TECHNICAL MEMORANDUM

DATE January 14, 2025 **Project No.** 31405712.2139

TO Stephen P. Madden, Geotechnical Engineer
Vermont Agency of Transportation

CC

FROM Karen A. Roth **EMAIL karen.roth@wsp.com**

SUMMARY OF GEOTECHNICAL INVESTIGATION AND SUBSURFACE CONDITIONS
BRIDGE NO. 42, VT ROUTE 30 OVER WINHALL RIVER
JAMAICA, VERMONT
VTRANS JAMAICA ER P23-1(216)

INTRODUCTION

WSP USA Inc. (WSP) is pleased to provide the Vermont Agency of Transportation (VTrans) with this Technical Data Memorandum summarizing our geotechnical investigation for the proposed replacement of Bridge No. 42 carrying Vermont Route 30 over the Winhall River in Jamaica, Vermont. This memorandum presents the results of the subsurface investigation we performed in November 2024, consisting of two geotechnical borings conducted at the proposed bridge abutment locations, and includes the resulting boring logs, rock core evaluations, and laboratory test results on select soil and rock samples.

This memorandum constitutes the completion of our proposed scope of work[1] submitted to VTrans on October 18, 2024 with subsequent work authorization #WA00035 dated October 24, 2024, under our On-Call Geotechnical Services Agreement with VTrans (Contract No. PS0836) dated November 1, 2020.

PROJECT BACKGROUND

The former Bridge No. 42 was constructed in 1930 and widened in 1980, and consisted of a two-span structure with concrete abutments, pier, and deck.[2,3] Based on discussion with VTrans, WSP understands that in the July 2023 flood event, the former bridge was damaged and subsequently fully removed, including the abutments, and riprap slope protection was placed at the site of the former abutments. A temporary off-alignment structure was installed to the north of the former bridge and currently carries VT Rt. 30 traffic over the river. Based on the

[1] WSP USA Inc. Proposal for Geotechnical Borings: Bridge 42, VT Route 30, Jamaica, Vermont, VTrans Jamaica ER P23-1(216). Proposal No. 2024US312139, dated October 18, 2024.

[2] State of Vermont Department of Highways. Record Plans: Proposed Improvement Bridge Project, Town of Jamaica, County of Windham, Route No. Vt. Rte. 30, Bridge No. 42. Contract dated June 25, 1979; construction accepted September 10, 1980.

[3] VTrans. Bridge 42 Inspection Report. Inspection date August 24, 2023.

preliminary plans[4] provided by VTrans, we understand that VTrans proposes to construct a replacement Bridge 42 on-alignment at the site of the former bridge.

GEOLOGIC SETTING

Regional Surficial Geology

The surficial geology of the bridge site is mapped as a glaciofluvial outwash deposit consisting of horizontally-bedded gravel. The outwash may be overlain in some areas by a thin veneer of postglacial alluvium. Regional mapping indicates that the outwash is underlain by glacial till mantling the bedrock.[5]

Regional Bedrock Geology

The bedrock beneath the bridge site is mapped as Middle and Early Mesoproterozoic (i.e., Precambrian) rocks of the Washington Gneiss and Wilcox Formation, previously mapped as the Mount Holly Complex. The lithology is described as dark- to light-gray, heterogeneous, well-layered, biotite-quartz-plagioclase gneiss, containing variable amounts of magnetite, hornblende, and garnet, with little potassium feldspar. The parent, premetamorphic lithologies (i.e., protoliths) may have been volcaniclastic and clastic sediments.[6]

SUBSURFACE INVESTIGATION

WSP subcontracted Seaboard Drilling, LLC (Seaboard) of Somersworth, NH to perform the two (2) borings shown in Figure 1. The borings, designated as B425 and B545, were completed between November 19, 2024 and November 21, 2024. Seaboard completed the borings using a Mobile B-53 truck-mounted drill rig and drive-and-wash drilling methods with 4-inch inside diameter (I.D.) casing.

Standard penetration testing (SPT) was performed at 5-foot intervals using a calibrated automatic hammer system and a standard 2-inch split spoon sampler in general accordance with ASTM D1586. For each SPT location, the split spoon sampler was driven 24 inches with a 140-pound automatic hammer dropped 30 inches, and WSP recorded the number of hammer blows required to advance the sampler through each 6-inch increment. Measured, uncorrected N-values, calculated as the sum of the hammer blows to advance the sampler during the 6-inch to 18-inch interval, are provided in the boring logs in Appendix A. The hammer correction factor of 1.55 shown on the boring logs was obtained from the hammer calibration report[7] provided by Seaboard. WSP collected and stored soil samples in sealed glass jars for later evaluation and laboratory testing.

Each boring was advanced to the top of bedrock, after which 15 feet of rock core was collected in B425 and 10 feet of rock core was collected in B545 using an NQ-size 1.88-inch I.D. diamond-tipped core barrel. The rock core samples were placed in wooden boxes and transported to the WSP office in Merrimack, NH. Total Core Recovery (TCR), calculated Rock Quality Designation (RQD), and coring rates were recorded for each core run and are provided on the boring logs in Appendix A.

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[4] VTrans. Preliminary Plans: Proposed Improvement Bridge Project, Town of Jamaica, County of Windham, Route No. Vermont Route 30 (Minor Arterial), Bridge No. 42. Dated May 21, 2024.

[5] Stewart, D.P. and MacClintock, P., 1970. Surficial Geologic Map of Vermont. Vermont Geological Survey, 1 plate, scale 1:250,000.

[6] Ratcliffe, N.M., Stanley, R.S., Gale, M.H., Thompson, P.J., and Walsh, G.J., 2011. Bedrock Geologic Map of Vermont, U.S. Geological Survey Scientific Investigations Map 3184, 3 sheets, scale 1:100,000.

[7] Geosciences Testing and Research, Inc. Standard Penetration Test Energy Measurement Calibration, Mobile Truck B-53 Drill Rig - Automatic Hammer (S/N 2127), Chicopee, MA 01013. Dated March 7, 2024.

WSP's field engineer monitored drilling activities, logged the subsurface conditions encountered, and obtained soil samples and rock core for use in visual description and classification and subsequent laboratory testing. Boring logs, including details of the sampling methods used, field data obtained, soil and rock conditions encountered during the investigation, bedrock lithologic conditions, and borehole backfilling details, are provided in Appendix A. An explanation of the boring log symbols and terms used for the soil and rock descriptions precedes the boring logs. A detailed summary of the rock core quality parameters from the recovered rock core is presented in Table 2 and photographs of the rock core are presented in Appendix B. The as-drilled boring locations are shown on Figure 1 and are based on survey files provided to WSP by VTrans.

LABORATORY TESTING PROGRAM

GeoTesting Express (GTX) of Acton, MA performed soil and rock laboratory testing that included index and classification testing of representative SPT soil samples and uniaxial compressive strength testing of representative rock core samples in accordance with applicable American Association of State Highway Transportation Officials (AASHTO) and American Society of Testing and Material (ASTM) testing procedures. The types and quantities of laboratory tests conducted are summarized in Table 1. Table 3 (attached) and Table 4 (attached) provide summaries of the laboratory testing results. Laboratory testing results are also summarized on the boring logs in Appendix A and are provided in full in Appendix C.

Table 1: Laboratory Testing Summary of Soil and Rock

Laboratory Test	Material	Test Standard	No. Tests Completed
Grain Size (Sieve)	Soil	ASTM D6913	11
Moisture Content	Soil	ASTM D2216	11
Unconfined Compressive Strength	Rock	ASTM D7012C	4

SUBSURFACE CONDITIONS

The boring logs in Appendix A provide detailed descriptions of the soil, bedrock, and measured groundwater conditions encountered in the borings. Soils include topsoil, asphalt interpreted as the base pavement of the former bridge approach, fill materials placed during construction of the former bridge, and glacial deposits, including glaciofluvial outwash and glacial till, overlying bedrock. The following descriptions summarize the major stratigraphic units from the existing ground surface to depth.

Topsoil: Topsoil was encountered in both borings; the thickness of the topsoil ranged from 0.5 inch to 1 inch. The topsoil generally consisted of silty fine sand with roots and grass.

Base Pavement of Former Bridge Approach: A layer of gravel with broken asphalt, interpreted as the base pavement of the former bridge approach roadway, was encountered in both borings directly below the topsoil. The thickness ranged from 3 inches to 6 inches. The layer generally consisted of dense, fine to coarse gravel with some sand and trace fines. Laboratory classifications generally described the layer as A-1-a (AASHTO classification) and GP or SW (USCS classification).

Fill: A layer interpreted as granular fill was encountered beneath the base pavement in both borings. The approximate fill thickness ranged from 4 feet to 10 feet. The fill generally consisted of medium dense to very dense, fine to coarse gravel with sand fractions ranging from “some” to “sandy” and little fines. Laboratory classifications generally described the layer as A-1-b (AASHTO classification) and SM or SP-SM (USCS classification). Uncorrected N-values for the fill in these borings ranged from 26 to 96, with an average of 55. The fill layer overlies the glaciofluvial outwash layer, transitioning at a depth of 10 feet bgs in B425 and 5 feet bgs in B545.

Glaciofluvial Outwash: A layer interpreted as glaciofluvial outwash deposits was encountered beneath the fill in both borings. The approximate layer thickness ranged from 13 feet to 16 feet. The glaciofluvial outwash was variable and generally consisted of medium dense to very dense, fine to medium sand with little to some fines and trace to little gravel; or dense, fine to coarse gravel with some sand and little fines; or hard non-plastic silt with sand fractions ranging from “some” to “sandy” and trace gravel. Laboratory classifications generally described the layer as A-2-4, A-1-a, or A-4 (AASHTO classification) and SM or ML (USCS classification). Uncorrected N-values for the glaciofluvial outwash in these borings ranged from 25 to refusal, with an average of 54. The glaciofluvial outwash layer overlies glacial till layer, transitioning at a depth of 23 feet bgs in B425 and 21 feet bgs in B545.

Glacial Till: A layer interpreted as glacial till was encountered beneath the glaciofluvial outwash in both borings. The approximate glacial till thickness ranged from 7 feet to 11 feet. The glacial till generally consisted of very dense fine to coarse sand and gravel with silt fractions ranging from “some” to “silty”. Cobbles and boulders were observed in this layer during drilling. Laboratory classifications generally described the layer as A-4 or A-1-b (AASHTO classification) and GM or SM (USCS classification). SPT sampling within the glacial till encountered refusal for all samples. The glacial till layer overlies bedrock, transitioning at a depth of 29.5 feet bgs in B425 and 32 feet bgs in B545.

Bedrock: The weathered bedrock surface was encountered at 29.5 feet bgs in B425 and 32.0 feet bgs in B545; the competent bedrock surface was encountered at 31.1 ft bgs in B425 and 35.5 ft bgs in B545. 15 feet of rock core was collected in B425 and 10 feet of rock core was collected in B545 in 5-foot runs. The bedrock collected in these borings generally consists of gray, fine- to medium-grained, medium strong to very strong (R3-R5, ISRM classification[8]), fresh to slightly weathered (W1-W2, ISRM classification[8]), biotite-quartz gneiss with Rock Quality Designations (RQD) ranging from 8% to 56% with an average of 33%. The Rock Mass Rating[9] (RMR), a measure of overall rock mass conditions, ranges from 35 to 58 with an average of 46. The RMR is a geo-mechanical classification system for design and construction of rock excavation such as tunnels, mines, slopes, and foundations, using field estimates and laboratory measurements of compressive strength, and field observations of discontinuity spacing, discontinuity condition, groundwater, and discontinuity orientation. A Geological Strength Index[10] (GSI) value of 55 was interpreted for the rock encountered in the borings. The GSI provides a system for estimating the reduction in rock mass strength under different geological conditions, using field observations of rock mass structure and discontinuity condition. Table 2 contains a detailed summary of the data generated from the rock coring and core logging.

[8] Wyllie, D.C. and Mah, C.W., 2004. Rock Slope Engineering: Civil and Mining, 4th ed., Spon Press, London, p. 381-397, Appendix II: Quantitative Description of Discontinuities in Rock Masses (includes International Society of Rock Mechanics [ISRM] procedures).

[9] Bieniawski, Z.T., 1989. Engineering Rock Mass Classifications, John Wiley & Sons, NY.

[10] Marinos, P. and Hoek, E. 2000. GSI: a geologically friendly tool for rock mass strength estimation. ISRM International Symposium, Melbourne, Australia, paper number ISRM-IS-2000-035.

Groundwater: WSP measured groundwater levels in boring B545 during drilling. Measurements were made with temporary steel casing in the ground upon completion of rock coring. The groundwater level was measured at 13.5 feet bgs (elevation 1206.9 feet) in B545, which is consistent with the Winhall River elevation. We note that groundwater levels will vary seasonally from that measured.

CLOSING AND LIMITATIONS

WSP prepared this Technical Memorandum for the exclusive use of VTrans for specific application to the replacement of Bridge No. 42 carrying VT Rt. 30 over the Winhall River in Jamaica, Vermont. We performed the geotechnical site investigation and compiled our subsurface conditions summary in accordance with generally accepted soil engineering practices in this geographical area and under similar time and financial constraints. Our interpretations are based, in part, on information obtained from the referenced subsurface explorations completed at the discrete locations described in the memorandum. Variations in the nature and extent of subsurface conditions between explorations should be expected. WSP makes no other warranty, either express or implied.

The professional services provided by WSP for this project include only the geotechnical aspects of the subsurface conditions at this site. The presence or implications of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this report and have not been investigated or addressed.

WSP appreciates the opportunity to provide our geotechnical services to VTrans for this project. Please contact us if you have any questions.

Sincerely,

WSP USA, Inc.

