% Fines



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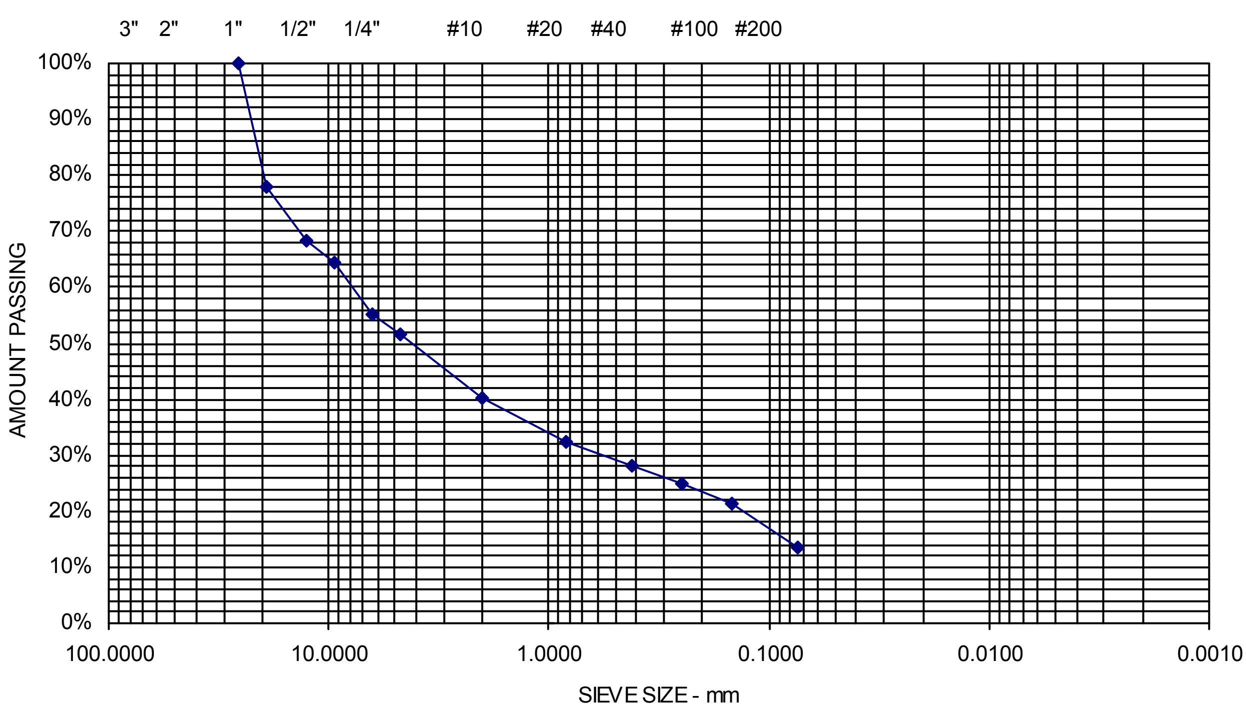
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15034S
		Date Received	9/6/2016
		Date Completed	9/12/2016
Material Source	**B31B, S2, 9.5'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**78**	
12.5 mm	**1/2"**	**68**	
9.5 mm	**3/8"**	**64**	
6.3 mm	**1/4"**	**55**	
4.75 mm	**No. 4**	**51**	48.5% Gravel
2.00 mm	**No. 10**	**40**	
850 um	**No. 20**	**32**	
425 um	**No. 40**	**28**	38.1% Sand
250 um	**No. 60**	**25**	
150 um	**No. 100**	**21**	
75 um	**No. 200**	**13.4**	13.4% Fines



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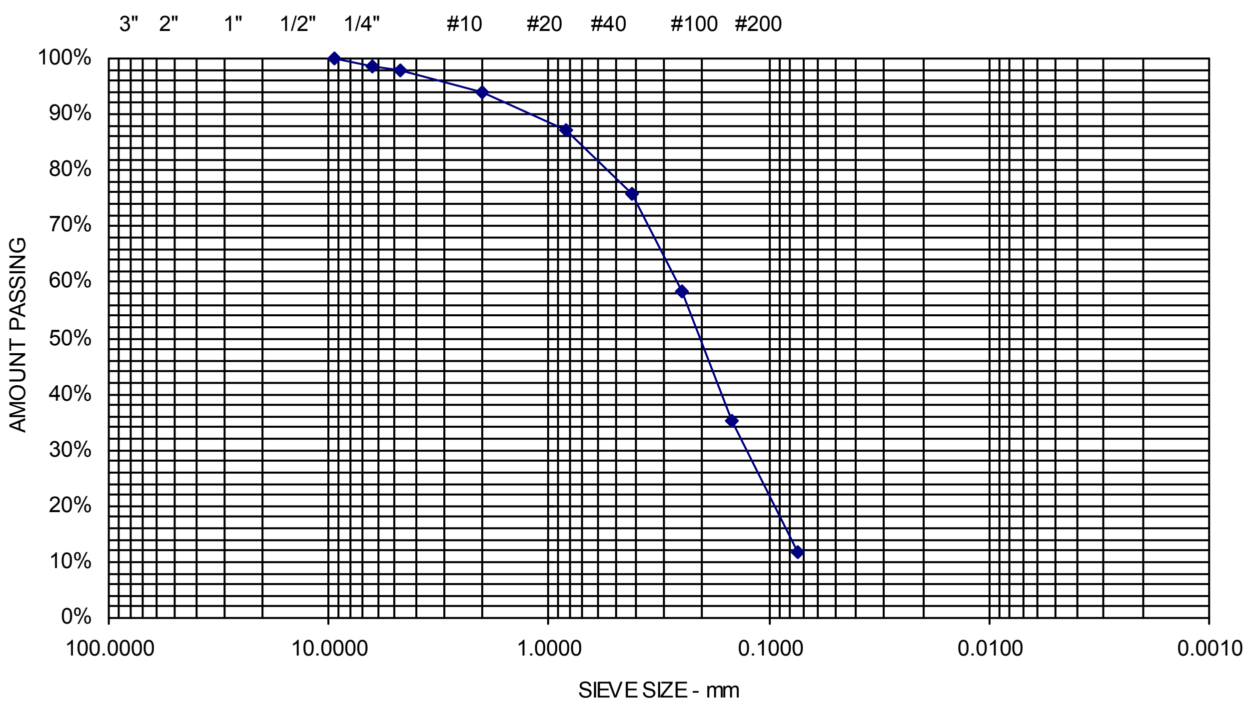
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15035S
		Date Received	9/6/2016
		Date Completed	9/12/2016
Material Source	**B33A, S3, 14'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**98**	
4.75 mm	**No. 4**	**98**	2.3% Gravel
2.00 mm	**No. 10**	**94**	
850 um	**No. 20**	**87**	
425 um	**No. 40**	**76**	86% Sand
250 um	**No. 60**	**58**	
150 um	**No. 100**	**35**	
75 um	**No. 200**	**11.6**	11.6% Fines



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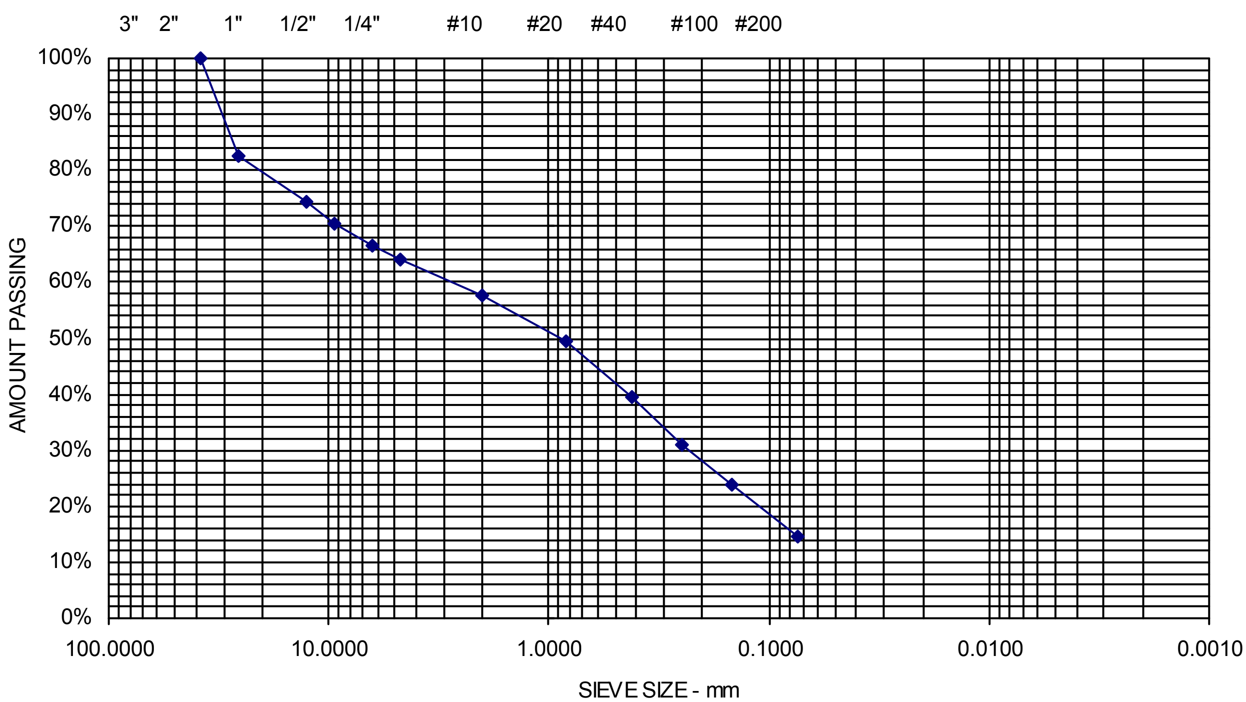
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15036S
		Date Received	9/6/2016
		Date Completed	9/12/2016
Material Source	**B34B, S3**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**83**	
12.5 mm	**1/2"**	**74**	
9.5 mm	**3/8"**	**71**	
6.3 mm	**1/4"**	**67**	
4.75 mm	**No. 4**	**64**	35.8% Gravel
2.00 mm	**No. 10**	**58**	
850 um	**No. 20**	**49**	
425 um	**No. 40**	**40**	49.7% Sand
250 um	**No. 60**	**31**	
150 um	**No. 100**	**24**	
75 um	**No. 200**	**14.5**	14.5% Fines



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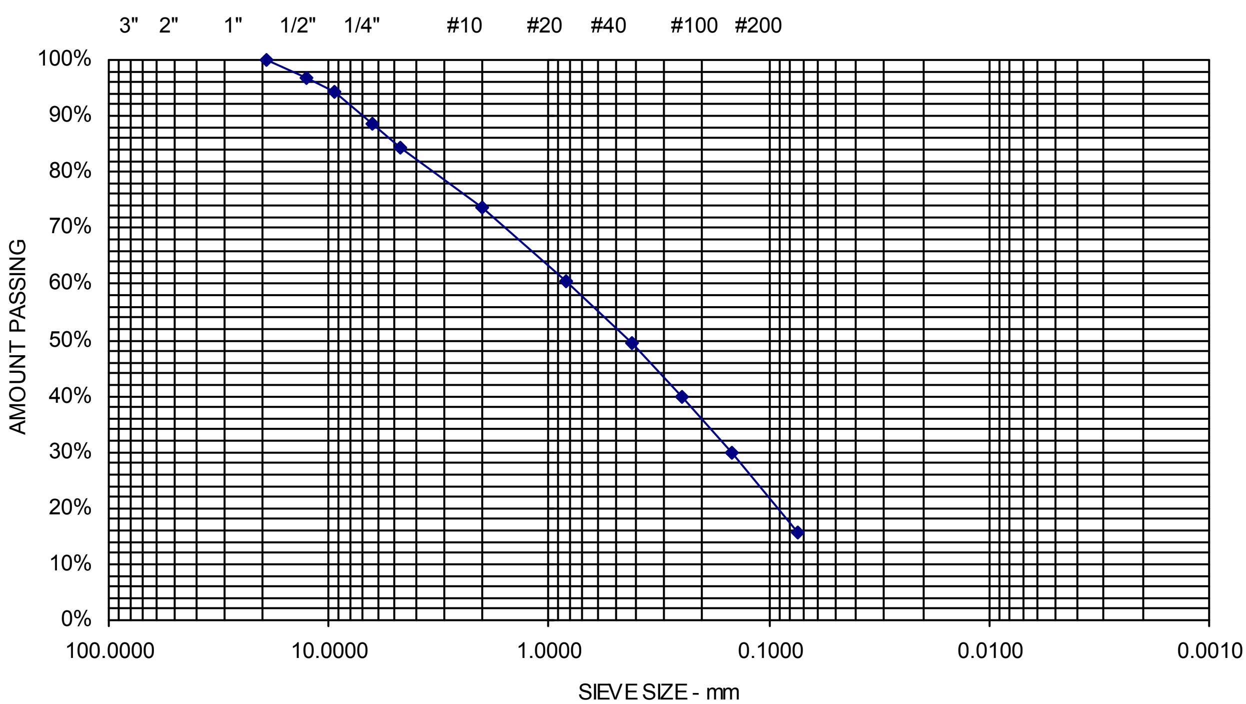
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15037S
		Date Received	9/6/2016
		Date Completed	9/12/2016
Material Source	**B35B, S2, 9'**	Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**97**	
9.5 mm	**3/8"**	**94**	
6.3 mm	**1/4"**	**89**	
4.75 mm	**No. 4**	**84**	15.7% Gravel
2.00 mm	**No. 10**	**74**	
850 um	**No. 20**	**61**	
425 um	**No. 40**	**49**	68.7% Sand
250 um	**No. 60**	**40**	
150 um	**No. 100**	**30**	
75 um	**No. 200**	**15.6**	15.6% Fines



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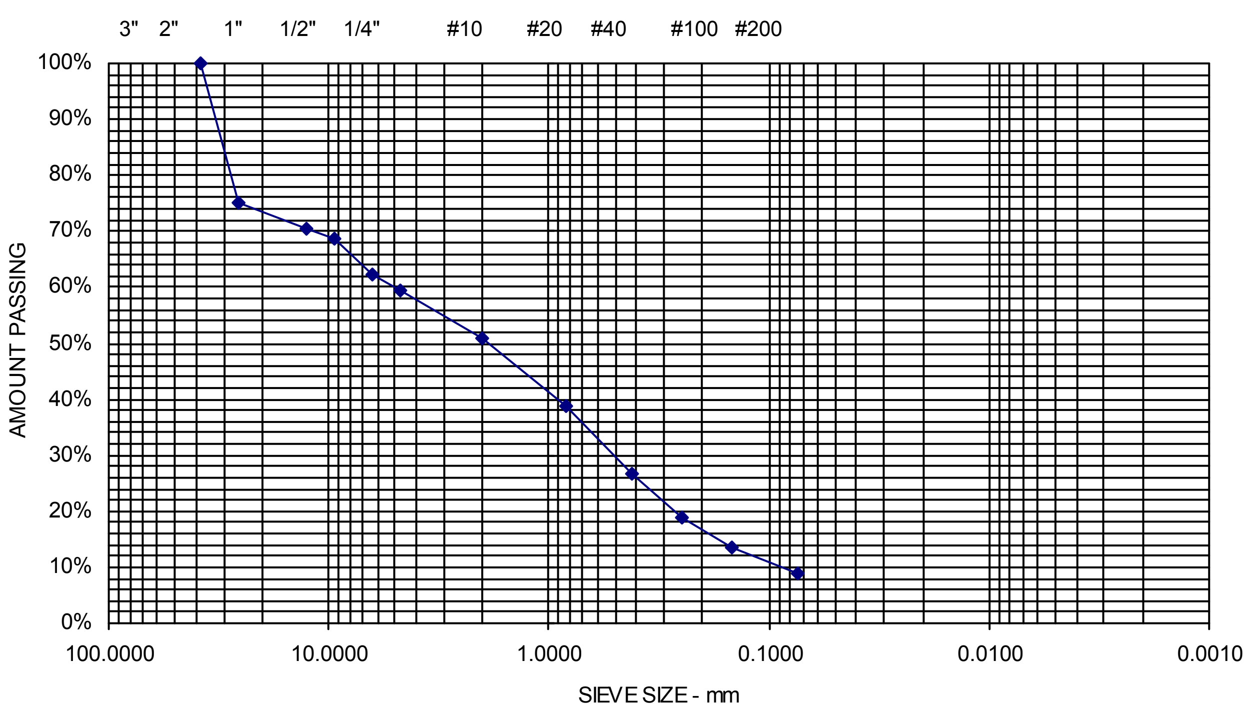
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15040S
Exploration	**B15A**	Date Received	9/7/2016
Material Source	**S3, 14'**	Date Completed	9/12/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**75**	
12.5 mm	**1/2"**	**70**	
9.5 mm	**3/8"**	**69**	
6.3 mm	**1/4"**	**62**	
4.75 mm	**No. 4**	**60**	40.5% Gravel
2.00 mm	**No. 10**	**51**	
850 um	**No. 20**	**39**	
425 um	**No. 40**	**27**	50.7% Sand
250 um	**No. 60**	**19**	
150 um	**No. 100**	**14**	
75 um	**No. 200**	**8.8**	8.8% Fines



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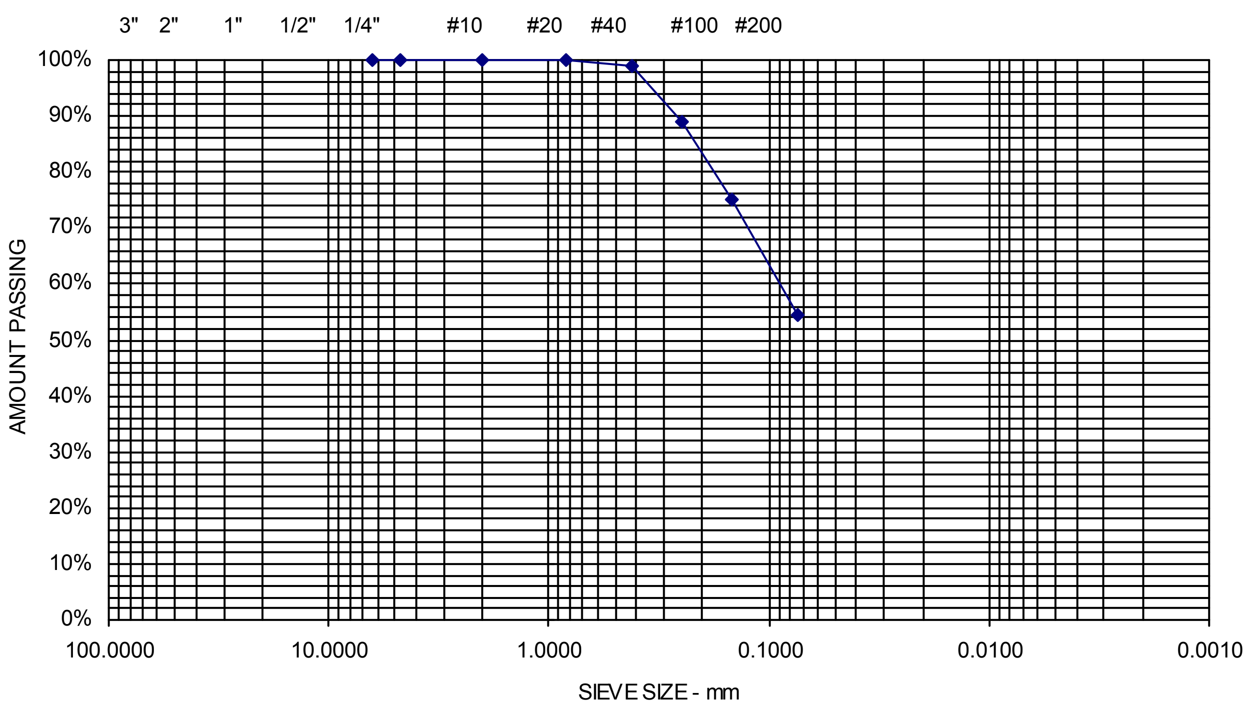
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15042S
Exploration	**B18B**	Date Received	9/7/2016
Material Source	**S5, 25'**	Date Completed	9/10/2016
		Tested By	BRADLEY GERSCHWILER

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**99**	45.7% Sand
250 um	**No. 60**	**89**	
150 um	**No. 100**	**75**	
75 um	**No. 200**	**54.3**	54.3% Fines



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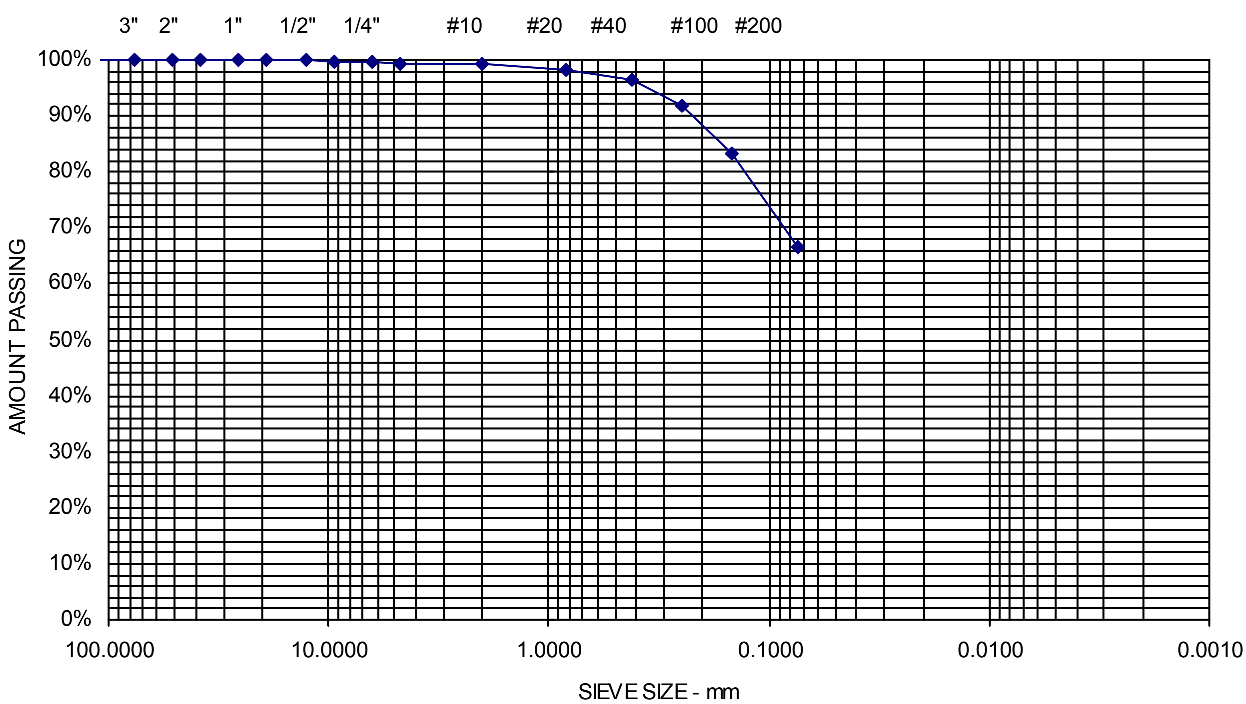
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15049S
		Date Received	9/12/2016
		Date Completed	9/15/2016
Material Source	**B11A, S9, 44'**	Tested By	ANTONIO SANTIAGO

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**99**	
6.3 mm	**1/4"**	**99**	
4.75 mm	**No. 4**	**99**	0.6% Gravel
2.00 mm	**No. 10**	**99**	
850 um	**No. 20**	**98**	
425 um	**No. 40**	**96**	32.9% Sand
250 um	**No. 60**	**92**	
150 um	**No. 100**	**83**	
75 um	**No. 200**	**66.5**	66.5% Fines



Comments: Moisture Content = 17.8%

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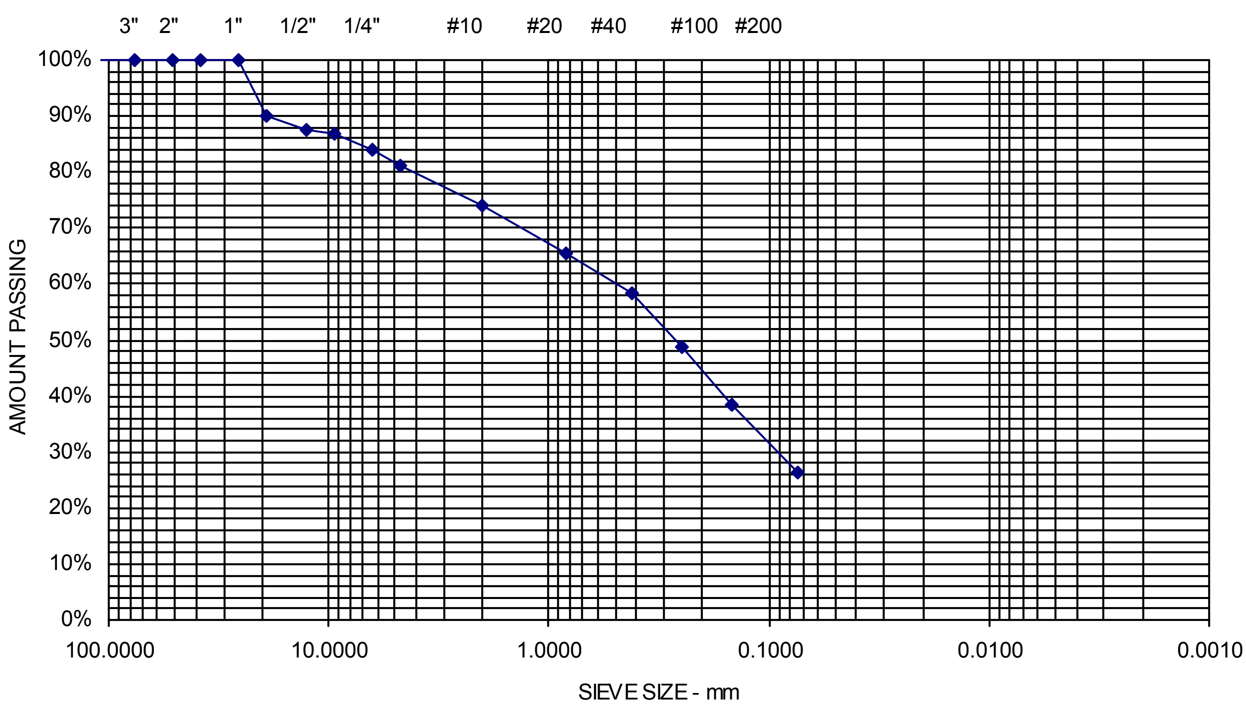
Report of Gradation

ASTM C-117 & C-136

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15050S
		Date Received	9/12/2016
		Date Completed	9/15/2016
Material Source	**B11B, S4, 19'**	Tested By	ANTONIO SANTIAGO

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**90**	
12.5 mm	**1/2"**	**88**	
9.5 mm	**3/8"**	**87**	
6.3 mm	**1/4"**	**84**	
4.75 mm	**No. 4**	**81**	18.9% Gravel
2.00 mm	**No. 10**	**74**	
850 um	**No. 20**	**65**	
425 um	**No. 40**	**58**	54.6% Sand
250 um	**No. 60**	**49**	
150 um	**No. 100**	**38**	
75 um	**No. 200**	**26.5**	26.5% Fines



Comments: Moisture Content = 10.8%

Sheet

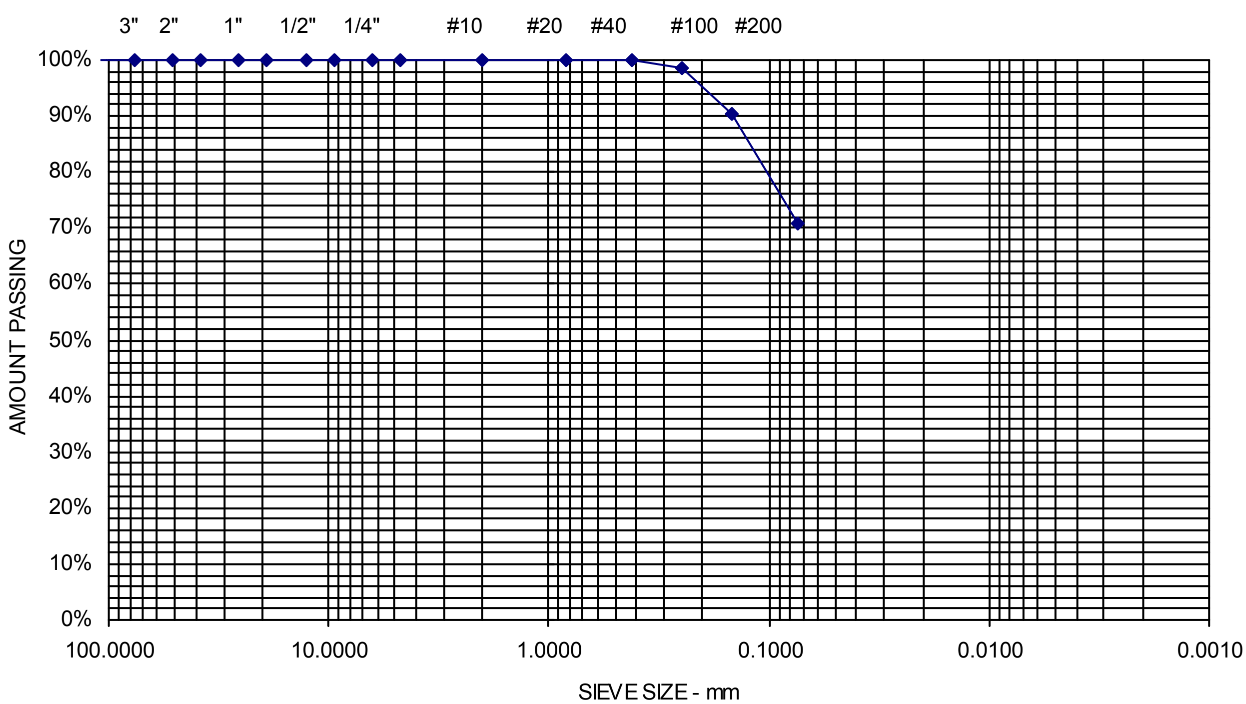
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15051S
		Date Received	9/12/2016
		Date Completed	9/15/2016
Material Source	**B13A, S6, 34'**	Tested By	ANTONIO SANTIAGO

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	29.2% Sand
250 um	**No. 60**	**99**	
150 um	**No. 100**	**91**	
75 um	**No. 200**	**70.8**	70.8% Fines



Comments:

Sheet

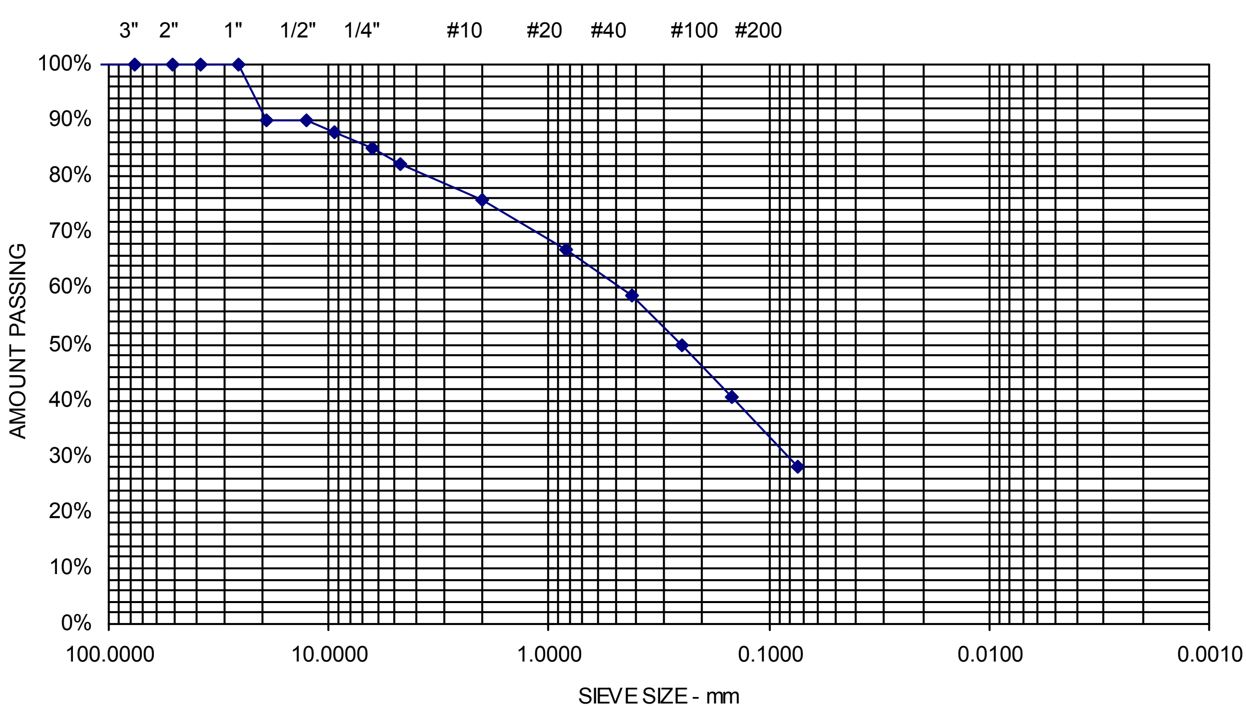
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15052S
		Date Received	9/12/2016
		Date Completed	9/15/2016
Material Source	**B17A, S7, 34'**	Tested By	ANTONIO SANTIAGO

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**90**	
12.5 mm	**1/2"**	**90**	
9.5 mm	**3/8"**	**88**	
6.3 mm	**1/4"**	**85**	
4.75 mm	**No. 4**	**82**	17.8% Gravel
2.00 mm	**No. 10**	**76**	
850 um	**No. 20**	**67**	
425 um	**No. 40**	**59**	54% Sand
250 um	**No. 60**	**50**	
150 um	**No. 100**	**41**	
75 um	**No. 200**	**28.2**	28.2% Fines



Comments: Moisture Content = 11.3

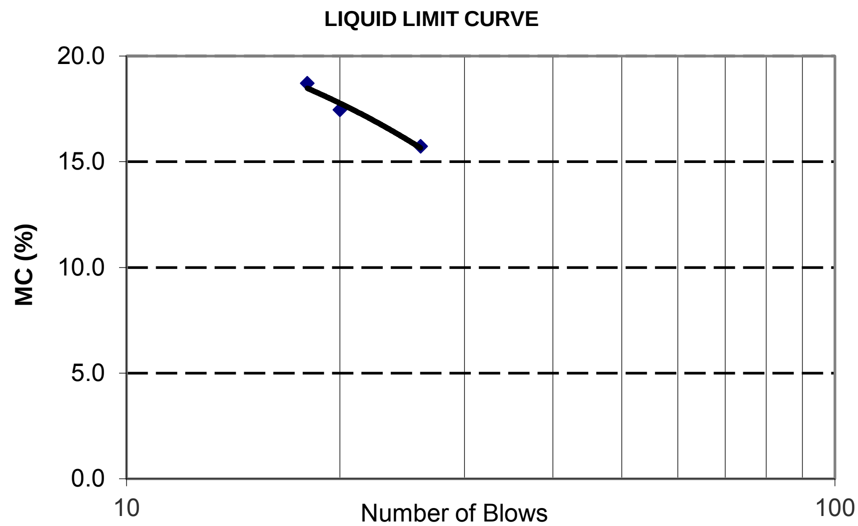
Sheet

Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various NH	**Lab ID:**	15053S
Client:	Quanta Subsurface	**Date Received:**	09/12/16
Material Description:	Glaciolacustrine	**Date Completed:**	09/20/16
Material Source:	B17A, S8, 39'	**Tested By:**	BLG

Liquid Limit	**16**
Plastic Limit	
Plasticity Index	**Non-Plastic**



Material Retained On the No. 40 Sieve: 48%

As-received Moisture Content: 10%

Comments:

Reviewed By: ______________________

10 Centre Road, Somersworth, NH 03878-2926 • P: (603) 692.0088 • F: (603) 692.0044 • E: infosomersworth@swcole.com

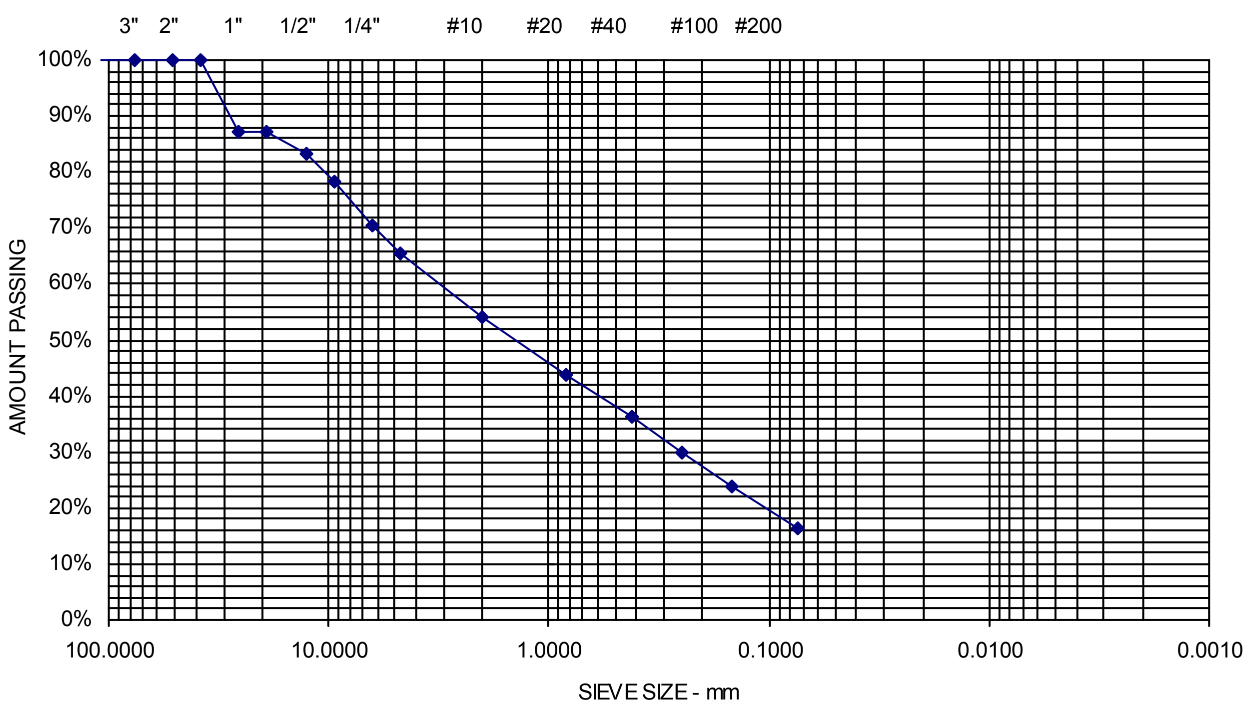
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15054S
		Date Received	9/12/2016
		Date Completed	9/15/2016
Material Source	**B17B, S2, 9'**	Tested By	ANTONIO SANTIAGO

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**87**	
19.0 mm	**3/4"**	**87**	
12.5 mm	**1/2"**	**83**	
9.5 mm	**3/8"**	**78**	
6.3 mm	**1/4"**	**70**	
4.75 mm	**No. 4**	**66**	34.4% Gravel
2.00 mm	**No. 10**	**54**	
850 um	**No. 20**	**44**	
425 um	**No. 40**	**36**	49.1% Sand
250 um	**No. 60**	**30**	
150 um	**No. 100**	**24**	
75 um	**No. 200**	**16.5**	16.5% Fines



Comments:

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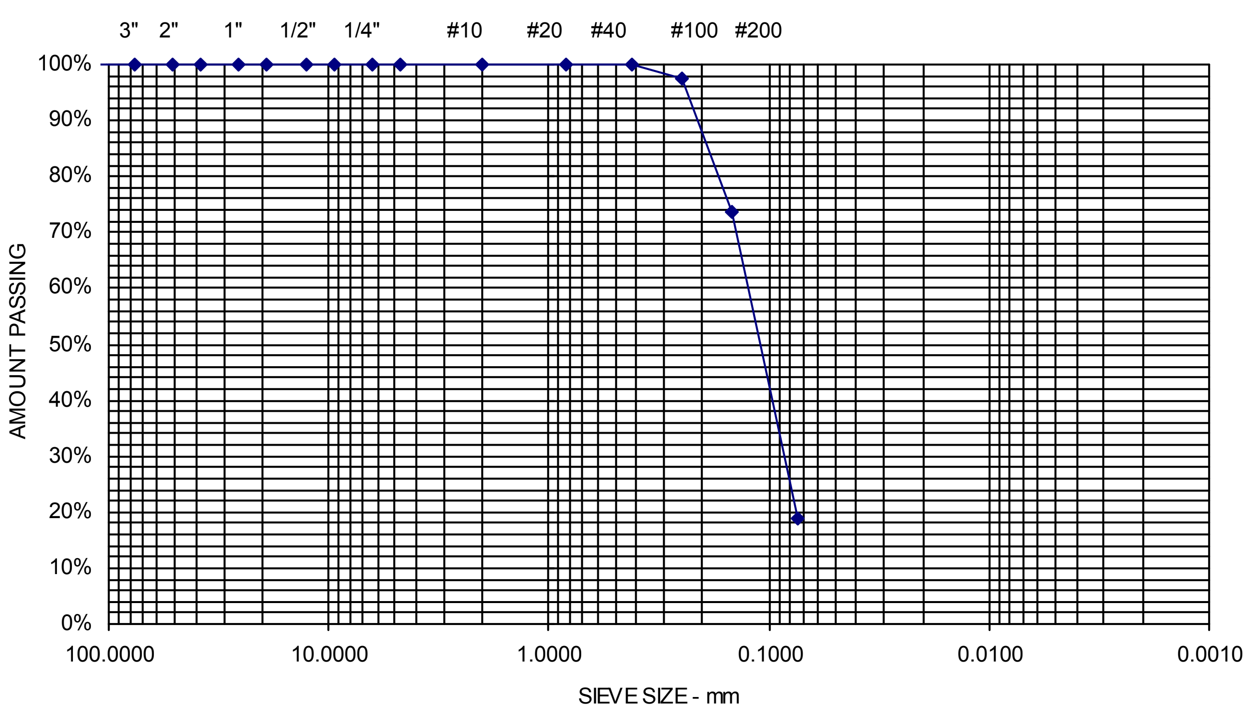
Report of Gradation

ASTM C-117 & C-136

S.W.COLE ENGINEERING, INC.

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	QUANTA SUBSURFACE	Lab ID	15055S
		Date Received	9/12/2016
		Date Completed	9/15/2016
Material Source	**B25B, S5, 24'**	Tested By	ANTONIO SANTIAGO

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
6.3 mm	**1/4"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**100**	
425 um	**No. 40**	**100**	81.1% Sand
250 um	**No. 60**	**98**	
150 um	**No. 100**	**74**	
75 um	**No. 200**	**18.9**	18.9% Fines



Comments:

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GeoTesting
EXPRESS

Technologies to manage risk for infrastructure

Boston
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New York
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Transmittal

TO:

Balin Strickler
Quanta Subsurface
4308 N Barker Rd.
Spokane Valley, WA 99027

DATE: 9/1/2016	GTX NO: 305223
RE: Northern Pass Trenchless	

COPIES	DATE	DESCRIPTION
	9/1/2016	**August 2016 Laboratory Test Report**

REMARKS:

SIGNED:
Jonathan Campbell, Assistant Laboratory Manager

CC:

APPROVED BY:
Mark Dobday, P.G., Laboratory Manager

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September 1, 2016

Balin Strickler
Quanta Subsurface
4308 N Barker Rd.
Spokane Valley, WA 99027

RE: Northern Pass Trenchless, Lincoln, NH (GTX-305223)

Dear Balin Strickler:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received eight samples from you on 8/19/2016. These samples were labeled as follows:

Boring Number	Sample Number	Depth
BH36B	R1	31 ft
BH36C	R2	38 ft
BH41B	R2	52 ft
BH42B	R3	21 ft
BH43B	R1	51 ft
BH47B	R1	55 ft
BH52A	R2	22 ft
BH52B	R4	46 ft

GTX performed the following tests on these samples:

8 ASTM D7012 Method C- Uniaxial Compressive Strength of Rock
8 ASTM D7625 -CERCHAR Abrasivity Index (CAI)

A copy of your test request is attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing services. We look forward to working with you again in the future.

Respectfully yours,

Jonathan Campbell
Assistant Laboratory Manager

GeoTesting
EXPRESS

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for infrastructure

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Geotechnical Test Report **9/1/2016**

GTX-305223

Northern Pass Trenchless

Lincoln, NH

Client Project No.: 201-16-NH

Prepared for:

Quanta Subsurface

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth, ft	Bulk Density, pcf	Compressive Strength, psi	Failure Type	In conformance with ASTM D4543	Note(s)
BH36B	R1	29.94-30.31	164	6878	1	Yes	---
BH36C	R2	37.50-37.87	171	9127	2	Yes	---
BH41B	R2	52.45-52.82	167	9565	3	Yes	---
BH42B	R3	21.10-21.47	173	28861	1	Yes	---
BH43B	R1	51	163	16420	1	Yes	---
BH47B	R1	55	164	5386	2	Yes	---
BH52A	R2	22.40-22.77	177	13721	1	Yes	---
BH52B	R4	46.10-46.47	166	8502	1	Yes	---

Notes: Density determined on core samples by measuring dimensions and mass and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure
(See attached photographs)

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	8/23/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa/rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH36B		
Sample ID:	R1		
Depth:	29.94-30.31 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.28	4.28	4.28
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	569.5		
Bulk Density, lb/ft^3	164	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00020	0.00020	0.00020	0.00030	0.00030

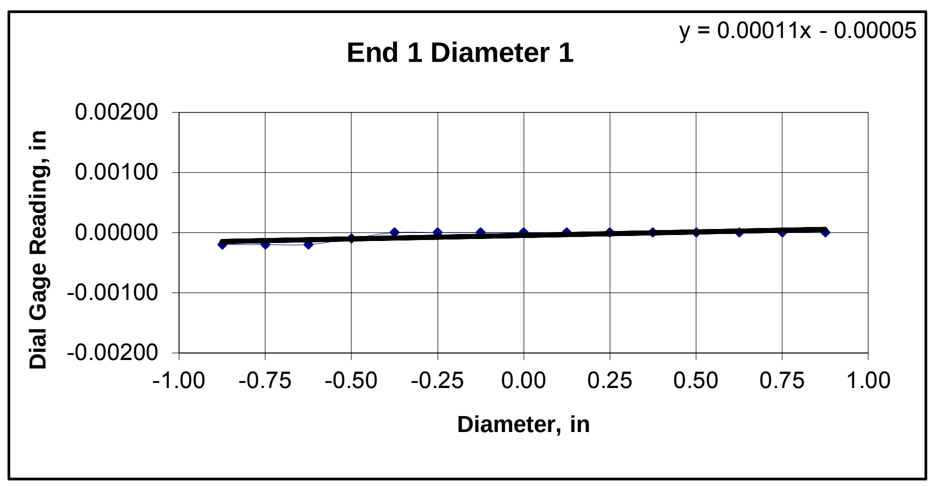
Difference between max and min readings, in:
0° = 0.00020 90° = 0.00030

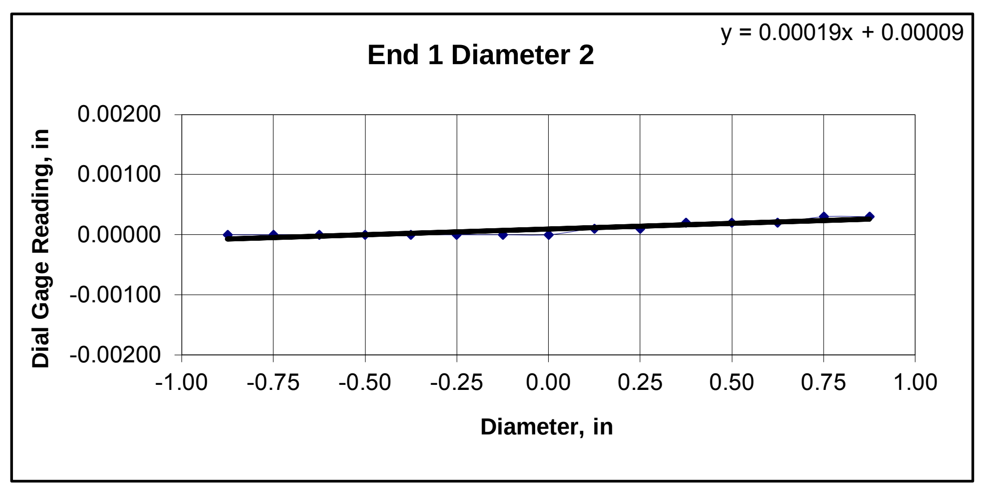
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00020	0.00020	0.00030	0.00030	0.00030

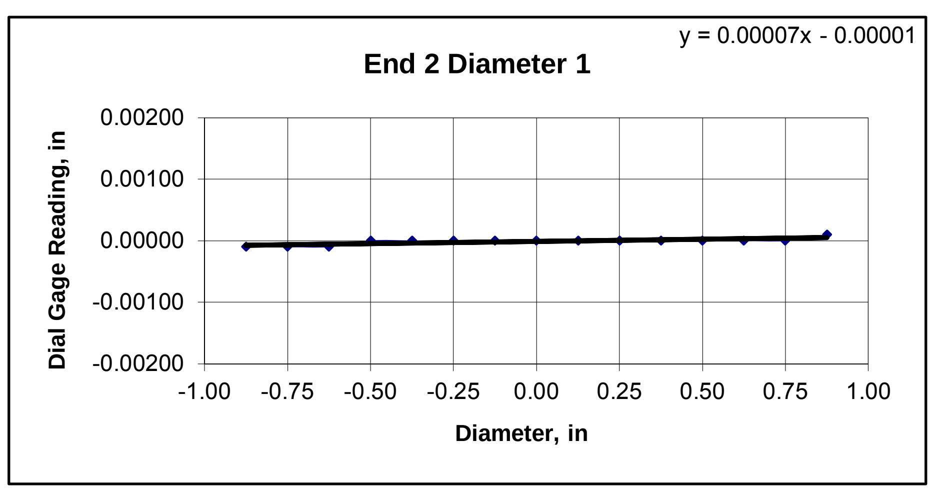
Difference between max and min readings, in:
0° = 0.0002 90° = 0.0004

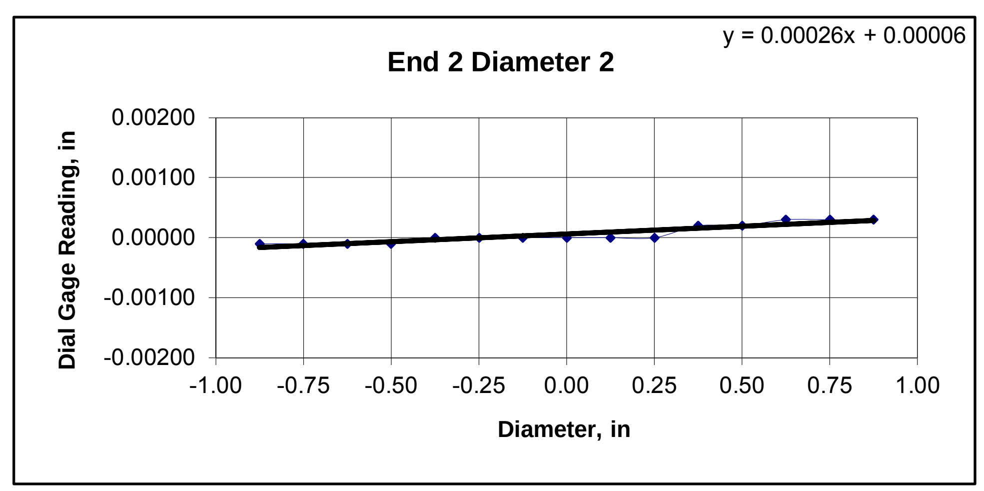
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00020

Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00011
Angle of Best Fit Line: 0.00630

End 2:
Slope of Best Fit Line 0.00007
Angle of Best Fit Line: 0.00401

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00019
Angle of Best Fit Line: 0.01089

End 2:
Slope of Best Fit Line 0.00026
Angle of Best Fit Line: 0.01490

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.980	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00030	1.980	0.00015	0.009	YES
END 2					
Diameter 1, in	0.00020	1.980	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00040	1.980	0.00020	0.012	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	daa
Checked By:	mpd
Boring ID:	BH36B
Sample ID:	R1
Depth, ft:	29.94-30.31

After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	8/22/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa/rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH36C		
Sample ID:	R2		
Depth:	37.50-37.87 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.40	4.40	4.40
Specimen Diameter, in:	1.97	1.97	1.97
Specimen Mass, g:	603.06		
Bulk Density, lb/ft^3	171	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020

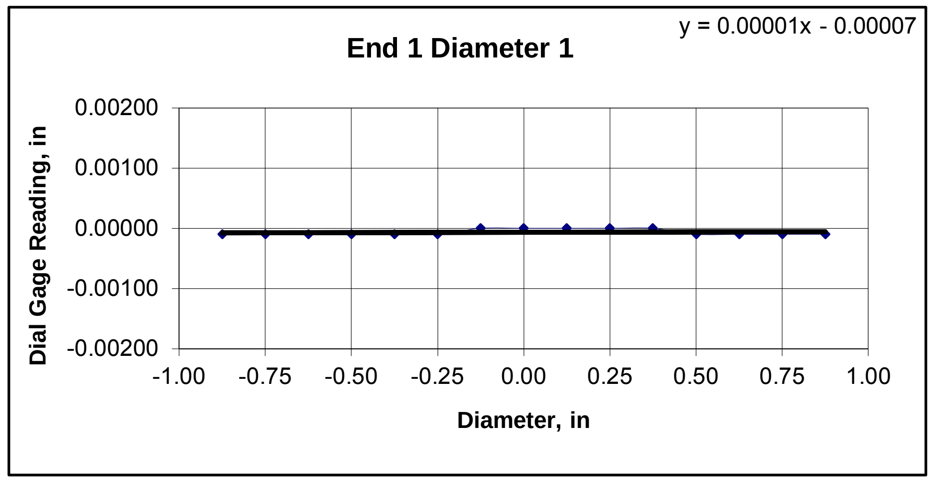
Difference between max and min readings, in:
0° = 0.00010 90° = 0.00020

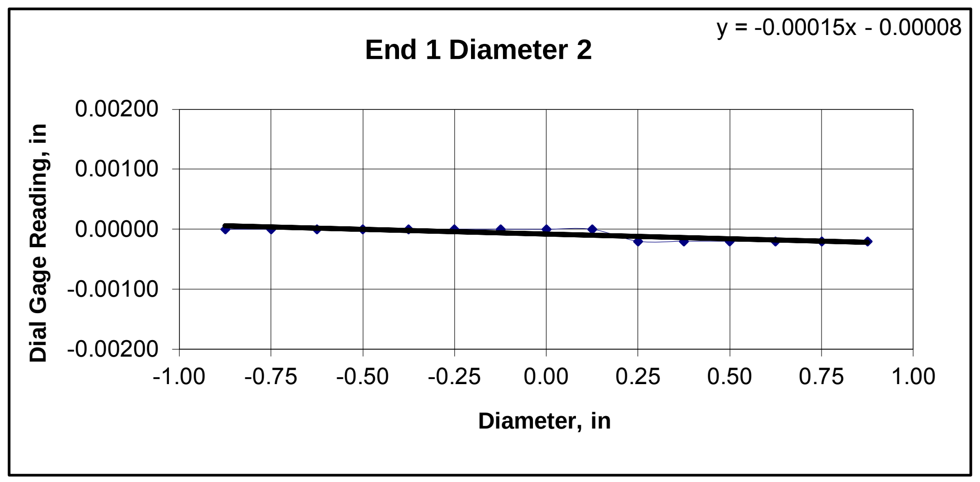
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020

Difference between max and min readings, in:
0° = 0.0002 90° = 0.0002

Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00010

Flatness Tolerance Met? YES

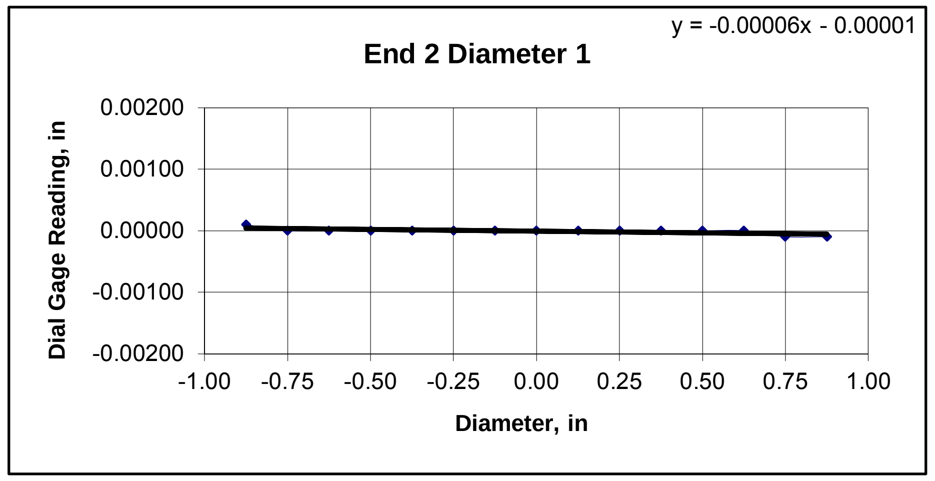


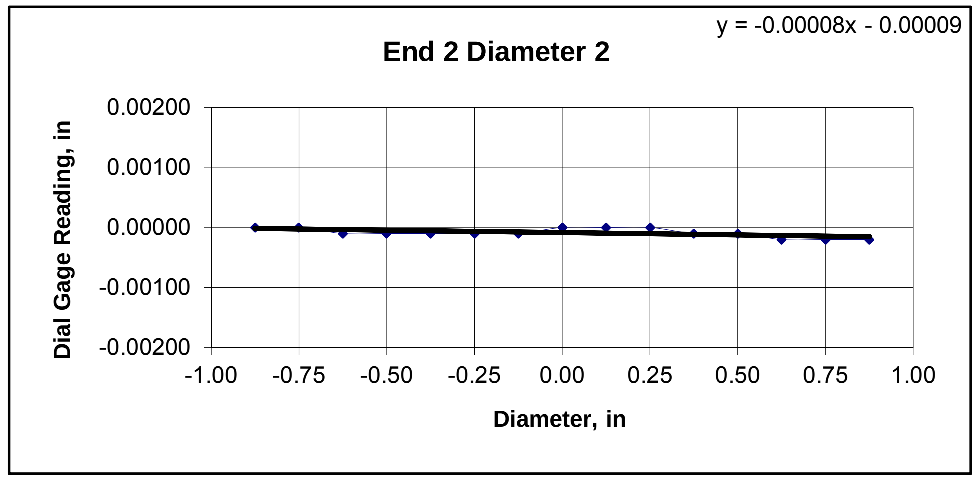


DIAMETER 1

End 1:		
	Slope of Best Fit Line	0.00001
	Angle of Best Fit Line:	0.00057
End 2:		
	Slope of Best Fit Line	-0.00006
	Angle of Best Fit Line:	-0.00344
Maximum Angular Difference:		0.00401

Parallelism Tolerance Met? YES
Spherically Seated





DIAMETER 2

End 1:		
	Slope of Best Fit Line	-0.00015
	Angle of Best Fit Line:	-0.00859
End 2:		
	Slope of Best Fit Line	-0.00008
	Angle of Best Fit Line:	-0.00458
Maximum Angular Difference:		0.00401

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	1.970	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00020	1.970	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00020	1.970	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00020	1.970	0.00010	0.006	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	daa
Checked By:	mpd
Boring ID:	BH36C
Sample ID:	R2
Depth, ft:	37.50-37.87

After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	8/22/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa/rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH41B		
Sample ID:	R2		
Depth:	52.45-52.82 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.33	4.34	4.34		
Specimen Diameter, in:	1.98	1.98	1.98		
Specimen Mass, g:	587.12				
Bulk Density, lb/ft^3	167	**Minimum Diameter Tolerence Met?**		YES	
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**		YES	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010

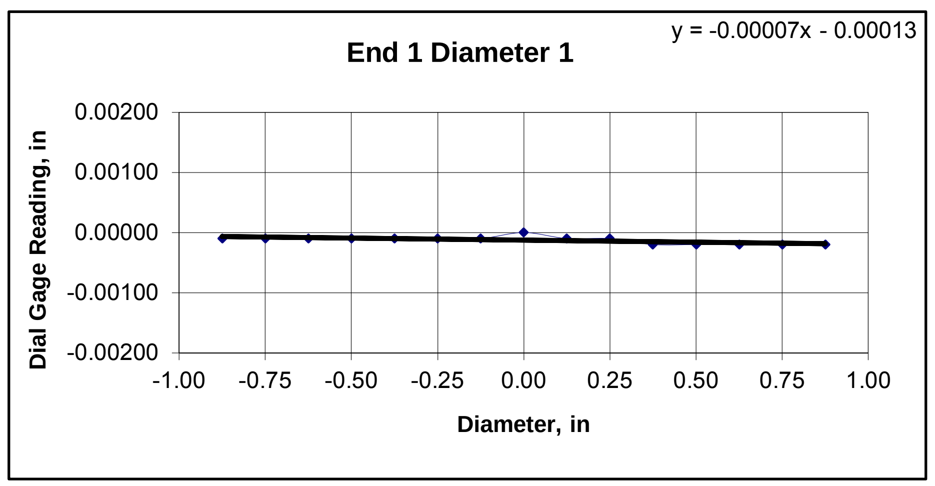
Difference between max and min readings, in:
0° = 0.00020 90° = 0.00010

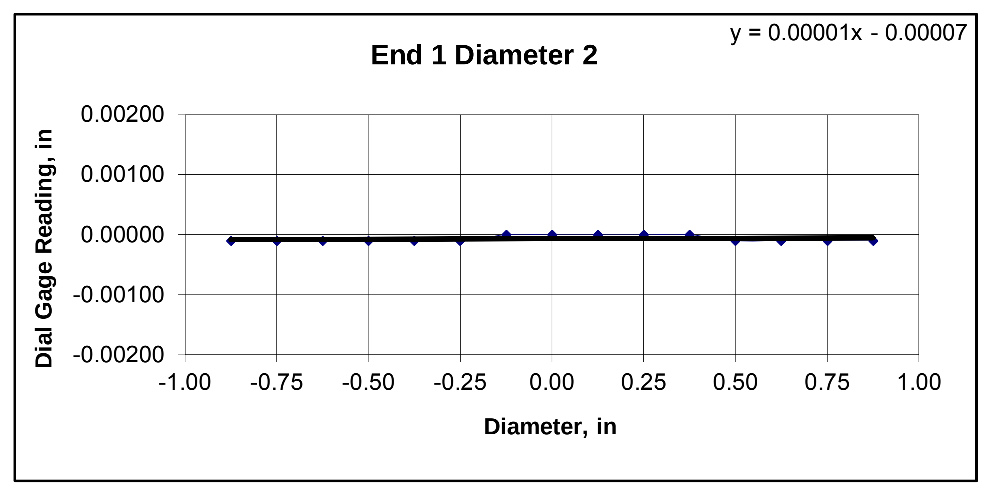
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020

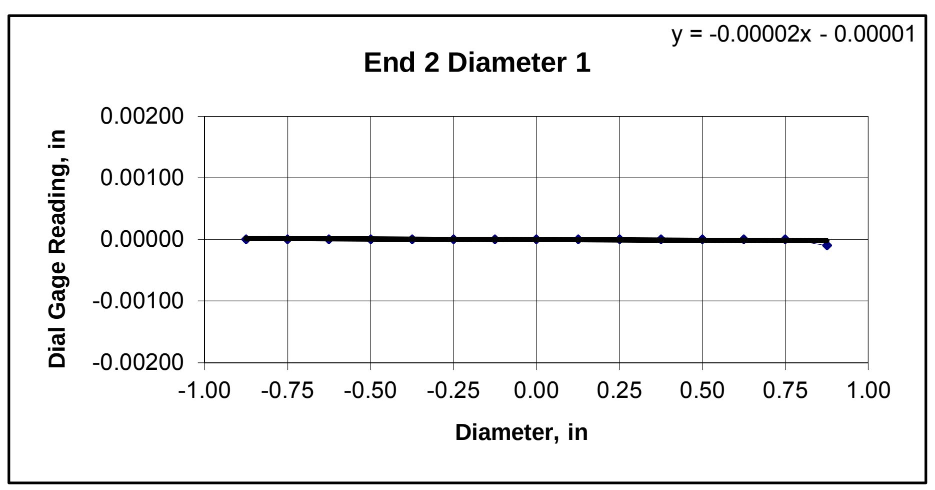
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0002

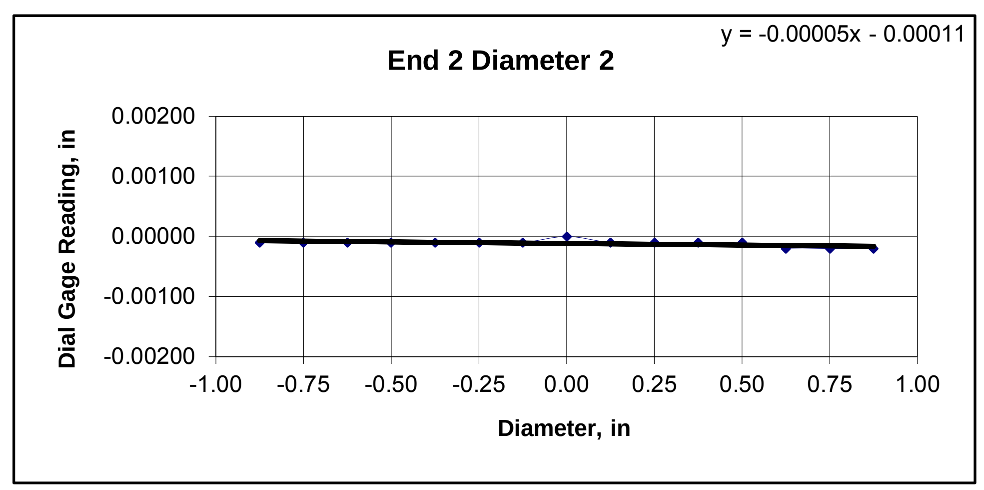
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00010

Flatness Tolerance Met? YES









DIAMETER 1

End 1:
- Slope of Best Fit Line: -0.00007
- Angle of Best Fit Line: -0.00401

End 2:
- Slope of Best Fit Line: -0.00002
- Angle of Best Fit Line: -0.00115

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
- Slope of Best Fit Line: 0.00001
- Angle of Best Fit Line: 0.00057

End 2:
- Slope of Best Fit Line: -0.00005
- Angle of Best Fit Line: -0.00286

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

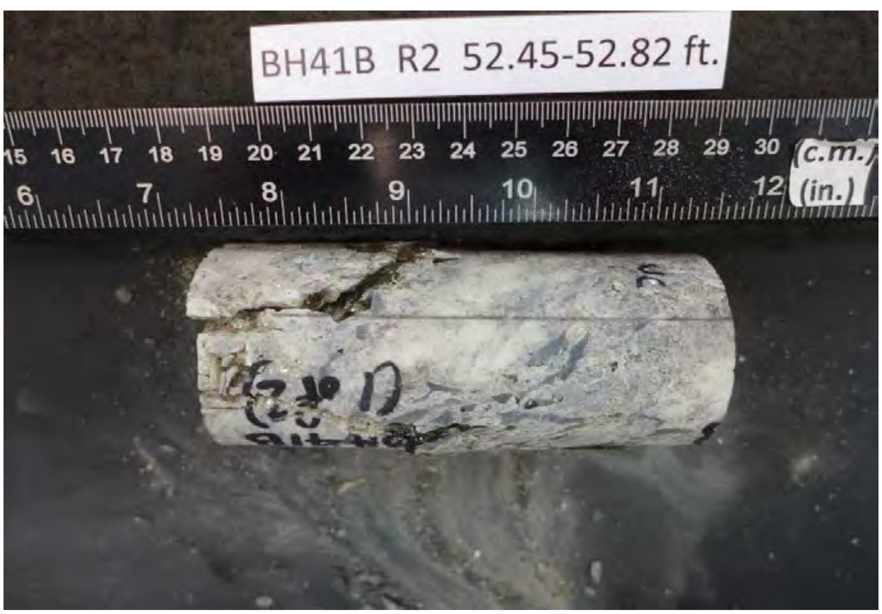
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.980	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00010	1.980	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00010	1.980	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00020	1.980	0.00010	0.006	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	daa
Checked By:	mpd
Boring ID:	BH41B
Sample ID:	R2
Depth, ft:	52.45-52.82

After cutting and grinding



After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	8/22/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa/rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH42B		
Sample ID:	R3		
Depth:	21.10-21.47 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.35	4.35	4.35
Specimen Diameter, in:	1.97	1.97	1.97
Specimen Mass, g:	604.71		
Bulk Density, lb/ft^3	173	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010

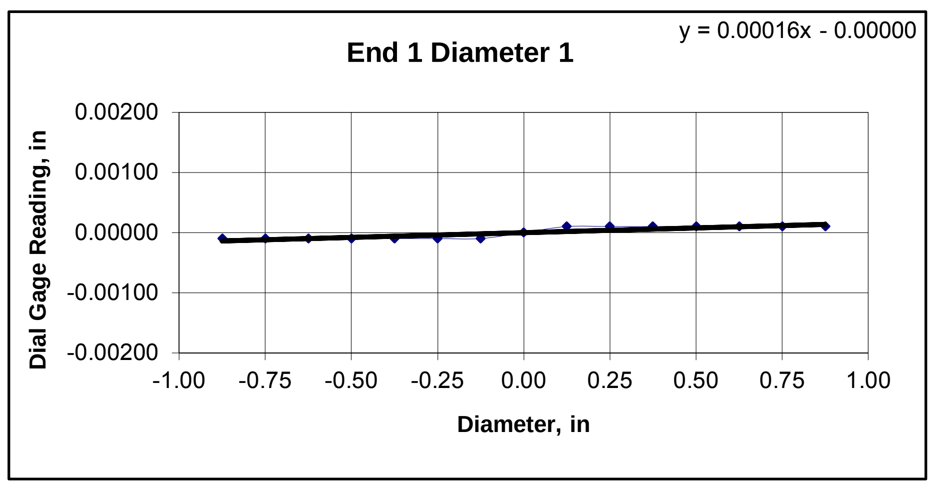
Difference between max and min readings, in:
0° = 0.00020 90° = 0.00010

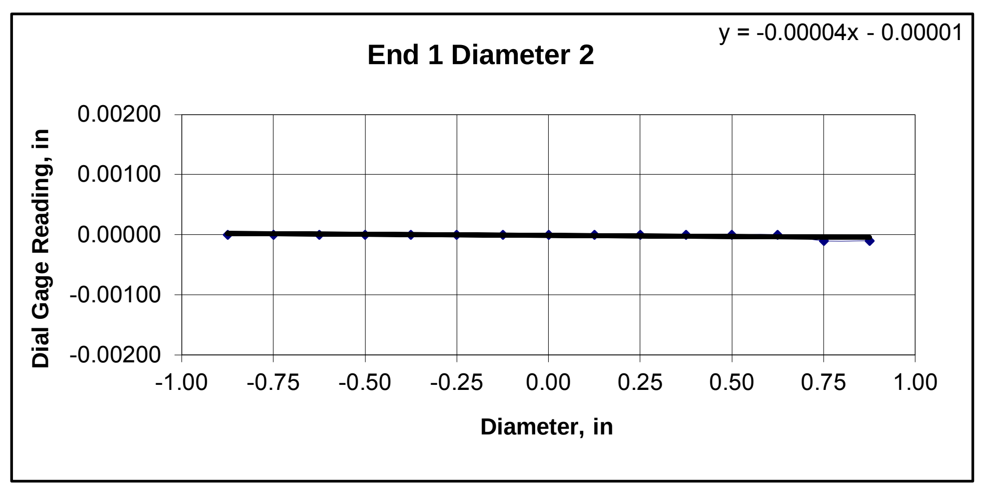
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

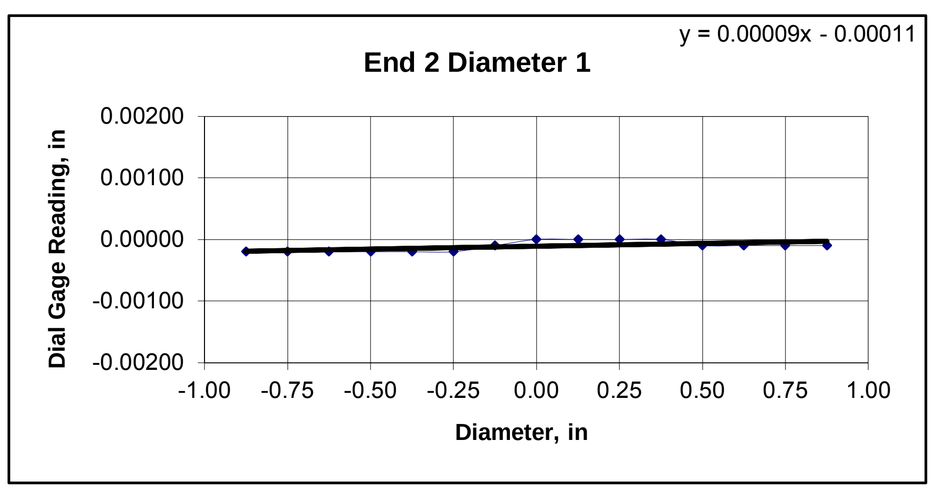
Difference between max and min readings, in:
0° = 0.0002 90° = 0

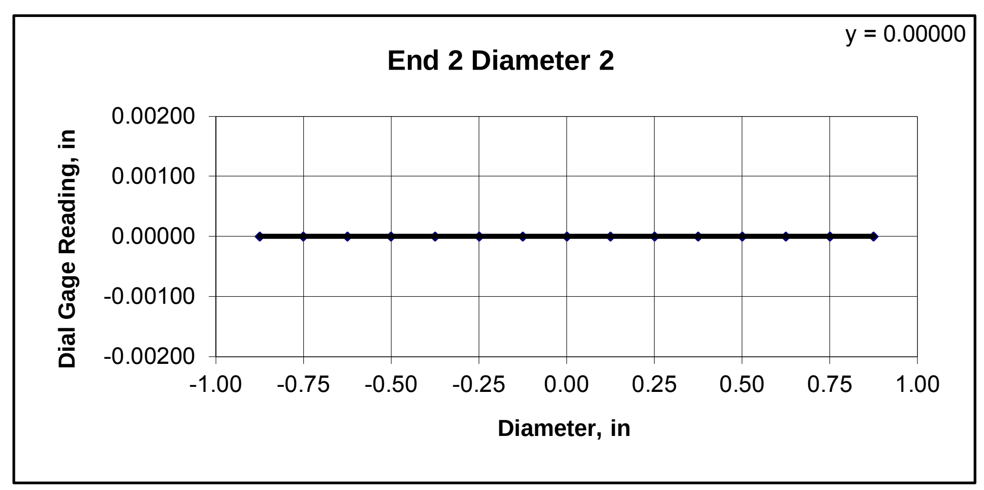
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00010

Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00016
Angle of Best Fit Line: 0.00917

End 2:
Slope of Best Fit Line 0.00009
Angle of Best Fit Line: 0.00516

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line -0.00004
Angle of Best Fit Line: -0.00229

End 2:
Slope of Best Fit Line 0.00000
Angle of Best Fit Line: 0.00000

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES
Spherically Seated

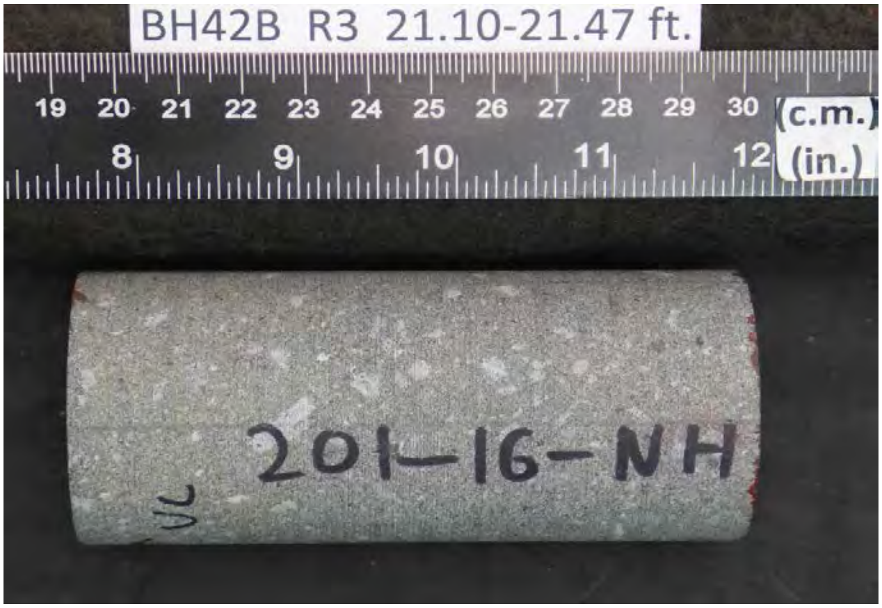
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.970	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00010	1.970	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00020	1.970	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00000	1.970	0.00000	0.000	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	daa
Checked By:	mpd
Boring ID:	BH42B
Sample ID:	R3
Depth, ft:	21.10-21.47



After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	8/23/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa/rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH43B		
Sample ID:	R1		
Depth:	51 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.32	4.32	4.32		
Specimen Diameter, in:	1.97	1.98	1.98		
Specimen Mass, g:	569.19				
Bulk Density, lb/ft^3	163			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020

Difference between max and min readings, in:

0° = 0.00020 90° = 0.00020

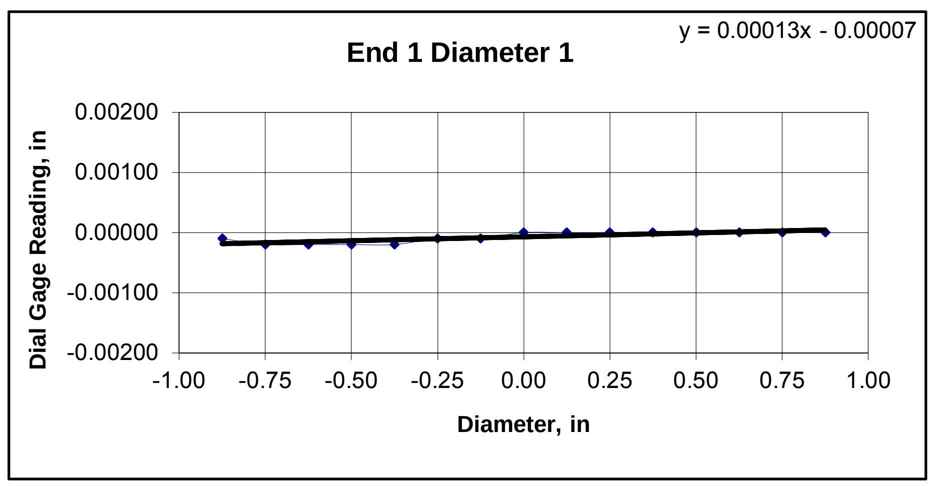
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00020	-0.00030

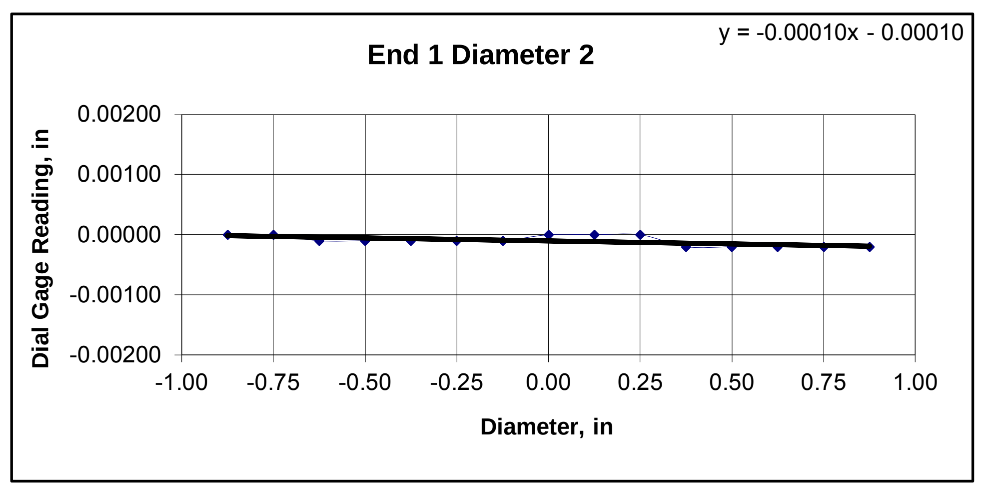
Difference between max and min readings, in:

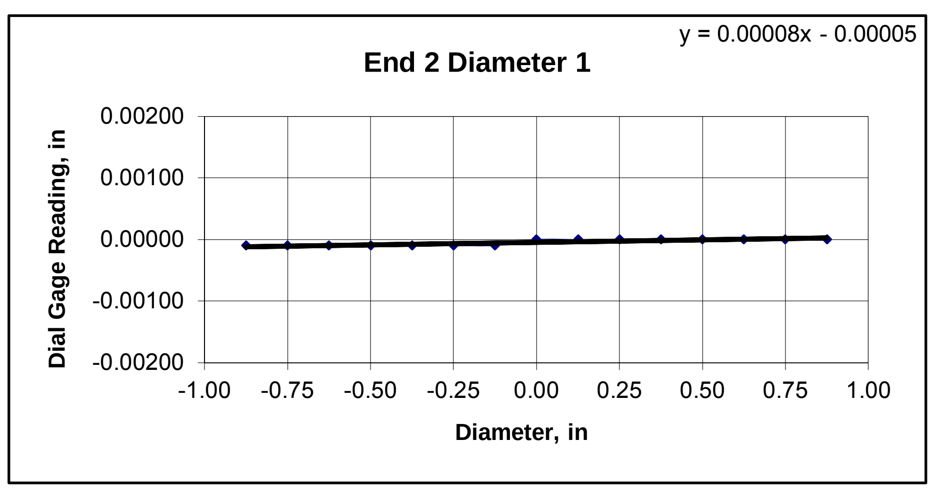
0° = 0.0001 90° = 0.0004

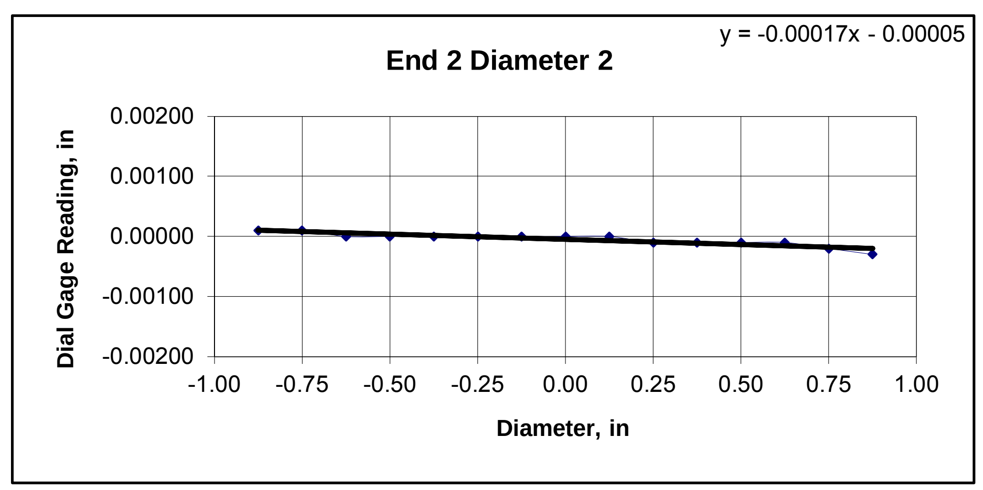
Maximum difference must be < 0.0020 in. Difference = ± 0.00020

Flatness Tolerance Met? YES









DIAMETER 1

End 1:
- Slope of Best Fit Line 0.00013
- Angle of Best Fit Line: 0.00745

End 2:
- Slope of Best Fit Line 0.00008
- Angle of Best Fit Line: 0.00458

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:
- Slope of Best Fit Line -0.00010
- Angle of Best Fit Line: -0.00573

End 2:
- Slope of Best Fit Line -0.00017
- Angle of Best Fit Line: -0.00974

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES

Spherically Seated

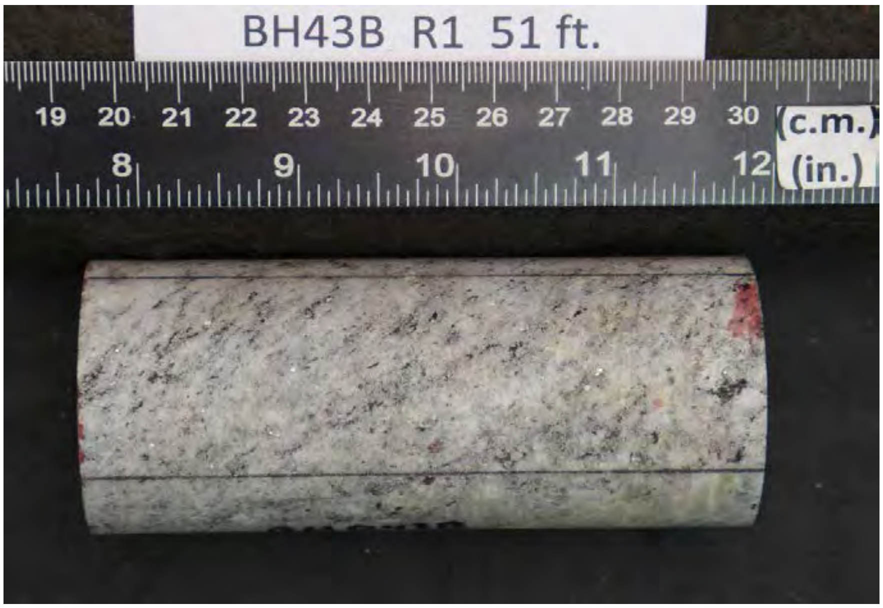
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.975	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00020	1.975	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00010	1.975	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00040	1.975	0.00020	0.012	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	daa
Checked By:	mpd
Boring ID:	BH43B
Sample ID:	R1
Depth, ft:	51