Karen A. Roth
Senior Consultant, Geotechnical Engineering

Jeffrey D. Lloyd, PE
Assistant Vice President, Geotechnical Engineering

KAR/LMP/JDL

Distribution: Melissa E. Landon, PhD, PE, Lead Consultant, Geotechnical Engineering

Attachments: Table 1: Laboratory Testing Summary of Soil and Rock (in text)
Table 2: Summary of Rock Core Quality
Table 3: Summary of Soil Index and Classification Laboratory Testing Results
Table 4: Summary of Rock Laboratory Testing Results

Figure 1: Boring Location Plan

Appendix A: Boring Logs
Appendix B: Rock Core Photographs
Appendix C: Laboratory Test Results

https://wsponlinenam.sharepoint.com/sites/us-vtrans-jamaica-er/shared documents/06 deliverables/final report 01-14-2025/31405712.2139 vtrans jamaica geotechnical data memorandum.docx

Tables

Table 2: Summary of Rock Core Quality
Bridge 42, VT Route 30
VTrans Jamaica ER P23-1(216)
Jamaica, VT

Test Boring Designation	Core Size	Run						TCR [1]		RQD [2]			Physical Rock Parameters			Lithologic, Rock Mass and Discontinuity Description[5,6]
		No.	Midpoint Depth Below Bedrock Surface	Depth Below Ground Surface (ft)			Length	Length		Length		Designation	Weathering[3]	Estimated Field Strength[3]	Rock Mass Rating [RMR][4]	
	(in)		(ft)	Start	End	Midpoint	(ft)	(ft)	%	(ft)	%					
B425	NQ (1.88)	R1	3.0	30.0	35.0	32.5	5.0	3.9	77%	0.40	8%	Very Poor	Slightly Weathered (W2) to Completely Weathered (W5)	Medium Strong (R3)	35	Medium gray, fine- to medium-grained, medium strong (R3, bottom 3.9 ft), biotite-quartz GNEISS, completely weathered (W5, top 1.1 ft) to slightly weathered (W2, bottom 3.9 ft); discontinuities shallowly to moderately dipping (up to 45°), closely spaced, tight, irregular, very rough to smooth, with fine to medium sand infilling in some fractures, average 8.0 fractures per foot. Biotite and quartz banding and folding observed throughout run. [MOUNT HOLLY COMPLEX].
		R2	8.0	35.0	40.0	37.5	5.0	4.4	88%	1.55	31%	Poor	Slightly Weathered (W2)	Medium Strong (R3)	43	Brownish gray, fine- to medium-grained, medium strong (R3), biotite-quartz GNEISS, slightly weathered (W2); discontinuities shallowly to moderately dipping, very closely spaced, irregular to planar, smooth to rough, with fine sand infilling in fractures, average 5.2 fractures per foot. Biotite and quartz banding and folding observed throughout run. [MOUNT HOLLY COMPLEX].
		R3	13.0	40.0	45.0	42.5	5.0	4.3	86%	0.90	18%	Very Poor	Slightly Weathered (W2)	Strong (R4)	40	Brown (weathered) to gray, fine- to medium-grained, strong (R4), biotite-quartz GNEISS, slightly weathered (W2); discontinuities shallowly to moderately dipping (up to 45°), very closely to closely spaced, planar to irregular, smooth to rough, with fine sand infilling in fractures, average 5.4 fractures per foot. Biotite and quartz banding observed throughout run. [MOUNT HOLLY COMPLEX].
B545	NQ (1.88)	R1	5.7	35.2	40.2	37.7	5.0	4.7	93%	2.80	56%	Fair	Fresh (W1) to Completely Weathered (W5)	Very Strong (R5)	54	White to light and dark gray, fine-grained, very strong (R5), micaceous GNEISS, completely weathered (W5, top 0.3 ft) to fresh (W1); discontinuities shallowly to horizontally dipping, very closely spaced, planar to irregular, smooth to rough, average 3.2 fractures per foot. Alternating white and light or dark gray banding 0.1-0.4 mm thick observed throughout run. Quartz vein 10 mm thick at 39 ft bgs. [MOUNT HOLLY COMPLEX].
		R2	10.7	40.2	45.2	42.7	5.0	5.0	100%	2.60	52%	Fair	Fresh (W1) to Slightly Weathered (W2)	Very Strong (R5)	58	White to light and dark gray, fine-grained, very strong (R5), GNEISS, fresh (W1) to slightly weathered (W2); discontinuities shallowly to steeply dipping, very closely spaced, planar to stepped, smooth to rough, average 4.4 fractures per foot. Mica, biotite, and quartz banding and folding observed throughout run. [MOUNT HOLLY COMPLEX].

Notes:

1. TCR = total core recovery. Total core recovery is the length of core recovered divided by the length of the run.

2. RQD = rock quality designation. RQD is the total length of intact, full diameter core pieces recovered with a length greater than or equal to 4 inches measured along the core axis. The percent RQD is the total length of RQD measured divided by the run length. Note that vertical discontinuities are not included in determination of RQD.

3. Weathering and Estimated Field Strength based on Tables II.4 and II.3 (respectively) in Wyllie and Mah, 2004, Rock Slope Engineering: Civil and Mining, 4th Edition (based on ISRM, 1981).

4. Rock Mass Rating (RMR) System (Bieniawski, 1989) assigns numerical ratings to six parameters, including the strength of the intact rock, the RQD, the discontinuity spacing, groundwater conditions, and orientation of discontinuities. These ratings are summed to provide the RMR value. The rating adjustment for joint orientation was assigned a value of 0; correlation of geologic field mapping data of exposed rock outcrops with the rock core samples and proposed foundation type may allow for a different rating adjustment for joint orientation, and thus a modification to the RMR value shown on this table.

5. Bedrock formation name from: Ratcliffe, N.M., Stanley, R.S., Gale., M.H., Thompson, P.J., and Walsh, G.J., 2011, Bedrock geologic map of Vermont: U.S. Geological Survey Scientific Investigations Map 3184, 3 sheets, scale 1:100,000.

6. ft = feet, in = inches

Prepared by: LMP
Checked by: KAR
Reviewed by: JDL

Table 3: Summary of Soil Index and Classification Laboratory Testing Results
Bridge 42, VT Route 30
VTrans Jamaica ER P23-1(216)
Jamaica, VT

Test Boring Designation[1]	Ground Surface Elevation (feet)[2]	Sample Number[3]	Sample Depth Below Ground Surface (feet)	Approximate Sample Elevation (feet)[2]	Laboratory Testing [3,4,5]		Soil Classification	
					Sieve Minus No. 200[4] (%)	Moisture Content[5] (%)	AASHTO[6,7]	USCS[6,7]
B425	1213.5	S1B	0.3 - 2.0	1213.3 - 1211.5	15.8	5.6	A-1-b	SM
		S2	5.0 - 7.0	1208.5 - 1206.5	17.8	5.7	A-1-b	SM
		S4	15.0 - 17.0	1198.5 - 1196.5	64.4	17.2	A-4	ML
		S5	20.0 - 22.0	1193.5 - 1191.5	65.2	22.1	A-4	ML
		S6	25.0 - 25.4	1188.5 1188.2	37.7	13.2	A-4	GM
B545	1220.4	S1A	0.1 - 0.6	1220.3 - 1219.8	3.9	2.1	A-1-a	SW
		S1B	0.6 - 2.0	1219.8 - 1218.4	10.7	2.6	A-1-b	SP-SM
		S2	5.0 - 7.0	1215.4 - 1213.4	13.3	9.2	A-1-a	SM
		S3	10.0 - 12.0	1210.4 - 1208.4	51.2	17.8	A-4	ML
		S4	15.0 - 15.8	1205.4 - 1204.5	38.4	13.7	A-4	SM
		S7	25.0 - 25.3	1195.4 - 1195.0	36.7	13.1	A-4	SM

Notes:

1. Boring locations are illustrated in Figure 1: Boring Location Plan of the Geotechnical Data Memorandum.
2. The as-drilled boring elevations are derived from electronic file "x24b002sv.dgn" provided to WSP by VTrans on December 18, 2024.
3. Laboratory testing was performed by Geotesting Express of Acton, MA.
4. Particle size testing was performed in accordance with ASTM D6913, Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
5. Moisture content testing was performed in accordance with ASTM D2216, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
6. AASHTO and USCS symbols were assigned based on interpreted laboratory test results provided by Geotesting Express on December 13, 2024.
7. Complete laboratory test results for soil testing are provided in Appendix C.

Prepared By: LMP
Checked By: KAR
Reviewed By: JDL

Table 4: Summary of Rock Laboratory Testing Results
Bridge 42, VT Route 30
VTrans Jamaica ER P23-1(216)
Jamaica, VT

Test Boring Designation[1]	Ground Surface Elevation[2] (ft)	Top of Bedrock Depth[3] (ft)	Top of Bedrock Elevation (ft)	Sample Number[4] (-)	Sample Depth Below Top of Bedrock (ft)	Sample Depth Below Ground Surface (ft)	Sample Elevation (ft)	Unconfined Compressive Strength[5] (psi)	Bulk Density[6] (pcf)
B425	1213.5	29.5	1184.0	Run 2	7.2 - 7.6	36.7 - 37.1	1176.8 - 1176.5	6,844	168
B425	1213.5	29.5	1184.0	Run 3	14.1 - 14.5	43.6 - 44.0	1169.9 - 1169.5	10,660	169
B545	1220.4	32.0	1188.4	Run 1	6.5 - 6.9	38.5 - 38.9	1181.8 - 1181.5	15,924	166
B545	1220.4	32.0	1188.4	Run 2	12.2 - 12.6	44.2 - 44.6	1176.1 - 1175.8	20,093	167

Notes:

1. Boring locations are illustrated in Figure 1: Boring Location Plan of the Geotechnical Data Memorandum.
2. The as-drilled boring elevations are derived from electronic file "x24b002sv.dgn" provided to WSP by VTrans on December 18, 2024.
3. Top of bedrock surface refers to the interpreted top of weathered bedrock based on roller cone resistance or material observed in wash cuttings. Notes regarding weathered rock are provided in Appendix A.
4. Laboratory testing was performed by Geotesting Express (GTX) of Acton, MA.
5. Testing was performed based on ASTM D7012 Method C - Standard Test Methods for Uniaxial Compressive Strength of Intact Rock Core Specimens.
7. Density determined by GTX on core samples by measuring dimensions and weight and then calculating.
8. Complete laboratory test results for rock core testing are provided in Appendix C.
9. ft = feet; psi = pounds per square inch; pcf = pounds per cubic foot

Prepared By: LMP
Checked By: KAR
Reviewed By: JDL

Figure

LEGEND

- 1210 — EXISTING CONTOUR (1FT INTERVALS)
- O/H — OVERHEAD UTILITY LINE
- EDGE OF WATER
- B-525 — BORING LOCATION

NOTES AND REFERENCES

1. THE AS-DRILLED BORING LOCATIONS SHOWN IN THIS FIGURE ARE DERIVED FROM ELECTRONIC FILE "x24b002sv.dgn" PROVIDED TO WSP BY VTRANS ON DECEMBER 18, 2024.
2. THE AS-DRILLED BORING ELEVATIONS ARE DERIVED FROM ELECTRONIC FILE "x24b002sv.dgn" PROVIDED TO WSP BY VTRANS ON DECEMBER 18, 2024.
3. THE BORINGS SHOWN IN THIS FIGURE WERE PERFORMED BY SEABOARD DRILLING LLC BETWEEN NOVEMBER 19, 2024 AND NOVEMBER 21, 2024.
4. SEE BORING LOGS FOR DETAILED LITHOLOGICAL DESCRIPTIONS.
5. BASEMAP IS TAKEN FROM ELECTRONIC FILE "x24b002sv.dgn" PROVIDED TO WSP BY VTRANS ON DECEMBER 4, 2024.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2024-12-18		KAR	RG	JDL	JDL

CLIENT
VERMONT AGENCY OF TRANSPORTATION
2178 AIRPORT ROAD, DILL BUILDING UNIT B
BERLIN, VT 05641

CONSULTANT
wsp
MERRIMACK
10 AL PAUL LANE, SUITE 103
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PROJECT
JAMAICA ER P23-1(216)
BRIDGE NO. 42, VT ROUTE 30 OVER WINHALL RIVER
JAMAICA, VERMONT

TITLE
BORING LOCATION PLAN

PROJECT NO.	CONTROL	REV.	of	FIGURE
31405712.2139	0001-001	0		1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

0 1in

APPENDIX A

Boring Logs

Table A-1

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS (more than half of material is larger than No. 200 sieve size)	GRAVELS (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.
		GRAVEL WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SANDS (little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly-graded sands, gravelly sand, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (more than half of material is smaller than No. 200 sieve size)	SILTS AND CLAYS (liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Desired Soil Observations: (in this order)

Color (Munsell color chart)
Moisture (dry, damp, moist, wet, saturated)
Density/Consistency (from above right hand side)
Name (sand, silty sand, clay, etc., including portions - trace, little, etc.)
Gradation (well-graded, poorly-graded, uniform, etc.)
Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastic)
Structure (layering, fractures, cracks, etc.)
Bonding (well, moderately, loosely, etc., if applicable)
Cementation (weak, moderate, or strong, if applicable, ASTM D 2488)
Geologic Origin (till, marine clay, alluvium, etc.)
Unified Soil Classification Designation
Groundwater level

TERMS DESCRIBING DENSITY/CONSISTENCY

Coarse-grained soils (more than half of material is larger than No. 200 sieve): Includes (1) clean gravels; (2) silty or clayey gravels; and (3) silty, clayey or gravelly sands. Consistency is rated according to standard penetration resistance.