After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	8/23/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa/rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH47B		
Sample ID:	R1		
Depth:	55 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.35	4.35	4.35		
Specimen Diameter, in:	1.97	1.97	1.97		
Specimen Mass, g:	572.52				
Bulk Density, lb/ft^3	164			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00010	0.00010	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020
Diameter 2, in (rotated 90°)	-0.00030	-0.00030	-0.00030	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010

Difference between max and min readings, in:

0° = 0.00030 90° = 0.00030

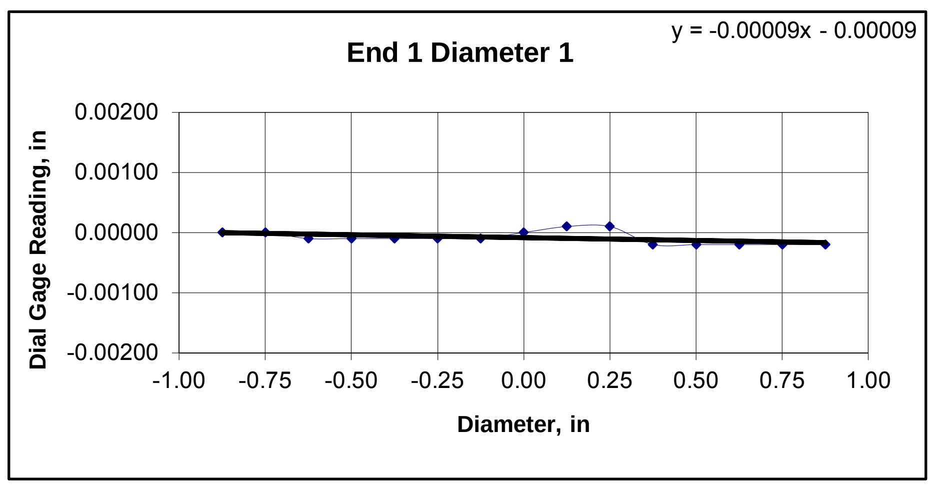
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020
Diameter 2, in (rotated 90°)	-0.00030	-0.00030	-0.00030	-0.00030	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

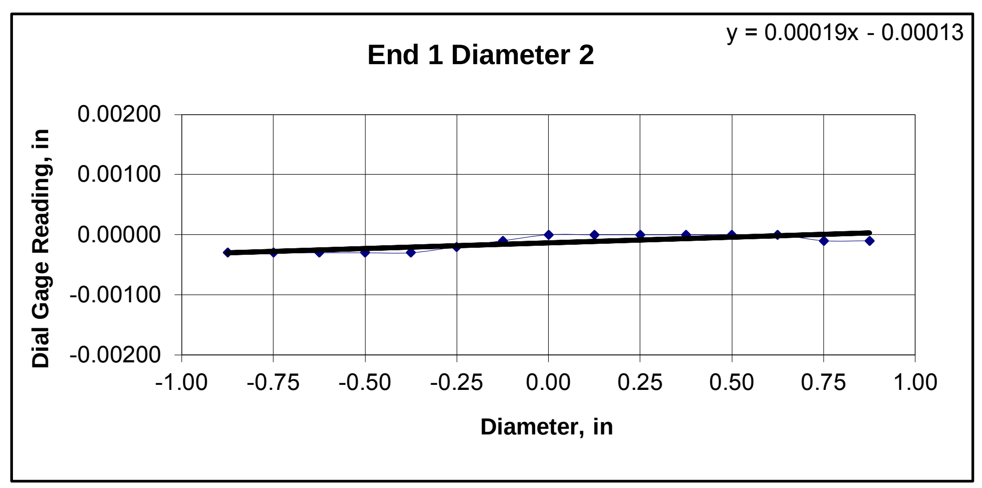
Difference between max and min readings, in:

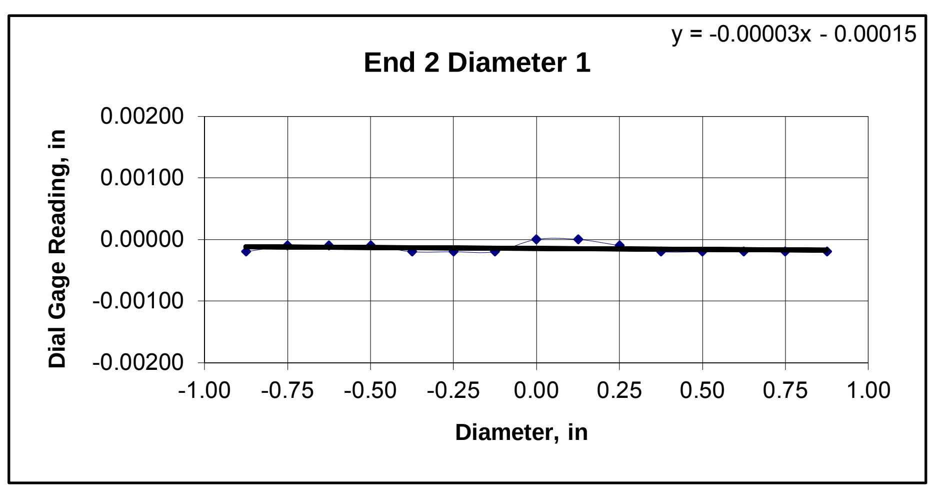
0° = 0.0002 90° = 0.0003

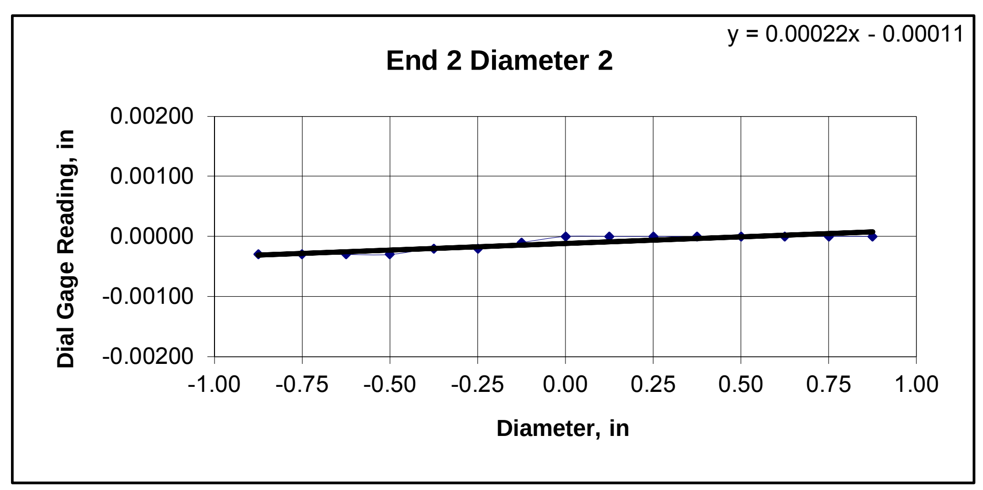
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	-0.00009
Angle of Best Fit Line:	-0.00516

End 2:

Slope of Best Fit Line	-0.00003
Angle of Best Fit Line:	-0.00172

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00019
Angle of Best Fit Line:	0.01089

End 2:

Slope of Best Fit Line	0.00022
Angle of Best Fit Line:	0.01261

Maximum Angular Difference: 0.00172

Parallelism Tolerance Met? YES

Spherically Seated

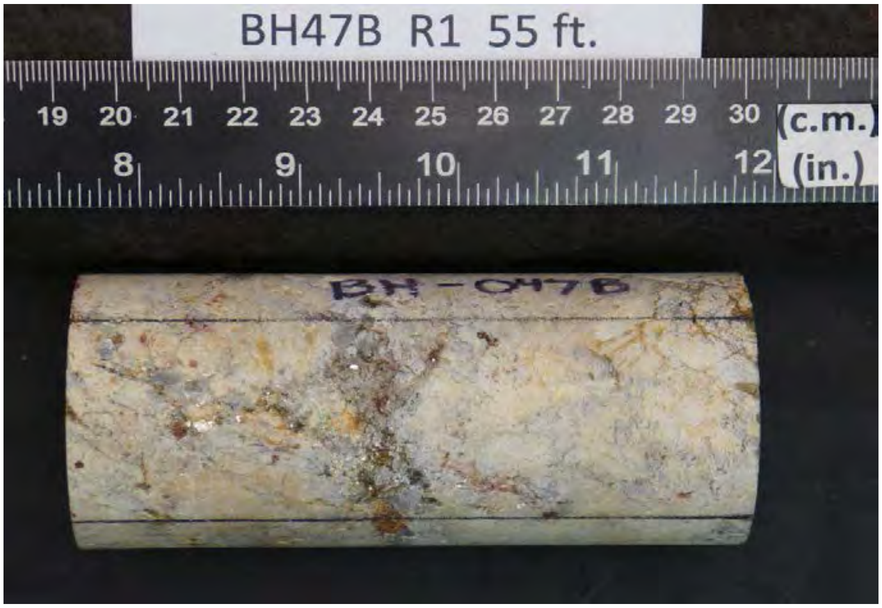
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.970	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00030	1.970	0.00015	0.009	YES
END 2					
Diameter 1, in	0.00020	1.970	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00030	1.970	0.00015	0.009	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	daa
Checked By:	mpd
Boring ID:	BH47
Sample ID:	R1
Depth, ft:	55



After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	8/22/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH52A		
Sample ID:	R2		
Depth:	22.40-22.77 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average	
Specimen Length, in:	4.30	4.30	4.30	
Specimen Diameter, in:	1.97	1.97	1.97	
Specimen Mass, g:	608.94			
Bulk Density, lb/ft^3	177	**Minimum Diameter Tolerence Met?**		YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**		YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00030	-0.00030	-0.00030	-0.00010	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010

Difference between max and min readings, in:

0° = 0.00030 90° = 0.00010

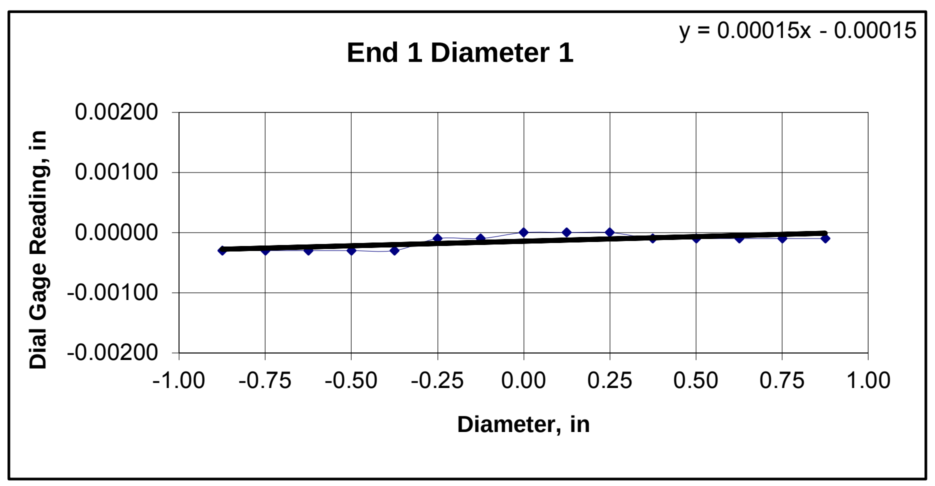
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000

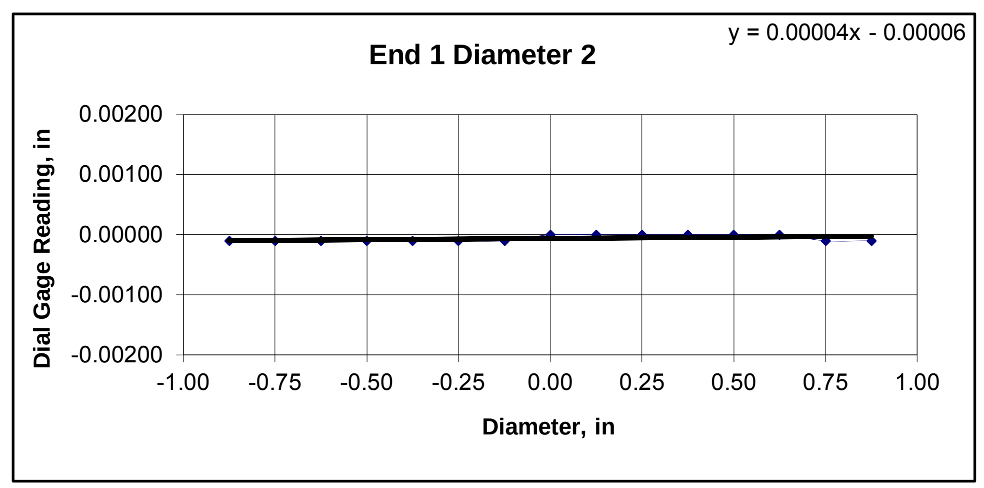
Difference between max and min readings, in:

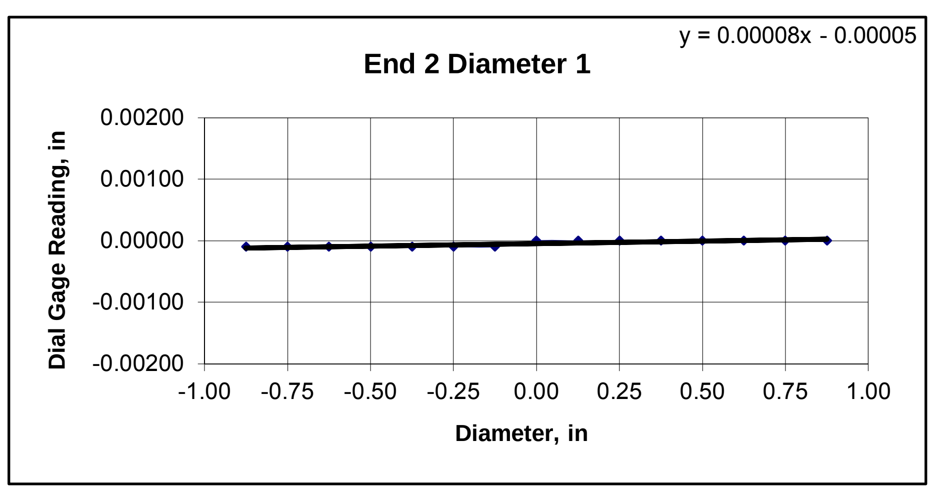
0° = 0.0001 90° = 0.0001

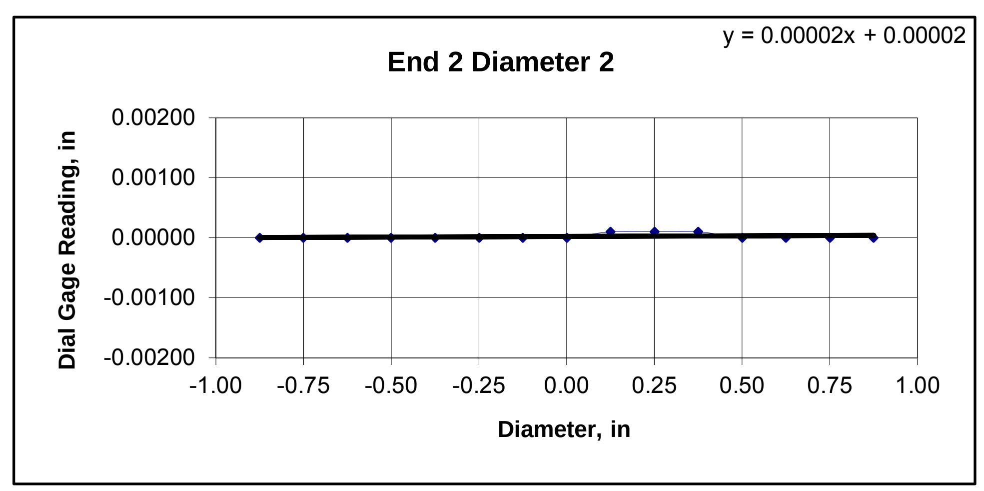
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	0.00015
Angle of Best Fit Line:	0.00859

End 2:

Slope of Best Fit Line	0.00008
Angle of Best Fit Line:	0.00458

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00004
Angle of Best Fit Line:	0.00229

End 2:

Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115

Maximum Angular Difference: 0.00115

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.970	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00010	1.970	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00010	1.970	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00010	1.970	0.00005	0.003	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	daa
Checked By:	mpd
Boring ID:	BH52A
Sample ID:	R2
Depth, ft:	22.40-22.77

After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	8/23/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa/rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH52B		
Sample ID:	R4		
Depth:	46.10-46.47 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.30	4.30	4.30
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	577.36		
Bulk Density, lb/ft^3	166	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010

Difference between max and min readings, in:

0° = 0.00020 90° = 0.00020

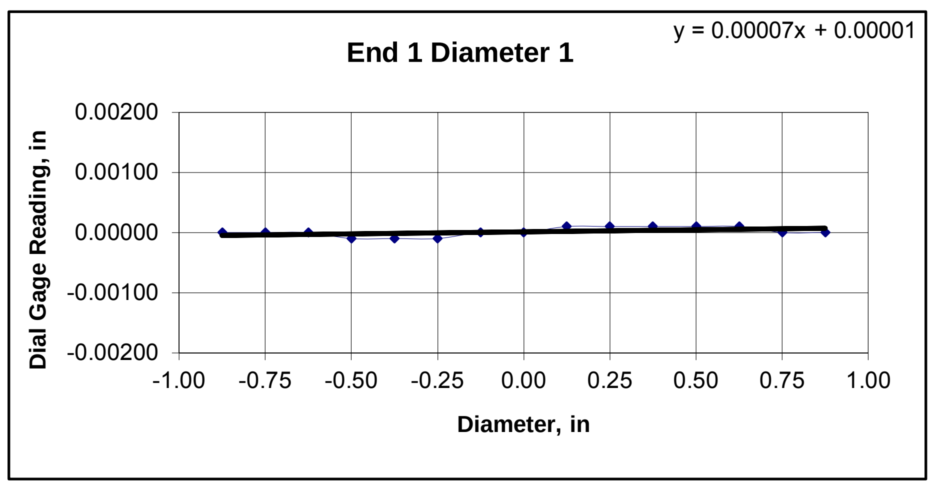
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020

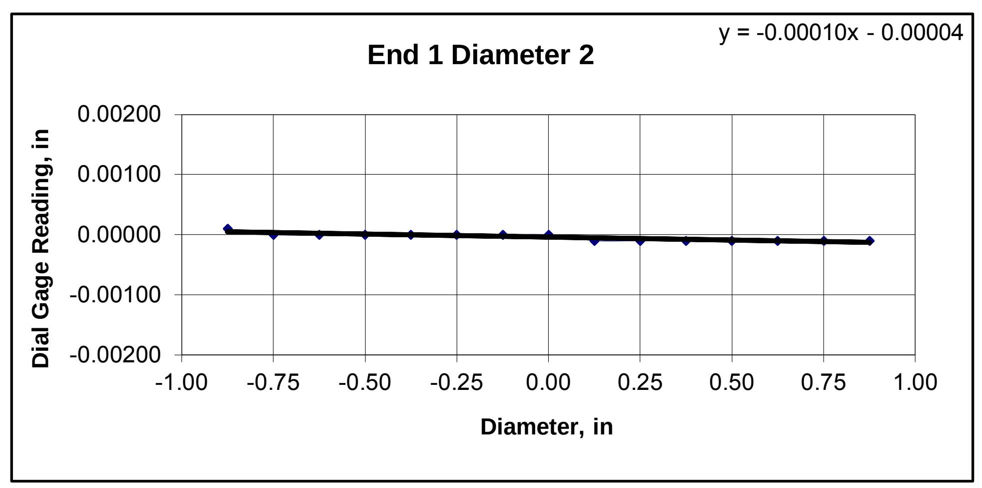
Difference between max and min readings, in:

0° = 0.0002 90° = 0.0003

Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015

Flatness Tolerance Met? YES





DIAMETER 1

End 1:

Slope of Best Fit Line	0.00007
Angle of Best Fit Line:	0.00401

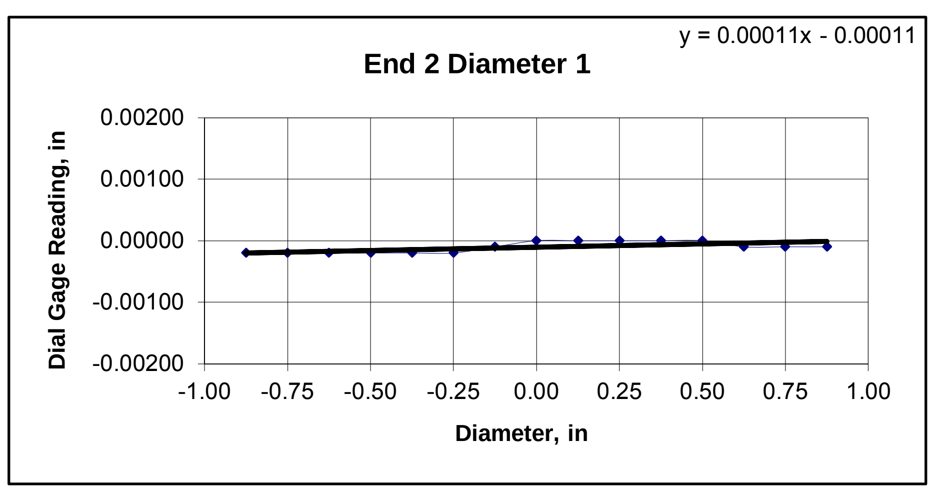
End 2:

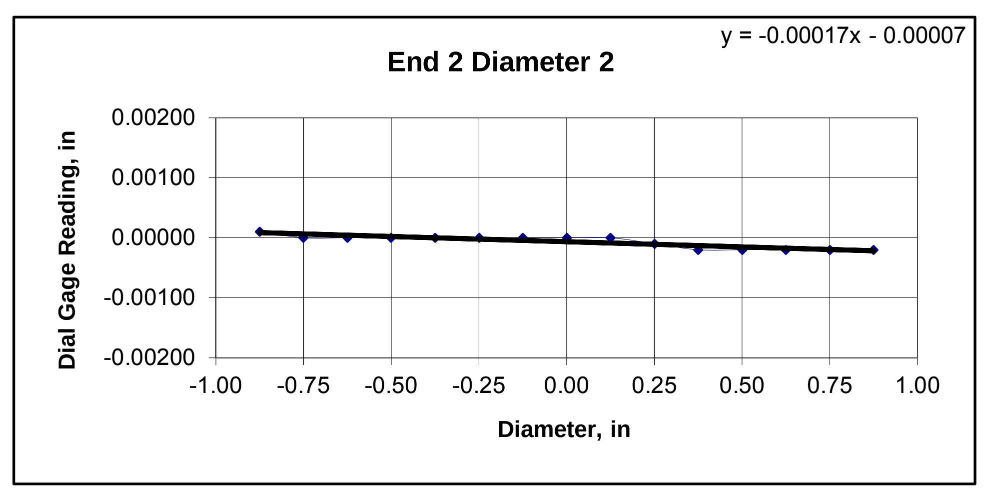
Slope of Best Fit Line	0.00011
Angle of Best Fit Line:	0.00630

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES

Spherically Seated





DIAMETER 2

End 1:

Slope of Best Fit Line	-0.00010
Angle of Best Fit Line:	-0.00573

End 2:

Slope of Best Fit Line	-0.00017
Angle of Best Fit Line:	-0.00974

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.980	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00020	1.980	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00020	1.980	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00030	1.980	0.00015	0.009	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/23/2016
Tested By:	daa
Checked By:	mpd
Boring ID:	BH52B
Sample ID:	R4
Depth, ft:	46.10-46.47

After cutting and grinding

After break

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	rlc
Checked By:	mpd

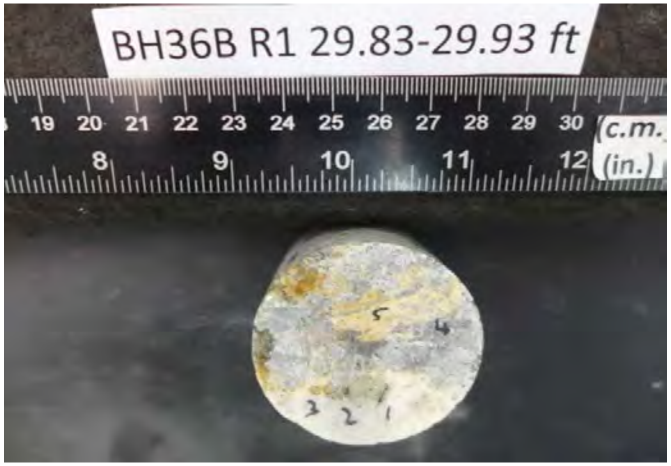
Abrasiveness of Rock Using the CERCHAR Method by ASTM D7625

Boring ID	Sample ID	Depth (ft)	Stylus No.	Reading 1	Reading 2	Average	Comments
BH36B	R1	29.83-29.93	1	3.1	3.4	3.25	
			2	4.6	4.2	4.40	
			3	2.8	3.0	2.90	
			4	3.9	3.8	3.85	
			5	4.5	4.3	4.40	
			Average CAIs			3.76	
			Average CAI *			4.20	
			CERCHAR Abrasiveness Index Classification			Extreme Abrasiveness	

Notes:

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardness 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel

* CAI = (0.99 x CAI_S) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface



After Test

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	rlc
Checked By:	mpd

Abrasiveness of Rock Using the CERCHAR Method by ASTM D7625

Boring ID	Sample ID	Depth (ft)	Stylus No.	Reading 1	Reading 2	Average	Comments
BH36C	R2	37.39-37.49	1	3.8	4.0	3.90	
			2	3.2	3.8	3.50	
			3	4.4	3.9	4.15	
			4	3.8	3.7	3.75	
			5	3.2	3.9	3.55	
			Average CAIs			3.77	
			Average CAI *			4.21	
			CERCHAR Abrasiveness Index Classification			Extreme Abrasiveness	

Notes:

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

After Test

GeoTesting EXPRESS

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	rlc
Checked By:	mpd

Abrasiveness of Rock Using the CERCHAR Method by ASTM D7625

Boring ID	Sample ID	Depth (ft)	Stylus No.	Reading 1	Reading 2	Average	Comments
BH41B	R2	52.83-52.93	1	4.8	4.1	4.45	
			2	5.0	4.8	4.90	
			3	4.3	4.0	4.15	
			4	4.2	4.4	4.30	
			5	3.9	4.8	4.35	
			Average CAIs			4.43	
			Average CAI *			4.87	
			CERCHAR Abrasiveness Index Classification			Extreme Abrasiveness	

Notes:

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardness 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel

* CAI = (0.99 x CAI_S) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface

After Test

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	rlc
Checked By:	mpd

Abrasiveness of Rock Using the CERCHAR Method by ASTM D7625

Boring ID	Sample ID	Depth (ft)	Stylus No.	Reading 1	Reading 2	Average	Comments
BH42B	R3	20.99-21.09	1	2.2	2.1	2.15	
			2	4.0	4.2	4.10	
			3	2.4	2.3	2.35	
			4	1.8	2.0	1.90	
			5	2.2	2.5	2.35	
			Average CAIs			2.57	
			Average CAI *			3.02	
			CERCHAR Abrasiveness Index Classification			High Abrasiveness	

Notes:

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardness 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel

* CAI = (0.99 x CAI_S) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface

After Test

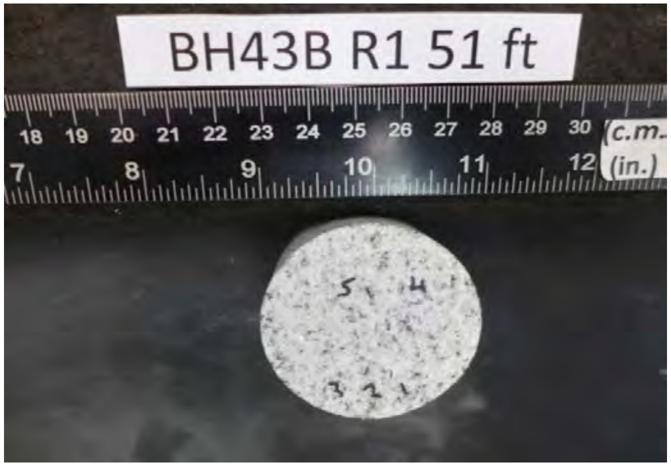
Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	rlc
Checked By:	mpd

Abrasiveness of Rock Using the CERCHAR Method by ASTM D7625

Boring ID	Sample ID	Depth (ft)	Stylus No.	Reading 1	Reading 2	Average	Comments
BH43B	R1	51	1	4.3	4.5	4.40	
			2	4.1	3.8	3.95	
			3	4.8	4.7	4.75	
			4	4.4	4.6	4.50	
			5	4.7	4.5	4.60	
			Average CAIs			4.44	
			Average CAI *			4.88	
			CERCHAR Abrasiveness Index Classification			Extreme Abrasiveness	

Notes:

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



After Test

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	rlc
Checked By:	mpd

Abrasiveness of Rock Using the CERCHAR Method by ASTM D7625

Boring ID	Sample ID	Depth (ft)	Stylus No.	Reading 1	Reading 2	Average	Comments
BH47B	R1	55	1	3.5	3.1	3.30	
			2	4.8	4.5	4.65	
			3	5.0	4.9	4.95	
			4	3.3	3.5	3.42	
			5	4.5	5.5	5.00	
			Average CAIs			4.26	
			Average CAI *			4.70	
			CERCHAR Abrasiveness Index Classification			Extreme Abrasiveness	

Notes:

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardness 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel

* CAI = (0.99 x CAI_S) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface

After Test

GeoTesting EXPRESS

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	rlc
Checked By:	mpd

Abrasiveness of Rock Using the CERCHAR Method by ASTM D7625

Boring ID	Sample ID	Depth (ft)	Stylus No.	Reading 1	Reading 2	Average	Comments
BH52A	R2	22.29-22.39	1	3.8	4.0	3.90	
			2	3.1	3.1	3.10	
			3	2.7	2.3	2.50	
			4	2.6	2.9	2.75	
			5	4.2	4.1	4.15	
			Average CAIs			3.28	
			Average CAI *			3.73	
			CERCHAR Abrasiveness Index Classification			High Abrasiveness	

Notes:

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

After Test

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	8/24/2016
Tested By:	rlc
Checked By:	mpd

Abrasiveness of Rock Using the CERCHAR Method by ASTM D7625

Boring ID	Sample ID	Depth (ft)	Stylus No.	Reading 1	Reading 2	Average	Comments
BH52B	R4	45.85-45.95	1	3.4	3.2	3.30	
			2	3.0	3.2	3.10	
			3	4.4	3.9	4.15	
			4	3.2	3.6	3.40	
			5	3.9	4.5	4.20	
			Average CAIs			3.63	
			Average CAI *			4.07	
			CERCHAR Abrasiveness Index Classification			Extreme Abrasiveness	

Notes:

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

After Test

GeoTesting EXPRESS

ROCK CHAIN OF CUSTODY & TEST REQUEST

GeoTesting Express, Inc.
125 Nagog Park
Acton, MA 01720
800 434 1062 Toll Free
978 635 0266 Fax

2358 Perimeter Park Drive, Suite 320
Atlanta, GA 30341
770 645 6575 Tel
770 645 6570 Fax

www.geotesting.com

CLIENT		INVOICE (complete if different from Client)	
Company: Quanta Subsurface		Company:	
Address: 4308 N Barker Rd		Address:	
City, State, Zip: Spokane Valley, WA 99027		City, State, Zip:	
Contact: Balin Strickler	Phone: 509-892-9409	Contact:	Phone:
E-mail: bstrickler@quantasubsurface.com	Cell: 928-830-4662	E-mail:	Cell:

PROJECT		
Project Name: Northern Pass Trenchless	Client Project #: 201-16-NH	Purchase Order#:
Project Location: Lincoln	GTX Sales Order #:	Requested Turnaround:
On-site Contact: Sean Kearney	E-mail: skearney@cruxsub.com	Phone: 617-549-6390

ROCK

Core Run #	Sample ID	Depth	CERCHAR Abrasivity (ASTM D 7625)* 55HRC/40HRC	Direct Shear (ASTM D5607)*	Direct Tensile Strength (ASTM D 2936)	Elastic Moduli in Triaxial Compression (ASTM D 7012B)	Elastic Moduli in Uniaxial Compression (ASTM D 7012D)	Unit Weight (ISRM)	Petrographic Analysis (ISRM)	Point Load Index (ASTM D 5731)* Diametral, Axial, Lump/Block	Punch Penetration (Handewith)	Slake Durability (ASTM D 4644)	Splitting (Brazilian) Tensile Strength (ASTM D 3967)	Schmidt Hammer (ASTM D 5873)	Total Hardness (Schmidt Hammer and Taber Abrasion)	Triaxial Compression (ASTM D 7012A)	Unconfined Compression (ASTM D 7012C)	Other:	Other:
R1	BH36B	+/- 31'	X														X		
R2	BH36C	+/- 38'	X														X		
R2	BH41B	+/- 52'	X														X	Tests added	
R3	BH42B	+/- 21'	X														X	8/19/16	
R1	BH43B	+/- 51'	X														X		
R1	BH47B	+/- 55'	X														X		
R2	BH52A	+/- 22'	X														X		
R4	BH52B	+/- 46'	X														X		

*Specify Test Conditions (Undisturbed or Remolded, Density and Moisture, Test Normal Loads, Test Confining Stresses, etc.):

AUTHORIZE BY SIGNING AND DATING:

SIGNATURE: ____________ PRINT NAME: Brian J. Olson DATE: ____________

For GTX Use Only
Incoming Sample Inspection Performed ☐
Adverse conditions:

Relinquished By: T. Vernon	DATE:	Received By:	DATE: 8/19/16
	TIME:		TIME: 1623
Relinquished By:	DATE:	Received By:	DATE:
	TIME:		TIME:

WARRANTY and LIABILITY

GeoTesting Express (GTX) warrants that all tests it performs are run in general accordance with the specified test procedures and accepted industry practice. GTX will correct or repeat any test that does not comply with this warranty. GTX has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

GTX's liability will be limited to correcting or repeating a test which fails our warranty. GTX's liability for damages to the Purchaser of testing services for any cause whatsoever shall be limited to the amount GTX received for the testing services. GTX will not be liable for any damages, or for any lost benefits or other consequential damages resulting from the use of these test results, even if GTX has been advised of the possibility of such damages. GTX will not be responsible for any liability of the Purchaser to any third party.

Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$
B	pore pressure parameter for $\Delta\sigma_3$
CAI	CERCHAR Abrasiveness Index
CIU	isotropically consolidated undrained triaxial shear test
CR	compression ratio for one dimensional consolidation
CSR	cyclic stress ratio
C_c	coefficient of curvature, $(D_{30})^2$ / (D_{10} x D_{60})
C_u	coefficient of uniformity, D_{60}/D_{10}
C_c	compression index for one dimensional consolidation
C_α	coefficient of secondary compression
c_v	coefficient of consolidation
c	cohesion intercept for total stresses
c'	cohesion intercept for effective stresses
D	diameter of specimen
D	damping ratio
D_{10}	diameter at which 10% of soil is finer
D_{15}	diameter at which 15% of soil is finer
D_{30}	diameter at which 30% of soil is finer
D_{50}	diameter at which 50% of soil is finer
D_{60}	diameter at which 60% of soil is finer
D_{85}	diameter at which 85% of soil is finer
d_{50}	displacement for 50% consolidation
d_{90}	displacement for 90% consolidation
d_{100}	displacement for 100% consolidation
E	Young's modulus
e	void ratio
e_c	void ratio after consolidation
e_o	initial void ratio
G	shear modulus
G_s	specific gravity of soil particles
H	height of specimen
H_R	Rebound Hardness number
i	gradient
I_S	Uncorrected point load strength
$I_{S(50)}$	Size corrected point load strength index
H_A	Modified Taber Abrasion
H_T	Total hardness
K_o	lateral stress ratio for one dimensional strain
k	permeability
LI	Liquidity Index
m_v	coefficient of volume change
n	porosity
PI	plasticity index
P_c	preconsolidation pressure
p	$(\sigma_1 + \sigma_3) / 2$, $(\sigma_v + \sigma_h) / 2$
p'	$(\sigma'_1 + \sigma'_3) / 2$, $(\sigma'_v + \sigma'_h) / 2$
p'_c	p' at consolidation
Q	quantity of flow
q	$(\sigma_1 - \sigma_3) / 2$
q_f	q at failure
q_o, q_i	initial q
q_c	q at consolidation
S_r	Post cyclic undrained shear strength
T	temperature
t	time
U, UC	unconfined compression test
UU, Q	unconsolidated undrained triaxial test
u_a	pore gas pressure
u_e	excess pore water pressure
u, u_w	pore water pressure
V	total volume
V_g	volume of gas
V_s	volume of solids
V_s	shear wave velocity
V_v	volume of voids
V_w	volume of water
V_o	initial volume
v	velocity
W	total weight
W_s	weight of solids
W_w	weight of water
w	water content
w_c	water content at consolidation
w_f	final water content
w_l	liquid limit
w_n	natural water content
w_p	plastic limit
w_s	shrinkage limit
w_o, w_i	initial water content
α	slope of q_f versus p_f
α'	slope of q_f versus p_f'
γ_t	total unit weight
γ_d	dry unit weight
γ_s	unit weight of solids
γ_w	unit weight of water
ε	strain
ε_{vol}	volume strain
ε_h, ε_v	horizontal strain, vertical strain
μ	Poisson's ratio, also viscosity
σ	normal stress
σ'	effective normal stress
σ_c, σ'_c	consolidation stress in isotropic stress system
σ_h, σ'_h	horizontal normal stress
σ_v, σ'_v	vertical normal stress
σ'_{vc}	Effective vertical consolidation stress
σ_1	major principal stress
σ_2	intermediate principal stress
σ_3	minor principal stress
τ	shear stress
φ	friction angle based on total stresses
φ'	friction angle based on effective stresses
φ'_r	residual friction angle
φ_{ult}	φ for ultimate strength

GeoTesting EXPRESS
Technologies to manage risk for infrastructure

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Transmittal

TO:

Balin Strickler
Quanta Subsurface
4308 N Barker Rd.
Spokane Valley, WA 99027

DATE: 9/15/2016	GTX NO: 305223
RE: Northern Pass Trenchless	

COPIES	DATE	DESCRIPTION
	9/15/2016	**September 2016 Laboratory Test Report**

REMARKS:

SIGNED:
Jonathan Campbell, Assistant Laboratory Manager

CC:

APPROVED BY:
Mark Dobday, P.G., Laboratory Manager

September 15, 2016

Balin Strickler
Quanta Subsurface
4308 N Barker Rd.
Spokane Valley, WA 99027

RE: Northern Pass Trenchless, Lincoln, NH (GTX-305223)

Dear Balin Strickler:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received 16 samples from you on 9/2/2016. These samples were labeled as follows:

Boring Number	Sample Number	Depth
BH-18A	R2	55 ft
BH-19A	R1	43 ft
BH-28A	R3	28.4-29.35 ft
BH-28B	R4	29.1-29.6 ft
BH-29A	R2	13-14 ft
BH-29B	R5	32-33 ft
BH-30A	R3	24 ft
BH-31A	R9	42 ft
BH-31B	R3	48 ft
BH-32A	R2	17 ft
BH-32B	R9	49.8-50.8 ft
BH-33B	R2	27 ft
BH-34A	R2	34 ft
BH-34B	R2	26 ft
BH-35A	R2	23.4-24.5 ft
BH-35B	R9	48 ft

GTX performed the following tests on these samples:

16 ASTM D7012 Method C- Uniaxial Compressive Strength of Rock
16 ASTM D7625 -CERCHAR Abrasivity Index (CAI)

A copy of your test request is attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing services. We look forward to working with you again in the future.

Respectfully yours,

Jon Camm

Jonathan Campbell
Assistant Laboratory Manager

GeoTesting EXPRESS

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Geotechnical Test Report **9/15/2016**

GTX-305223

Northern Pass Trenchless

Lincoln, NH

Client Project No.: 201-16-NH

Prepared for:

Quanta Subsurface

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth, ft	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
BH-18A	R2	55.17-55.54	170	9798	1	No	2,*
BH-19A	R1	43.30-43.67	169	9758	3	Yes	---
BH-28A	R3	28.60-28.97	186	20237	1	Yes	---
BH-28B	R4	29.22-29.57	159	23615	1	No	4,*
BH-29A	R2	13.13-13.50	169	11929	1	No	2,*
BH-29B	R5	32.20-32.57	169	9699	1	No	2,*
BH-30A	R3	24.20-24.57	176	10541	1	Yes	---
BH-31A	R9	42.50-42.87	166	14047	1	Yes	5,*

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

1: Best effort end preparation. See Tolerance report for details.
2: The as-received core did not meet the ASTM side straightness tolerance due to irregularities in the sample as cored.
3: Specimen L/D < 2.
4: The as-received core did not meet the ASTM minimum diameter tolerance of 1.875 inches.
5: Specimen diameter is less than 10 times maximum particle size.
6: Specimen diameter is less than 6 times maximum particle size.

*Because the indicated tested specimens did not meet the ASTM D4543 standard tolerances, the results reported here may differ from those for a test specimen within tolerances.

GeoTesting EXPRESS

Client:	Quanta Subsurface				
Project:	Northern Pass Trenchless				
Location:	Lincoln, NH			Project No:	GTX-305223
Boring ID:	---	Sample Type:	---	Tested By:	daa/rlc
Sample ID:	---	Test Date:	9/8-9/13/16	Checked By:	jsc
Depth :	---	Test Id:	389434		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth, ft	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
BH-31B	R3	48.20-48.57	162	10322	1	Yes	5,*
BH-32A	R2	17	170	10818	1	Yes	---
BH-32B	R9	49.96-50.33	165	23754	1	Yes	---
BH-33B	R2	27.50-27.87	169	14422	1	Yes	---
BH-34A	R2	34	165	18792	1	Yes	---
BH-34B	R2	26.40-26.77	170	12315	3	Yes	---
BH-35A	R2	24.05-24.42	171	5792	2	Yes	---
BH-35B	R9	46.80-47.17	166	6981	2	No	3,*

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

1: Best effort end preparation. See Tolerance report for details.
2: The as-received core did not meet the ASTM side straightness tolerance due to irregularities in the sample as cored.
3: Specimen L/D < 2.
4: The as-received core did not meet the ASTM minimum diameter tolerance of 1.875 inches.
5: Specimen diameter is less than 10 times maximum particle size.
6: Specimen diameter is less than 6 times maximum particle size.