Modified Burmister System

Descriptive Term	Portion of Total
trace	0% - 10%
little	11% - 20%
some	21% - 35%
adjective (e.g. sandy, clayey)	36% - 50%

Density of Cohesionless Soils	Standard Penetration Resistance N-Value (blows per foot)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

Fine-grained soils (more than half of material is smaller than No. 200 sieve): Includes (1) inorganic and organic silts and clays; (2) gravelly, sandy or silty clays; and (3) clayey silts. Consistency is rated according to shear strength as indicated.

Consistency of Cohesive soils	SPT N-Value blows per foot	Approximate Undrained Shear Strength (psf)	Field Guidelines
Very Soft	WOH, WOR, WOP, <2	0 - 250	Fist easily Penetrates
Soft	2 - 4	250 - 500	Thumb easily penetrates
Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort
Stiff	9 - 15	1000 - 2000	Indented by thumb with great effort
Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail
Hard	>30	over 4000	Indented by thumbnail with difficulty

Rock Quality Designation (RQD):

$$RQD = \frac{\text{sum of the lengths of intact pieces of core* > 100 mm}}{\text{length of core advance}}$$

*Minimum NQ rock core (1.88 in. OD of core)

Correlation of RQD to Rock Mass Quality

Rock Mass Quality	RQD
Very Poor	<25%
Poor	26% - 50%
Fair	51% - 75%
Good	76% - 90%
Excellent	91% - 100%

Desired Rock Observations: (in this order)

Color (Geological Society of America Rock Color Chart)
Texture (aphanitic, fine-grained, etc.)
Strength (ISRM Classification per Table A-2)
Lithology (igneous, sedimentary, metamorphic, etc.)
Hardness (very hard, hard, mod. hard, etc.)
Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.)
Geologic discontinuities/jointing:
-dip (horiz - 0-5, low angle - 5-35, mod. dipping - 35-55, steep - 55-85, vertical - 85-90)
-spacing (very close - <5 cm, close - 5-30 cm, mod. close 30-100 cm, wide - 1-3 m, very wide >3 m)
-tightness (tight, open or healed)
-infilling (grain size, color, etc.)
Formation (Waterville, Ellsworth, Cape Elizabeth, etc.)
RQD and correlation to rock mass quality (very poor, poor, etc.)
ref: AASHTO Standard Specification for Highway Bridges 17th Ed. Table 4.4.8.1.2A
Recovery

Sample Container Labeling Requirements:

Project Name / Town
Boring Number
Sample Number
Sample Depth
Blow Counts
Sample Recovery
Date
Personnel Initials

wsp

Key to Soil and Rock Descriptions
Including Boring Log Terms and Field Identification Information

May 2023

Table A-2

Classification of Rock Material Strengths[1]

Grade	Description	Field Identification	Approx. Range of Uniaxial Compressive Strength	
			MPa	psi
S1	Very soft clay	Easily penetrated several inches by fist	<0.025	<4
S2	Soft clay	Easily penetrated several inches by thumb	0.025-0.05	4-7
S3	Firm clay	Can be penetrated several inches by thumb with moderate effort	0.05-0.10	7-15
S4	Stiff clay	Readily indented by thumb but penetrated only with great effort	0.10-0.25	15-35
S5	Very stiff clay	Readily indented by thumbnail	0.25-0.50	35-70
S6	Hard clay	Indented with difficulty by thumbnail	>0.50	>70
R0	Extremely weak rock	Indented by thumbnail	0.25-1.0	35-150
R1	Very weak rock	Crumbles under firm blows with point of geological hammer; can be peeled by a pocket knife	1-5	150-725
R2	Weak rock	Can be peeled by a pocket knife with difficulty; shallow indentations made by firm blow with point of geological hammer	5-25	725-3,500
R3	Medium strong rock	Cannot be scraped or peeled with a pocket knife; specimen can be fractured with single firm blow of geological hammer	25-50	3,500-7,000
R4	Strong rock	Specimen requires more than one blow of geological hammer to fracture it	50-100	7,000-15,000
R5	Very strong rock	Specimen requires many blows of geological hammer to fracture it	100-250	15,000-36,000
R6	Extremely strong rock	Specimen can only be chipped with geological hammer	>250	>36,000

Note: Grades S1 to S6 apply to cohesive soils, for example clays, silty clays, and combinations of silts and clays with sand, generally slow draining. Discontinuity wall strength will generally be characterized by grades R0-R6 (rock) while S1-S6 (clay) will generally apply to filled discontinuities.

[1] International Society for Rock Mechanics (ISRM), Commission on standardization of laboratory and field tests (1978): Suggested methods for the quantitative description of discontinuities in rock masses. Int. J. Rock Mech. Min. Sci. & Geomech. Abstr., Vol. 15, No. 6, pp. 319-368.

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Jamaica
ER P23-1(216)
Bridge 42, VT Route 30

Boring No.: **B425**
Page No.: 1 of 2
Pin No.: 24b002
Checked By: KAR

Boring Crew: Jeff Nitsch (Seaboard), Lina Maria Pua (WSP)
Date Started: 11/20/24 Date Finished: 11/21/24
VTSPG NAD83: N 235473.24 ft E 1544623.36 ft
Station: 513+98.4 Offset: 0.17 ft R
Ground Elevation: 1213.54 ft

	Casing	Sampler
Type:	WASH BORE	SS
I.D.:	4 in	1.5 in
Hammer Wt:	300 lb.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto	
Rig:	Mobile B-53	C_F = 1.55

Groundwater Observations

Date	Depth (ft)	Notes

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate minutes/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		0.0 ft - 0.04 ft, Field Description: A-4, SM, Brown, wet, silty SAND, with roots, [TOPSOIL]				4-10-16-17 (26)	5.6	55.0	29.0	16.0
		0.04 ft - 0.25 ft, Field Description: A-1-a, GP, Black, moist, GRAVEL, with asphalt, [BASE PAVEMENT PREVIOUS BRIDGE]								
		0.25 ft - 2.0 ft, Lab Classification: A-1-b, SM, Brown, moist, medium dense, fine GRAVEL, some fine to coarse sand, little silt, poorly graded, Rec. = 0.96 ft, [FILL]								
5		5.0 ft - 7.0 ft, Lab Classification: A-1-b, SM, Yellowish brown, moist, very dense, fine to coarse GRAVEL, some fine to coarse sand, little fines, poorly graded, Rec. = 1.08 ft, [FILL]				42-41-55-54 (96)	5.7	50.0	32.0	18.0
10		10.0 ft - 12.0 ft, Field Description: A-2-4, SM, Brown, moist, medium dense, fine to medium SAND, little fines, trace angular quartz gravel, poorly graded, Rec. = 0.04 ft, [GLACIOFLUVIAL OUTWASH]				16-12-13-14 (25)				
15		15.0 ft - 17.0 ft, Lab Classification: A-4, ML, Light brown to yellow, wet, hard, SILT, some fine sand, trace fine gravel, laminated structure of fine sand and sandy silt, non-plastic, Rec. = 1.46 ft, [GLACIOFLUVIAL OUTWASH]				18-27-35-42 (62)	17.2	1.0	35.0	64.0
20		20.0 ft - 22.0 ft, Lab Classification: A-4, ML, Light brown to yellow with gray bands, moist, hard, SILT, some fine sand, laminated structure of fine sand and sandy silt, non-plastic, Rec. = 1.5 ft, [GLACIOFLUVIAL OUTWASH]				26-37-44-42 (81)	22.1		35.0	65.0
		23.5 ft - 24.5 ft, Driller noted boulder								
25		25.0 ft - 25.38 ft, Lab Classification: A-4, GM, Light brown to yellow, wet, very dense, silty fine to coarse GRAVEL (partially weathered rock fragments), little fine to coarse sand, poorly graded, Rec. = 0.33 ft, [GLACIAL TILL]				100/4.5" (R)	13.2	44.0	18.0	38.0
		25.38 ft - 28.0 ft, Driller noted cobble zone when washing from 25 to 28 feet bgs.								
		29.5 ft - 30.0 ft, Driller noted increase in roller bit resistance, interpreted								

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG VTRANS JAMAICA 01.13.2025.GPJ VERMONT AOT.GDT 1/13/25

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Jamaica
ER P23-1(216)
Bridge 42, VT Route 30

Boring No.: **B425**
Page No.: 2 of 2
Pin No.: 24b002
Checked By: KAR

Boring Crew: Jeff Nitsch (Seaboard), Lina Maria Pua (WSP)
Date Started: 11/20/24 Date Finished: 11/21/24
VTSPG NAD83: N 235473.24 ft E 1544623.36 ft
Station: 513+98.4 Offset: 0.17 ft R
Ground Elevation: 1213.54 ft

	Casing	Sampler
Type:	WASH BORE	SS
I.D.:	4 in	1.5 in
Hammer Wt:	300 lb.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto	
Rig:	Mobile B-53	C_F = 1.55

Groundwater Observations

Date	Depth (ft)	Notes

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate minutes/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		as partially weathered rock. [WEATHERED ROCK]	R1	77 (8)	5.27					
		30.0 ft - 35.0 ft, Medium gray, fine- to medium-grained, medium strong (R3, bottom 3.9 ft), biotite-quartz GNEISS, completely weathered (W5, top 1.1 ft) to slightly weathered (W2, bottom 3.9 ft); discontinuities shallowly to moderately dipping (up to 45°). closely spaced, tight, irregular, very rough to smooth, with fine to medium sand infilling in some fractures, average 8.0 fractures per foot. Biotite and quartz banding and folding observed throughout run. [MOUNT HOLLY COMPLEX]. NQ.			3					
					2.33					
					4.3					
					4.25					
35		31.1 ft, No recovery from 30.0 ft bgs to 31.1 ft bgs; interpreted as partially weathered rock washed out during coring.	R2	88 (31)	2.22					
		35.0 ft - 40.0 ft, Brownish gray, fine- to medium-grained, medium strong (R3), biotite-quartz GNEISS, slightly weathered (W2); discontinuities shallowly to moderately dipping, very closely spaced, irregular to planar. smooth to rough, with fine sand infilling in fractures, average 5.2 fractures per foot. Biotite and quartz banding and folding observed throughout run. [MOUNT HOLLY COMPLEX]. NQ. UCS = 6,844 psi.			3.18					
					4.73					
					2.22					
40					3.23					
		40.0 ft - 45.0 ft, Brown (weathered) to gray, fine- to medium-grained, strong (R4), biotite-quartz GNEISS, slightly weathered (W2); discontinuities shallowly to moderately dipping (up to 45°). very closely to closely spaced, planar to irregular, smooth to rough, with fine sand infilling in fractures, average 5.4 fractures per foot. Biotite and quartz banding observed throughout run. [MOUNT HOLLY COMPLEX]. NQ. UCS = 10,660 psi.	R3	86 (18)	2.43					
					2.57					
					2.42					
					2					
45					2.63					
		Hole stopped @ 45.0 ft Boring grouted up to 25 ft bgs and then backfilled with drill cuttings to ground surface.								
50										
55										

Top of Bedrock @ 29.5 ft

Remarks:
1. The as-drilled boring locations and elevations are derived from electronic file "x24b002sv.dgn" provided to WSP by VTrans on December 18, 2024.
2. AASHTO and USCS classifications are based on visual description of sample recovery at depths where laboratory testing not performed.
3. The SPT sample at 0-2 ft bgs was obtained 2.2 feet north of the as-drilled B425 location due to a damaged spoon sampler. No casing was inserted at this offset location.

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

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BORING LOG

Jamaica
ER P23-1(216)
Bridge 42, VT Route 30

Boring No.: **B545**
Page No.: 1 of 2
Pin No.: 24b002
Checked By: KAR

Boring Crew: Jeff Nitsch (Seaboard), Lina Maria Pua (WSP)
Date Started: 11/19/24 Date Finished: 11/20/24
VTSPG NAD83: N 235482.99 ft E 1544453.26 ft
Station: 515+68.6 Offset: 7.39 ft L
Ground Elevation: 1220.37 ft

	Casing	Sampler
Type:	WASH BORE	SS
I.D.:	4 in	1.5 in
Hammer Wt:	300 lb.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto	
Rig:	Mobile B-53	C_F = 1.55

Groundwater Observations

Date	Depth (ft)	Notes
11/20/24	13.5	9:20 AM after core

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate minutes/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		0.0 ft - 0.08 ft, Field Description: A-2-4, SM, Brown, fine SAND, some silt, roots and grass, [TOPSOIL]					2.1	74.0	22.1	3.9
		0.08 ft - 0.58 ft, Lab Classification: A-1-a, SW, Black, dry, dense, fine to coarse GRAVEL, some coarse to medium sand with asphalt, trace fines, well graded, [BASE PAVEMENT PREVIOUS BRIDGE]				37-19-25-15 (44)	2.6	47.0	42.0	11.0
		0.58 ft - 2.0 ft, Lab Classification: A-1-b, SP-SM, Light brown to yellow, dry, dense, sandy fine rounded to subrounded GRAVEL, little fines, poorly graded, Rec. = 1.5 ft, [FILL]								
5		5.0 ft - 7.0 ft, Lab Classification: A-1-a, SM, Light brown to yellow, moist, dense, fine to coarse rounded to angular GRAVEL, some fine to coarse sand, little fines, poorly graded, Rec. = 0.58 ft, [GLACIOFLUVIAL OUTWASH]				17-28-22-13 (50)	9.2	55.0	32.0	13.0
10		10.0 ft - 12.0 ft, Lab Classification: A-4, ML, Light brown to yellow, moist, hard, sandy SILT, trace fine gravel, lenses of fine sand, non-plastic, Rec. = 1.33 ft, [GLACIOFLUVIAL OUTWASH]				21-26-31-34 (57)	17.8	3.0	46.0	51.0
15		15.0 ft - 15.83 ft, Lab Classification: A-4, SM, Light brown to yellow, moist, very dense, silty SAND, little fine gravel, poorly graded, Rec. = 0.54 ft, [GLACIOFLUVIAL OUTWASH]				50-50/4" (R)	13.7	17.0	45.0	38.0
20		20.0 ft - 20.17 ft, Field Description: A-2-4, SM, Light brown, moist, very dense, fine to medium SAND, some fines, trace gravel, Rec. = 0.1 ft, [GLACIOFLUVIAL OUTWASH]				50/2" (R)				
		20.17 ft - 20.42 ft, Sampled with 3" OD split spoon; no recovery, Rec. = 0.0 ft				(R)				
		20.42 ft, Gravel and cobbles observed in wash water.								
25		25.0 ft - 25.33 ft, Lab Classification: A-4, SM, Light brown to yellow, moist, very dense, silty fine to coarse SAND, little fine gravel, little mica, poorly graded, Rec. = 0.04 ft, [GLACIAL TILL]				100/4" (R)	13.1	13.0	50.0	37.0
		25.33 ft - 25.54 ft, Sampled with 3" OD split spoon; no recovery, Rec. = 0.0 ft				(R)				
		25.54 ft, Gravel and cobbles observed in wash water.								

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG VTRANS JAMAICA 01.13.2025.GPJ VERMONT AOT.GDT 1/13/25

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BORING LOG

Jamaica
ER P23-1(216)
Bridge 42, VT Route 30

Boring No.: **B545**
Page No.: 2 of 2
Pin No.: 24b002
Checked By: KAR

Boring Crew: Jeff Nitsch (Seaboard), Lina Maria Pua (WSP)
Date Started: 11/19/24 Date Finished: 11/20/24
VTSPG NAD83: N 235482.99 ft E 1544453.26 ft
Station: 515+68.6 Offset: 7.39 ft L
Ground Elevation: 1220.37 ft

	Casing	Sampler
Type:	WASH BORE	SS
I.D.:	4 in	1.5 in
Hammer Wt:	300 lb.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto	
Rig:	Mobile B-53	C_F = 1.55

Groundwater Observations

Date	Depth (ft)	Notes
11/20/24	13.5	9:20 AM after core

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate minutes/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		30.0 ft - 30.08 ft, Field Description: A-1-b, GM, Light brown, very dense, gravel-size rock fragments, some fine to medium sand, some silt, Rec. = 0.08 ft, [GLACIAL TILL]				100/1" (R)				
		32.0 ft - 35.0 ft, Driller noted increase in roller bit resistance and gravel observed in wash water; interpreted as weathered rock., [WEATHERED ROCK]					Top of Bedrock @ 32.0 ft			
35		35.0 ft - 35.17 ft, No recovery, Rec. = 0.0 ft	R1	93 (56)	2.8	100/2" (R)				
		35.17 ft - 40.17 ft, White to light and dark gray, fine-grained, very strong (R5), micaceous GNEISS, completely weathered (W5, top 0.3 ft) to fresh (W1); discontinuities shallowly to horizontally dipping, very closely spaced. planar to irregular, smooth to rough, average 3.2 fractures per foot. Alternating white and light or dark gray banding 0.1-0.4 mm thick observed throughout run. Quartz vein 10 mm thick at 39 ft bgs. [MOUNT HOLLY COMPLEX]. NQ. UCS = 15,924 psi.			6.05 5.17 4.45					
40		35.47 ft, No recovery from 35.17 ft bgs to 35.47 ft bgs; interpreted as partially weathered rock washed out during coring.			5.98					
		40.17 ft - 45.17 ft, White to light and dark gray, fine-grained, very strong (R5), GNEISS, fresh (W1) to slightly weathered (W2); discontinuities shallowly to steeply dipping, very closely spaced, planar to stepped. smooth to rough, average 4.4 fractures per foot. Mica, biotite, and quartz banding and folding observed throughout run. [MOUNT HOLLY COMPLEX]. NQ. UCS = 20,093 psi.	R2	100 (52)	4.22 3.63 4.52 4.38					
45					6.18					
		Hole stopped @ 45.17 ft Boring grouted up to 35 ft bgs and then backfilled with drill cuttings to ground surface.								
50										
55										

Remarks:
1. The as-drilled boring locations and elevations are derived from electronic file "x24b002sv.dgn" provided to WSP by VTrans on December 18, 2024.
2. AASHTO and USCS classifications are based on visual description of sample recovery at depths where laboratory testing not performed.
3. The SPT sample at 0-2 ft bgs was obtained 0.5 feet west of the final as-drilled B545 location shown above. Due to non-plumb drill casing, this initial hole was terminated at 4.5 ft bgs and backfilled with cuttings. The boring was offset to the final as-drilled B545 location shown above, and all subsequent SPT samples and rock core samples were obtained at the final as-drilled B545 location.

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG VTRANS JAMAICA 01.13.2025.GPJ VERMONT AOT.GDT 1/13/25

APPENDIX B

Rock Core Photographs

Appendix B
Rock Core Photographs
Bridge 42, VT Route 30
VTrans Jamaica ER P23-1(216)
Jamaica, Vermont

Boring	Run	Depth Below Surface Feet	Recovery Feet	Recovery %	RQD Feet	RQD %	Rock Type	Box Row	Date Cored
B425	R1	30.0 - 35.0	3.9 / 5.0	77	0.4 / 5.0	8	GNEISS	Row 1	11/21/2024
	R2	35.0 - 40.0	4.4 / 5.0	88	1.6 / 5.0	31	GNEISS	Row 2	11/21/2024
	R3	40.0 - 45.0	4.3 / 5.0	86	0.9 / 5.0	18	GNEISS	Row 3	11/21/2024

Notes:
1. "Box row" indicates the section of the box where the core is contained: 1 = top, 4 = bottom.
2. Top of each core run is on the left and increases with depth to the right.

Prepared By: LMP
Checked By: KAR
Reviewed By: JDL

Appendix B
Rock Core Photographs
Bridge 42, VT Route 30
VTrans Jamaica ER P23-1(216)
Jamaica, Vermont

Boring	Run	Depth Below Surface Feet	Recovery Feet	Recovery %	RQD Feet	RQD %	Rock Type	Box Row	Date Cored
B545	R1	35.2 - 40.2	4.7 / 5.0	93	2.8 / 5.0	56	GNEISS	Row 1	11/20/2024
	R2	40.2 - 45.2	5.0 / 5.0	100	2.6 / 5.0	52	GNEISS	Row 2	11/20/2024

Notes:
1. "Box row" indicates the section of the box where the core is contained: 1 = top, 4 = bottom.
2. Top of each core run is on the left and increases with depth to the right.

Prepared By: LMP
Checked By: KAR
Reviewed By: JDL

APPENDIX C

Laboratory Test Results

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	---	Sample Type:	---	Tested By:	ajl
Sample ID:	---	Test Date:	12/10/24	Checked By:	ank
Depth :	---	Test Id:	795235		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B425	S1B	0.25-0.96'	Moist, grayish brown silty sand with gravel	5.6
B425	S2	5-7'	Moist, yellowish brown silty sand with gravel	5.7
B425	S4	15-17'	Moist, brown sandy silt	17.2
B425	S5	20-22'	Moist, grayish brown sandy silt	22.1
B425	S6	25-27'	Moist, grayish brown silty gravel with sand	13.2
B545	S1A	0.08-0.58'	Moist, dark yellowish brown sand with gravel	2.1
B545	S1B	0.58-1.5'	Moist, yellowish brown sand with silt and gravel	2.6

Notes: Temperature of Drying : 110º Celsius

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	---	Sample Type:	---	Tested By:	ajl
Sample ID:	---	Test Date:	12/10/24	Checked By:	ank
Depth :	---	Test Id:	795238		

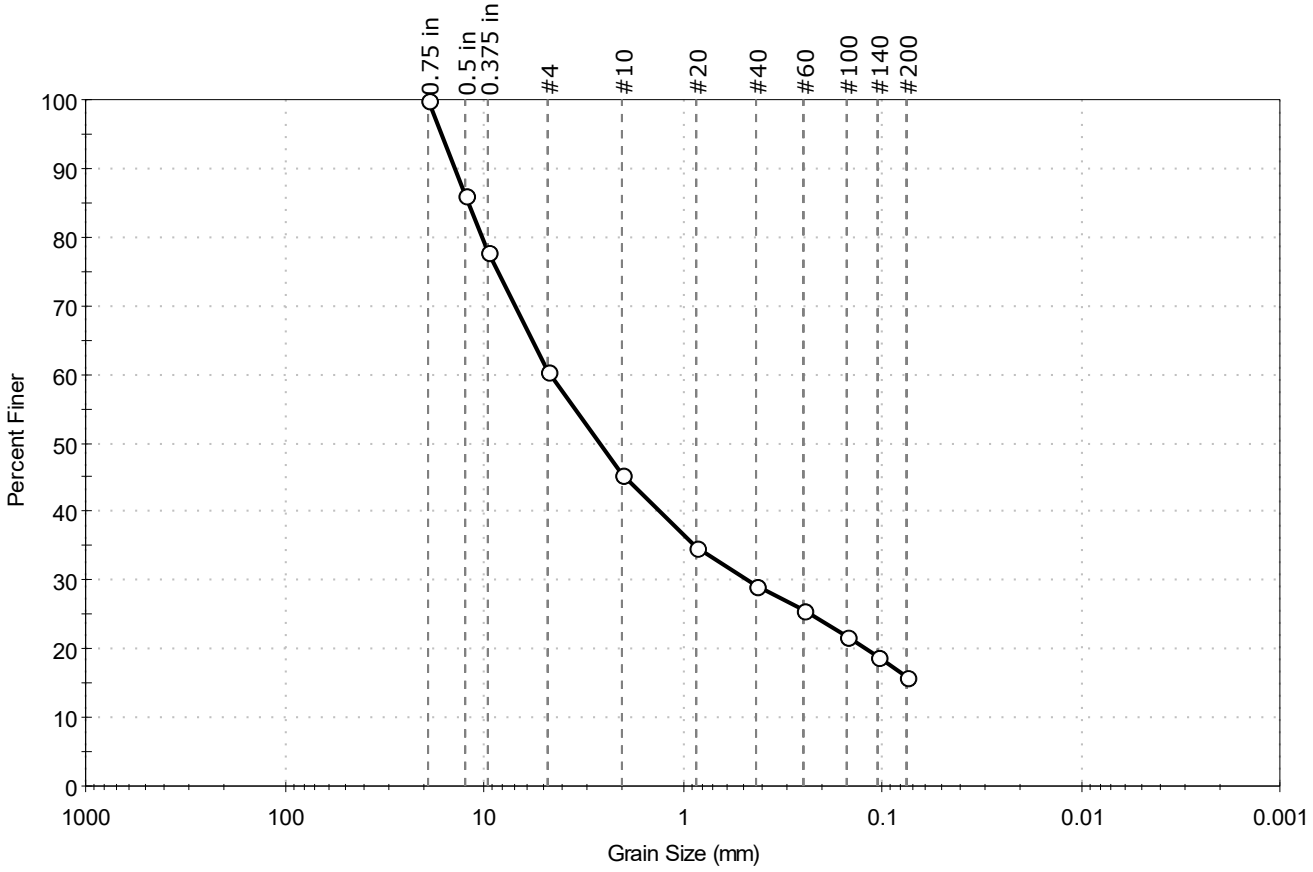
Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B545	S2	5-7'	Moist, grayish brown silty sand with gravel	9.2
B545	S3	10-12'	Moist, yellowish brown sandy silt	17.8
B545	S4	15-15.83'	Moist, yellowish brown silty sand	13.7
B545	S7	25-25.33'	Moist, yellowish brown silty sand	13.1

Notes: Temperature of Drying : 110º Celsius

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B425	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S1B	Test Date:	12/12/24	Checked By:	ank
Depth :	0.25-0.96'	Test Id:	795219		
Test Comment:	---				
Visual Description:	Moist, grayish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	39.4	44.8	15.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	86		
0.375 in	9.50	78		
#4	4.75	61		
#10	2.00	45		
#20	0.85	35		
#40	0.42	29		
#60	0.25	26		
#100	0.15	22		
#140	0.11	19		
#200	0.075	16		