*Because the indicated tested specimens did not meet the ASTM D4543 standard tolerances, the results reported here may differ from those for a test specimen within tolerances.

Client:	Quanta Subsurface	Test Date:	9/7/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-18A		
Sample ID:	R2		
Depth:	55.17-55.54 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.32	4.32	4.32
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	599.25		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? NO

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? NO

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00010	0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030

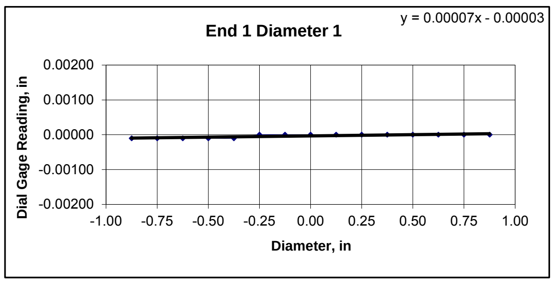
Difference between max and min readings, in:
0° = 0.00010 90° = 0.00040

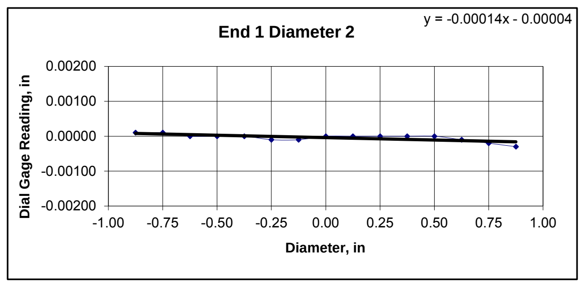
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010
Diameter 2, in (rotated 90°)	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

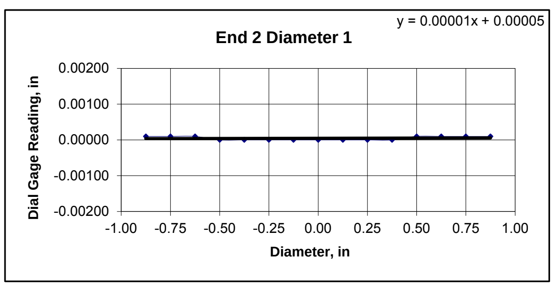
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0001

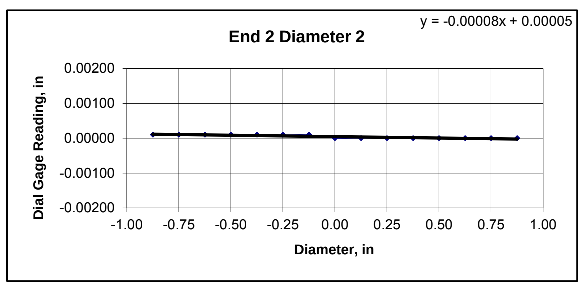
Maximum difference must be < 0.0020 in. Difference = ± 0.00020

Flatness Tolerance Met? YES









DIAMETER 1

End 1:		
	Slope of Best Fit Line	0.00007
	Angle of Best Fit Line:	0.00401
End 2:		
	Slope of Best Fit Line	0.00001
	Angle of Best Fit Line:	0.00057
Maximum Angular Difference:		0.00344

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:		
	Slope of Best Fit Line	-0.00014
	Angle of Best Fit Line:	-0.00802
End 2:		
	Slope of Best Fit Line	-0.00008
	Angle of Best Fit Line:	-0.00458
Maximum Angular Difference:		0.00344

Parallelism Tolerance Met? YES
Spherically Seated

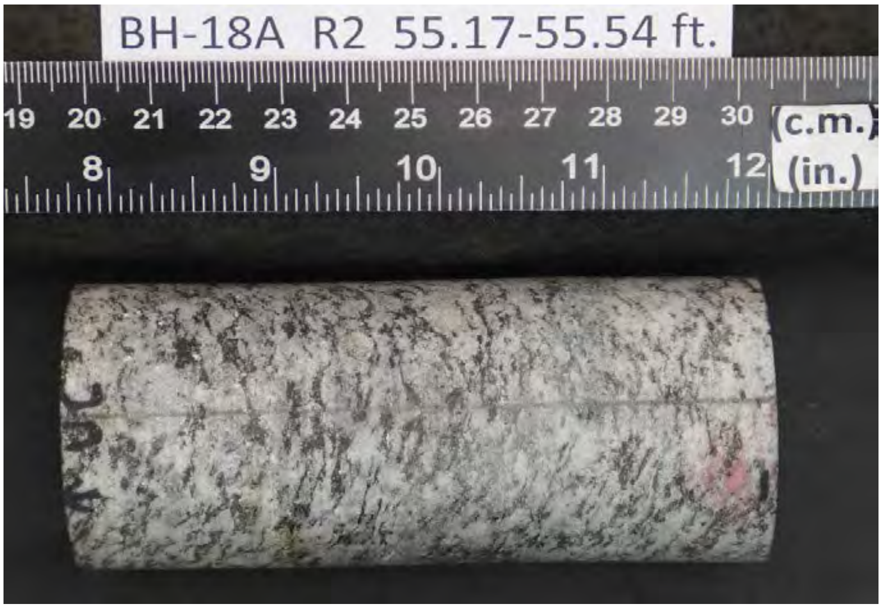
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00040	1.990	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00010	1.990	0.00005	0.003	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-18A
Sample ID:	R2
Depth, ft:	55.17-55.54



After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	9/7/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-19A		
Sample ID:	R1		
Depth:	43.30-43.67 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.34	4.34	4.34
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	598.92		
Bulk Density, lb/ft^3	169	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90^o)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010

Difference between max and min readings, in:

0° = 0.00010 90° = 0.00010

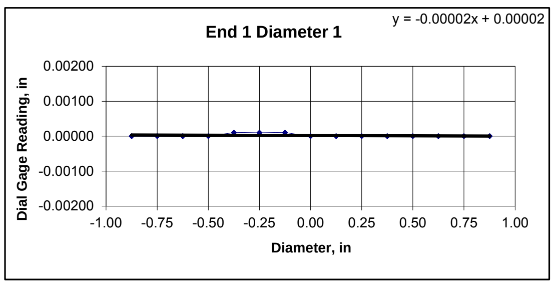
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90^o)	-0.00020	-0.00020	-0.00020	-0.00030	-0.00030	-0.00030	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010

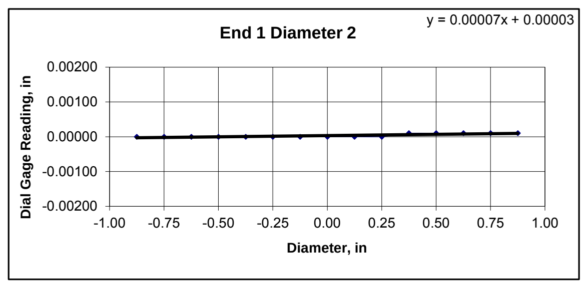
Difference between max and min readings, in:

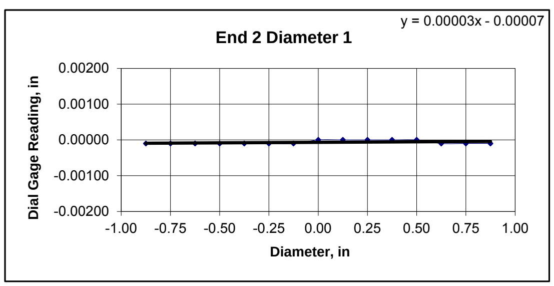
0° = 0.0001 90° = 0.0003

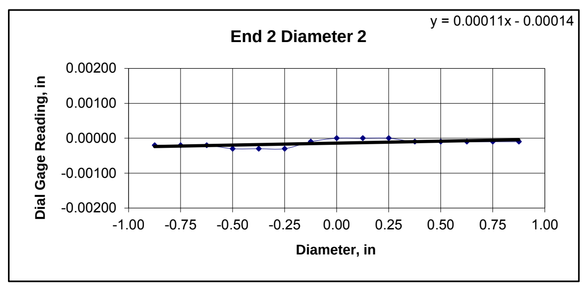
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	-0.00002
Angle of Best Fit Line:	-0.00115

End 2:

Slope of Best Fit Line	0.00003
Angle of Best Fit Line:	0.00172

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00007
Angle of Best Fit Line:	0.00401

End 2:

Slope of Best Fit Line	0.00011
Angle of Best Fit Line:	0.00630

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES

Spherically Seated

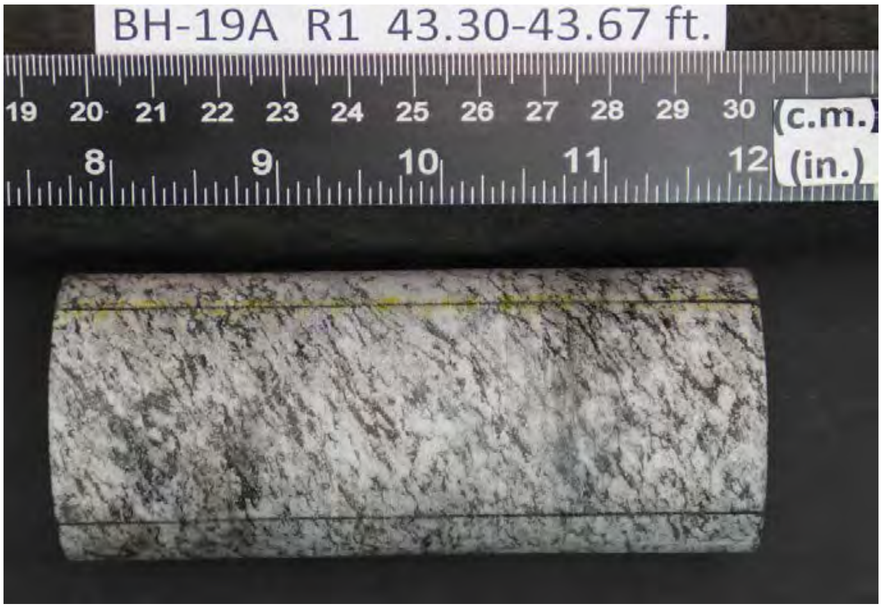
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90^o)	0.00010	1.990	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90^o)	0.00030	1.990	0.00015	0.009	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-19A
Sample ID:	R1
Depth, ft:	43.30-43.67



After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	9/6/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-28A		
Sample ID:	R3		
Depth:	28.60-28.97 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.32	4.32	4.32		
Specimen Diameter, in:	1.98	1.98	1.98		
Specimen Mass, g:	652.46				
Bulk Density, lb/ft^3	186			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	0.00000	0.00010	0.00010	0.00020	0.00020	0.00010	0.00010	0.00010
Diameter 2, in (rotated 90^o)	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

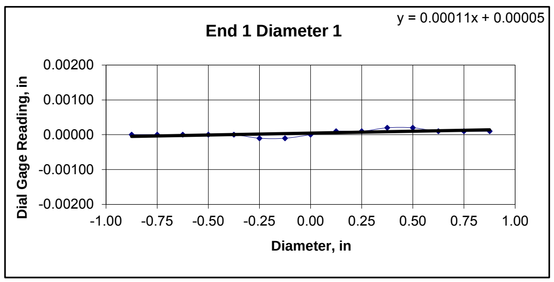
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00020

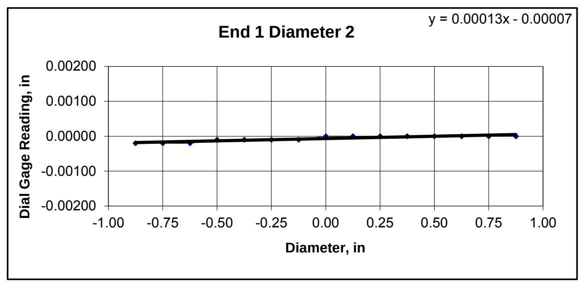
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010
Diameter 2, in (rotated 90^o)	-0.00030	-0.00030	-0.00030	0.00000	0.00000	0.00000	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000

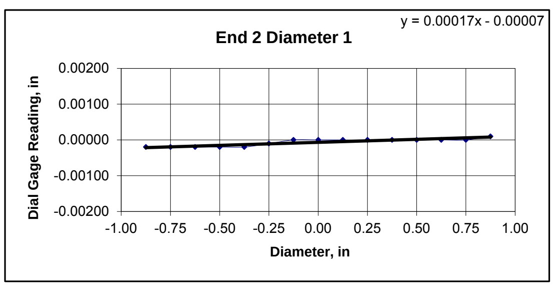
Difference between max and min readings, in:
0° = 0.0003 90° = 0.0004

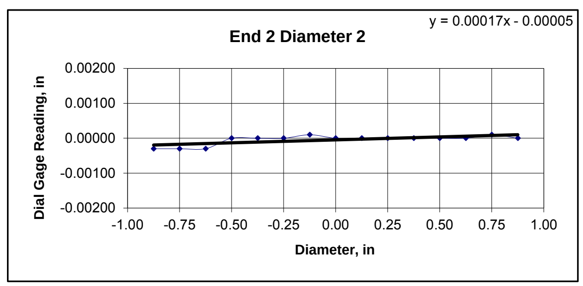
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00020

Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00011
Angle of Best Fit Line: 0.00630

End 2:
Slope of Best Fit Line 0.00017
Angle of Best Fit Line: 0.00974

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00013
Angle of Best Fit Line: 0.00745

End 2:
Slope of Best Fit Line 0.00017
Angle of Best Fit Line: 0.00974

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.980	0.00015	0.009	YES
Diameter 2, in (rotated 90^o)	0.00020	1.980	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00030	1.980	0.00015	0.009	YES
Diameter 2, in (rotated 90^o)	0.00040	1.980	0.00020	0.012	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-28A
Sample ID:	R3
Depth, ft:	28.60-28.97

After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	9/7/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-28B		
Sample ID:	R4		
Depth:	29.22-29.57 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average	
Specimen Length, in:	3.99	3.99	3.99	
Specimen Diameter, in:	1.85	1.85	1.85	
Specimen Mass, g:	448.84			
Bulk Density, lb/ft^3	159	**Minimum Diameter Tolerence Met?**	**NO**	
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	**YES**	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00030	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90^o)	-0.00030	-0.00030	-0.00030	-0.00040	-0.00040	-0.00030	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	0.00000

Difference between max and min readings, in:

0° = 0.00030 90° = 0.00040

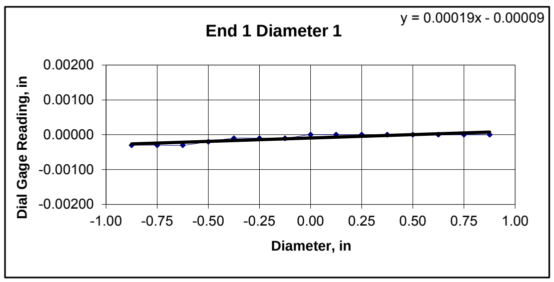
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010
Diameter 2, in (rotated 90^o)	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020	0.00010

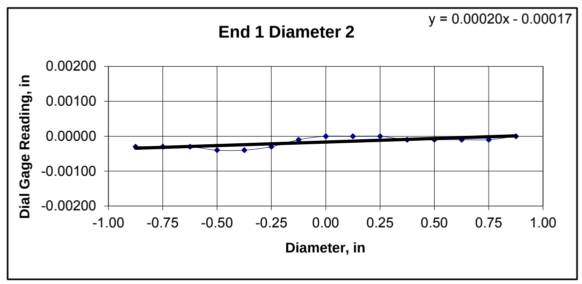
Difference between max and min readings, in:

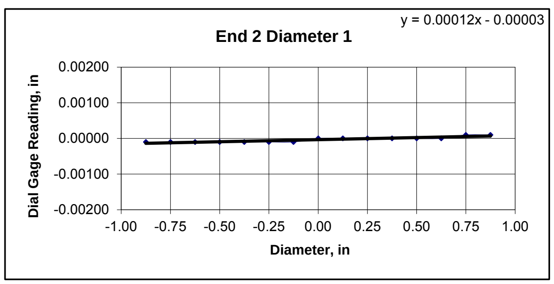
0° = 0.0002 90° = 0.0003

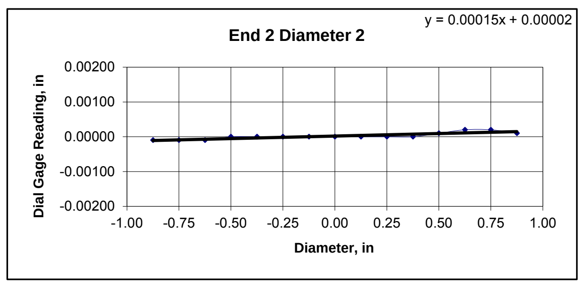
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00020

Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:

Slope of Best Fit Line	0.00019
Angle of Best Fit Line:	0.01089

End 2:

Slope of Best Fit Line	0.00012
Angle of Best Fit Line:	0.00688

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? **YES**

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00020
Angle of Best Fit Line:	0.01146

End 2:

Slope of Best Fit Line	0.00015
Angle of Best Fit Line:	0.00859

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? **YES**

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.850	0.00016	0.009	YES
Diameter 2, in (rotated 90^o)	0.00040	1.850	0.00022	0.012	YES
END 2					
Diameter 1, in	0.00020	1.850	0.00011	0.006	YES
Diameter 2, in (rotated 90^o)	0.00030	1.850	0.00016	0.009	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-28B
Sample ID:	R4
Depth, ft:	29.22-29.57

After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	9/7/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-29A		
Sample ID:	R2		
Depth:	13.13-13.50 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.33	4.33	4.33
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	599.04		
Bulk Density, lb/ft^3	169		
Length to Diameter Ratio:	2.2		

Minimum Diameter Tolerence Met? YES

Length to Diameter Ratio Tolerance Met? YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? NO

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? NO

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00020	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90^o)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00020	-0.00020	-0.00030	-0.00040	-0.00040

Difference between max and min readings, in:

0° = 0.00020 90° = 0.00040

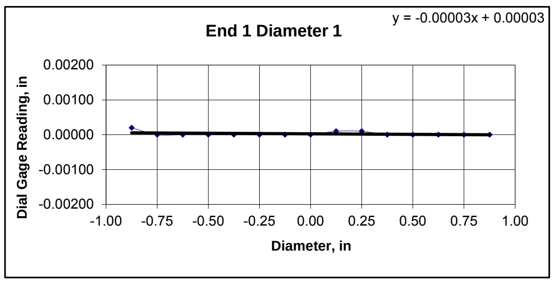
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010
Diameter 2, in (rotated 90^o)	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020

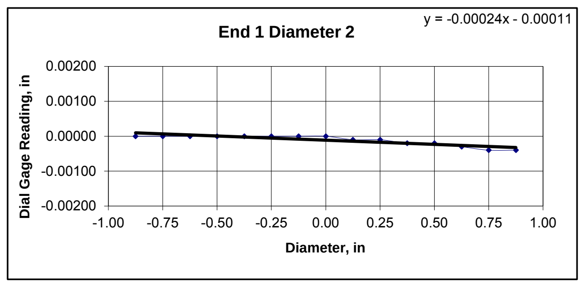
Difference between max and min readings, in:

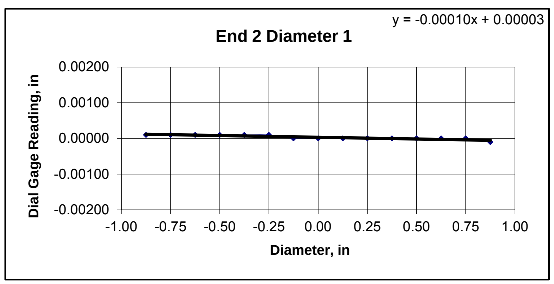
0° = 0.0002 90° = 0.0003

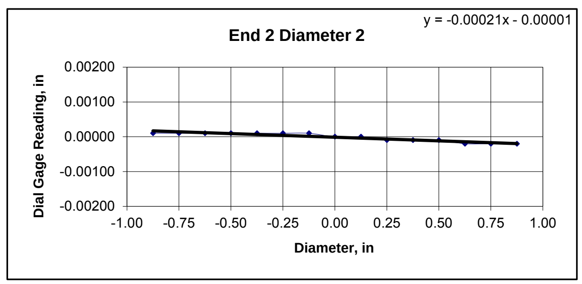
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00020

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	-0.00003
Angle of Best Fit Line:	-0.00172

End 2:

Slope of Best Fit Line	-0.00010
Angle of Best Fit Line:	-0.00573

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	-0.00024
Angle of Best Fit Line:	-0.01375

End 2:

Slope of Best Fit Line	-0.00021
Angle of Best Fit Line:	-0.01203

Maximum Angular Difference: 0.00172

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1)

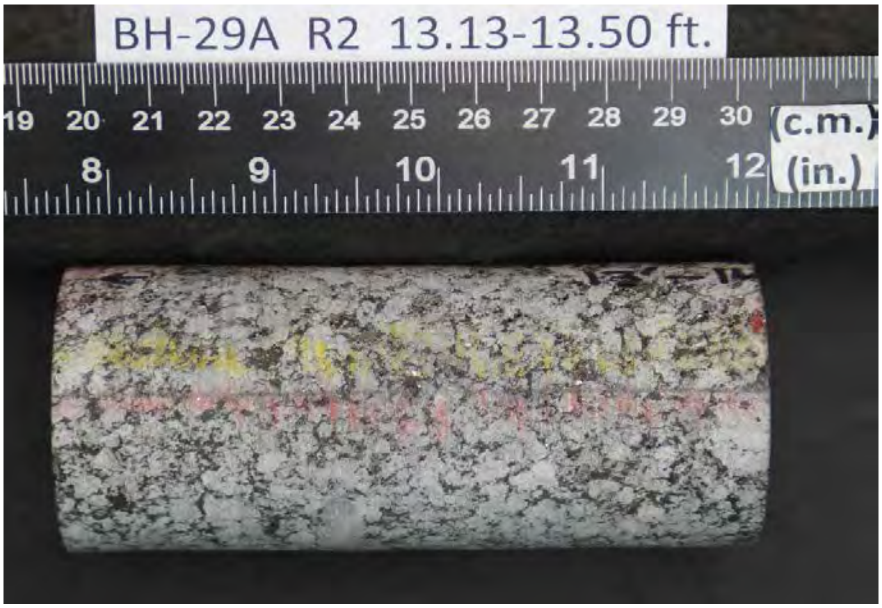
(Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.990	0.00010	0.006	YES
Diameter 2, in (rotated 90^o)	0.00040	1.990	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00020	1.990	0.00010	0.006	YES
Diameter 2, in (rotated 90^o)	0.00030	1.990	0.00015	0.009	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-29A
Sample ID:	R2
Depth, ft:	13.13-13.50



After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	9/6/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-29B		
Sample ID:	R5		
Depth:	32.20-32.57 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.34	4.34	4.34		
Specimen Diameter, in:	1.98	1.99	1.99		
Specimen Mass, g:	597.7				
Bulk Density, lb/ft^3	169	**Minimum Diameter Tolerence Met?**		YES	
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**		YES	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? NO

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? NO

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010
Diameter 2, in (rotated 90^o)	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Difference between max and min readings, in:

0° = 0.00030 90° = 0.00010

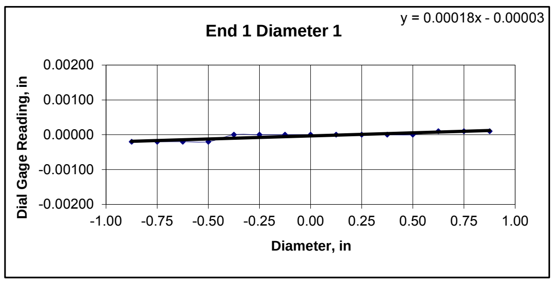
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00040	-0.00040	-0.00040	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020
Diameter 2, in (rotated 90^o)	-0.00020	-0.00020	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020	-0.00020

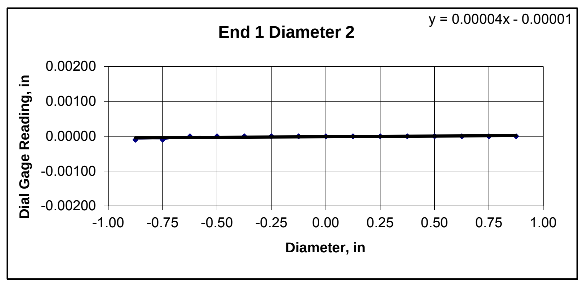
Difference between max and min readings, in:

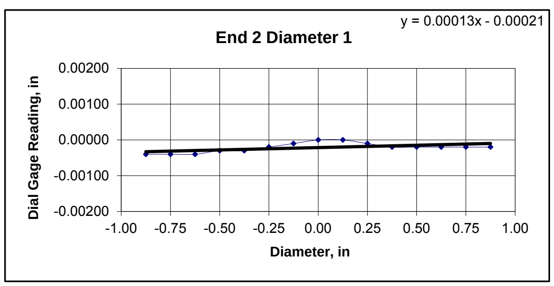
0° = 0.0004 90° = 0.0002

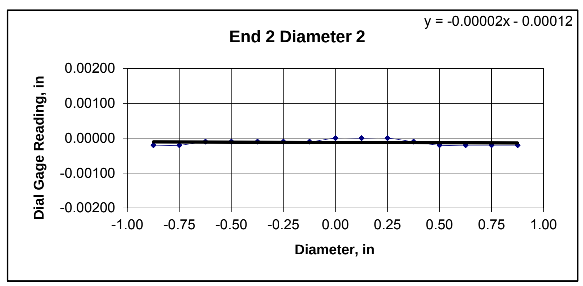
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00020

Flatness Tolerance Met? YES









DIAMETER 1

End 1:		
	Slope of Best Fit Line	0.00018
	Angle of Best Fit Line:	0.01031
End 2:		
	Slope of Best Fit Line	0.00013
	Angle of Best Fit Line:	0.00745
Maximum Angular Difference:		0.00286

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:		
	Slope of Best Fit Line	0.00004
	Angle of Best Fit Line:	0.00229
End 2:		
	Slope of Best Fit Line	-0.00002
	Angle of Best Fit Line:	-0.00115
Maximum Angular Difference:		0.00344

Parallelism Tolerance Met? YES
Spherically Seated

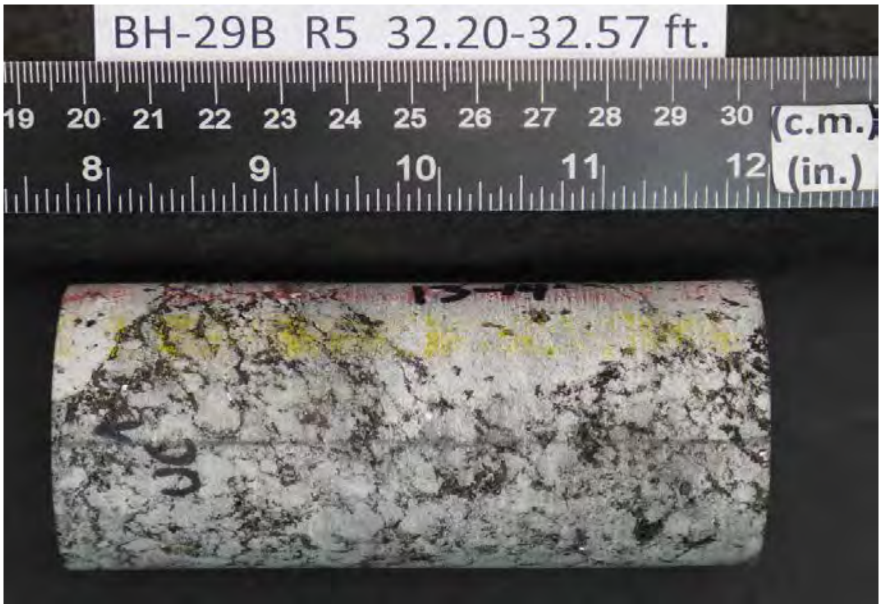
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.985	0.00015	0.009	YES
Diameter 2, in (rotated 90^o)	0.00010	1.985	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00040	1.985	0.00020	0.012	YES
Diameter 2, in (rotated 90^o)	0.00020	1.985	0.00010	0.006	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-29B
Sample ID:	R5
Depth, ft:	32.20-32.57



After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	9/7/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-30A		
Sample ID:	R3		
Depth:	24.20-24.57 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.35	4.35	4.35		
Specimen Diameter, in:	1.97	1.98	1.98		
Specimen Mass, g:	617.42				
Bulk Density, lb/ft^3	176			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00030	-0.00040
Diameter 2, in (rotated 90°)	-0.00020	-0.00030	-0.00040	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00030	-0.00030	-0.00030

Difference between max and min readings, in:

0° = 0.00040 90° = 0.00040

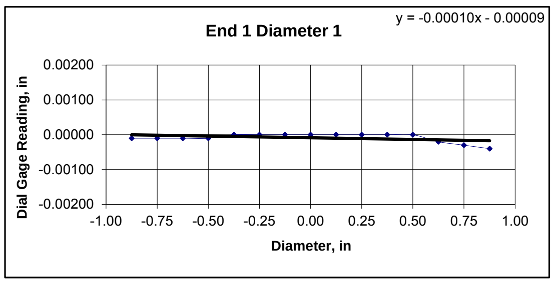
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00040	-0.00050	-0.00050
Diameter 2, in (rotated 90°)	-0.00020	-0.00030	-0.00030	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00020	-0.00030	-0.00030

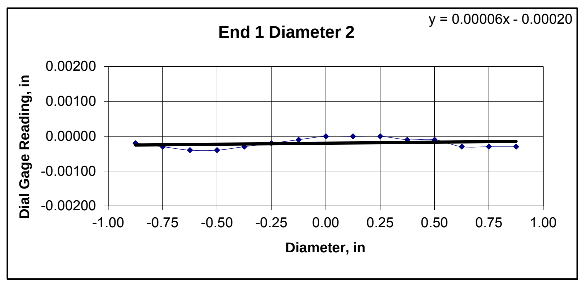
Difference between max and min readings, in:

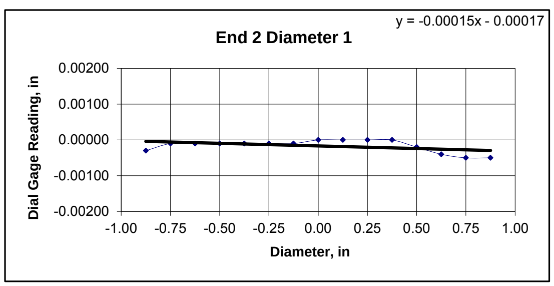
0° = 0.0005 90° = 0.0003

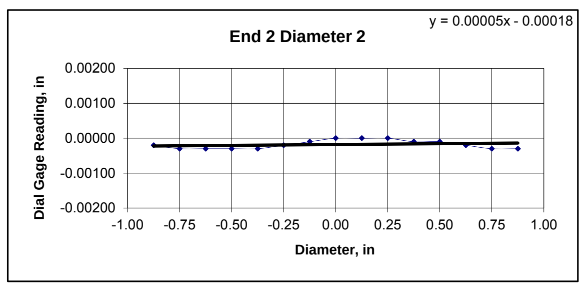
Maximum difference must be < 0.0020 in. Difference = ± 0.00025

Flatness Tolerance Met? YES









DIAMETER 1

End 1:		
	Slope of Best Fit Line	-0.00010
	Angle of Best Fit Line:	-0.00573
End 2:		
	Slope of Best Fit Line	-0.00015
	Angle of Best Fit Line:	-0.00859
Maximum Angular Difference:		0.00286

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:		
	Slope of Best Fit Line	0.00006
	Angle of Best Fit Line:	0.00344
End 2:		
	Slope of Best Fit Line	0.00005
	Angle of Best Fit Line:	0.00286
Maximum Angular Difference:		0.00057

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00040	1.975	0.00020	0.012	YES
Diameter 2, in (rotated 90°)	0.00040	1.975	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00050	1.975	0.00025	0.015	YES
Diameter 2, in (rotated 90°)	0.00030	1.975	0.00015	0.009	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-30A
Sample ID:	R3
Depth, ft:	24.20-24.57

After cutting and grinding

After break

GeoTesting
EXPRESS

Client:	Quanta Subsurface	Test Date:	9/7/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-31A		
Sample ID:	R9		
Depth:	42.50-42.87 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.26	4.26	4.26		
Specimen Diameter, in:	1.99	1.99	1.99		
Specimen Mass, g:	578.63				
Bulk Density, lb/ft^3	166	**Minimum Diameter Tolerence Met?**		**YES**	
Length to Diameter Ratio:	2.1	**Length to Diameter Ratio Tolerance Met?**		**YES**	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90^o)	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

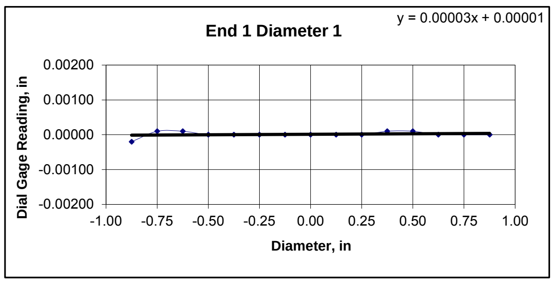
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00020

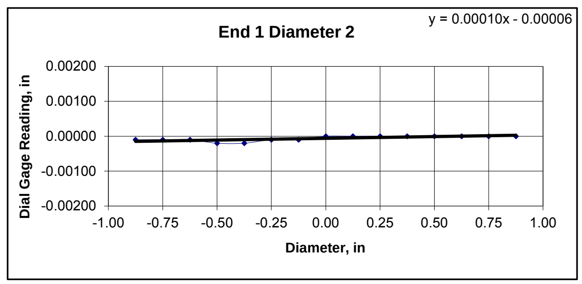
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010
Diameter 2, in (rotated 90^o)	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020	0.00020	0.00020

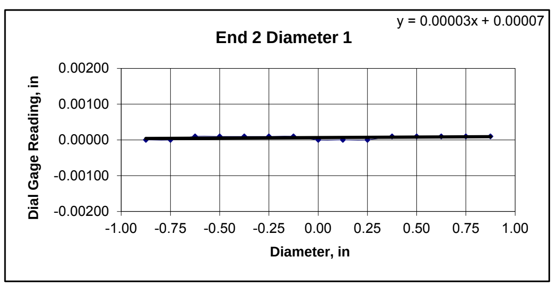
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0002

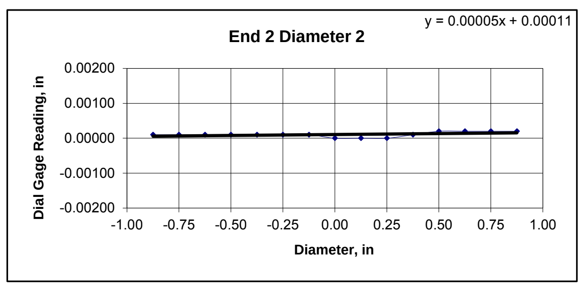
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015

Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00003
Angle of Best Fit Line: 0.00172

End 2:
Slope of Best Fit Line 0.00003
Angle of Best Fit Line: 0.00172

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00010
Angle of Best Fit Line: 0.00573

End 2:
Slope of Best Fit Line 0.00005
Angle of Best Fit Line: 0.00286

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? **YES**
Spherically Seated

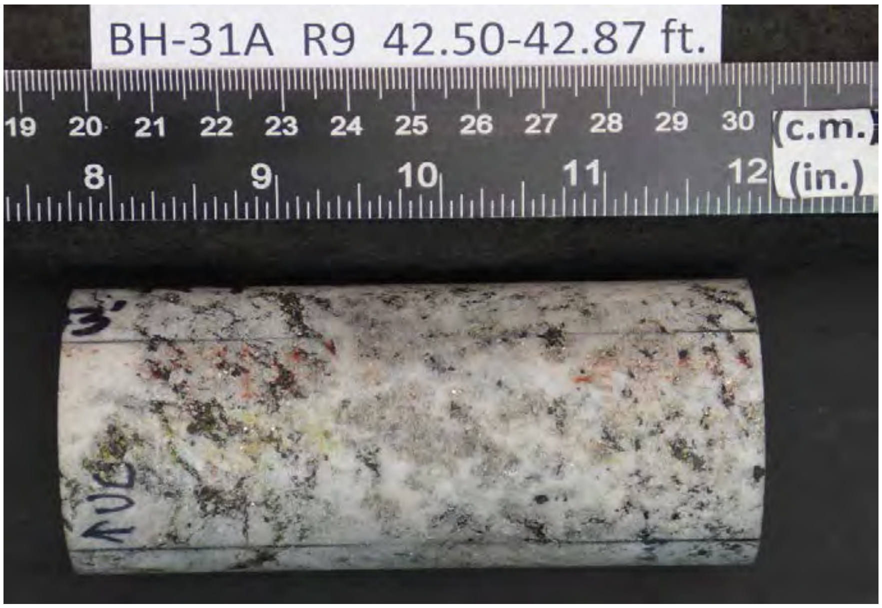
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.990	0.00015	0.009	YES
Diameter 2, in (rotated 90^o)	0.00020	1.990	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90^o)	0.00020	1.990	0.00010	0.006	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-31A
Sample ID:	R9
Depth, ft:	42.50-42.87



After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	9/6/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-31B		
Sample ID:	R3		
Depth:	48.20-48.57 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.31	4.31	4.31		
Specimen Diameter, in:	1.99	1.99	1.99		
Specimen Mass, g:	570.45				
Bulk Density, lb/ft^3	162			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020	-0.00030	-0.00020
Diameter 2, in (rotated 90^o)	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00030	-0.00040

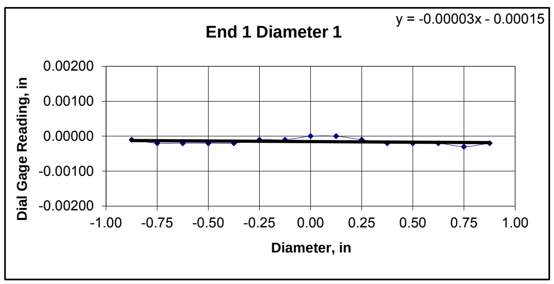
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00040

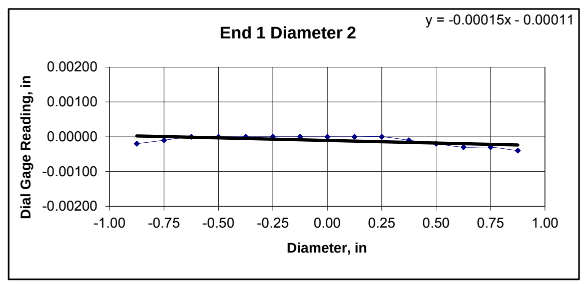
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010
Diameter 2, in (rotated 90^o)	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00040	-0.00040

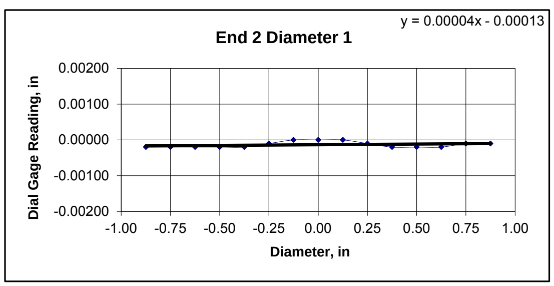
Difference between max and min readings, in:
0° = 0.0002 90° = 0.0004

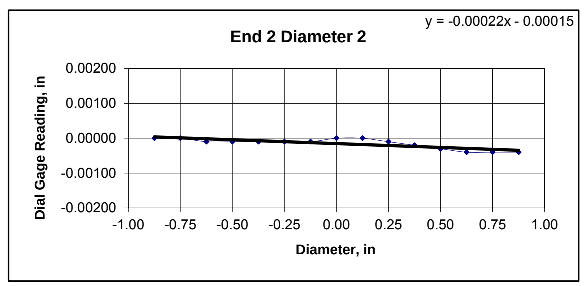
Maximum difference must be < 0.0020 in. Difference = ± 0.00020

Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line -0.00003
Angle of Best Fit Line: -0.00172

End 2:
Slope of Best Fit Line 0.00004
Angle of Best Fit Line: 0.00229

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line -0.00015
Angle of Best Fit Line: -0.00859

End 2:
Slope of Best Fit Line -0.00022
Angle of Best Fit Line: -0.01261

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES
Spherically Seated

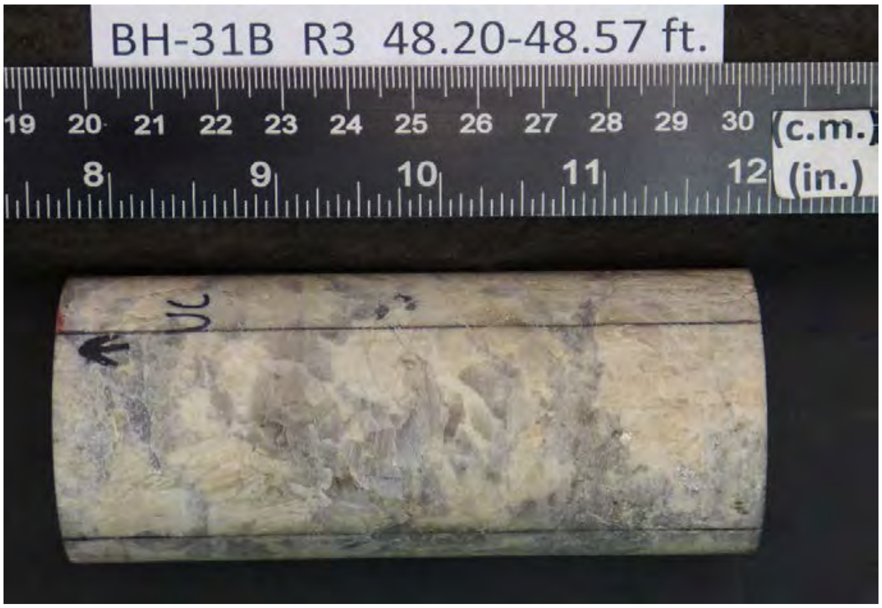
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.990	0.00015	0.009	YES
Diameter 2, in (rotated 90^o)	0.00040	1.990	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00020	1.990	0.00010	0.006	YES
Diameter 2, in (rotated 90^o)	0.00040	1.990	0.00020	0.012	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-31B
Sample ID:	R3
Depth, ft:	48.20-48.57