Coefficients

D_{85} = 12.0510 mm D_{30} = 0.4618 mm

D_{60} = 4.5923 mm D_{15} = N/A

D_{50} = 2.5981 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

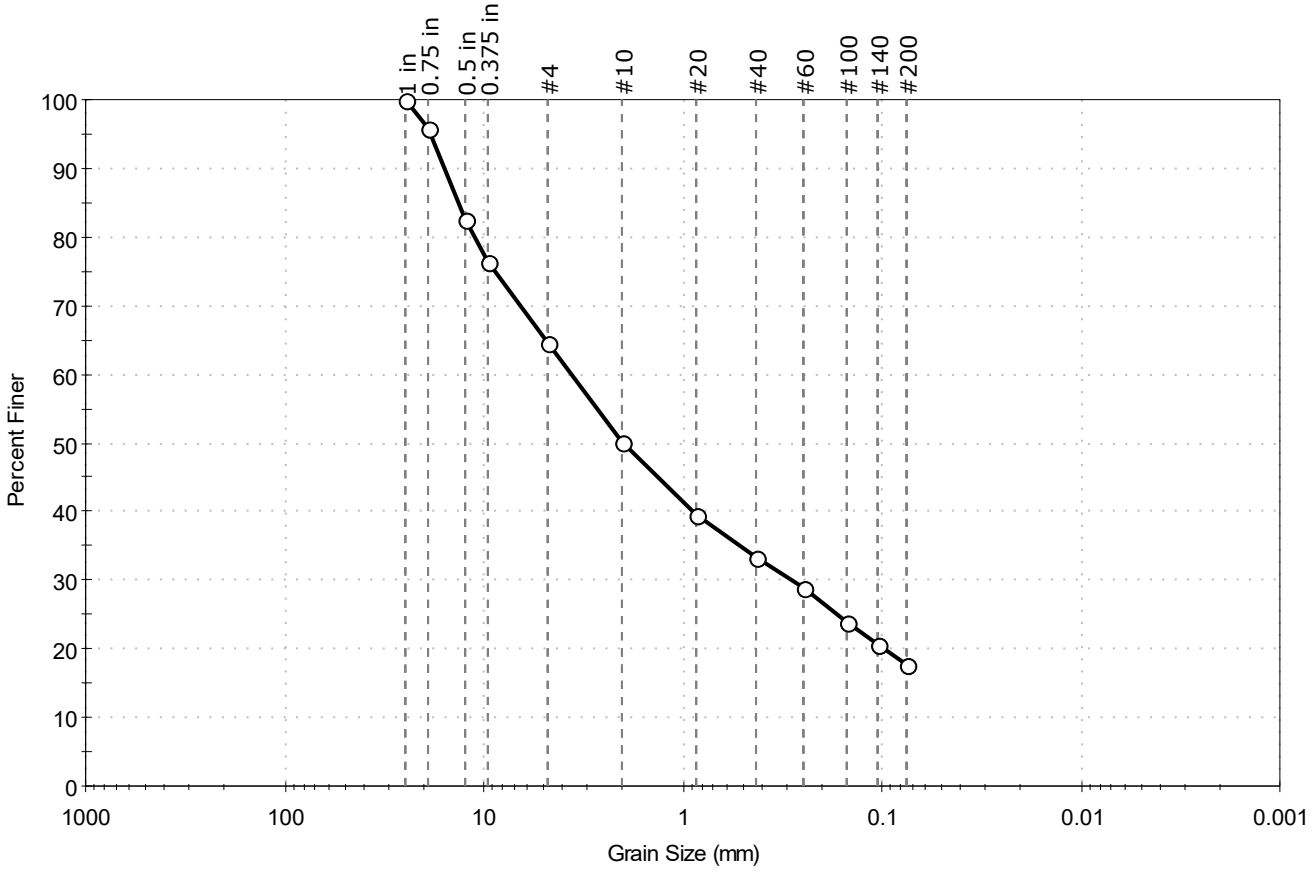
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B425	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S2	Test Date:	12/12/24	Checked By:	ank
Depth :	5-7'	Test Id:	795220		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	35.3	46.9	17.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	83		
0.375 in	9.50	76		
#4	4.75	65		
#10	2.00	50		
#20	0.85	39		
#40	0.42	33		
#60	0.25	29		
#100	0.15	24		
#140	0.11	21		
#200	0.075	18		

Coefficients

D_{85} = 13.4753 mm	D_{30} = 0.2889 mm
D_{60} = 3.6145 mm	D_{15} = N/A
D_{50} = 1.9986 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

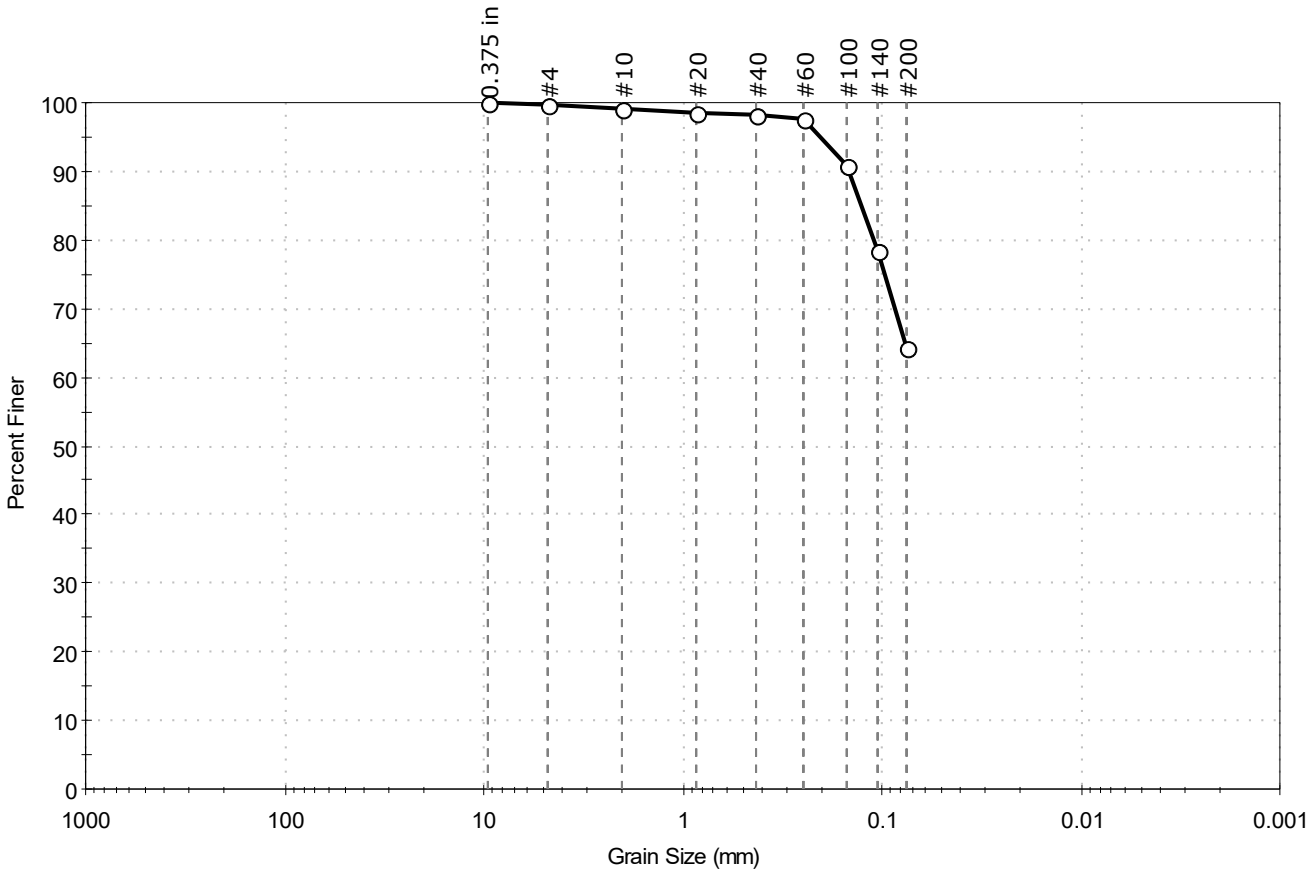
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B425	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S4	Test Date:	12/12/24	Checked By:	ank
Depth :	15-17'	Test Id:	795221		
Test Comment:	---				
Visual Description:	Moist, brown sandy silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.2	35.4	64.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	99		
#40	0.42	98		
#60	0.25	98		
#100	0.15	91		
#140	0.11	78		
#200	0.075	64		

Coefficients

D_{85} = 0.1274 mm	D_{30} = N/A
D_{60} = N/A	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

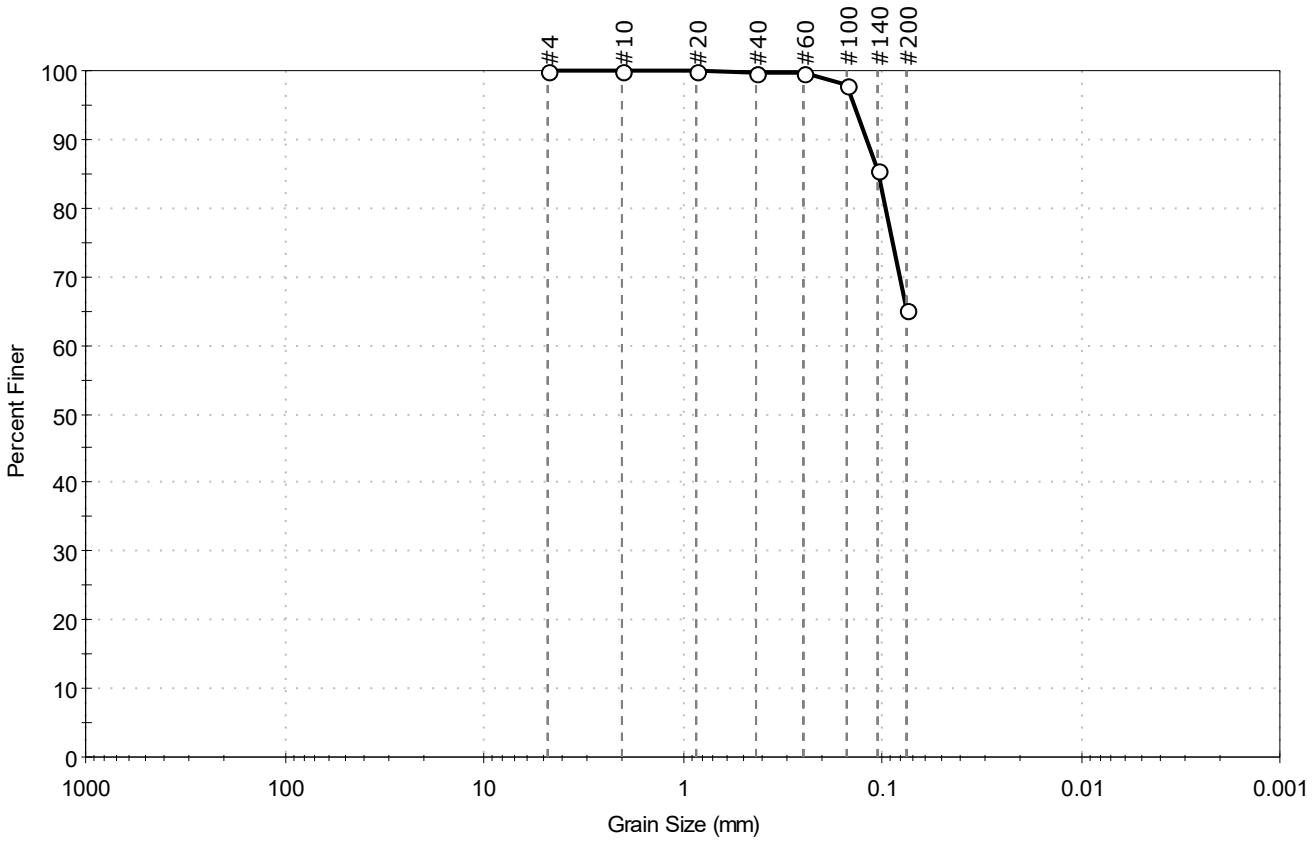
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B425	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S5	Test Date:	12/12/24	Checked By:	ank
Depth :	20-22'	Test Id:	795222		
Test Comment:	---				
Visual Description:	Moist, grayish brown sandy silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	34.8	65.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	98		
#140	0.11	86		
#200	0.075	65		

Coefficients

D_{85} = 0.1049 mm	D_{30} = N/A
D_{60} = N/A	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

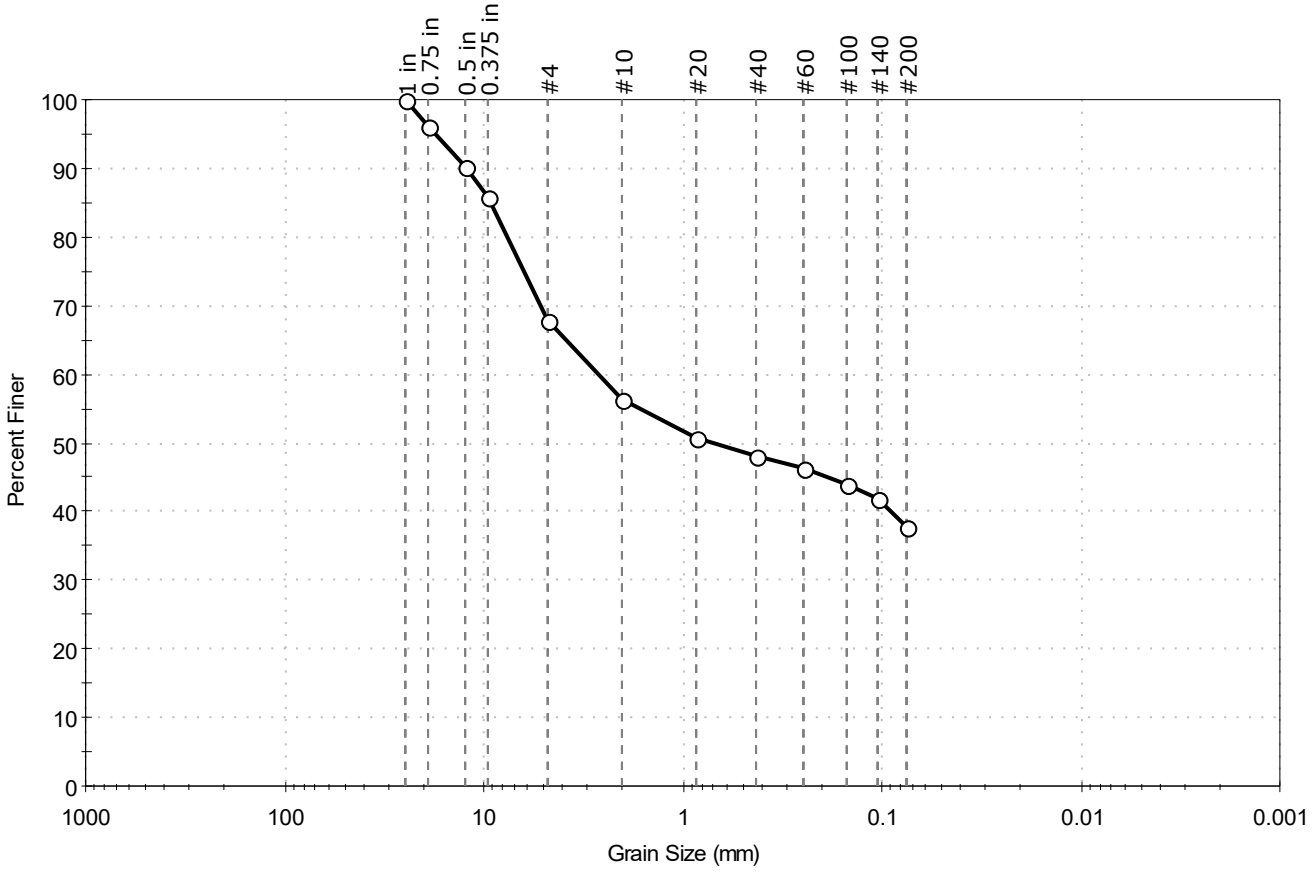
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B425	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S6	Test Date:	12/12/24	Checked By:	ank
Depth :	25-27'	Test Id:	795223		
Test Comment:	---				
Visual Description:	Moist, grayish brown silty gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	32.1	30.2	37.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	90		
0.375 in	9.50	86		
#4	4.75	68		
#10	2.00	56		
#20	0.85	51		
#40	0.42	48		
#60	0.25	46		
#100	0.15	44		
#140	0.11	42		
#200	0.075	38		