After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	9/12/2016
Project Name:	Northern Pass Trenchless	Tested By:	rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-32A		
Sample ID:	R2		
Depth:	17 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.33	4.33	4.33		
Specimen Diameter, in:	2.00	2.00	2.00		
Specimen Mass, g:	606.63				
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**		YES	
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**		YES	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90^o)	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000	0.00000	0.00000

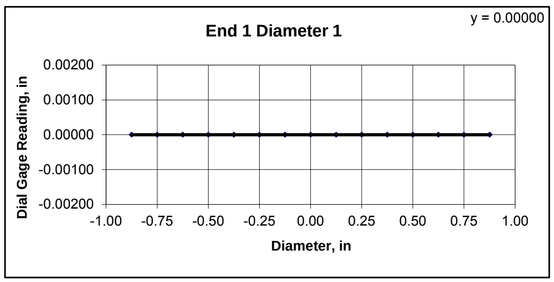
Difference between max and min readings, in:
0° = 0.00000 90° = 0.00010

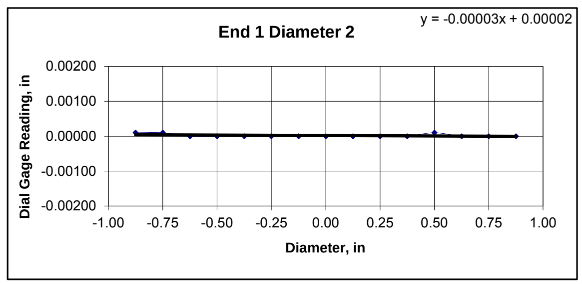
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010
Diameter 2, in (rotated 90^o)	-0.00010	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

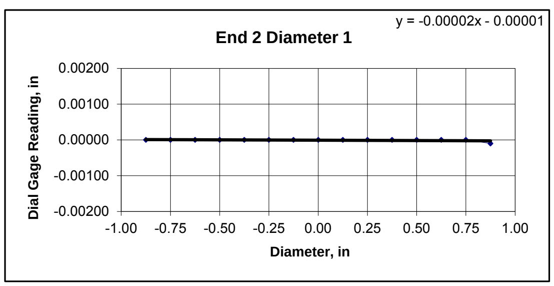
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0002

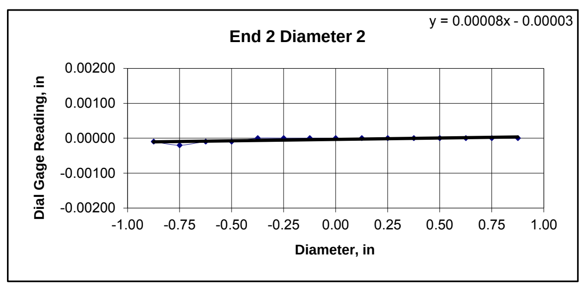
Maximum difference must be < 0.0020 in. Difference = ± 0.00010

Flatness Tolerance Met? YES









DIAMETER 1

End 1:	Slope of Best Fit Line	0.00000
	Angle of Best Fit Line:	0.00000
End 2:	Slope of Best Fit Line	0.00002
	Angle of Best Fit Line:	0.00115
Maximum Angular Difference:		0.00115

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:	Slope of Best Fit Line	0.00003
	Angle of Best Fit Line:	0.00172
End 2:	Slope of Best Fit Line	0.00008
	Angle of Best Fit Line:	0.00458
Maximum Angular Difference:		0.00286

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00000	2.000	0.00000	0.000	YES
Diameter 2, in (rotated 90^o)	0.00010	2.000	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00010	2.000	0.00005	0.003	YES
Diameter 2, in (rotated 90^o)	0.00020	2.000	0.00010	0.006	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/13/2016
Tested By:	rlc
Checked By:	jsc
Boring ID:	BH-32A
Sample ID:	R2
Depth, ft:	17

After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	9/6/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-32B		
Sample ID:	R9		
Depth:	49.96-50.33 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.35	4.35	4.35		
Specimen Diameter, in:	1.98	1.98	1.98		
Specimen Mass, g:	581.64				
Bulk Density, lb/ft^3	165			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00030	-0.00030	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00020
Diameter 2, in (rotated 90^o)	-0.00010	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00040	-0.00040

Difference between max and min readings, in:

0° = 0.00030 90° = 0.00040

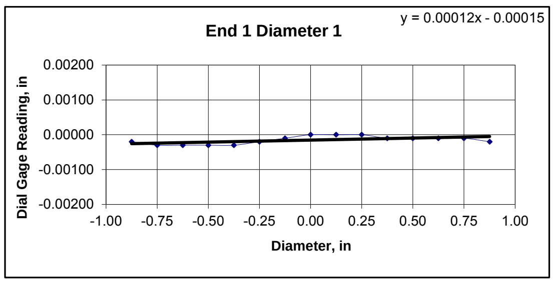
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00040	-0.00040	-0.00040	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90^o)	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	-0.00020	-0.00030	-0.00030	-0.00030	-0.00040

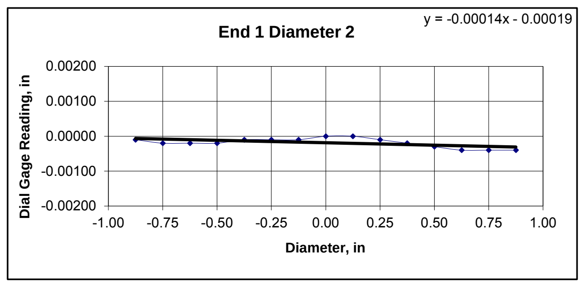
Difference between max and min readings, in:

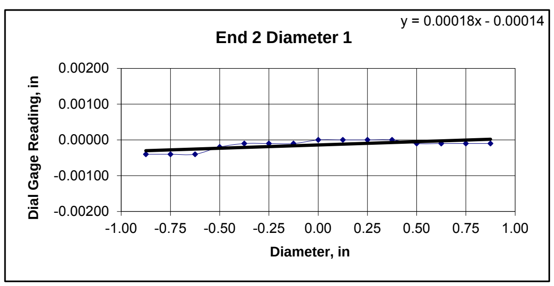
0° = 0.0004 90° = 0.0004

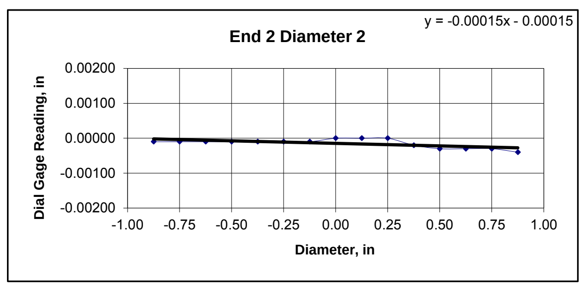
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00020

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	0.00012
Angle of Best Fit Line:	0.00688

End 2:

Slope of Best Fit Line	0.00018
Angle of Best Fit Line:	0.01031

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	-0.00014
Angle of Best Fit Line:	-0.00802

End 2:

Slope of Best Fit Line	-0.00015
Angle of Best Fit Line:	-0.00859

Maximum Angular Difference: 0.00057

Parallelism Tolerance Met? YES
Spherically Seated

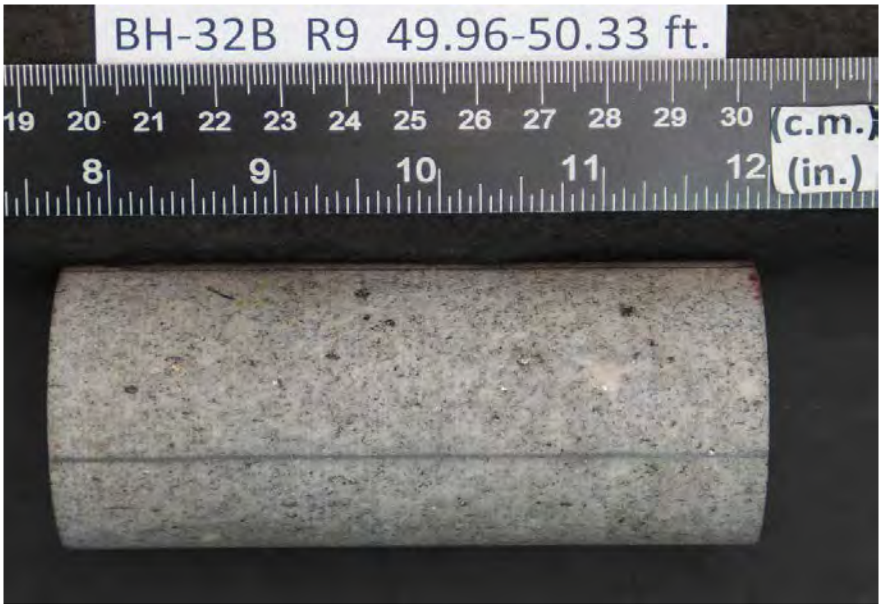
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.980	0.00015	0.009	YES
Diameter 2, in (rotated 90^o)	0.00040	1.980	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00040	1.980	0.00020	0.012	YES
Diameter 2, in (rotated 90^o)	0.00040	1.980	0.00020	0.012	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-32B
Sample ID:	R9
Depth, ft:	49.96-50.33



After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	9/7/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-33B		
Sample ID:	R2		
Depth:	27.50-27.87 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average	
Specimen Length, in:	4.31	4.31	4.31	
Specimen Diameter, in:	1.99	1.99	1.99	
Specimen Mass, g:	596.59			
Bulk Density, lb/ft^3	169	**Minimum Diameter Tolerence Met?**	YES	
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010
Diameter 2, in (rotated 90^o)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Difference between max and min readings, in:

0° = 0.00010 90° = 0.00000

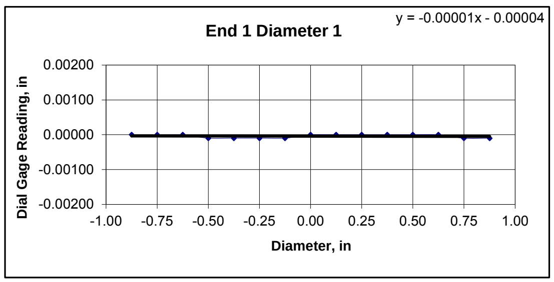
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010
Diameter 2, in (rotated 90^o)	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010

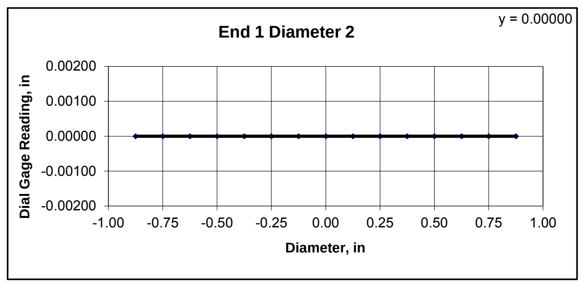
Difference between max and min readings, in:

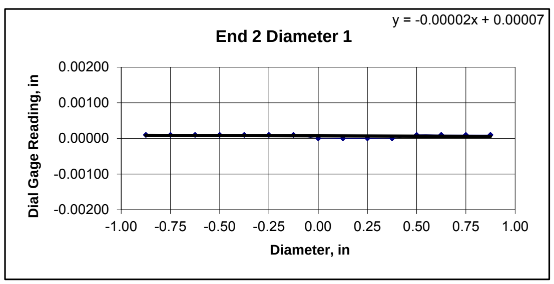
0° = 0.0001 90° = 0.0001

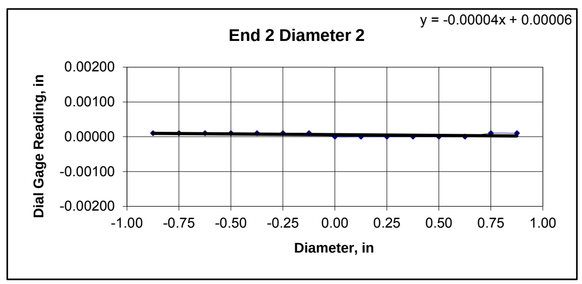
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00005

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	-0.00001
Angle of Best Fit Line:	-0.00057

End 2:

Slope of Best Fit Line	-0.00002
Angle of Best Fit Line:	-0.00115

Maximum Angular Difference: 0.00057

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00000
Angle of Best Fit Line:	0.00000

End 2:

Slope of Best Fit Line	-0.00004
Angle of Best Fit Line:	-0.00229

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES

Spherically Seated

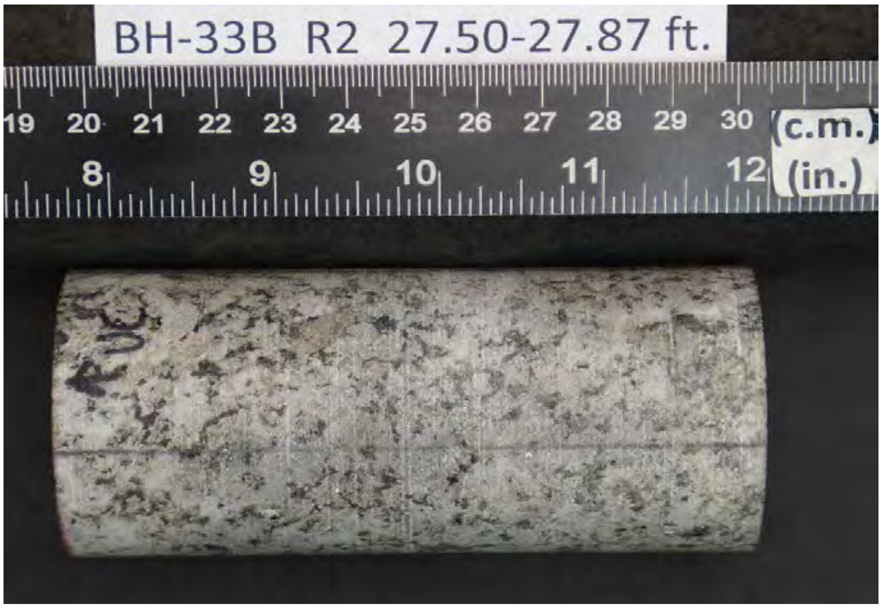
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90^o)	0.00000	1.990	0.00000	0.000	YES
END 2					
Diameter 1, in	0.00010	1.990	0.00005	0.003	YES
Diameter 2, in (rotated 90^o)	0.00010	1.990	0.00005	0.003	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-33B
Sample ID:	R2
Depth, ft:	27.50-27.87



After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	9/7/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-34A		
Sample ID:	R2		
Depth:	34 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.30	4.30	4.30
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	573.2		
Bulk Density, lb/ft^3	165	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020
Diameter 2, in (rotated 90^o)	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00020	-0.00020

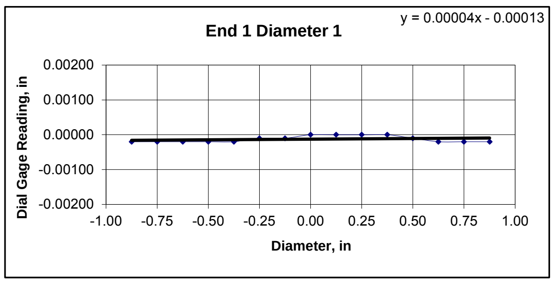
Difference between max and min readings, in:
0° = 0.00020 90° = 0.00020

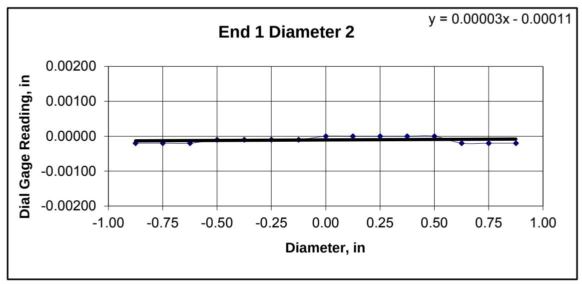
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90^o)	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010

Difference between max and min readings, in:
0° = 0.0002 90° = 0.0002

Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00010

Flatness Tolerance Met? YES





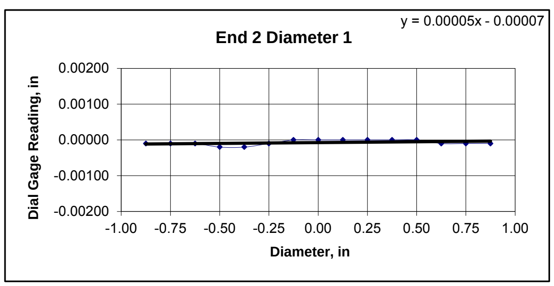
DIAMETER 1

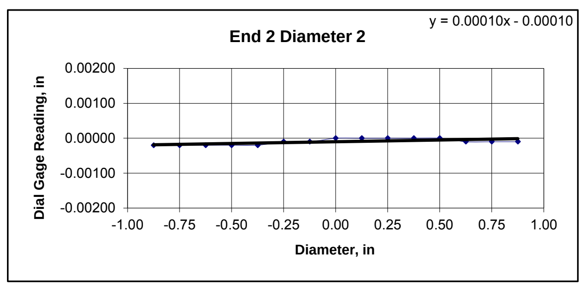
End 1:
Slope of Best Fit Line 0.00004
Angle of Best Fit Line: 0.00229

End 2:
Slope of Best Fit Line 0.00005
Angle of Best Fit Line: 0.00286

Maximum Angular Difference: 0.00057

Parallelism Tolerance Met? YES
Spherically Seated





DIAMETER 2

End 1:
Slope of Best Fit Line 0.00003
Angle of Best Fit Line: 0.00172

End 2:
Slope of Best Fit Line 0.00010
Angle of Best Fit Line: 0.00573

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES
Spherically Seated

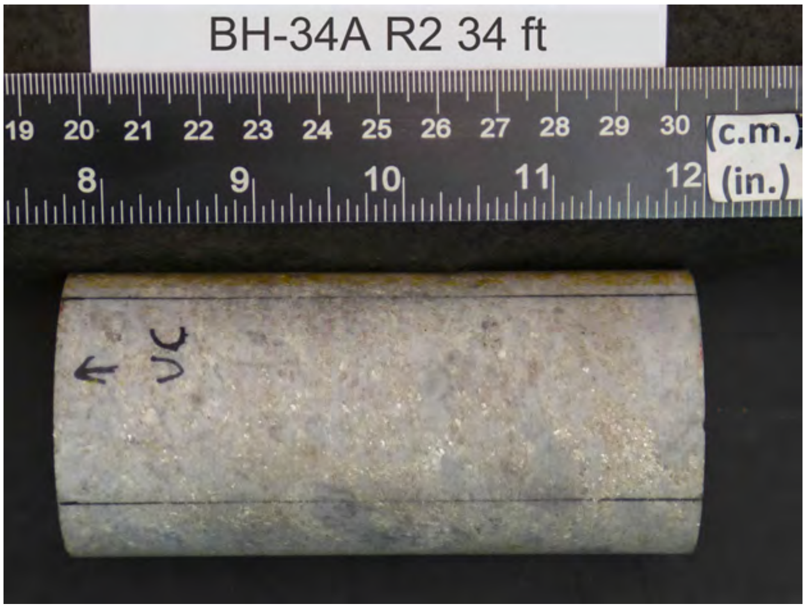
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.980	0.00010	0.006	YES
Diameter 2, in (rotated 90^o)	0.00020	1.980	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00020	1.980	0.00010	0.006	YES
Diameter 2, in (rotated 90^o)	0.00020	1.980	0.00010	0.006	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-34A
Sample ID:	R2
Depth, ft:	34



After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	9/6/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-34B		
Sample ID:	R2		
Depth:	26.40-26.77 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.26	4.26	4.26
Specimen Diameter, in:	1.98	1.97	1.98
Specimen Mass, g:	582.92		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	-0.00030	-0.00030	-0.00030	-0.00020	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00010	0.00000

Difference between max and min readings, in:

0° = 0.00020 90° = 0.00030

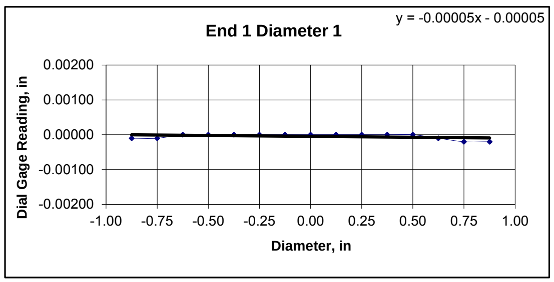
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00020	-0.00020
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	-0.00020	-0.00020	-0.00020	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	0.00000	0.00000

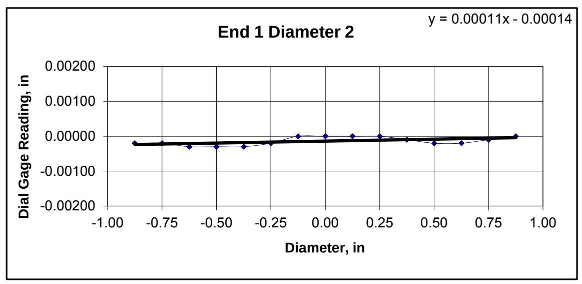
Difference between max and min readings, in:

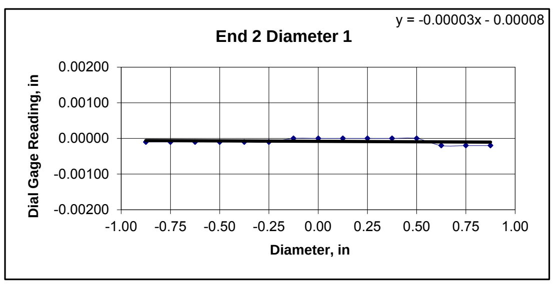
0° = 0.0002 90° = 0.0002

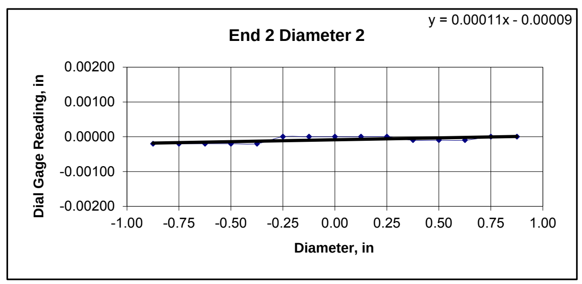
Maximum difference must be < 0.0020 in. Difference = ± 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:	Slope of Best Fit Line	-0.00005
	Angle of Best Fit Line:	-0.00286
End 2:	Slope of Best Fit Line	-0.00003
	Angle of Best Fit Line:	-0.00172
Maximum Angular Difference:		0.00115

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:	Slope of Best Fit Line	0.00011
	Angle of Best Fit Line:	0.00630
End 2:	Slope of Best Fit Line	0.00011
	Angle of Best Fit Line:	0.00630
Maximum Angular Difference:		0.00000

Parallelism Tolerance Met? YES
Spherically Seated

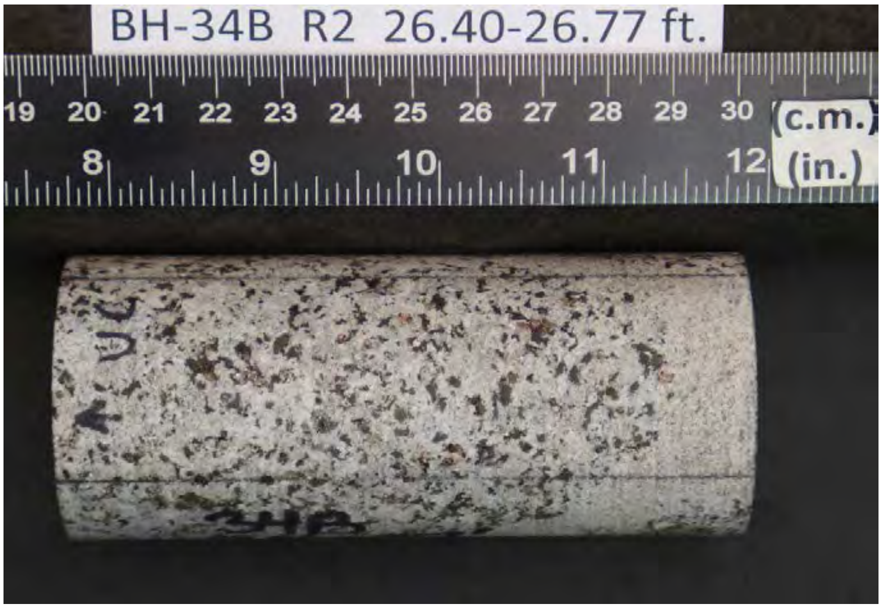
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.975	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00030	1.975	0.00015	0.009	YES
END 2					
Diameter 1, in	0.00020	1.975	0.00010	0.006	YES
Diameter 2, in (rotated 90°)	0.00020	1.975	0.00010	0.006	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-34B
Sample ID:	R2
Depth, ft:	26.40-26.77



After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	9/6/2016
Project Name:	Northern Pass Trenchless	Tested By:	daa
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-35A		
Sample ID:	R2		
Depth:	24.05-24.42 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.33	4.33	4.33		
Specimen Diameter, in:	1.97	1.97	1.97		
Specimen Mass, g:	592.52				
Bulk Density, lb/ft^3	171			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Difference between max and min readings, in:

0° = 0.00010 90° = 0.00020

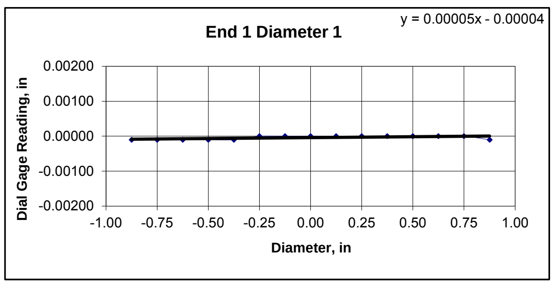
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	-0.00010	-0.00010	-0.00020
Diameter 2, in (rotated 90°)	-0.00030	-0.00030	-0.00030	-0.00030	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010

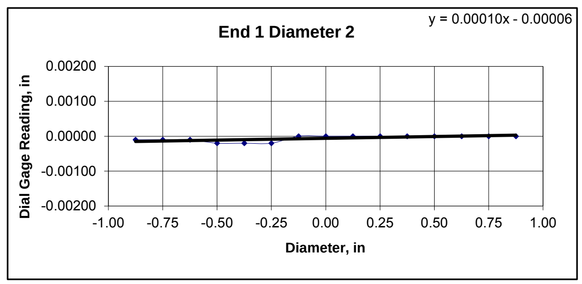
Difference between max and min readings, in:

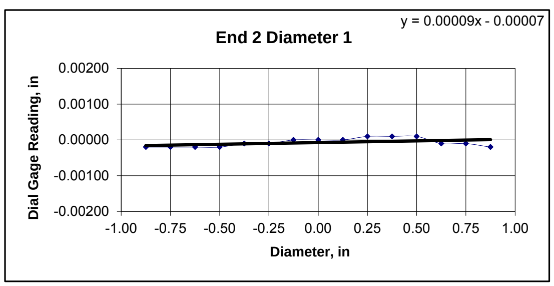
0° = 0.0003 90° = 0.0003

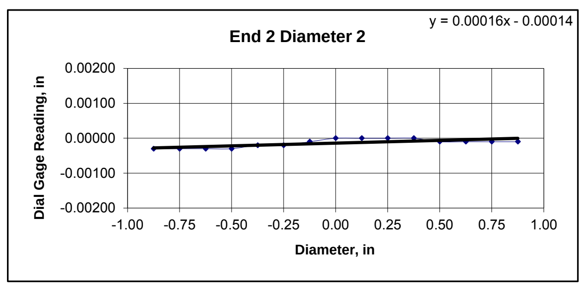
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:	Slope of Best Fit Line	0.00005
	Angle of Best Fit Line:	0.00286
End 2:	Slope of Best Fit Line	0.00009
	Angle of Best Fit Line:	0.00516
Maximum Angular Difference:		0.00229

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:	Slope of Best Fit Line	0.00010
	Angle of Best Fit Line:	0.00573
End 2:	Slope of Best Fit Line	0.00016
	Angle of Best Fit Line:	0.00917
Maximum Angular Difference:		0.00344

Parallelism Tolerance Met? YES

Spherically Seated

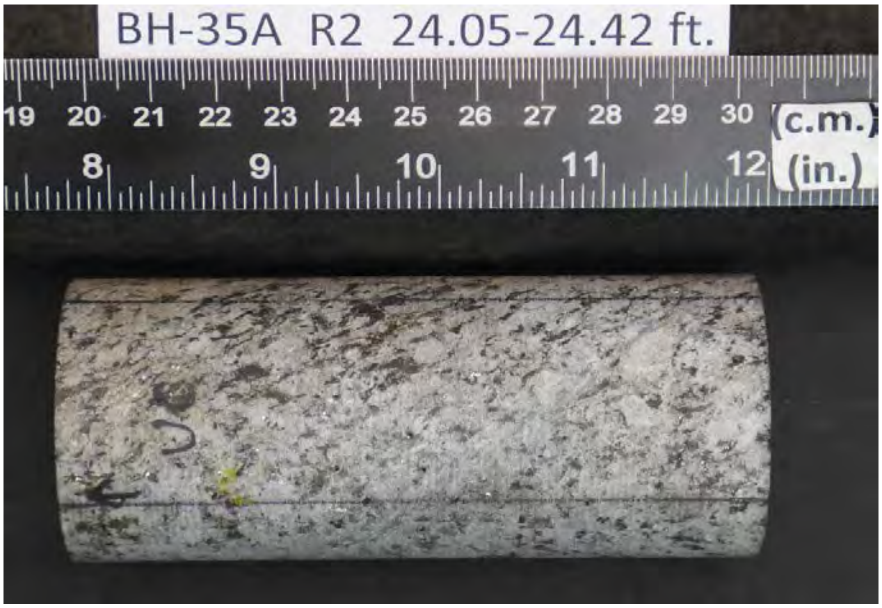
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	1.970	0.00005	0.003	YES
Diameter 2, in (rotated 90°)	0.00020	1.970	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00030	1.970	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00030	1.970	0.00015	0.009	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/8/2016
Tested By:	daa
Checked By:	jsc
Boring ID:	BH-35A
Sample ID:	R2
Depth, ft:	24.05-24.42



After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	9/12/2016
Project Name:	Northern Pass Trenchless	Tested By:	rlc
Project Location:	Lincoln, NH	Checked By:	jsc
GTX #:	305223		
Boring ID:	BH-35B		
Sample ID:	R9		
Depth:	46.80-47.17 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	3.87	3.87	3.87
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	524.04		
Bulk Density, lb/ft^3	166	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	1.9	**Length to Diameter Ratio Tolerance Met?**	NO

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020	0.00020	0.00030
Diameter 2, in (rotated 90^o)	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00030

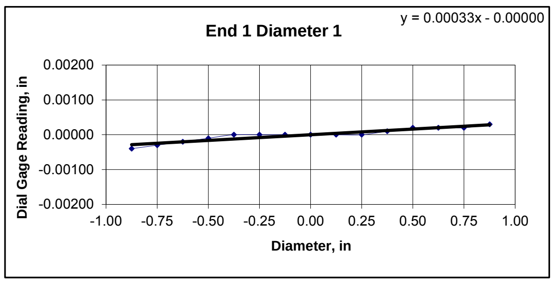
Difference between max and min readings, in:
0° = 0.00070 90° = 0.00080

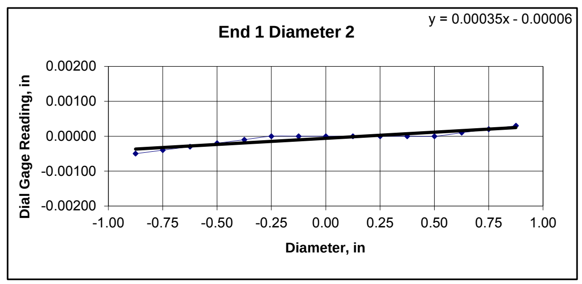
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00010	-0.00010	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00010	0.00010	0.00020	0.00020	0.00020	0.00030
Diameter 2, in (rotated 90^o)	0.00010	0.00000	0.00000	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00040	-0.00050

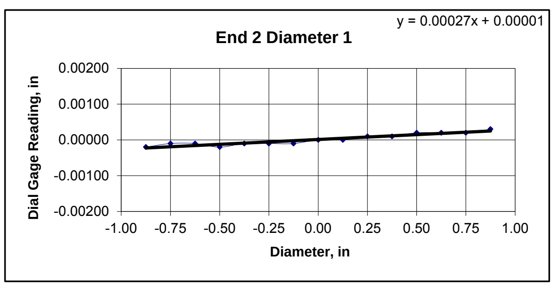
Difference between max and min readings, in:
0° = 0.0005 90° = 0.0006

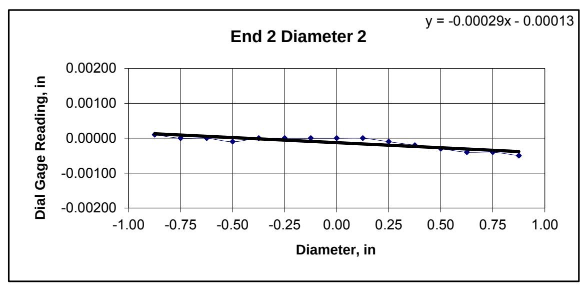
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00040

Flatness Tolerance Met? YES









DIAMETER 1

End 1:

Slope of Best Fit Line	0.00033
Angle of Best Fit Line:	0.01891

End 2:

Slope of Best Fit Line	0.00027
Angle of Best Fit Line:	0.01547
Maximum Angular Difference:	0.00344

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:

Slope of Best Fit Line	0.00035
Angle of Best Fit Line:	0.02005

End 2:

Slope of Best Fit Line	0.00029
Angle of Best Fit Line:	0.01662
Maximum Angular Difference:	0.00344

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00070	1.990	0.00035	0.020	YES
Diameter 2, in (rotated 90^o)	0.00080	1.990	0.00040	0.023	YES
END 2					
Diameter 1, in	0.00050	1.990	0.00025	0.014	YES
Diameter 2, in (rotated 90^o)	0.00060	1.990	0.00030	0.017	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass Trenchless
Project Location:	Lincoln, NH
GTX #:	305223
Test Date:	9/13/2016
Tested By:	rlc
Checked By:	jsc
Boring ID:	BH-35B
Sample ID:	R9
Depth, ft:	46.80-47.17

After cutting and grinding

After break

GeoTesting
EXPRESS

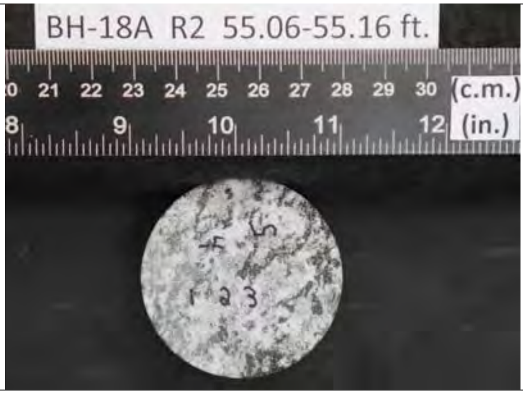
Client: Quanta Subsurface			
Project: Northern Pass Trenchless			
Location: Lincoln, NH		Project No:	GTX-305223
Boring ID: BH-18A	Sample Type: cylinder	Tested By:	daa
Sample ID: R2	Test Date: 09/13/16	Checked By:	jsc
Depth : 55 ft	Test Id: 389451		
Test Comment: ---			
Visual Description: ---			
Sample Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-18A	R2	55.06-55.16 ft.	1	3.7	4.2	3.95	
			2	3.3	3.8	3.55	
			3	3.4	3.9	3.65	
			4	3.6	4.1	3.85	
			5	2.3	2.8	2.55	
			Average CAIs			3.51	
			Average CAI *			3.95	
			CERCHAR Abrasiveness Index Classification			**High abrasiveness**	

Notes

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



Client:	Quanta Subsurface
Project:	Northern Pass Trenchless
Location:	Lincoln, NH
Project No:	GTX-305223
Boring ID:	BH-19A
Sample ID:	R1
Depth :	43 ft
Sample Type:	cylinder
Test Date:	09/13/16
Test Id:	389452
Tested By:	daa
Checked By:	jsc
Test Comment:	---
Visual Description:	---
Sample Comment:	---

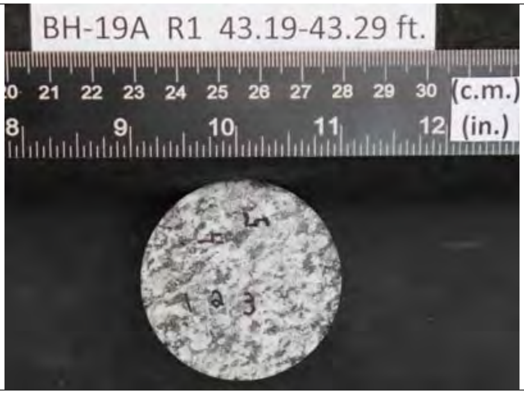
Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-19A	R1	43.19-43.29 ft.	1	2.3	2.6	2.45	
			2	3.4	3.9	3.65	
			3	3.3	3.8	3.55	
			4	3.3	3.8	3.55	
			5	3.7	4.2	3.95	
			Average CAIs			3.43	
			Average CAI *			3.88	

CERCHAR Abrasiveness Index Classification | **High abrasiveness**

Notes

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



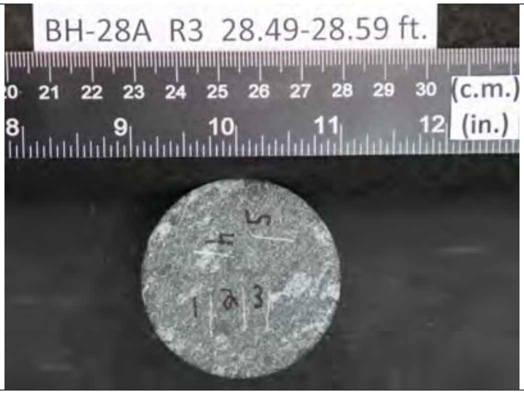
Client:	Quanta Subsurface				
Project:	Northern Pass Trenchless				
Location:	Lincoln, NH			Project No:	GTX-305223
Boring ID:	BH-28A	Sample Type:	cylinder	Tested By:	daa
Sample ID:	R3	Test Date:	09/13/16	Checked By:	jsc
Depth :	28.4-29.35 ft	Test Id:	389453		
Test Comment:	---				
Visual Description:	---				
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
BH-28A	R3	28.49-28.59 ft.	1	2.6	3.1	2.85	
			2	2.1	2.6	2.35	
			3	2.2	2.7	2.45	
			4	3.4	3.9	3.65	
			5	2.3	2.8	2.55	
			Average CAIs			2.77	
			Average CAI *			3.22	
			CERCHAR Abrasiveness Index Classification			**High abrasiveness**	

Notes

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



Client:	Quanta Subsurface		
Project:	Northern Pass Trenchless		
Location:	Lincoln, NH	Project No:	GTX-305223

Boring ID: BH-28B		Sample Type:	cylinder	Tested By:	daa
Sample ID: R4		Test Date:	09/13/16	Checked By:	jsc
Depth :	29.1-29.6 ft	Test Id:	389454		

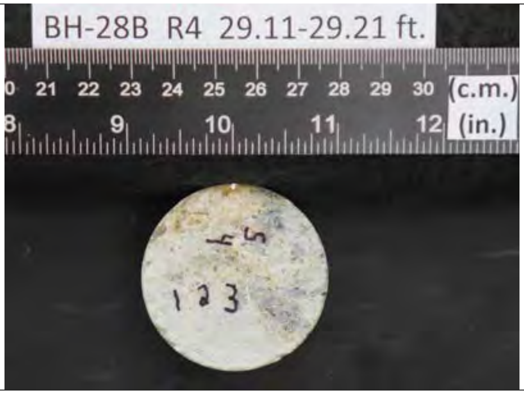
Test Comment: ---
Visual Description: ---
Sample Comment: ---

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-28B	R4	29.11-29.21 ft.	1	3.0	3.5	3.25	
			2	3.1	3.6	3.35	
			3	3.3	3.8	3.55	
			4	2.7	3.2	2.95	
			5	3.7	4.2	3.95	
			Average CAIs			3.41	
			Average CAI *			3.86	
			CERCHAR Abrasiveness Index Classification			**High abrasiveness**	

Notes

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



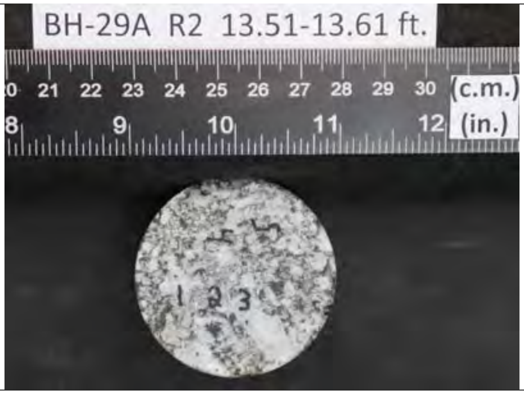
Client:	Quanta Subsurface			
Project:	Northern Pass Trenchless			
Location:	Lincoln, NH		Project No:	GTX-305223
Boring ID:	BH-29A	Sample Type: cylinder	Tested By:	daa
Sample ID:	R2	Test Date: 09/13/16	Checked By:	jsc
Depth :	13-14 ft	Test Id: 389439		
Test Comment:	---			
Visual Description:	---			
Sample Comment:	---			

Abrasiveness of Rock Using the Cerchar Method
by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-29A	R2	13.51-13.61 ft.	1	4.1	4.6	4.35	
			2	2.5	3.0	2.75	
			3	3.3	3.8	3.55	
			4	3.8	4.3	4.05	
			5	4.2	4.7	4.45	
			Average CAIs			3.83	
			Average CAI *			4.27	
			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:



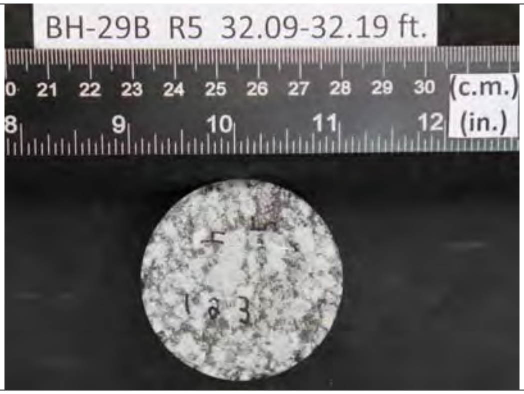
Client:	Quanta Subsurface
Project:	Northern Pass Trenchless
Location:	Lincoln, NH
Project No:	GTX-305223
Boring ID:	BH-29B
Sample ID:	R5
Depth :	32-33 ft
Sample Type:	cylinder
Test Date:	09/13/16
Test Id:	389440
Tested By:	daa
Checked By:	jsc
Test Comment:	---
Visual Description:	---
Sample Comment:	---

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-29B	R5	32.09-32.19 ft.	1	3.2	3.7	3.45	
			2	2.9	3.4	3.15	
			3	2.5	3.0	2.75	
			4	3.5	3.9	3.70	
			5	3.1	3.6	3.35	
			Average CAIs			3.28	
			Average CAI *			3.73	
			CERCHAR Abrasiveness Index Classification			**High abrasiveness**	

Notes

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



Client:	Quanta Subsurface				
Project:	Northern Pass Trenchless				
Location:	Lincoln, NH			Project No:	GTX-305223
Boring ID:	BH-30A	Sample Type:	cylinder	Tested By:	daa
Sample ID:	R3	Test Date:	09/13/16	Checked By:	jsc
Depth :	24 ft	Test Id:	389441		

Test Comment: ---
Visual Description: ---
Sample Comment: ---

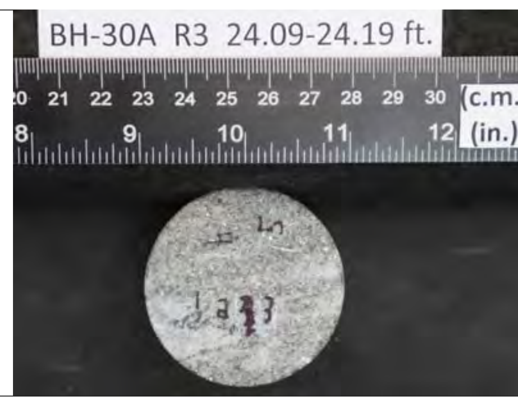
Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-30A	R3	24.09-24.19 ft.	1	4.0	4.5	4.25	
			2	3.5	4.0	3.75	
			3	1.9	2.4	2.15	
			4	2.4	2.9	2.65	
			5	1.7	2.2	1.95	
			Average CAIs			2.95	
			Average CAI *			3.40	

CERCHAR Abrasiveness Index Classification | **High abrasiveness**

Notes

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



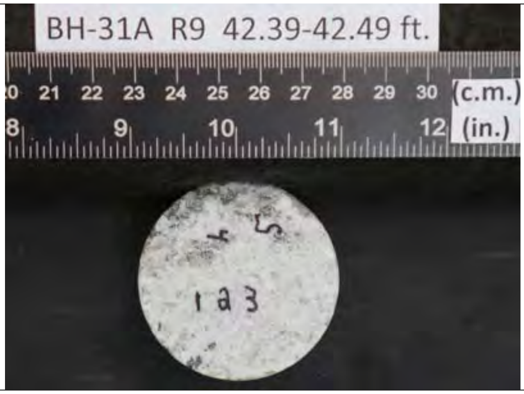
Client:	Quanta Subsurface			
Project:	Northern Pass Trenchless			
Location:	Lincoln, NH		Project No:	GTX-305223
Boring ID: BH-31A	Sample Type:	cylinder	Tested By:	daa
Sample ID: R9	Test Date:	09/13/16	Checked By:	jsc
Depth : 42 ft	Test Id:	389442		
Test Comment:	---			
Visual Description:	---			
Sample Comment:	---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-31A	R9	42.39-42.49 ft.	1	4.3	4.8	4.55	
			2	2.9	3.4	3.15	
			3	4.1	4.6	4.35	
			4	2.6	3.1	2.85	
			5	3.8	4.3	4.05	
			Average CAIs			3.79	
			Average CAI *			4.23	
			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:	Quanta Subsurface				
Project:	Northern Pass Trenchless				
Location:	Lincoln, NH			Project No:	GTX-305223
Boring ID:	BH-31B	Sample Type:	cylinder	Tested By:	daa
Sample ID:	R3	Test Date:	09/13/16	Checked By:	jsc
Depth :	48 ft	Test Id:	389443		

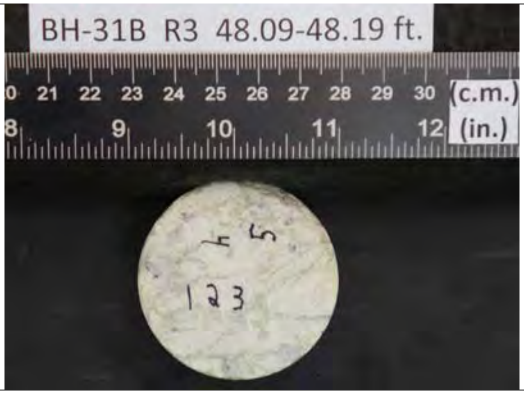
Test Comment: ---
Visual Description: ---
Sample Comment: ---

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-31B	R3	48.09-48.19 ft.	1	3.2	3.7	3.45	
			2	2.8	3.3	3.05	
			3	2.2	2.7	2.45	
			4	3.6	4.1	3.85	
			5	3.3	3.8	3.55	
			Average CAIs			3.27	
			Average CAI *			3.72	
			CERCHAR Abrasiveness Index Classification			**High abrasiveness**	

Notes

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



Client:	Quanta Subsurface				
Project:	Northern Pass Trenchless				
Location:	Lincoln, NH			Project No:	GTX-305223
Boring ID:	BH-32A	Sample Type:	cylinder	Tested By:	daa
Sample ID:	R2	Test Date:	09/13/16	Checked By:	jsc
Depth :	17 ft	Test Id:	389444		

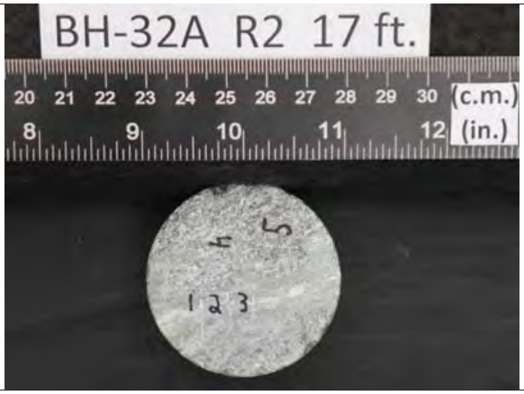
Test Comment: ---
Visual Description: ---
Sample Comment: ---

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-32A	R2	17 ft.	1	2.2	2.7	2.45	
			2	2.8	3.3	3.05	
			3	2.5	3.0	2.75	
			4	3.4	3.9	3.65	
			5	3.2	3.7	3.45	
			Average CAIs			3.07	
			Average CAI *			3.52	
					CERCHAR Abrasiveness Index Classification	High abrasiveness	

Notes

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



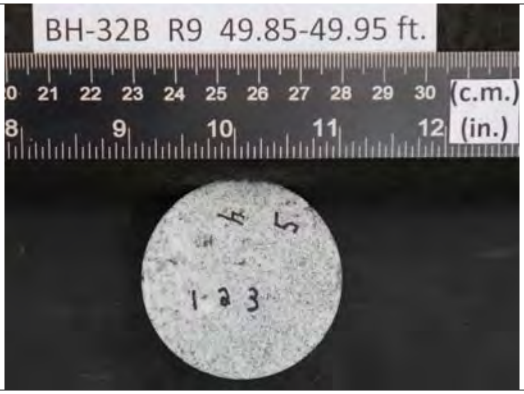
Client: Quanta Subsurface			
Project: Northern Pass Trenchless			
Location: Lincoln, NH		Project No:	GTX-305223
Boring ID: BH-32B	Sample Type: cylinder	Tested By:	daa
Sample ID: R9	Test Date: 09/13/16	Checked By:	jsc
Depth : 49.8-50.8 ft	Test Id: 389445		
Test Comment: ---			
Visual Description: ---			
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
BH-32B	R9	49.85-49.95 ft.	1	4.0	4.5	4.25	
			2	3.7	4.2	3.95	
			3	3.1	3.6	3.35	
			4	3.6	4.1	3.85	
			5	3.9	4.4	4.15	
			Average CAIs			3.91	
			Average CAI *			4.35	
			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:	Quanta Subsurface				
Project:	Northern Pass Trenchless				
Location:	Lincoln, NH			Project No:	GTX-305223
Boring ID:	BH-33B	Sample Type:	cylinder	Tested By:	daa
Sample ID:	R2	Test Date:	09/13/16	Checked By:	jsc
Depth :	27 ft	Test Id:	389446		

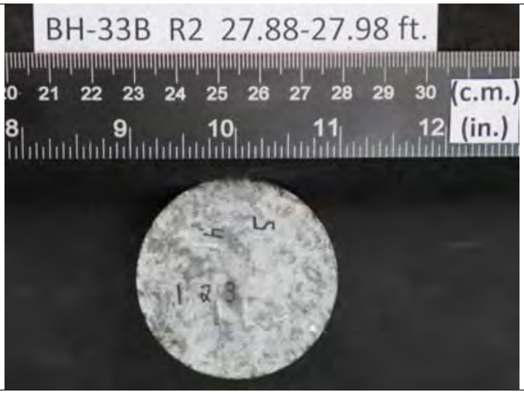
Test Comment: ---
Visual Description: ---
Sample Comment: ---

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-33B	R2	27.88-27.98 ft.	1	3.6	4.1	3.85	
			2	2.2	2.7	2.45	
			3	2.9	3.4	3.15	
			4	3.0	3.5	3.25	
			5	2.8	3.3	3.05	
			Average CAIs			3.15	
			Average CAI *			3.60	
			CERCHAR Abrasiveness Index Classification			**High abrasiveness**	

Notes

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



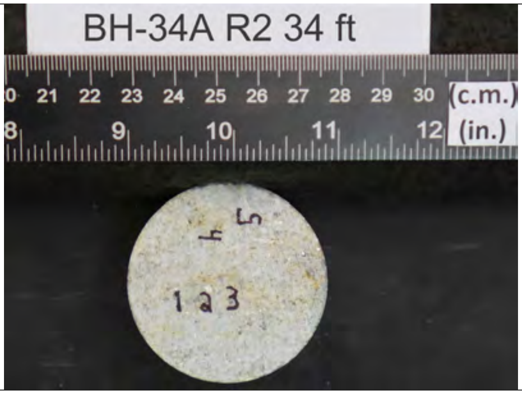
Client:	Quanta Subsurface		
Project:	Northern Pass Trenchless		
Location:	Lincoln, NH	Project No:	GTX-305223
Boring ID: BH-34A	Sample Type: cylinder	Tested By:	daa
Sample ID: R2	Test Date: 09/13/16	Checked By:	jsc
Depth : 34 ft	Test Id: 389447		
Test Comment: Visual ---			
Description: Sample ---			
Comment: ---			

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-34A	R2	34 ft.	1	3.5	4.0	3.75	
			2	3.3	3.7	3.50	
			3	3.5	4.0	3.75	
			4	3.3	3.8	3.55	
			5	2.7	3.2	2.95	
			Average CAIs			3.5	
			Average CAI *			3.95	
			CERCHAR Abrasiveness Index Classification			**High abrasiveness**	

Notes

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



Client:	Quanta Subsurface		
Project:	Northern Pass Trenchless		
Location:	Lincoln, NH	Project No:	GTX-305223
Boring ID: BH-34B	Sample Type: cylinder	Tested By:	daa
Sample ID: R2	Test Date: 09/13/16	Checked By:	jsc
Depth : 26 ft	Test Id: 389448		

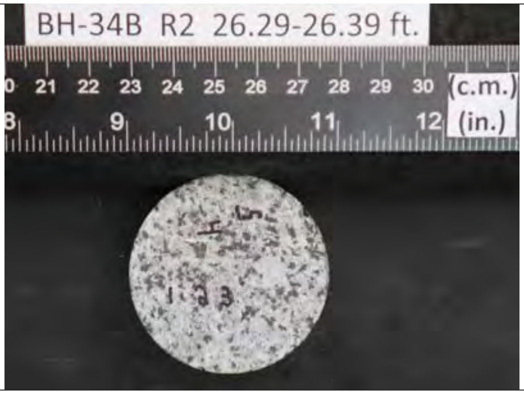
Test Comment: ---
Visual Description: ---
Sample Comment: ---

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-34B	R2	26.29-26.39 ft.	1	3.4	3.9	3.65	
			2	4.4	4.9	4.65	
			3	3.0	3.5	3.25	
			4	3.7	4.2	3.95	
			5	3.8	4.3	4.05	
			Average CAIs			3.91	
			Average CAI *			4.35	
			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:	Quanta Subsurface		
Project:	Northern Pass Trenchless		
Location:	Lincoln, NH	Project No:	GTX-305223
Boring ID: BH-35A	Sample Type: cylinder	Tested By:	daa
Sample ID: R2	Test Date: 09/13/16	Checked By:	jsc
Depth : 23.4-24.5 ft	Test Id: 389449		

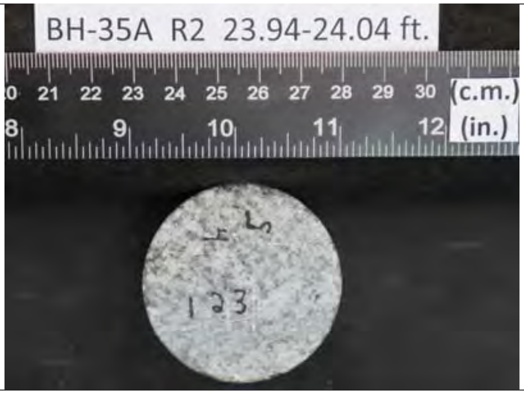
Test Comment: ---
Visual Description: ---
Sample Comment: ---

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-35A	R2	23.94-24.04 ft.	1	2.4	2.9	2.65	
			2	2.4	2.7	2.55	
			3	2.6	3.1	2.85	
			4	3.8	4.3	4.05	
			5	3.3	3.8	3.55	
			Average CAIs			3.13	
			Average CAI *			3.58	
				CERCHAR Abrasiveness Index Classification		**High abrasiveness**	

Notes

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



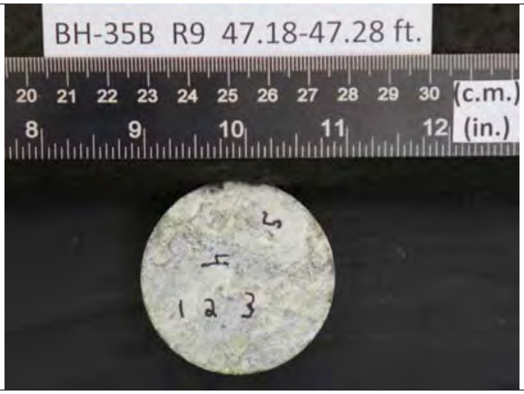
Client:	Quanta Subsurface
Project:	Northern Pass Trenchless
Location:	Lincoln, NH
Project No:	GTX-305223
Boring ID:	BH-35B
Sample ID:	R9
Depth :	48 ft
Sample Type:	cylinder
Test Date:	09/13/16
Test Id:	389450
Tested By:	daa
Checked By:	jsc
Test Comment:	---
Visual Description:	---
Sample Comment:	---

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
BH-35B	R9	47.18-47.28 ft.	1	3.3	3.8	3.55	
			2	4.3	4.8	4.55	
			3	3.1	3.6	3.35	
			4	3.2	3.7	3.45	
			5	3.6	4.1	3.85	
			Average CAIs			3.75	
			Average CAI *			4.19	
			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:



CHAIN OF CUSTODY

GeoTesting EXPRESS

GeoTesting Express, Inc.
125 Nagog Park
Acton, MA 01720
800-434-1062 Toll Free
978-635-0424 Phone
978-635-0266 Fax

Sales Order No.:
GTX No.:

Company Name: Quanta Subsurface
Address: 4308 N. Barker Rd. Spokane Valley, WA 99027
Contact: Zach Wright/Balin Strickler
e-mail: zwright@quantasubsurface.com
Phone Number: 509-789-7747
Fax Number:
Project Name: Northern Pass
Project Number: 201-16-NH
Project Location: New Hampshire

Sample Type: 1. Soil 2. Geosynthetic 3. Rock 4. Concrete 5. Other
Container Type: 1. Bucket 2. Bag 3. Jar 4. Tube 5. Roll

Sample Identification	Container Size	Container Type	Sampling Date	Sampling Time	Sample Type	UCS	Abrasivity					Comments
BH-29A (R2)					Rock	X	X					@ 13'-14'
BH-29B (R5)					↓	X	X					@ 32'-33'
BH-30A (R3)					↓	X	X					@ 24'
BH-31A (R9)					↓	X	X					@ 42'
BH-31B (R3)					↓	X	X					@ 48'
BH-32A (R2)					↓	X	X					@ 17'
BH-32B (R9)					↓	X	X					@ ~~50~~ 49.8-50.8'
BH-33B (R2)					↓	X	X					@ 27'
BH-34A (R2)					↓	X	X					@ ~~34~~' 26-27'

Relinquished By:	Date / Time	Received By:	Date / Time	
Relinquished By:	Date: 9/2/16 Time: 1100	Received By:	Date: 9/2/16 Time: 1:43	Turn-Around Time Requested:
Relinquished By:	Date: Time:	Received By:	Date: Time:	No. of Business Days: ______
Relinquished By:	Date: Time:	Received By:	Date: Time:	Special Instructions:

SHIPPED VIA:

CHAIN OF CUSTODY

GeoTesting Express, Inc.
125 Nagog Park
Acton, MA 01720
800-434-1062 Toll Free
978-635-0424 Phone
978-635-0266 Fax

Sales Order No.:
GTX No.:

Company Name:
Address:
Contact: SEE PG. 1
e-mail:
Phone Number:
Fax Number:
Project Name:
Project Number:
Project Location:

Sample Type: 1. Soil 2. Geosynthetic 3. Rock 4. Concrete 5. Other

Container Type: 1. Bucket 2. Bag 3. Jar 4. Tube 5. Roll

Sample Identification	Container Size	Container Type	Sampling Date	Sampling Time	Sample Type	UCS	Abrasivity					Comments
BH-34B (R2)					Rock	X	X					@ 26'
BH-35A (R2)						X	X					@ ~~24~~' 23.4-24.5'
BH-35B (R9)						X	X					@ 48'
BH-18A (R2)						X	X					@ 55'
BH-19A (R1)						X	X					@ 43'
BH-28A (R3)						X	X					@ 29.4-29.35'
BH-28B (R4)						X	X					@ 29.1-29.6'

Relinquished By: [signature]	Date: 9/2/16 Time: 1100	**Received By:** [signature]	Date: 9/2/16 Time: 1:45	**Turn-Around Time Requested:**
Relinquished By:	Date: Time:	**Received By:**	Date: Time:	No. of Business Days: ________
Relinquished By:	Date: Time:	**Received By:**	Date: Time:	**Special Instructions:**
SHIPPED VIA:				

WARRANTY and LIABILITY

GeoTesting Express (GTX) warrants that all tests it performs are run in general accordance with the specified test procedures and accepted industry practice. GTX will correct or repeat any test that does not comply with this warranty. GTX has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

GTX's liability will be limited to correcting or repeating a test which fails our warranty. GTX's liability for damages to the Purchaser of testing services for any cause whatsoever shall be limited to the amount GTX received for the testing services. GTX will not be liable for any damages, or for any lost benefits or other consequential damages resulting from the use of these test results, even if GTX has been advised of the possibility of such damages. GTX will not be responsible for any liability of the Purchaser to any third party.

Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$
B	pore pressure parameter for $\Delta\sigma_3$
CAI	CERCHAR Abrasiveness Index
CIU	isotropically consolidated undrained triaxial shear test
CR	compression ratio for one dimensional consolidation
CSR	cyclic stress ratio
C_c	coefficient of curvature, $(D_{30})^2 / (D_{10} \times D_{60})$
C_u	coefficient of uniformity, D_{60}/D_{10}
C_c	compression index for one dimensional consolidation
C_α	coefficient of secondary compression
c_v	coefficient of consolidation
c	cohesion intercept for total stresses
c'	cohesion intercept for effective stresses
D	diameter of specimen
D	damping ratio
D_{10}	diameter at which 10% of soil is finer
D_{15}	diameter at which 15% of soil is finer
D_{30}	diameter at which 30% of soil is finer
D_{50}	diameter at which 50% of soil is finer
D_{60}	diameter at which 60% of soil is finer
D_{85}	diameter at which 85% of soil is finer
d_{50}	displacement for 50% consolidation
d_{90}	displacement for 90% consolidation
d_{100}	displacement for 100% consolidation
E	Young's modulus
e	void ratio
e_c	void ratio after consolidation
e_o	initial void ratio
G	shear modulus
G_s	specific gravity of soil particles
H	height of specimen
H_R	Rebound Hardness number
i	gradient
I_S	Uncorrected point load strength
$I_{S(50)}$	Size corrected point load strength index
H_A	Modified Taber Abrasion
H_T	Total hardness
K_o	lateral stress ratio for one dimensional strain
k	permeability
LI	Liquidity Index
m_v	coefficient of volume change
n	porosity
PI	plasticity index
P_c	preconsolidation pressure
p	$(\sigma_1 + \sigma_3) / 2$, $(\sigma_v + \sigma_h) / 2$
p'	$(\sigma'_1 + \sigma'_3) / 2$, $(\sigma'_v + \sigma'_h) / 2$
p'_c	p' at consolidation
Q	quantity of flow
q	$(\sigma_1 - \sigma_3) / 2$
q_f	q at failure
q_o, q_i	initial q
q_c	q at consolidation
S_r	Post cyclic undrained shear strength
T	temperature
t	time
U, UC	unconfined compression test
UU, Q	unconsolidated undrained triaxial test
u_a	pore gas pressure
u_e	excess pore water pressure
u, u_w	pore water pressure
V	total volume
V_g	volume of gas
V_s	volume of solids
V_s	shear wave velocity
V_v	volume of voids
V_w	volume of water
V_o	initial volume
v	velocity
W	total weight
W_s	weight of solids
W_w	weight of water
w	water content
w_c	water content at consolidation
w_f	final water content
w_l	liquid limit
w_n	natural water content
w_p	plastic limit
w_s	shrinkage limit
w_o, w_i	initial water content
α	slope of q_f versus p_f
α'	slope of q_f versus p_f'
γ_t	total unit weight
γ_d	dry unit weight
γ_s	unit weight of solids
γ_w	unit weight of water
ε	strain
ε_{vol}	volume strain
ε_h, ε_v	horizontal strain, vertical strain
μ	Poisson's ratio, also viscosity
σ	normal stress
σ'	effective normal stress
σ_c, σ'_c	consolidation stress in isotropic stress system
σ_h, σ'_h	horizontal normal stress
σ_v, σ'_v	vertical normal stress
σ'_{vc}	Effective vertical consolidation stress
σ_1	major principal stress
σ_2	intermediate principal stress
σ_3	minor principal stress
τ	shear stress
φ	friction angle based on total stresses
φ'	friction angle based on effective stresses
φ'_r	residual friction angle
φ_{ult}	φ for ultimate strength

ATTACHMENT D

Thermal Resistivity Test Results

4370 Contractors Common
Livermore, CA 94551
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Fax: 925-999-8837
info@geothermusa.com

October 11, 2016

Quanta Subsurface
4308 N. Barker Road
Spokane Valley, WA 99027
Attn: Zach Wright

Re: Thermal Analysis of Rock Core Samples
Northern Pass Trenchless Investigation - New Hampshire (Project No. 201-16-NH)

The following is the report of thermal dryout characterization tests conducted on thirty-nine (39) rock-core samples received at our laboratory.

Thermal Resistivity Tests: For thermal dryout characterization the samples were tested 'as-is'. A series of thermal resistivity measurements were made in stages with moisture content ranging from the 'as-received' to the totally dry condition with results tabulated below. The tests were conducted in accordance with the IEEE standard 442. Due to the low moisture content (surface moisture of less than 1%), it was not possible to draw the thermal dryout graphs.

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-10A @ 28.3'	Rock Core	44	60	<1	167
BH-10B @ 27.5'	Rock Core	40	67	<1	163
BH-18B @ 55.5'	Rock Core	38	66	<1	165
BH-19A @ 41.2'	Rock Core	42	63	<1	160
BH-20A @ 17'	Rock Core	36	69	<1	164
BH-20A @ 35.8'	Rock Core	35	66	<1	166
BH-28A @ 39.7'	Rock Core	38	66	<1	157
BH-28B @ 21.8'	Rock Core	30	62	<1	157
BH-28B @ 41'	Rock Core	32	71	<1	155

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<u>**Sample ID, Description, Thermal Resistivity, Moisture Content and Density**</u>

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-29A @ 18'	Rock Core	37	73	<1	162
BH-29B @ 20'	Rock Core	39	69	<1	163
BH-29A @ 35'	Rock Core	44	70	<1	165
BH-29B @ 36'	Rock Core	40	63	<1	163
BH-30A @ 23'	Rock Core	32	60	<1	168
BH-30A @ 50'	Rock Core	36	59	<1	165
BH-31A @ 19'	Rock Core	39	61	<1	158
BH-31A @ 54'	Rock Core	46	65	<1	165
BH-31B @ 52.7'	Rock Core	35	66	<1	162
BH-32A @ 36'	Rock Core	41	62	<1	166
BH-32A @ 63'	Rock Core	45	69	<1	168
BH-32B @ 26'	Rock Core	38	65	<1	164
BH-32B @ 63.7'	Rock Core	50	72	<1	162
BH-33A @ 51'	Rock Core	44	70	<1	158
BH-33B @ 26.6	Rock Core	40	75	<1	160
BH-33B @ 51'	Rock Core	39	65	<1	155
BH-34A @ 33'	Rock Core	49	67	<1	154
BH-34A @ 47'	Rock Core	51	70	<1	158
BH-34B @ 47'	Rock Core	38	73	<1	165
BH-35A @ 55'	Rock Core	35	66	<1	160
BH-35B @ 56'	Rock Core	37	71	<1	159
BH-36C @ 40.6'	Rock Core	41	68	<1	159
BH-36B @ 54'	Rock Core	37	74	<1	163
BH-41A @ 42'	Rock Core	39	68	<1	158
BH-42B @ 17'	Rock Core	42	63	<1	164
BH-42B @ 34.4'	Rock Core	46	61	<1	165

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-52A @ 22.8'	Rock Core	38	70	<1	159
BH-52A @ 38.5'	Rock Core	40	67	<1	162
BH-52B @ 49.5'	Rock Core	44	74	<1	160
BH-120 @ 11.2'	Rock Core	49	69	<1	160

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel

4370 Contractors Common
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Fax: 925-999-8837
info@geothermusa.com

October 17, 2016

Quanta Subsurface
4308 N. Barker Road
Spokane Valley, WA 99027
Attn: Zach Wright

Re: Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation - New Hampshire (Project No. 201-16-NH)

The following is the report of thermal dryout characterization tests conducted on twenty-two (22) undisturbed tube samples of native soil sample received at our laboratory.

Thermal Resistivity Tests: For thermal dryout characterization the samples were tested 'as-received'. A series of thermal resistivity measurements were made in stages with moisture content ranging from the 'as-received' to the totally dry condition. The tests were conducted in accordance with the IEEE standard 442. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 4.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-52B @ 24'	SM	58	177	19	99
BH-51B @ 33'	SM/GM	48	118	13	126
BH-51B @ 18'	SM/GM	55	134	11	120
BH-51A @ 29'	PT	86	643	69	57
BH-51A @ 14'	SW	42	109	11	125
BH-48B @ 64'	ML	65	177	12	125
BH-48B @ 29'	GM	54	168	16	118

Geotherm USA

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

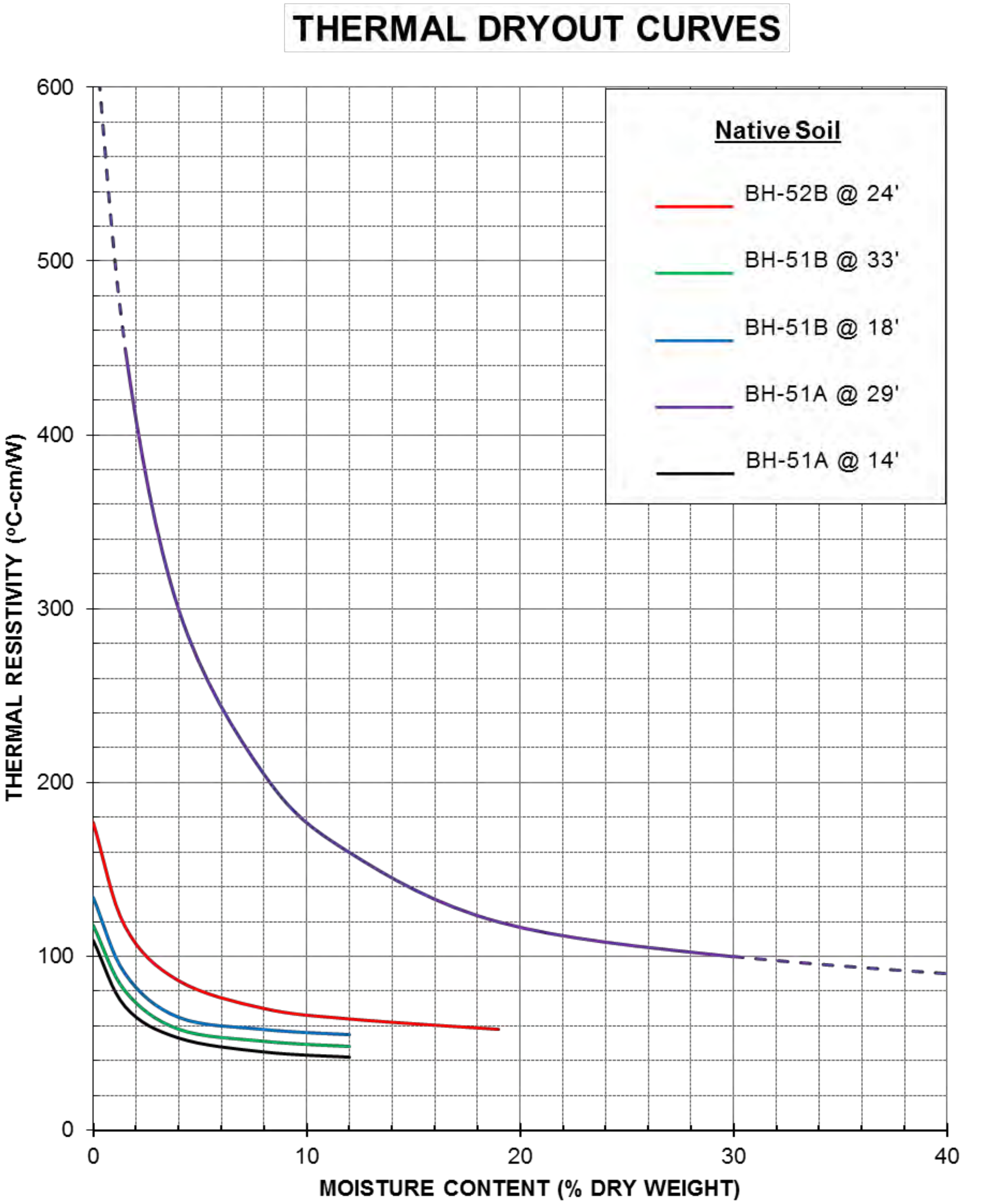
Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-48A @ 64'	SM	61	152	9	125
BH-48A @ 24'	SC	54	145	10	129
BH-47B @ 29.5'	GM	60	174	8	117
BH-47B @ 14'	GW	41	109	10	132
BH-47A @ 24'	SM/GM	48	153	17	113
BH-47A @ 9'	SM/GM	55	160	7	114
BH-46B @ 14.5	ML	81	270	32	93
BH-46A 54'	SM	60	180	15	110
BH-46A @ 14.5'	SM	68	192	11	108
BH-45B @ 54'	CL	58	142	11	118
BH-45B @ 4'	GW	44	129	8	126
BH-45A @ 59'	SM	64	181	12	109
BH-45A @ 29'	CH	49	206	21	110
BH-44B @ 54'	CH	62	166	20	114
BH-44B @ 24'	CH	65	182	18	111

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel



Quanta Subsurface

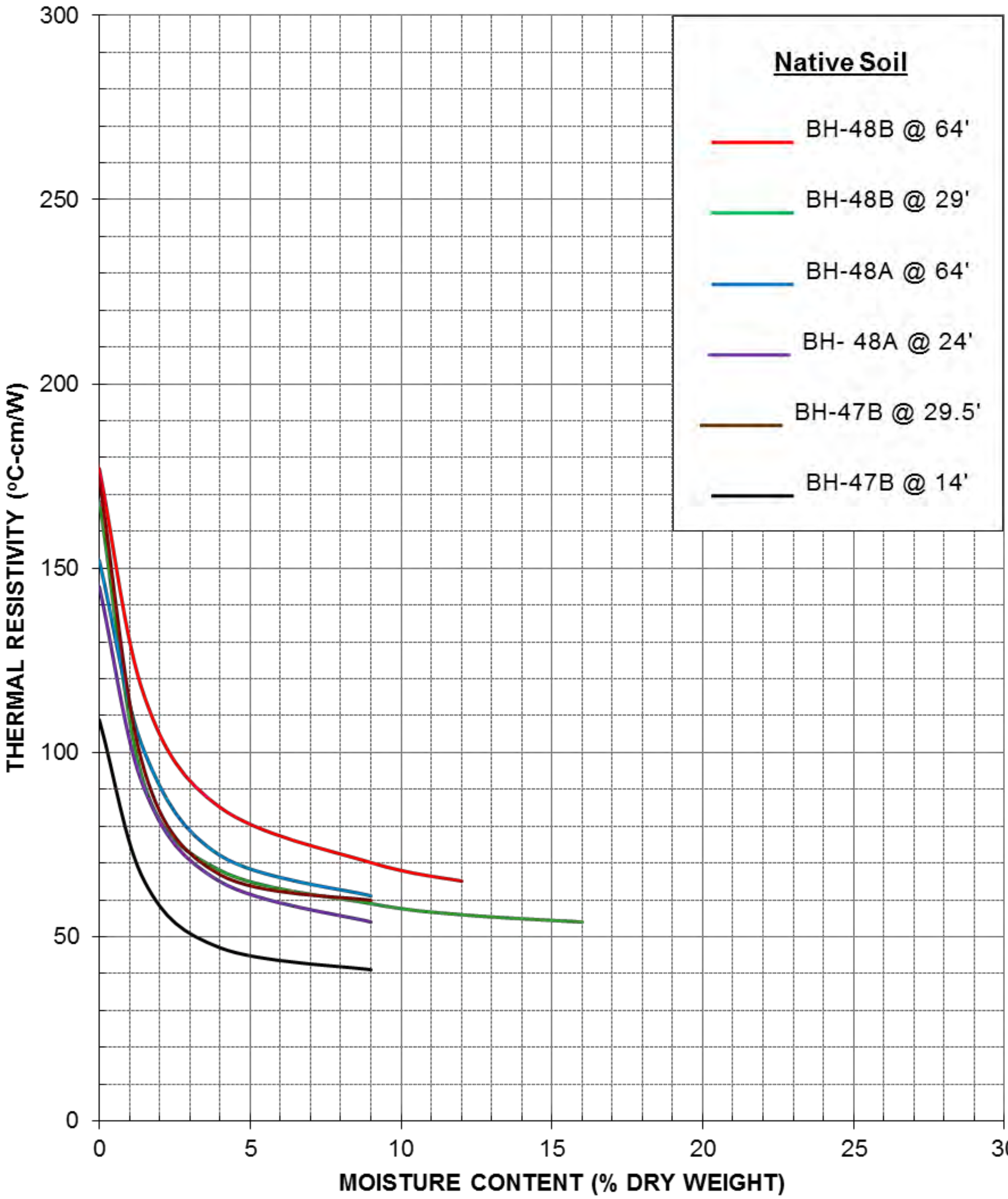
Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016

Figure 1

THERMAL DRYOUT CURVES



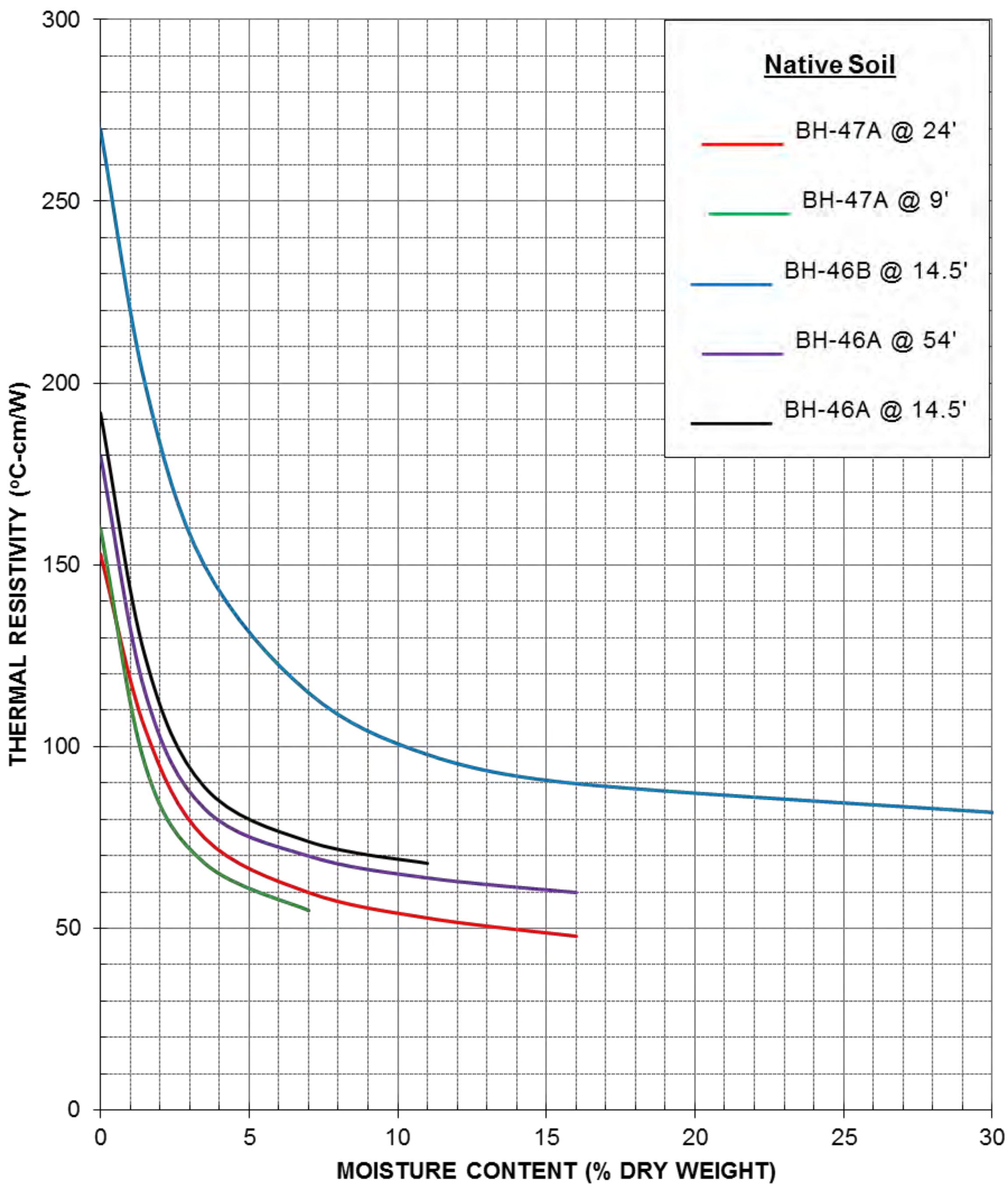
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 2**

THERMAL DRYOUT CURVES



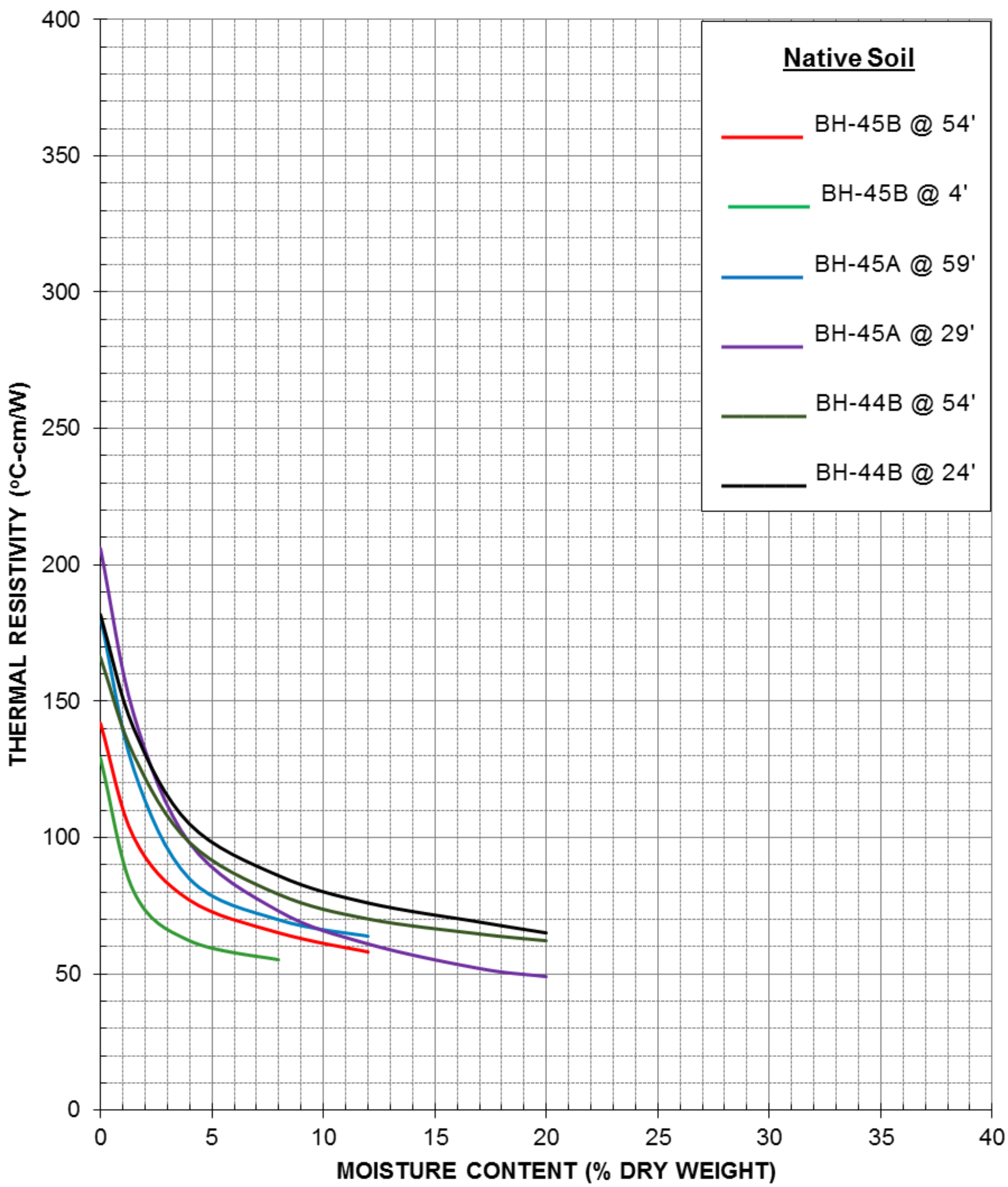
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 3**

THERMAL DRYOUT CURVES



Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 4**

4370 Contractors Common
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Fax: 925-999-8837
info@geothermusa.com

October 18, 2016

Quanta Subsurface
4308 N. Barker Road
Spokane Valley, WA 99027
Attn: Zach Wright

Re: Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation - New Hampshire (Project No. 201-16-NH)

The following is the report of thermal dryout characterization tests conducted on twenty-three (23) undisturbed tube samples of native soil received at our laboratory.