Coefficients

D_{85} = 9.2018 mm D_{30} = N/A

D_{60} = 2.6327 mm D_{15} = N/A

D_{50} = 0.7110 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

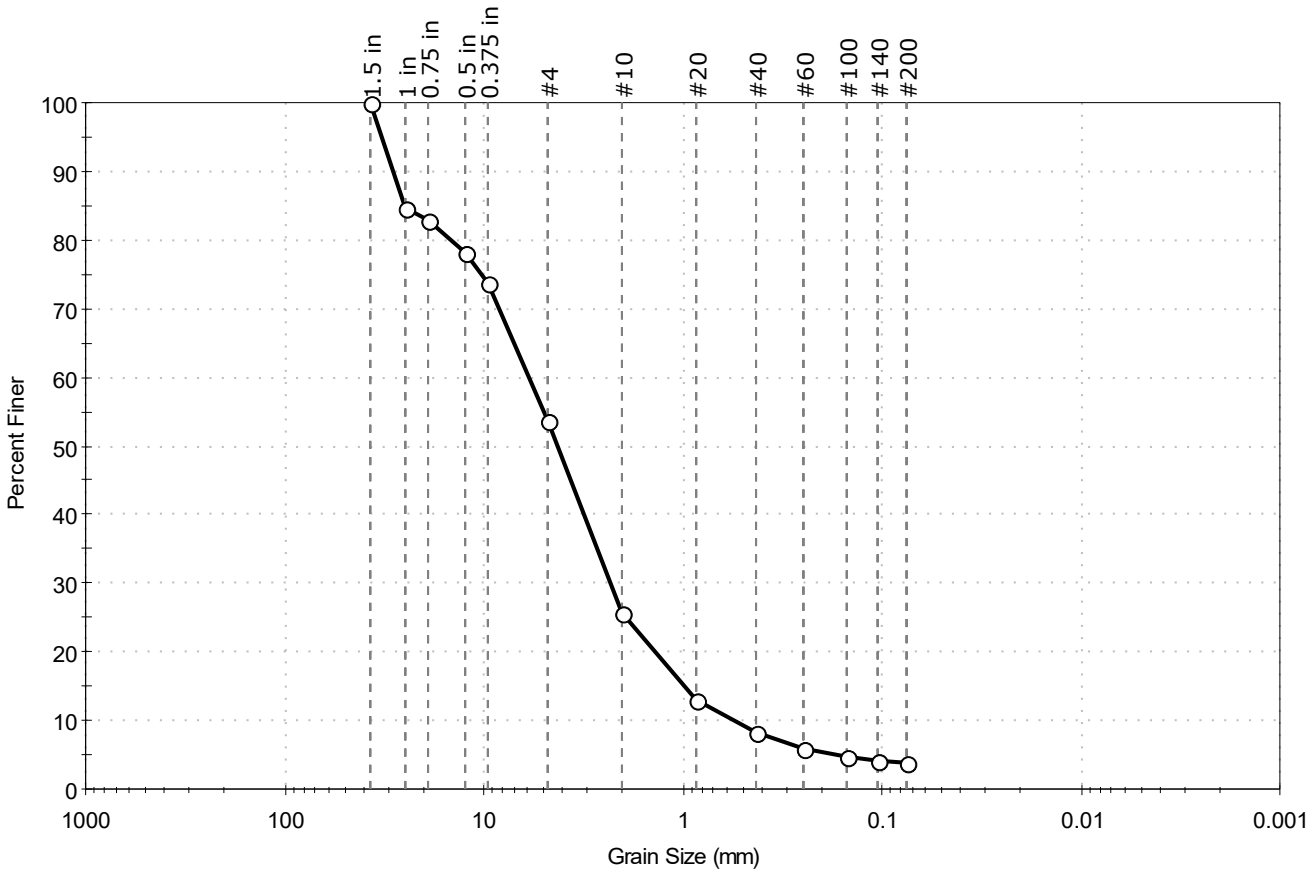
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B545	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S1A	Test Date:	12/12/24	Checked By:	ank
Depth :	0.08-0.58'	Test Id:	795224		
Test Comment:	---				
Visual Description:	Moist, dark yellowish brown sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	46.3	49.8	3.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	85		
0.75 in	19.00	83		
0.5 in	12.50	78		
0.375 in	9.50	74		
#4	4.75	54		
#10	2.00	26		
#20	0.85	13		
#40	0.42	8		
#60	0.25	6		
#100	0.15	5		
#140	0.11	4		
#200	0.075	3.9		

Coefficients

D_{85} = 25.2238 mm D_{30} = 2.2803 mm

D_{60} = 5.8993 mm D_{15} = 0.9658 mm

D_{50} = 4.2361 mm D_{10} = 0.5492 mm

C_u = 10.742 C_c = 1.605

Classification

ASTM Well-graded SAND with Gravel (SW)

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

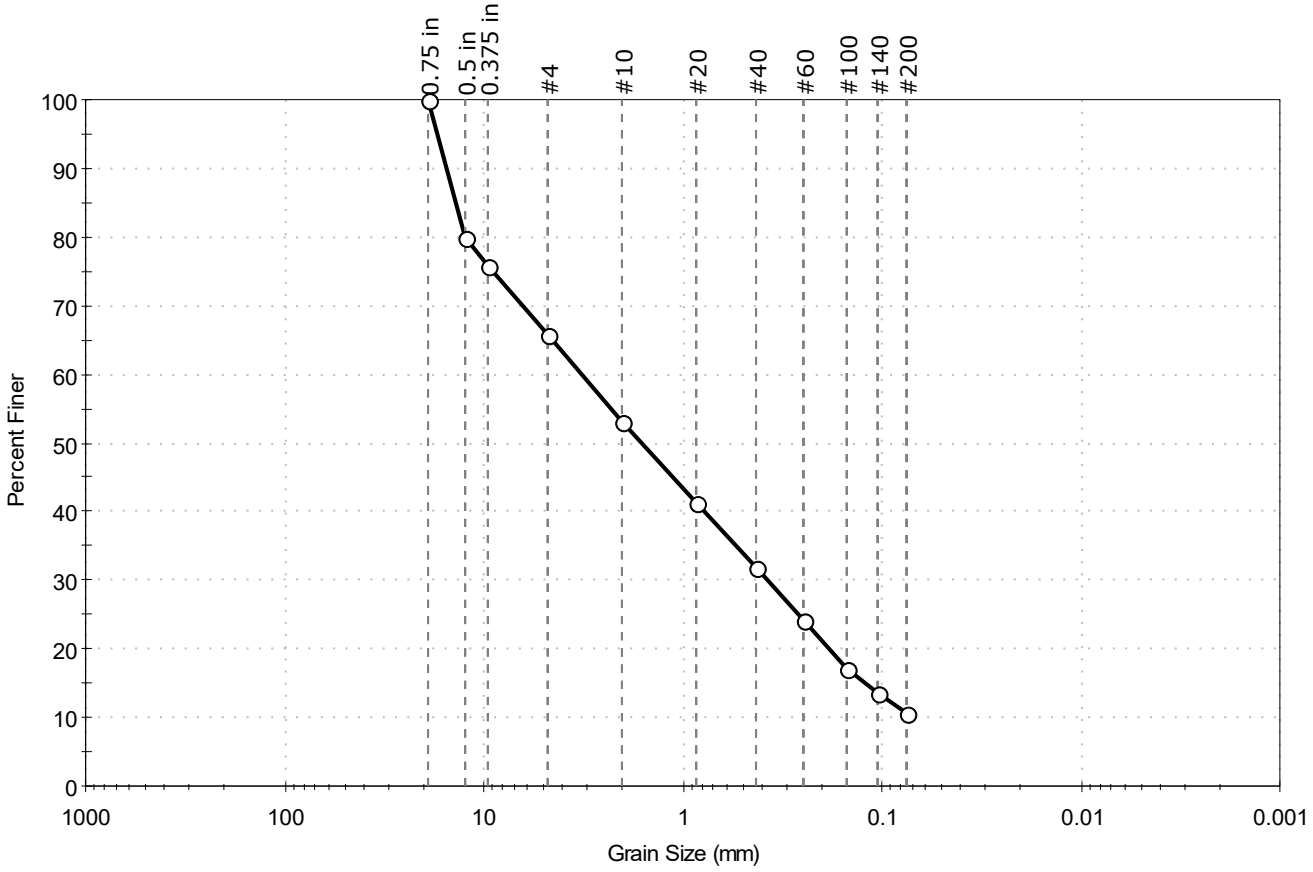
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B545	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S1B	Test Date:	12/12/24	Checked By:	ank
Depth :	0.58-1.5'	Test Id:	795225		
Test Comment:	---				
Visual Description:	Moist, yellowish brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	34.3	55.0	10.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	80		
0.375 in	9.50	76		
#4	4.75	66		
#10	2.00	53		
#20	0.85	41		
#40	0.42	32		
#60	0.25	24		
#100	0.15	17		
#140	0.11	14		
#200	0.075	11		

Coefficients

D_{85} = 13.8865 mm D_{30} = 0.3761 mm

D_{60} = 3.2002 mm D_{15} = 0.1210 mm

D_{50} = 1.5900 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

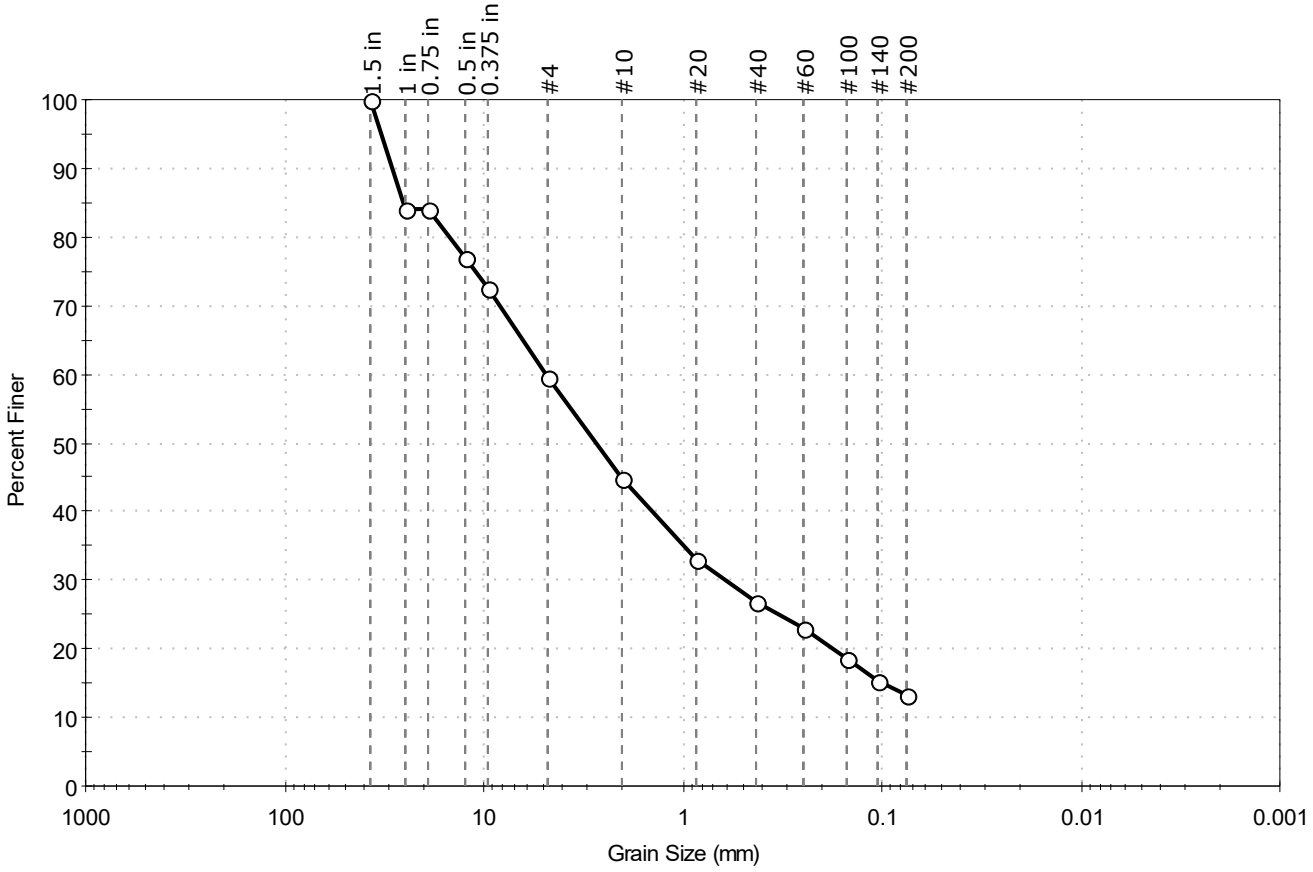
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B545	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S2	Test Date:	12/12/24	Checked By:	ank
Depth :	5-7'	Test Id:	795226		
Test Comment:	---				
Visual Description:	Moist, grayish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	40.3	46.4	13.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	84		
0.75 in	19.00	84		
0.5 in	12.50	77		
0.375 in	9.50	73		
#4	4.75	60		
#10	2.00	45		
#20	0.85	33		
#40	0.42	27		
#60	0.25	23		
#100	0.15	19		
#140	0.11	15		
#200	0.075	13		

Coefficients

D_{85} = 25.6381 mm
D_{30} = 0.6092 mm
D_{60} = 4.8311 mm
D_{15} = 0.0984 mm
D_{50} = 2.6979 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

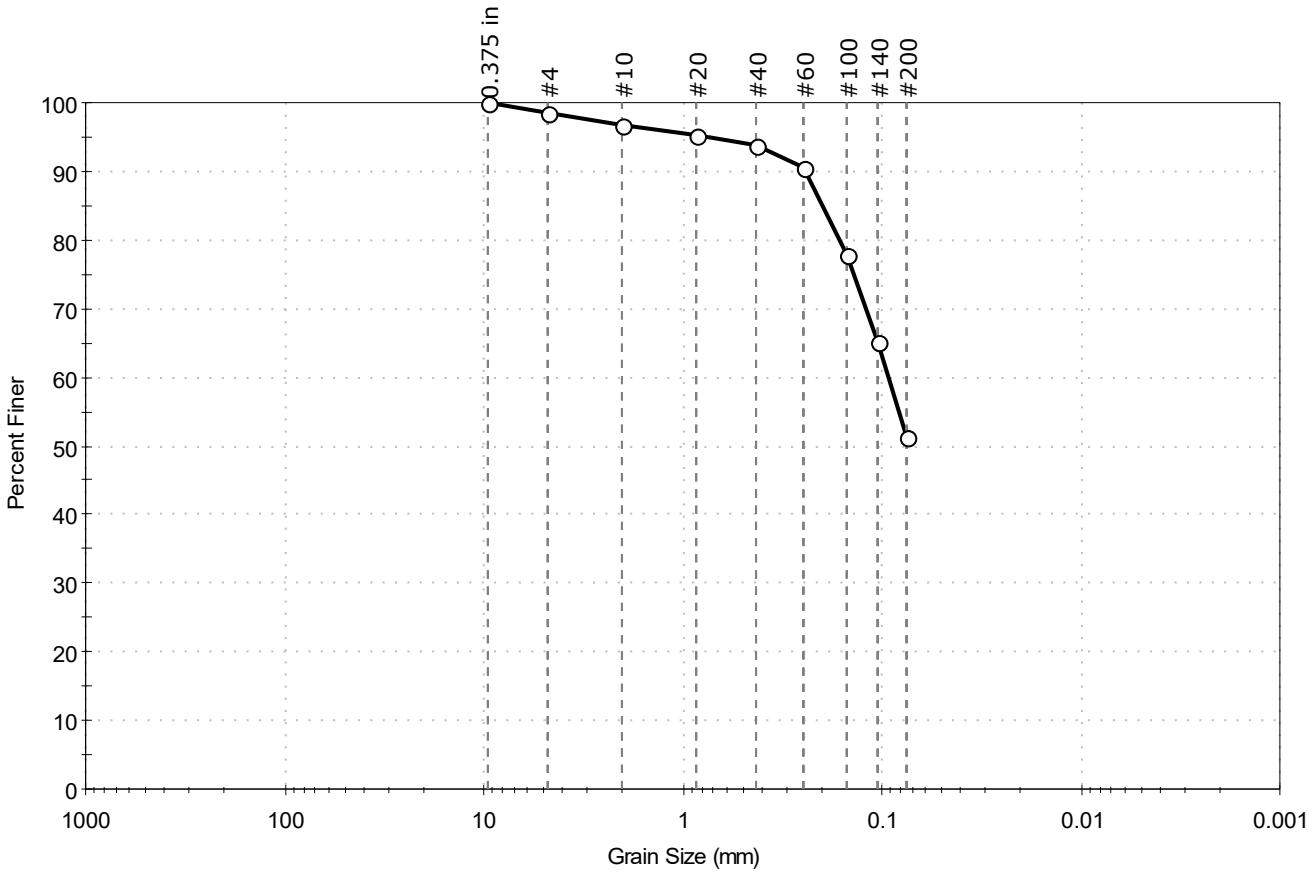
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B545	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S3	Test Date:	12/12/24	Checked By:	ank
Depth :	10-12'	Test Id:	795520		
Test Comment:	---				
Visual Description:	Moist, yellowish brown sandy silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	1.6	47.2	51.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	97		
#20	0.85	95		
#40	0.42	94		
#60	0.25	90		
#100	0.15	78		
#140	0.11	65		
#200	0.075	51		

Coefficients

D_{85} = 0.2010 mm	D_{30} = N/A
D_{60} = 0.0934 mm	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

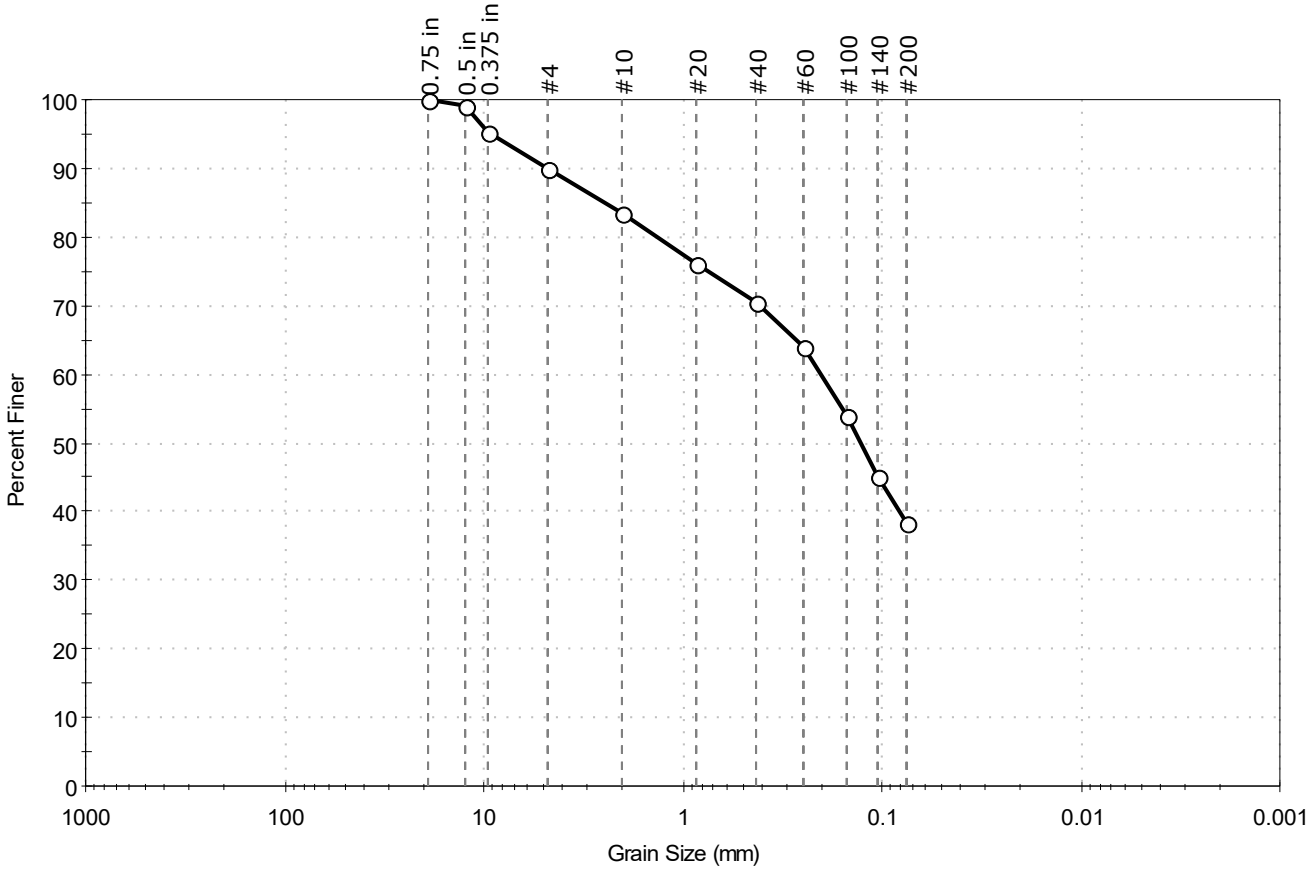
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B545	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S4	Test Date:	12/12/24	Checked By:	ank
Depth :	15-15.83'	Test Id:	795227		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	10.2	51.4	38.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	99		
0.375 in	9.50	95		
#4	4.75	90		
#10	2.00	83		
#20	0.85	76		
#40	0.42	70		
#60	0.25	64		
#100	0.15	54		
#140	0.11	45		
#200	0.075	38		

Coefficients

D_{85} = 2.4923 mm D_{30} = N/A

D_{60} = 0.2042 mm D_{15} = N/A

D_{50} = 0.1288 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

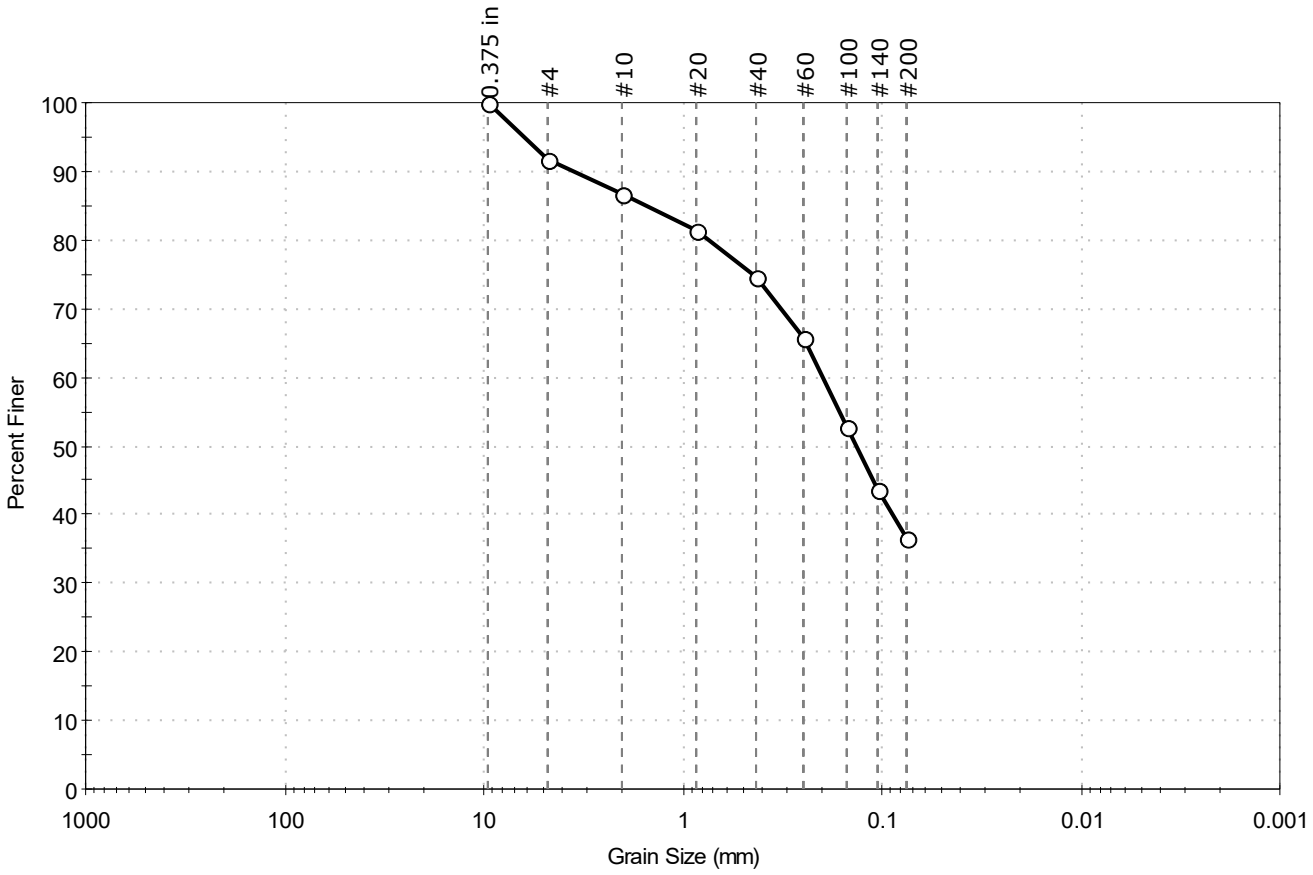
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	B545	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S7	Test Date:	12/12/24	Checked By:	ank
Depth :	25-25.33'	Test Id:	795228		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	8.2	55.1	36.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	92		
#10	2.00	87		
#20	0.85	81		
#40	0.42	75		
#60	0.25	66		
#100	0.15	53		
#140	0.11	44		
#200	0.075	37		