Thermal Resistivity Tests: For thermal dryout characterization the samples were tested 'as-received'. A series of thermal resistivity measurements were made in stages with moisture content ranging from the 'as-received' to the totally dry condition. The tests were conducted in accordance with the IEEE standard 442. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 4.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-44A @ 55'	GM	58	151	10	131
BH-44A @ 24'	CH	51	139	15	119
BH-43B @ 29'	SP	60	198	17	108
BH-43B @ 9'	SW	55	183	5	111
BH-43A @ 35'	SP	55	355	26	101
BH-43A @ 10'	SM	69	214	8	100
BH-42A @ 34'	CL	77	278	21	102
BH-42A @ 9'	GW	48	170	12	109

Geotherm USA

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

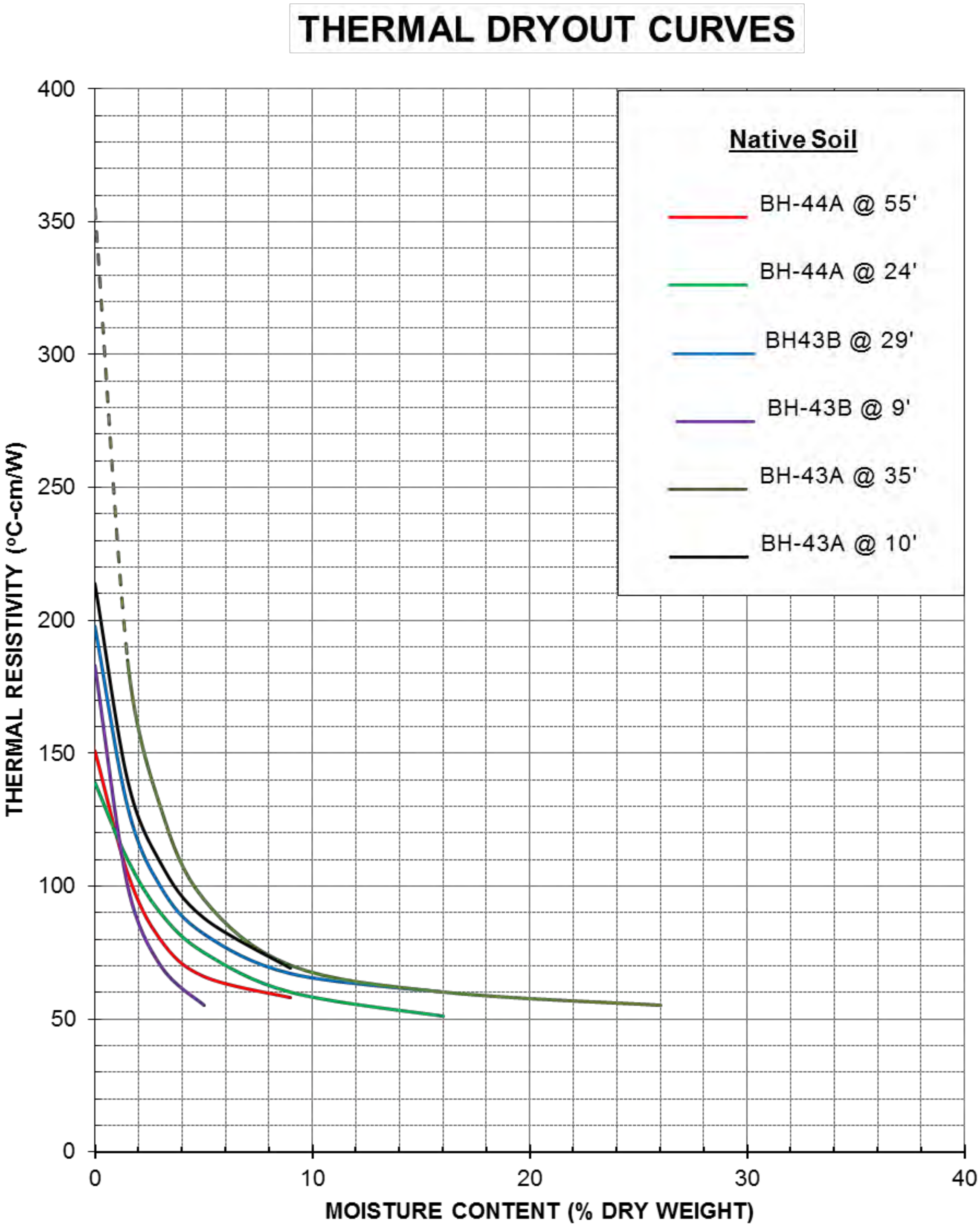
Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-41B @ 40'	SW	64	364	21	104
BH-41B @ 20'	SM	55	204	25	90
BH-41A @ 23.5'	ML	72	239	25	97
BH-40B @ 19'	SW	57	302	19	110
BH-40B @ 10'	SW	187	265	2	124
BH-40A @ 24'	SP	59	213	15	110
BH-40A @ 10'	SW	213	494	7	112
BH-39A @ 35'	SP	64	198	12	115
BH-39A @ 15'	SM	54	142	12	117
BH-37B @ 29'	CL	65	188	10	114
BH37B @ 9'	SC	50	137	9	129
BH-37A @ 29'	SW	61	167	10	111
BH-37A @ 14'	SM	83	248	16	113
BH-36C @ 19'	SM	50	142	21	123
BH-36B @ 14'	SW	54	198	26	97

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel



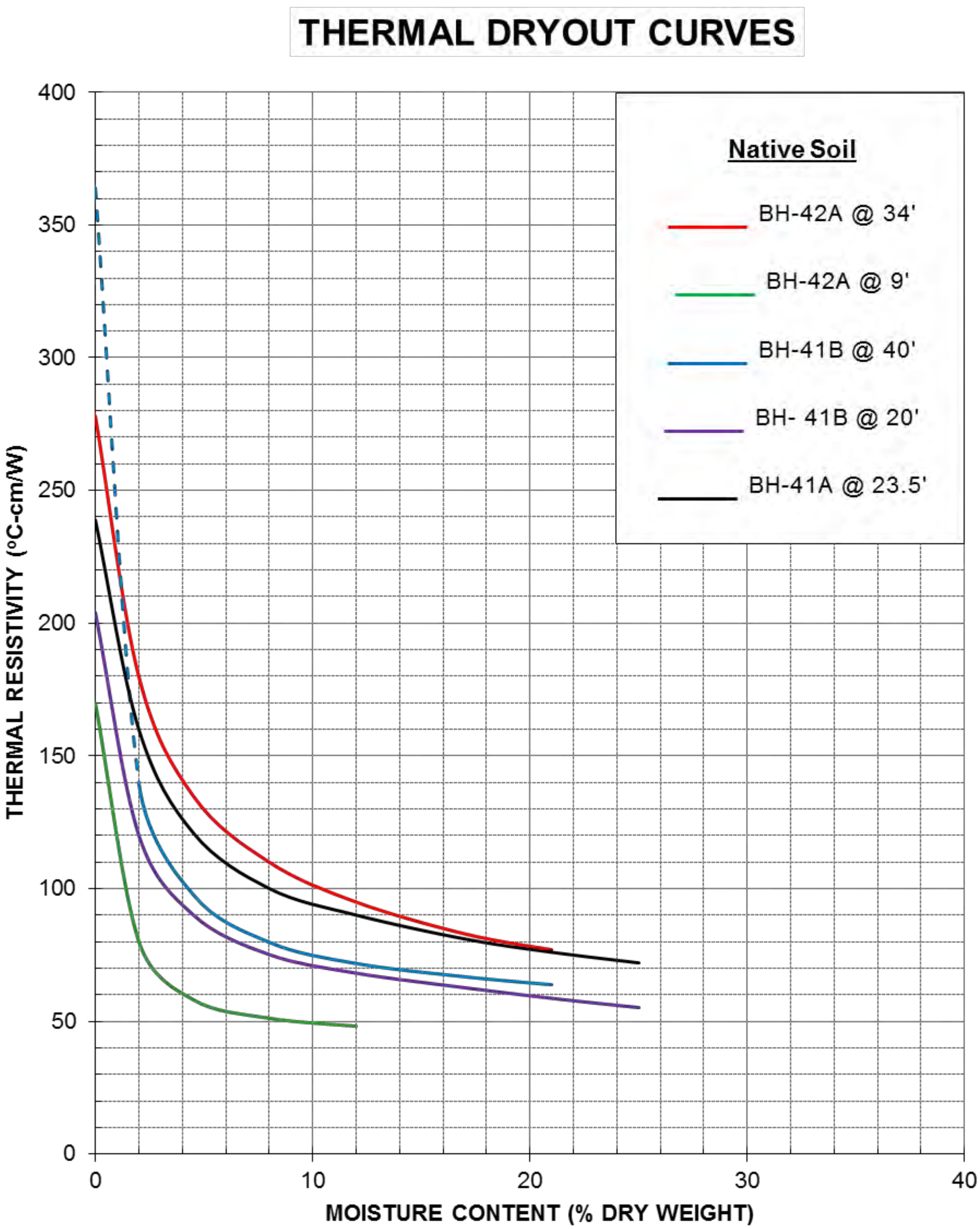
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 1**

Geotherm USA



Quanta Subsurface

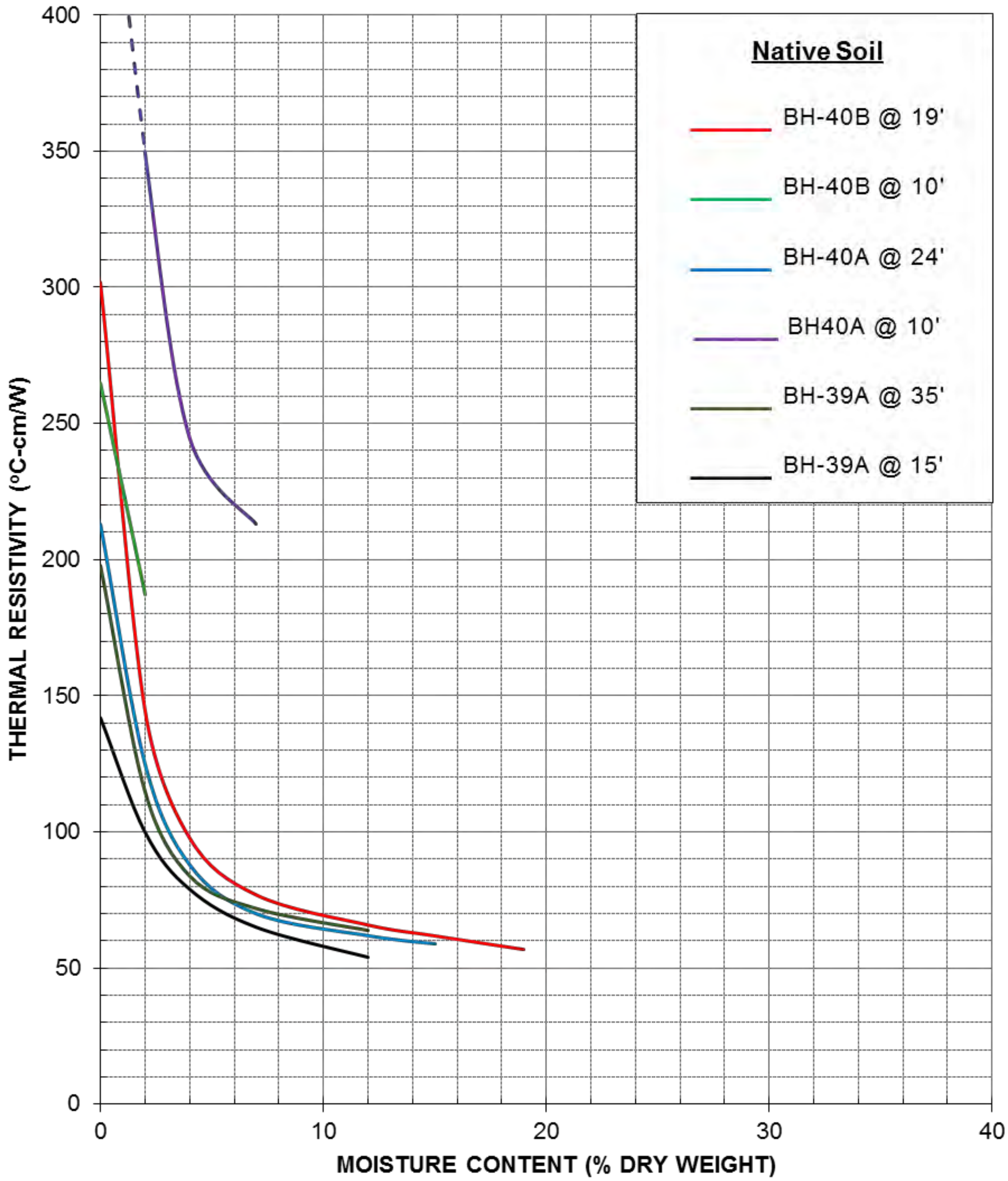
Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 2**

Geotherm USA

THERMAL DRYOUT CURVES



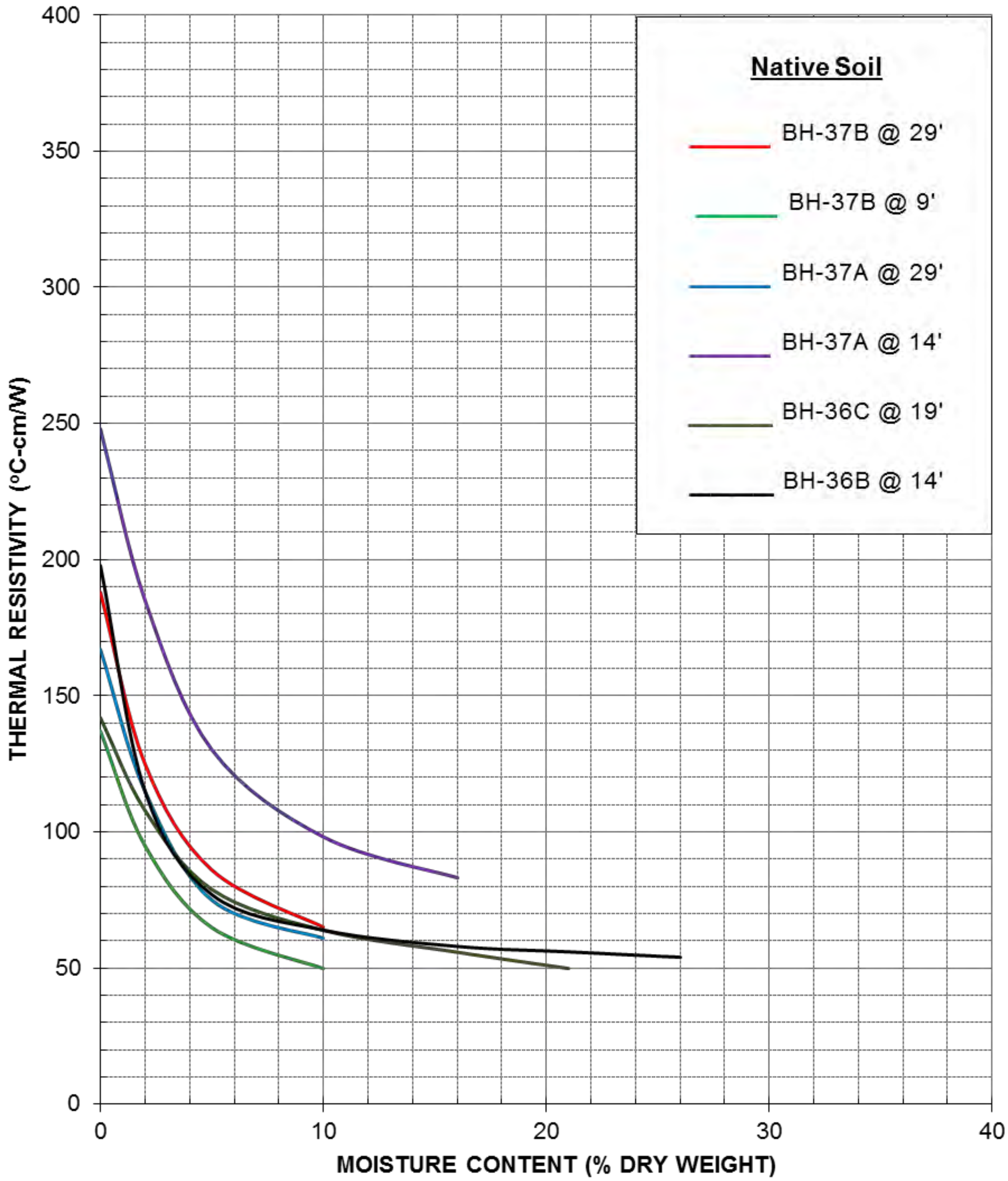
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 3**

THERMAL DRYOUT CURVES



Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 4**

Geotherm USA

4370 Contractors Common
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Fax: 925-999-8837
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October 21, 2016

Quanta Subsurface
4308 N. Barker Road
Spokane Valley, WA 99027
Attn: Zach Wright

Re: Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation - New Hampshire (Project No. 201-16-NH)

The following is the report of thermal dryout characterization tests conducted on twenty-two (22) undisturbed tube samples of native soil received at our laboratory.

Thermal Resistivity Tests: For thermal dryout characterization the samples were tested 'as-received'. A series of thermal resistivity measurements were made in stages with moisture content ranging from the 'as-received' to the totally dry condition. The tests were conducted in accordance with the IEEE standard 442. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 4.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-36A @ 54'	ML	54	308	15	119
BH-36A @ 29'	SP	43	158	11	118
BH-35B @ 4'	SM	54	140	8	118
BH-35A @ 9'	SM	51	149	12	119
BH-34B @ 9'	SW	42	214	22	120
BH-33A @ 30'	GW	46	108	12	133
BH-31B @ 24'	SP	40	151	21	117
BH-28A @ 9'	SM	48	137	12	129

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-27B @ 39'	SP	62	189	16	117
BH-27B @ 19'	SM	50	138	13	122
BH-27A @ 39'	SW	53	227	10	127
BH-27A @ 19'	GM	42	98	10	130
BH-26B @ 35'	SM	56	224	23	103
BH-26B @ 15'	SC	55	189	21	109
BH-26A @ 34'	SP	41	245	29	96
BH-26A @ 14'	GW	46	94	7	135
BH-25B @ 34'	ML	58	313	27	97
BH-25B @ 19'	SW	49	210	11	136
BH-25A @ 34'	ML	63	292	26	98
BH-24B @ 29'	SP	48	217	24	100
BH-24B @ 14'	SP	44	184	23	106
BH-24A @ 44'	SW	51	167	22	106

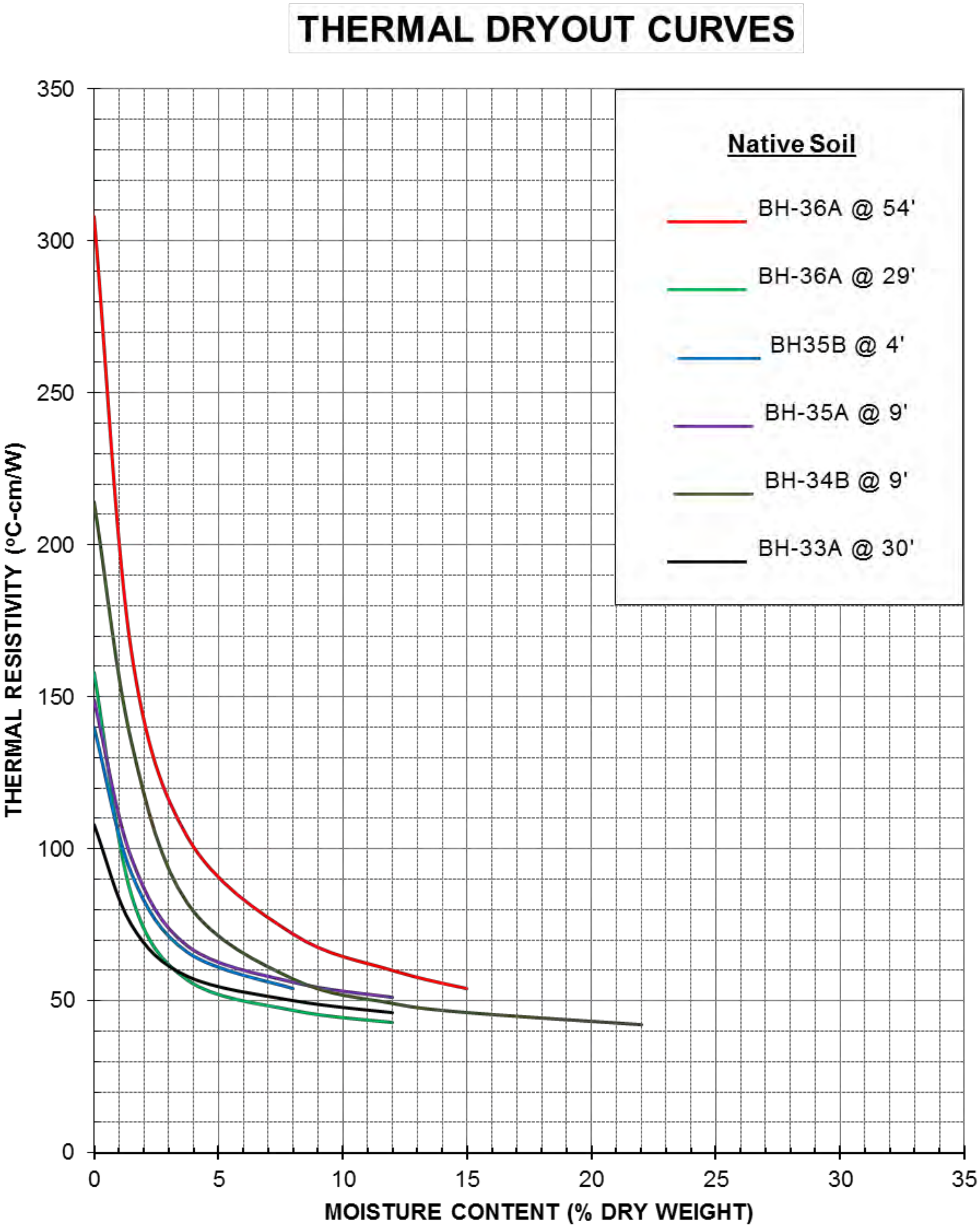
Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel

Geotherm USA



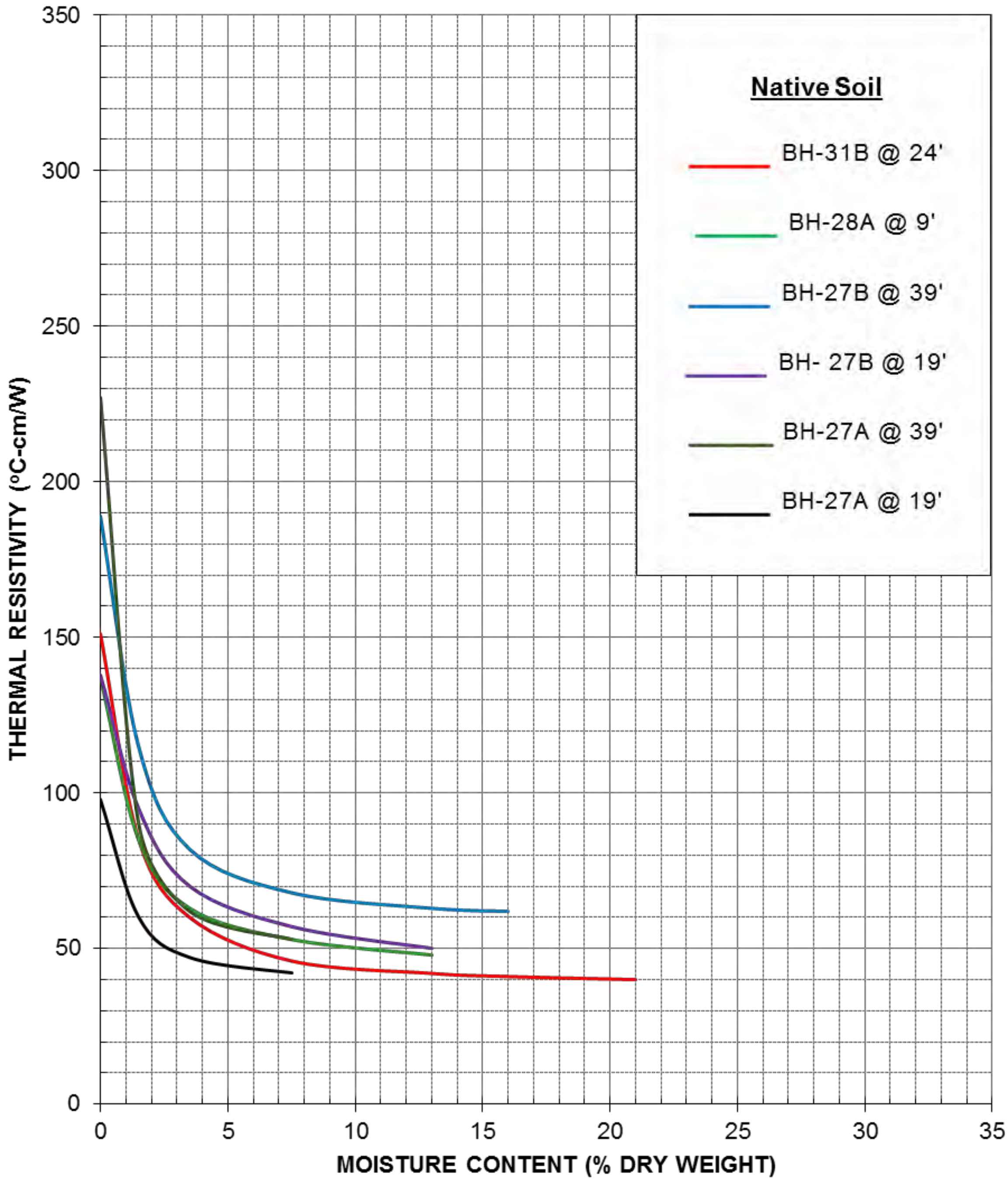
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 1**

THERMAL DRYOUT CURVES



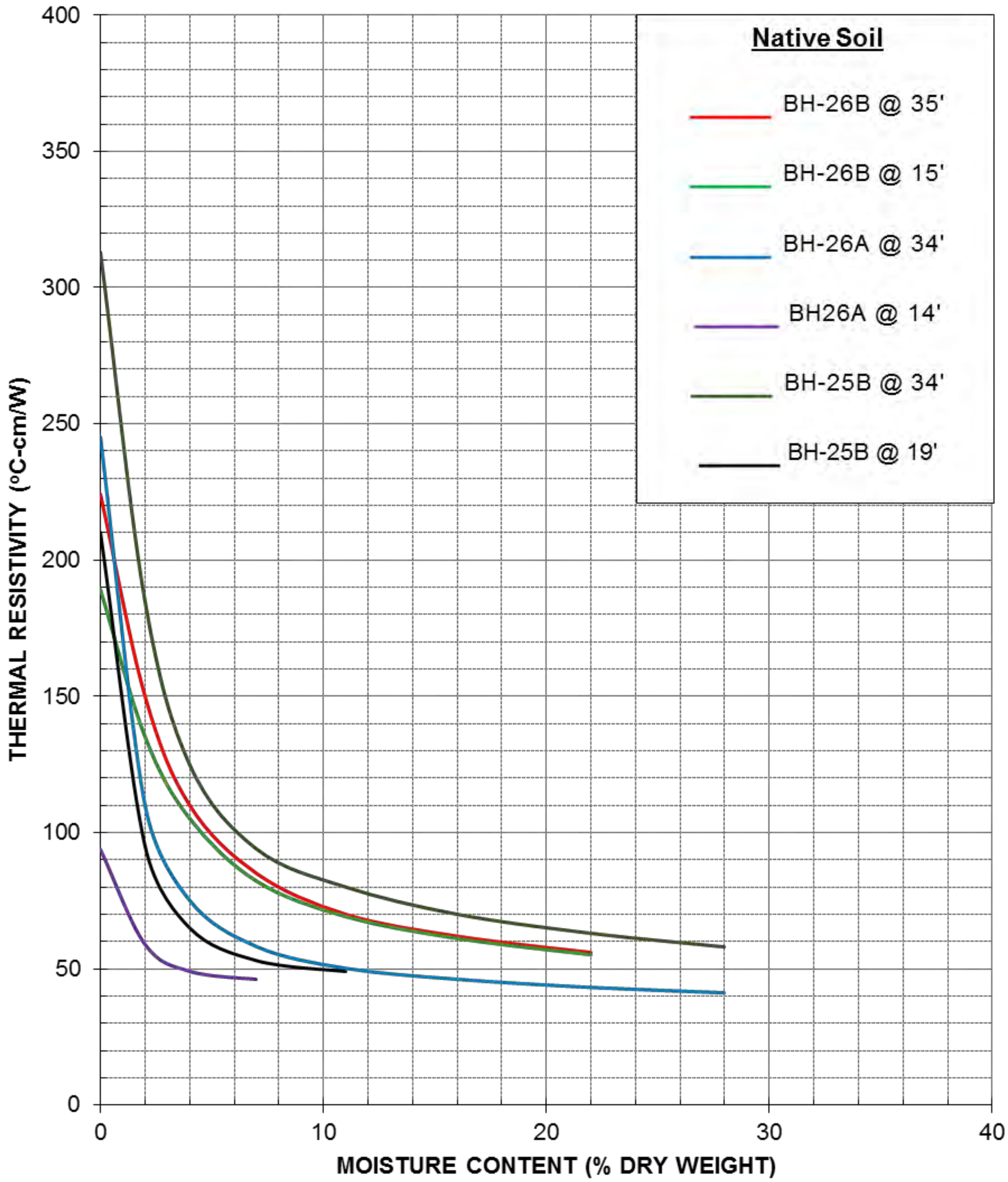
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 2**

THERMAL DRYOUT CURVES



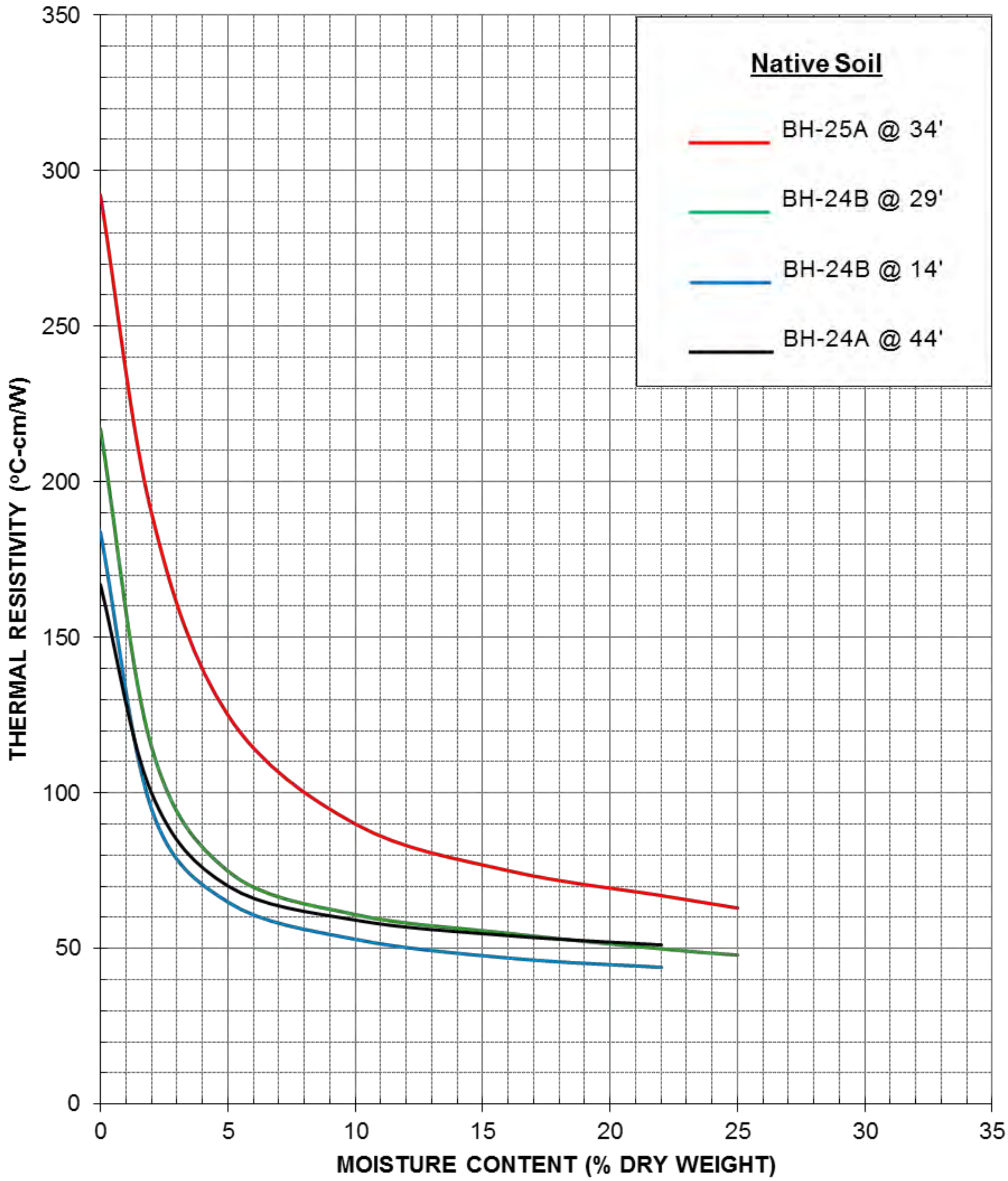
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 3**

THERMAL DRYOUT CURVES



Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 4**

4370 Contractors Common
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info@geothermusa.com

October 24, 2016

Quanta Subsurface
4308 N. Barker Road
Spokane Valley, WA 99027
Attn: Zach Wright

Re: Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation - New Hampshire (Project No. 201-16-NH)

The following is the report of thermal dryout characterization tests conducted on twenty-four (24) undisturbed tube samples of native soil received at our laboratory.

Thermal Resistivity Tests: For thermal dryout characterization the samples were tested 'as-received'. A series of thermal resistivity measurements were made in stages with moisture content ranging from the 'as-received' to the totally dry condition. The tests were conducted in accordance with the IEEE standard 442. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 5.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-23B @ 19'	SM	49	180	12	112
BH-23B @ 4'	SM	54	167	8	115
BH-23A @ 10'	SM	46	141	12	124
BH-22C @ 45'	GM	37	115	17	117
BH-22C @ 20'	SC	45	206	27	96
BH-22B @ 39'	CL	54	169	23	92
BH-22B @ 24'	SM	46	229	21	98

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

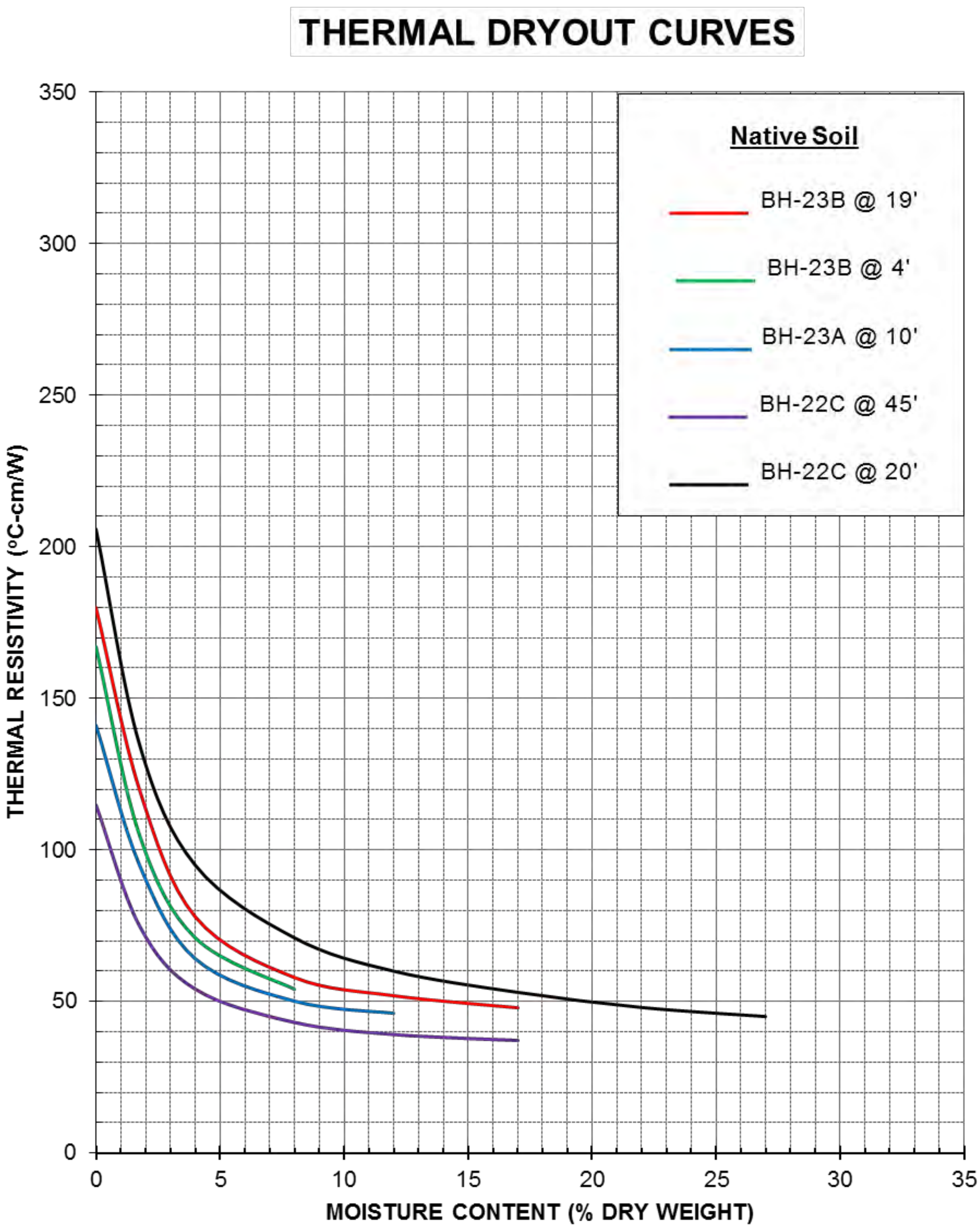
Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft³)
		As-rcvd	Dry		
BH-22A @ 44'	SM	48	152	14	124
BH-22A @ 29'	SC	61	247	20	91
BH-21B @ 39'	SC	55	192	22	107
BH-21B @ 14'	GM	43	128	8	132
BH-21A @ 39'	SP	38	250	23	101
BH-21A @ 24'	SW	45	182	10	129
BH-20B @ 39'	SM	45	168	16	119
BH-20B @ 24'	ML	57	231	20	108
BH-19C @ 40'	SP	39	212	21	110
BH-19C @ 19'	CL	51	129	15	119
BH-19B @ 30'	SM	44	249	23	90
BH-19A @ 15'	SM	41	209	24	100
BH-18B @ 39'	SM	48	191	20	112
BH-18A @ 34.5'	SM/SG	52	184	19	110
BH-18A @ 25.5”	GM	38	113	10	132
BH-17B @ 39’	SW	39	177	15	117
BH-17B @ 24’	SM	42	145	10	133

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel

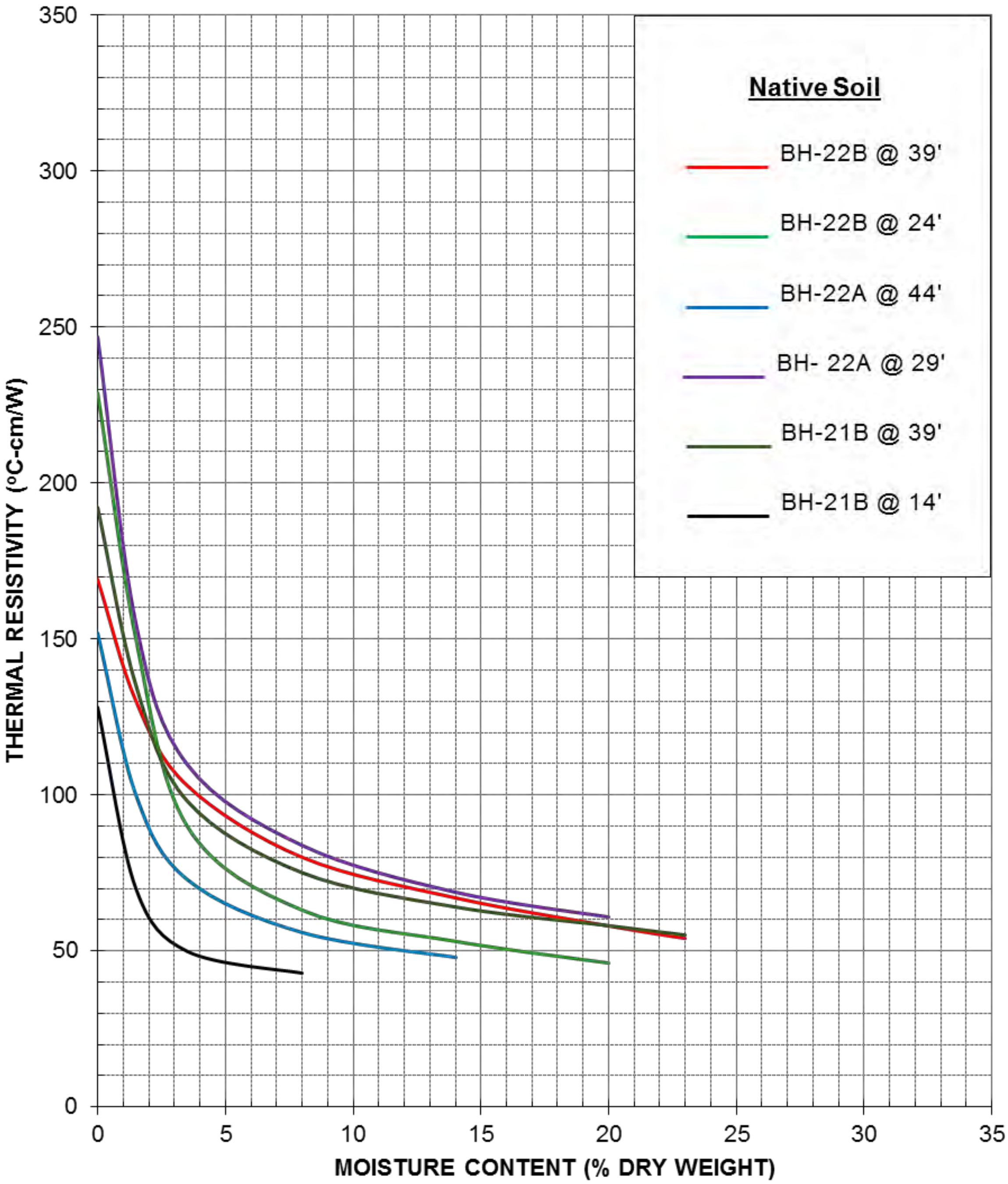


Quanta Subsurface

Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation

October 2016 **Figure 1**

THERMAL DRYOUT CURVES

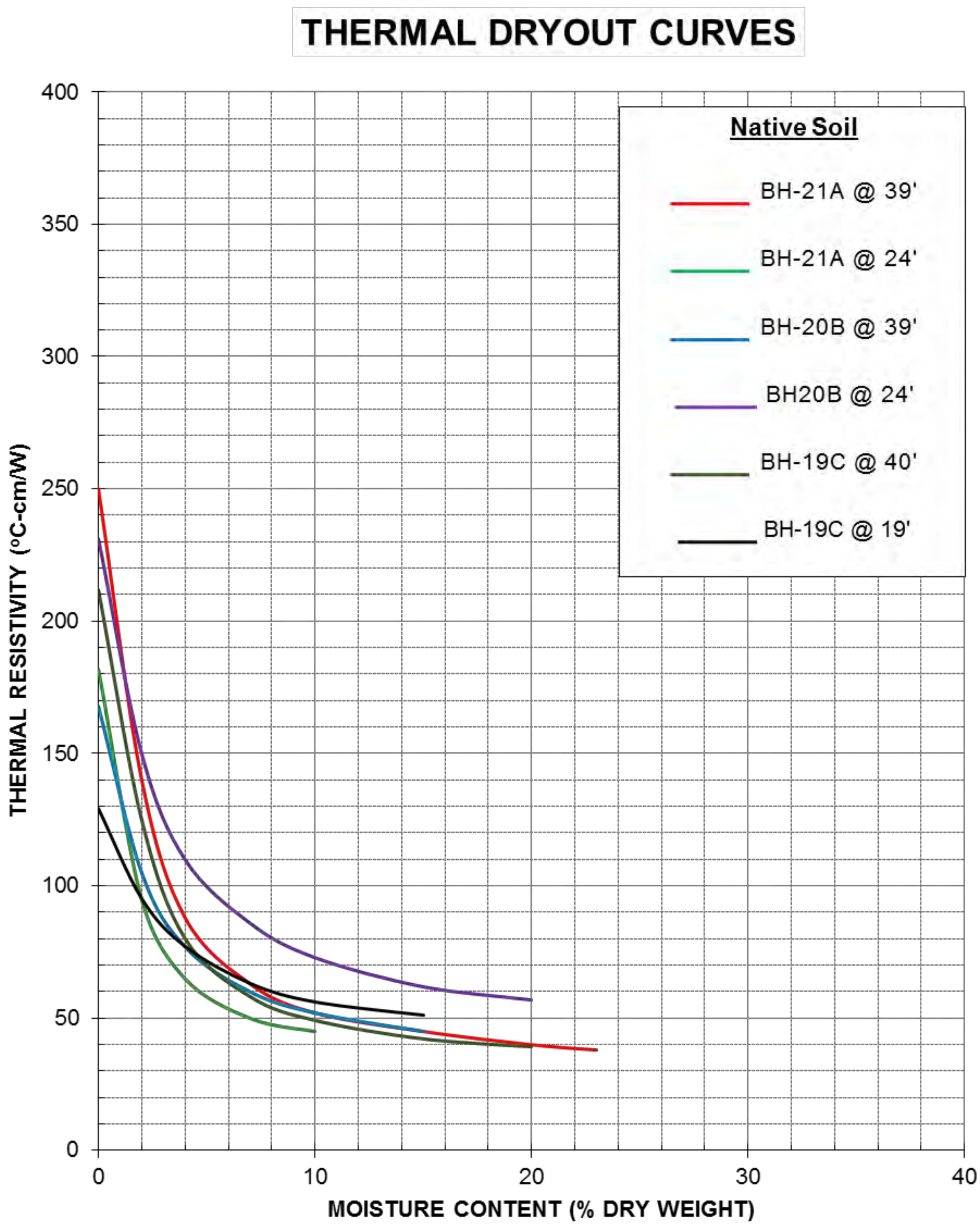


Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 2**



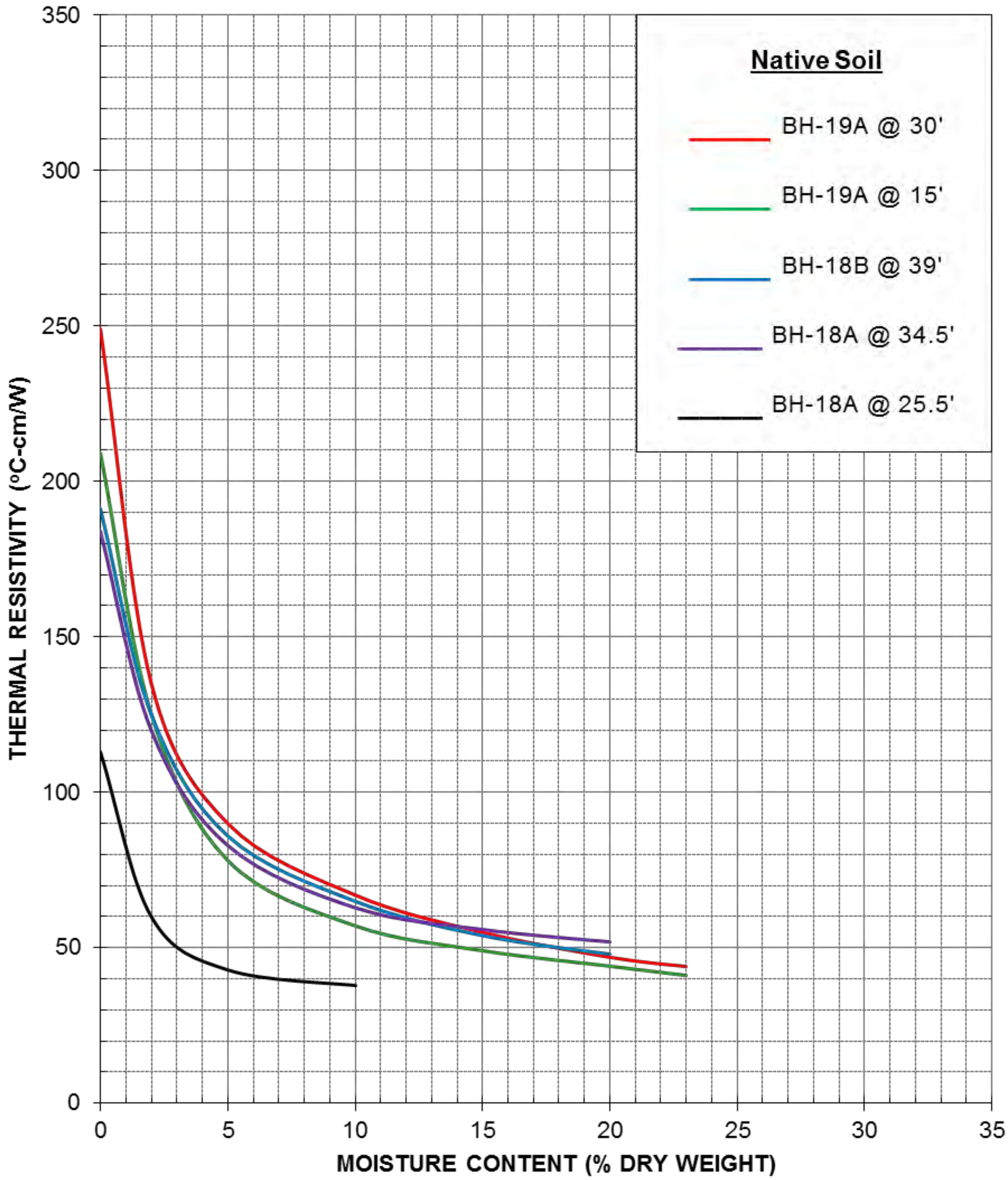
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 3**

THERMAL DRYOUT CURVES



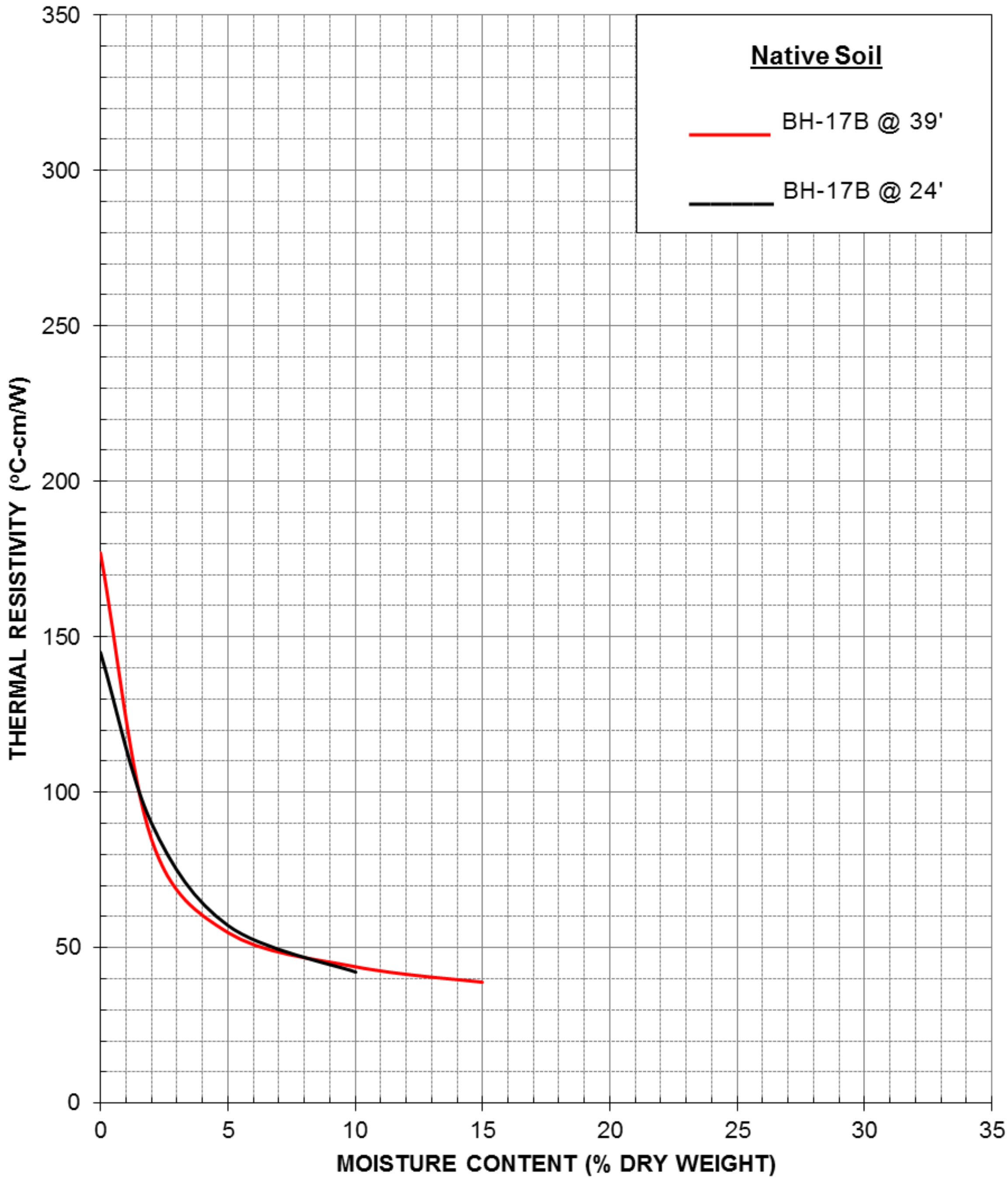
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 4**

THERMAL DRYOUT CURVES



Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 5**

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info@geothermusa.com

October 26, 2016

Quanta Subsurface
4308 N. Barker Road
Spokane Valley, WA 99027
Attn: Zach Wright

Re: Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation - New Hampshire (Project No. 201-16-NH)

The following is the report of thermal dryout characterization tests conducted on twenty-nine (29) undisturbed tube samples of native soil received at our laboratory.

Thermal Resistivity Tests: For thermal dryout characterization the samples were tested 'as-received'. A series of thermal resistivity measurements were made in stages with moisture content ranging from the 'as-received' to the totally dry condition. The tests were conducted in accordance with the IEEE standard 442. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 5.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-46B @ 56' - 56.4'	SM	46	274	19	106
BH-25 @ 9.5' - 11'	SM	48	151	11	121
BH-17A @ 45.5'	BOULDER	52	119	9	132
BH-17A @ 15.5'	SP	65	193	13	123
BH-16B @ 39'	ML	64	270	25	104
BH-16B @ 29'	ML	68	288	24	100
BH-16A @ 40.5'	SC-SM	48	366	25	101
BH-16A @ 15'	CL	78	231	18	109

Geotherm USA

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

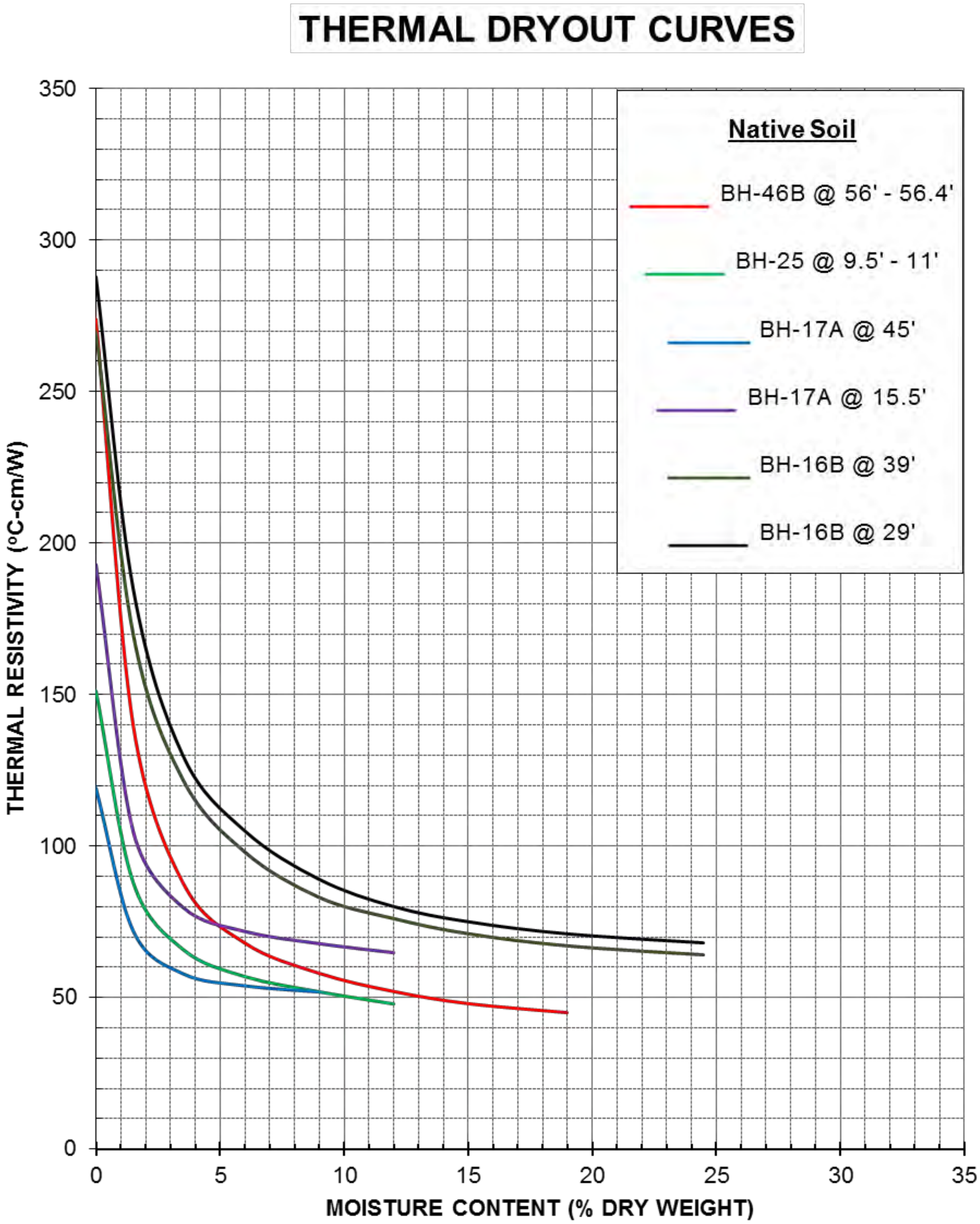
Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-15B @ 34'	SP	56	258	24	104
BH-15B @ 4'	SW	58	377	22	98
BH-15A @ 34'	SW	52	318	26	102
BH-14B @ 24'	SP	50	196	20	109
BH-14B @ 14'	GW	48	115	10	130
BH-14A @ 24'	GW	54	133	8	123
BH-14A @ 19'	SP	58	205	20	108
BH-13B @ 35.5'	SP	40	161	30	114
BH-13B @ 15'	GW	38	149	28	111
BH-13A @ 39.5'	SM	56	325	24	104
BH-13A @ 20'	SM	55	341	27	100
BH-12B @ 35'	ML	61	325	35	96
BH-12B @ 15'	SW	107	386	7	93
BH-12A @ 35'	SP	51	244	23	106
BH-12A @ 20'	ML	56	331	23	102
BH-11B @ 24'	SM	47	157	11	122
BH-11B @ 9'	SC	58	167	15	123
BH-11A @ 29'	ML	59	142	12	117
BH-11A @14'	SM	42	120	8	136
BH-10B @ 10'	SM	46	131	11	133
BH-10A @ 15'	SW	65	212	7	126

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

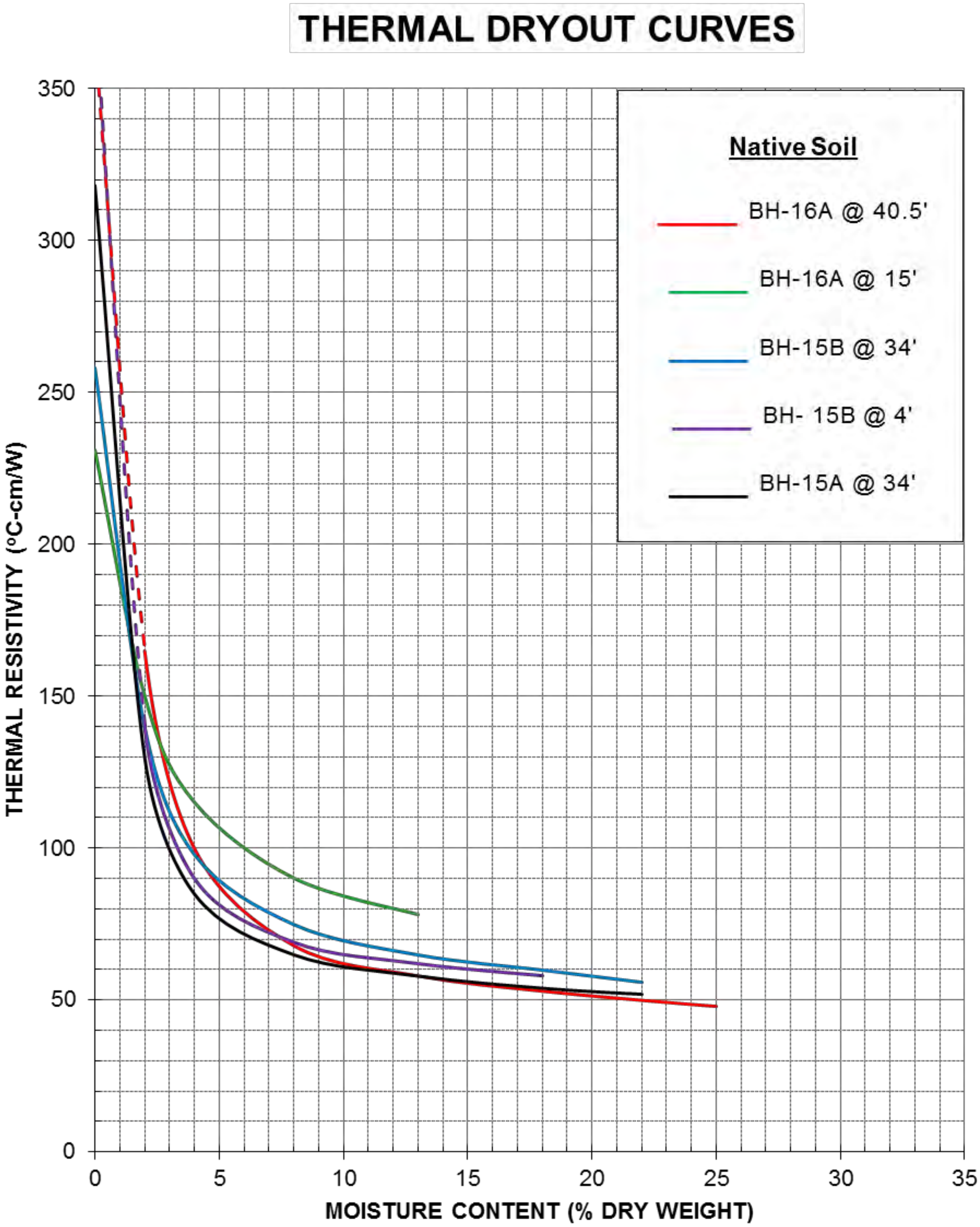
Nimesh Patel



Quanta Subsurface

Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation

October 2016 **Figure 1**



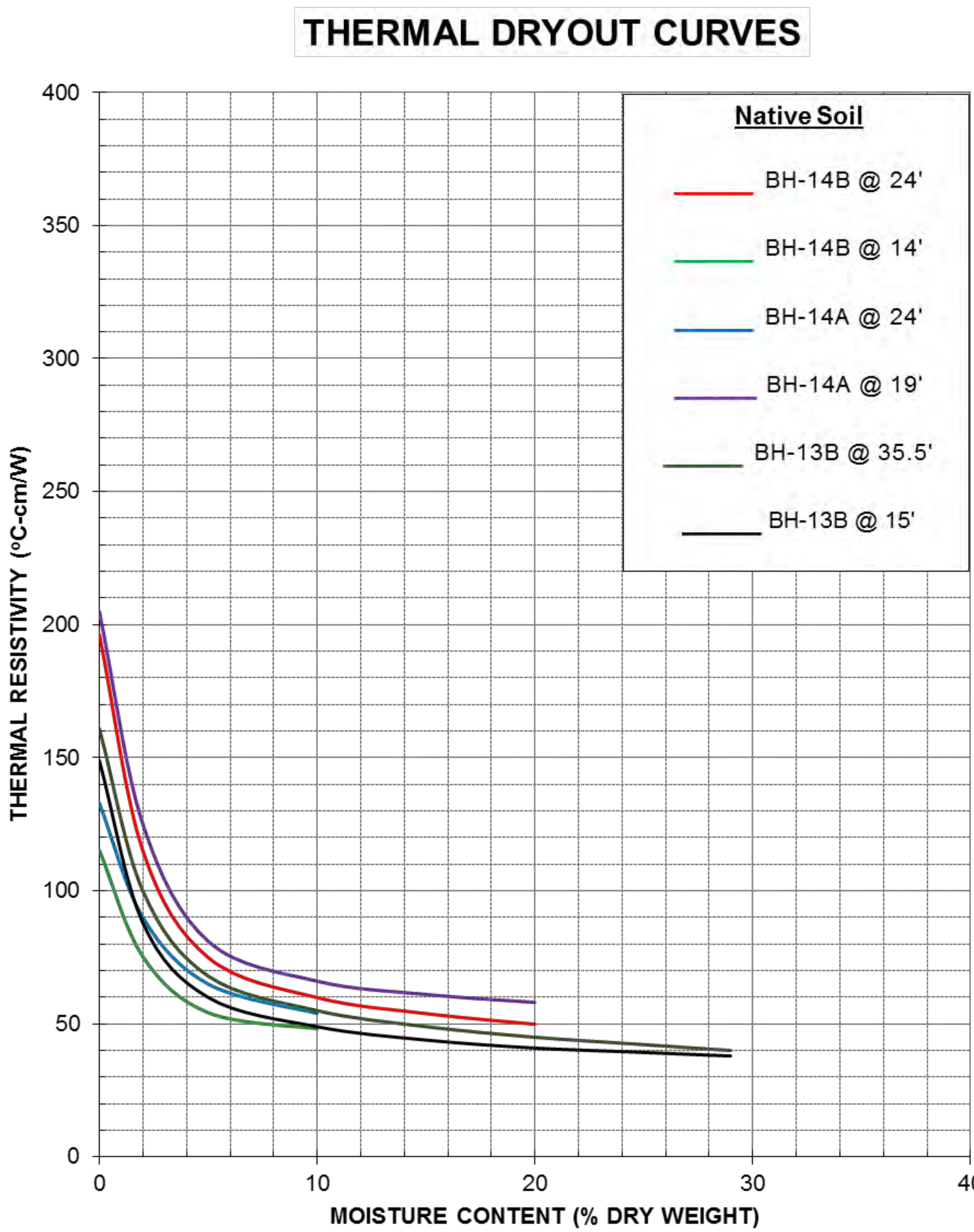
Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 2**

Geotherm USA

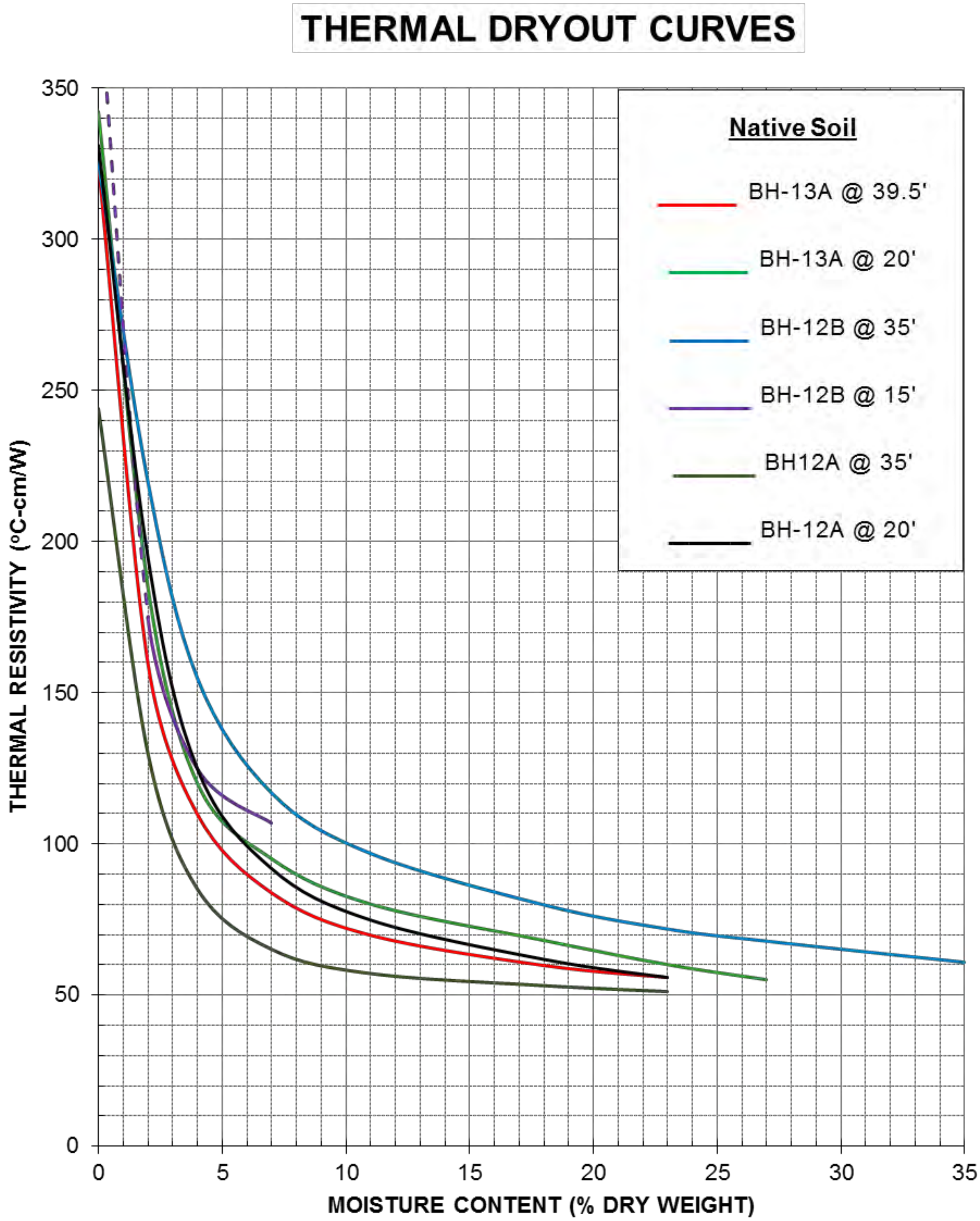


Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 3**



Quanta Subsurface

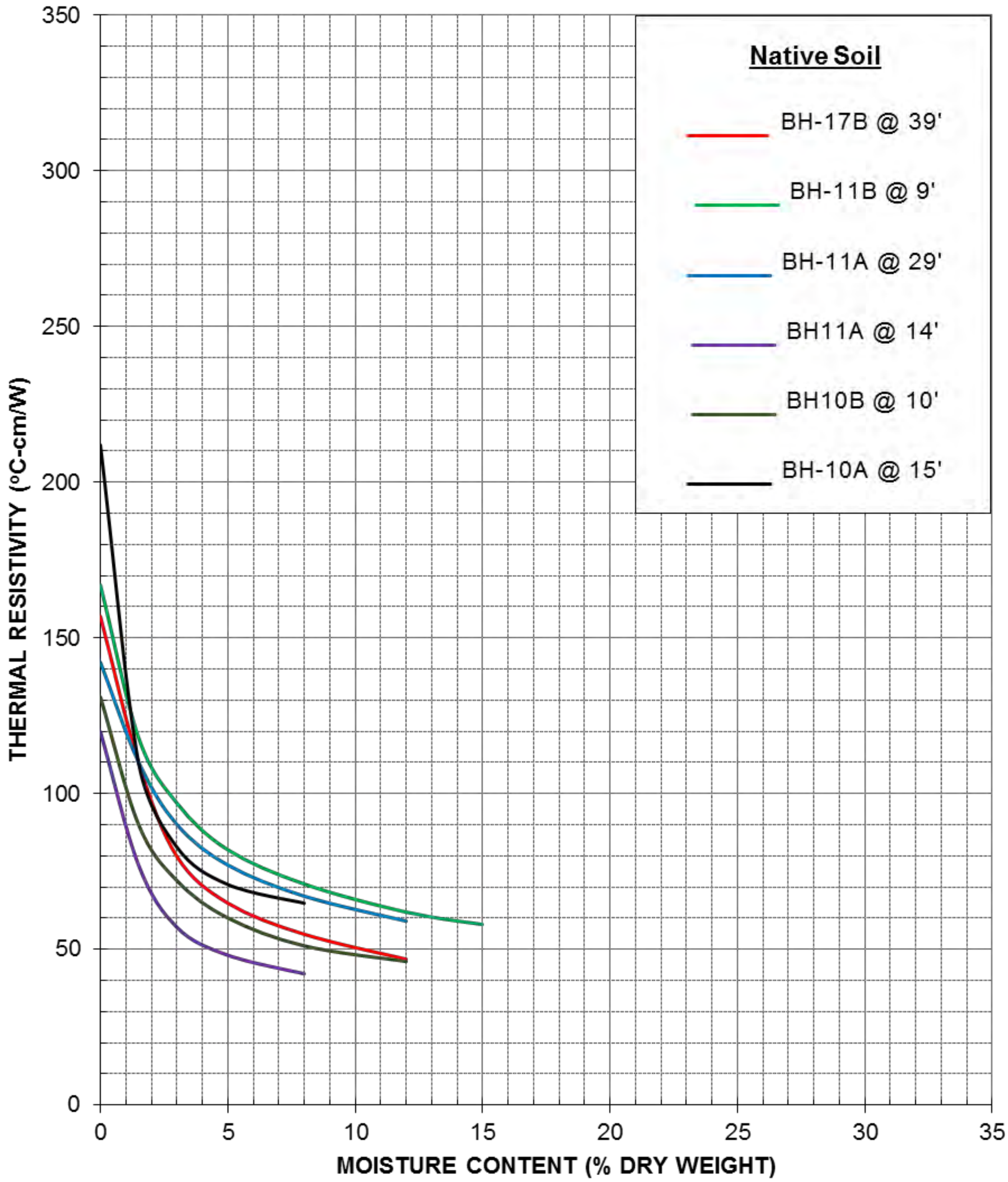
Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 4**

Geotherm USA

THERMAL DRYOUT CURVES



Quanta Subsurface

Thermal Analysis of Native Soil

Northern Pass Trenchless Investigation

October 2016 **Figure 5**

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November 3, 2016

Quanta Subsurface
4308 N. Barker Road
Spokane Valley, WA 99027
Attn: Zach Wright

Re: Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation - New Hampshire (Project No. 201-16-NH)

The following is the report of thermal dryout characterization tests conducted on two (2) undisturbed tube samples of native soil received at our laboratory.

Thermal Resistivity Tests: For thermal dryout characterization the samples were tested 'as-received'. A series of thermal resistivity measurements were made in stages with moisture content ranging from the 'as-received' to the totally dry condition. The tests were conducted in accordance with the IEEE standard 442. The results are tabulated below and the thermal dryout curves are presented in **Figure 1.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-24A @ 14'	SM	68	336	23	101
BH-19B @ 14'	SM	74	274	6	109

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

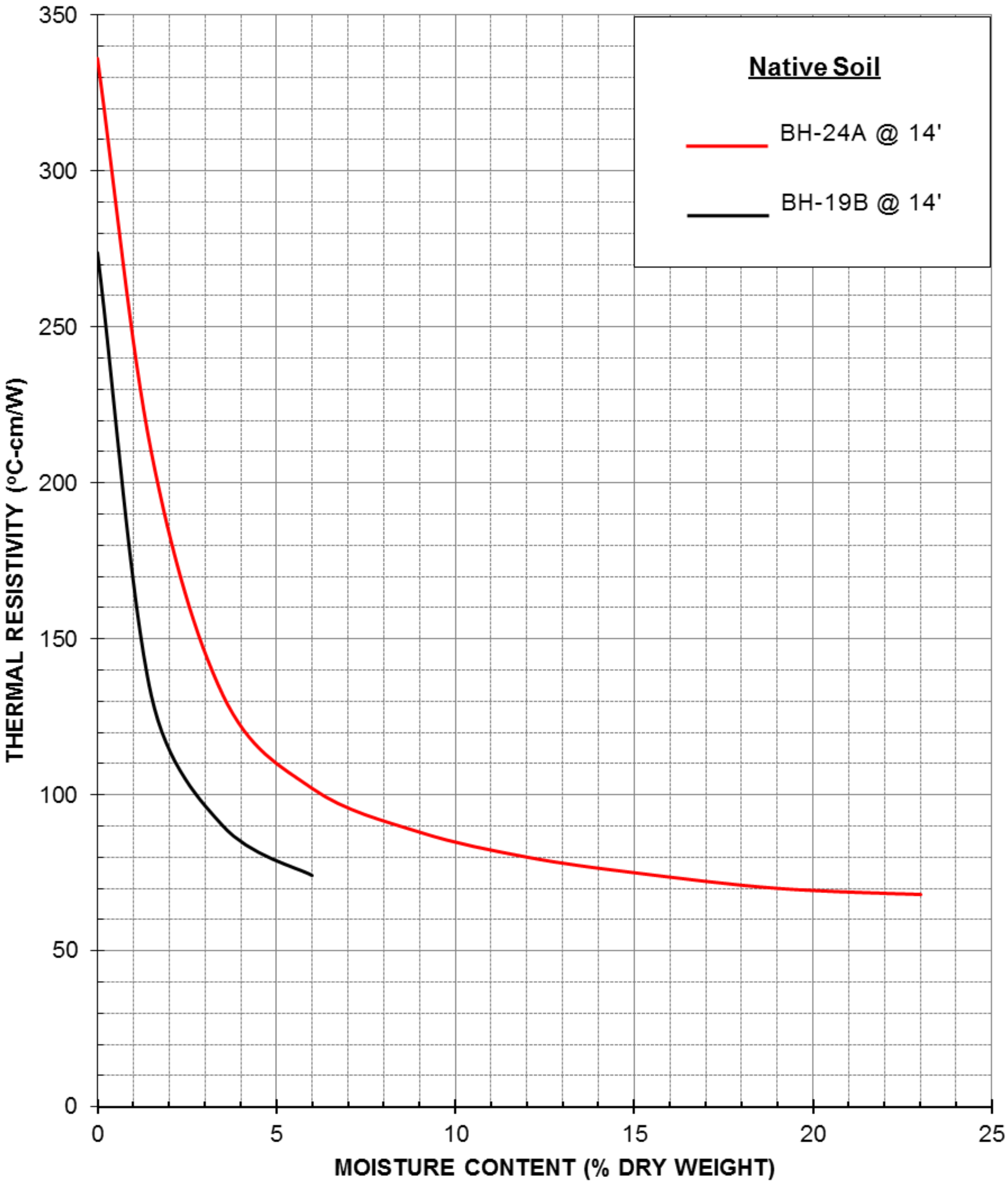
Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

N Patel

Nimesh Patel

THERMAL DRYOUT CURVES



Quanta Subsurface

Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation

November 2016 **Figure 1**

4370 Contractors Common
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info@geothermusa.com

November 9, 2016

Quanta Subsurface
4308 N. Barker Road
Spokane Valley, WA 99027
Attn: Zach Wright

Re: Thermal Analysis of Native Soil & Rock Core Samples
Northern Pass Trenchless Investigation - New Hampshire (Project No. 201-16-NH)

The following is the report of thermal dryout characterization tests conducted on one (1) undisturbed tube sample of native soil and one (1) rock core sample received at our laboratory.

Thermal Resistivity Tests: For thermal dryout characterization the samples were tested 'as-received'. A series of thermal resistivity measurements were made in stages with moisture content ranging from the 'as-received' to the totally dry condition. The tests were conducted in accordance with the IEEE standard 442. The results are tabulated below and the thermal dryout curve for the native soil is presented in **Figure 1.** Due to the low moisture content (surface moisture of less than 1%) for the rock core, it was not possible to draw the thermal dryout graph.

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Description (Quanta)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		As-rcvd	Dry		
BH-23B @ 45' – 45.9'	Rock Core	44	63	<1	173
BH-15A @ 4' – 5.5'	SM	53	270	19	110

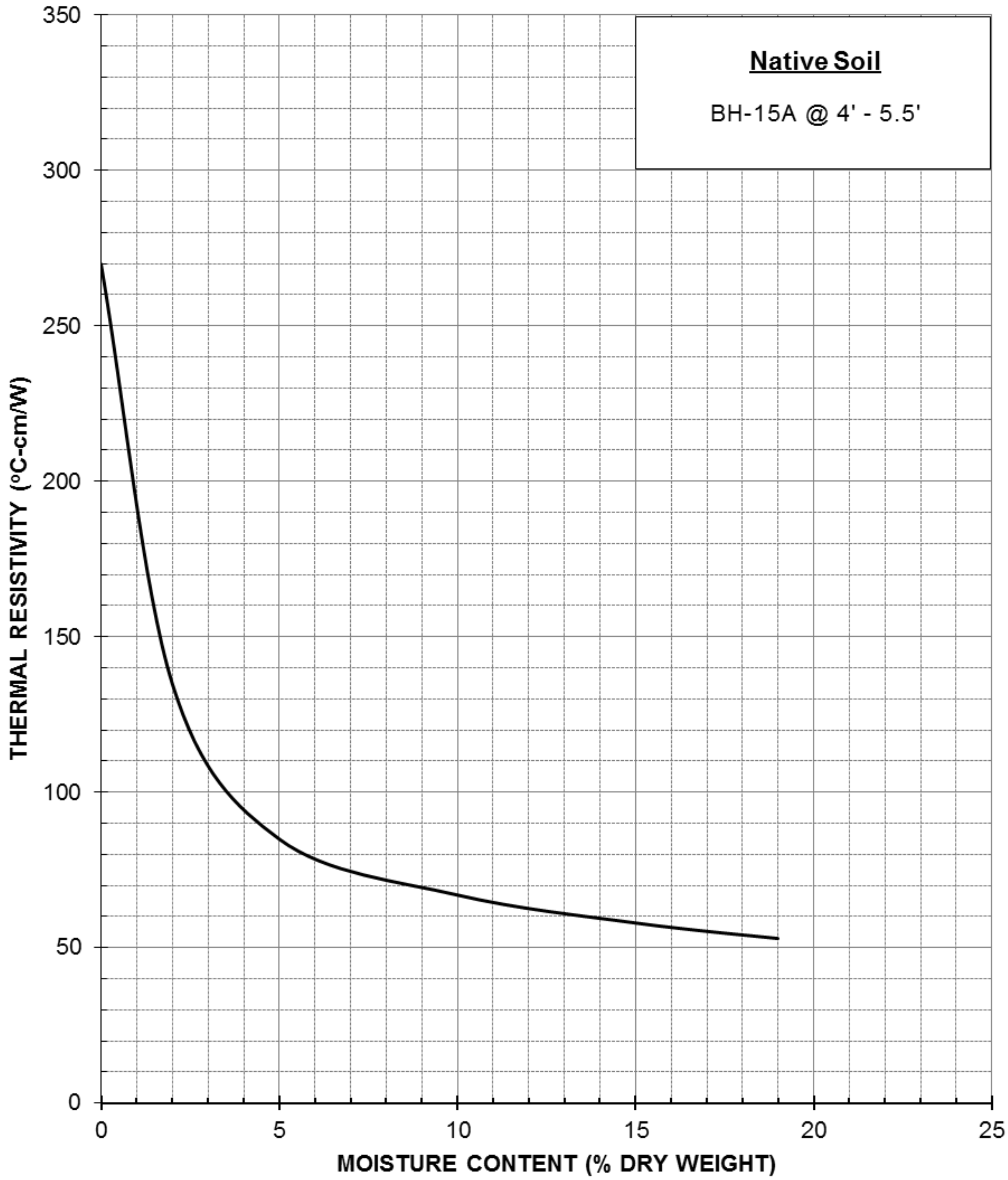
Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel

THERMAL DRYOUT CURVES



Quanta Subsurface

Thermal Analysis of Native Soil
Northern Pass Trenchless Investigation

November 2016 **Figure 1**