Coefficients

D_{85} = 1.5151 mm D_{30} = N/A

D_{60} = 0.1989 mm D_{15} = N/A

D_{50} = 0.1341 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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Client:	WSP USA, Inc.				
Project:	VTrans Jamaica Bridge 42				
Location:	Jamaica, VT			Project No:	GTX-320233
Boring ID:	---	Sample Type:	---	Tested By:	gp
Sample ID:	---	Test Date:	12/11/24	Checked By:	smd
Depth :	---	Test Id:	795218		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
B425	Run 2	36.7-37.05 ft	168	6844	1	No	1,*
B425	Run 3	43.6-44.0 ft	169	10660	1	No	1 , 2,*
B545	Run 1	38.54-38.91 ft	166	15924	1	No	1 , 2,*
B545	Run 2	44.23-44.61 ft	167	20093	1	No	1 , 2,*

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:	WSP USA, Inc.	Test Date:	12/10/2024
Project Name:	Vtrans Jamaica Bridge 42	Tested By:	jss
Project Location:	Jamaica, VT	Checked By:	smd
GTX #:	320233		
Boring ID:	B425		
Sample ID:	Run 2		
Depth, ft:	36.7-37.05		
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:	4.19	4.19	4.19
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	575.31		
Bulk Density, lb/ft^3	168	**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 ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

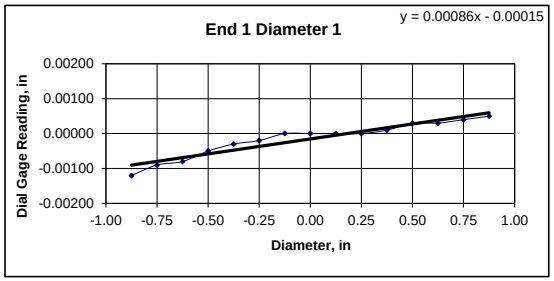
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00120	-0.00090	-0.00080	-0.00050	-0.00030	-0.00020	0.00000	0.00000	0.00000	0.00000	0.00010	0.00030	0.00030	0.00040	0.00050
Diameter 2, in (rotated 90°)	0.00120	0.00110	0.00090	0.00080	0.00060	0.00030	0.00020	0.00000	0.00000	-0.00020	-0.00060	-0.00080	-0.00100	-0.00130	-0.00150

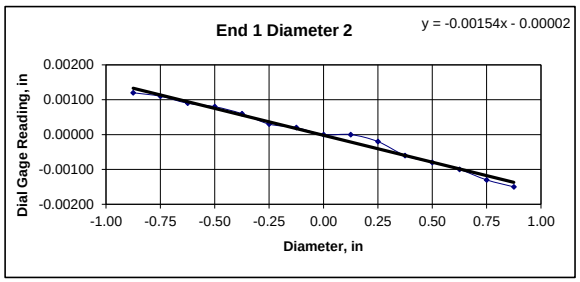
Difference between max and min readings, in:
0° = 0.00170 90° = 0.00270

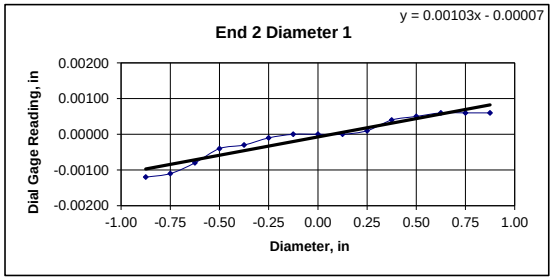
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00120	-0.00110	-0.00080	-0.00040	-0.00030	-0.00010	0.00000	0.00000	0.00000	0.00010	0.00040	0.00050	0.00060	0.00060	0.00060
Diameter 2, in (rotated 90°)	-0.00180	-0.00160	-0.00120	-0.00090	-0.00050	-0.00030	-0.00010	0.00000	0.00010	0.00020	0.00040	0.00070	0.00080	0.00090	0.00100

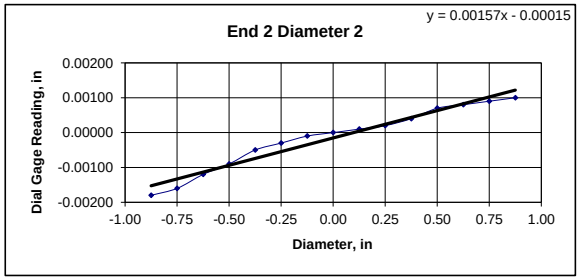
Difference between max and min readings, in:
0° = 0.0018 90° = 0.0028

Maximum difference must be < 0.0020 in. Difference = ± 0.00140
Flatness Tolerance Met? NO









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00086
Angle of Best Fit Line: 0.04911

End 2:
Slope of Best Fit Line 0.00103
Angle of Best Fit Line: 0.05877

Maximum Angular Difference: 0.00966

Parallelism Tolerance Met? NO
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00154
Angle of Best Fit Line: 0.08840

End 2:
Slope of Best Fit Line 0.00157
Angle of Best Fit Line: 0.08987

Maximum Angular Difference: 0.00147

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	0.00170	1.987	0.00086	0.049	YES
Diameter 2, in (rotated 90°)	0.00270	1.987	0.00136	0.078	YES
END 2					
Diameter 1, in	0.00180	1.987	0.00091	0.052	YES
Diameter 2, in (rotated 90°)	0.00280	1.987	0.00141	0.081	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

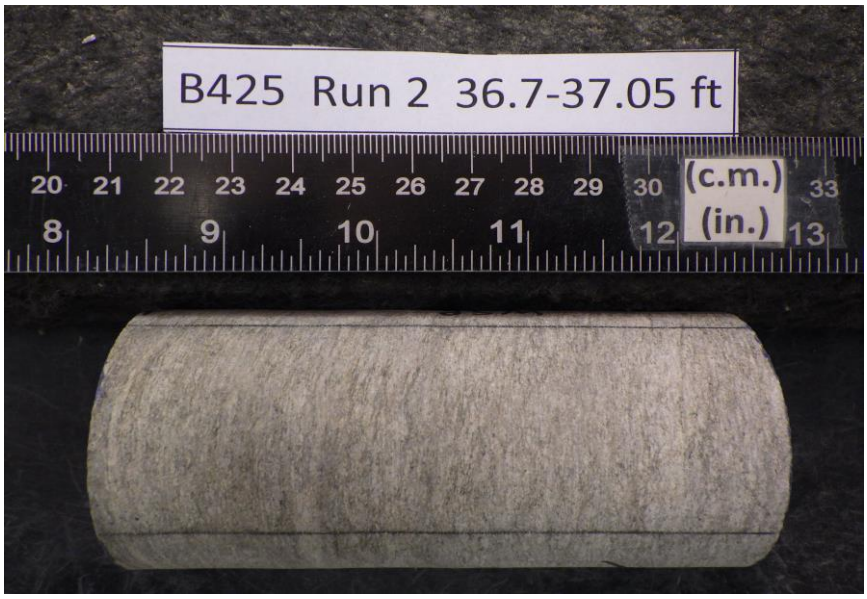
Client:	WSP USA, Inc.	Test Date:	12/10/2024
Project Name:	Vtrans Jamaica Bridge 42	Tested By:	jss
Project Location:	Jamaica, VT	Checked By:	smd
GTX #:	320233		
Boring ID:	B425	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	Run 2		
Depth (ft):	36.7-37.05		
Visual Description:	See photographs		

BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

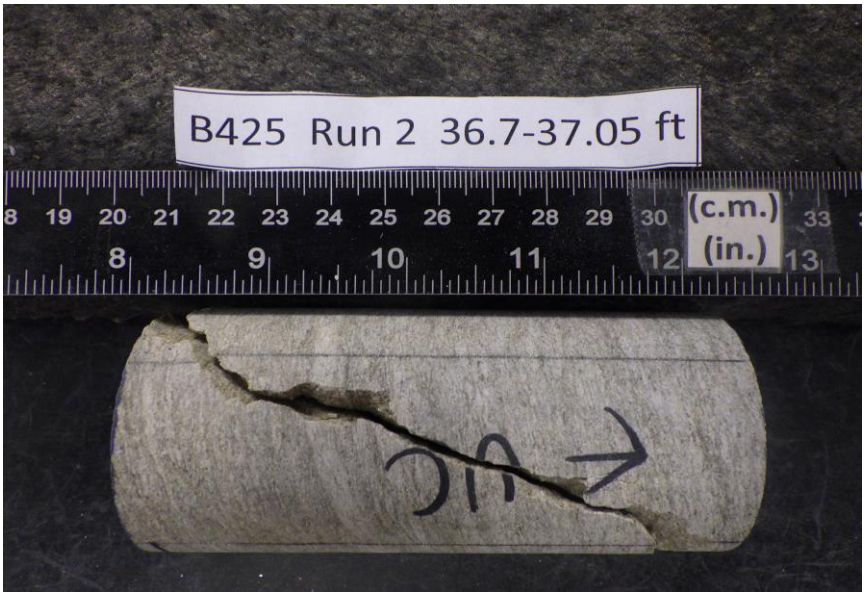
END FLATNESS		
END 1		
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES
END 2		
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES

End Flatness Tolerance Met? YES

Client:	WSP USA, Inc.
Project Name:	VTrans Jamaica Bridge 42
Project Location:	Jamaica, VT
GTX #:	320233
Test Date:	12/11/2024
Tested By:	gp
Checked By:	smd
Boring ID:	B425
Sample ID:	Run 2
Depth, ft:	36.7-37.05



After cutting and grinding



After break

Client:	WSP USA, Inc.	Test Date:	12/10/2024
Project Name:	Vtrans Jamaica Bridge 42	Tested By:	jss
Project Location:	Jamaica, VT	Checked By:	smd
GTX #:	320233		
Boring ID:	B425		
Sample ID:	Run 3		
Depth, ft:	43.6-44.0		
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:	4.37	4.37	4.37
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	600.26		
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 ≤ 0.02 in.? NO

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? NO

END FLATNESS AND PARALLELISM (Procedure FP1)

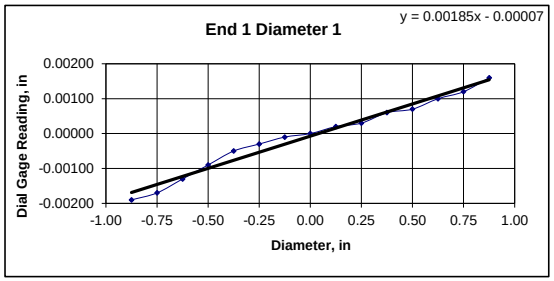
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00190	-0.00170	-0.00130	-0.00090	-0.00050	-0.00030	-0.00010	0.00000	0.00020	0.00030	0.00060	0.00070	0.00100	0.00120	0.00160
Diameter 2, in (rotated 90°)	0.00020	0.00020	0.00020	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010

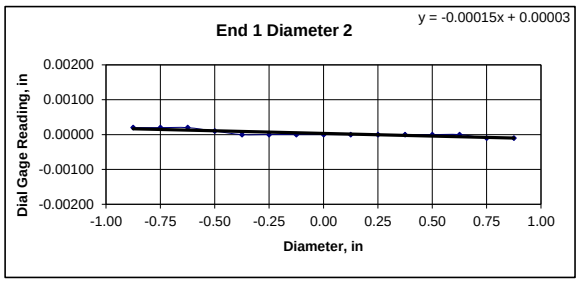
Difference between max and min readings, in:
0° = 0.00350 90° = 0.00030

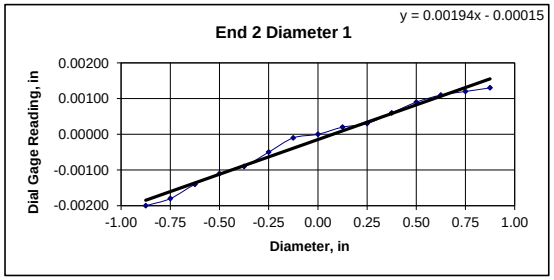
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00200	-0.00180	-0.00140	-0.00110	-0.00090	-0.00050	-0.00010	0.00000	0.00020	0.00030	0.00060	0.00090	0.00110	0.00120	0.00130
Diameter 2, in (rotated 90°)	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010

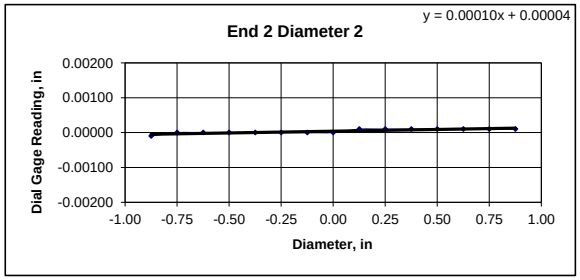
Difference between max and min readings, in:
0° = 0.0033 90° = 0.0002

Maximum difference must be < 0.0020 in. Difference = ± 0.00175
Flatness Tolerance Met? NO









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00185
Angle of Best Fit Line: 0.10575

End 2:
Slope of Best Fit Line 0.00194
Angle of Best Fit Line: 0.11132

Maximum Angular Difference: 0.00557

Parallelism Tolerance Met? NO
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00015
Angle of Best Fit Line: 0.00868

End 2:
Slope of Best Fit Line 0.00010
Angle of Best Fit Line: 0.00573

Maximum Angular Difference: 0.00295

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	0.00350	1.987	0.00176	0.101	YES
Diameter 2, in (rotated 90°)	0.00030	1.987	0.00015	0.009	YES
END 2					
Diameter 1, in	0.00330	1.987	0.00166	0.095	YES
Diameter 2, in (rotated 90°)	0.00020	1.987	0.00010	0.006	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

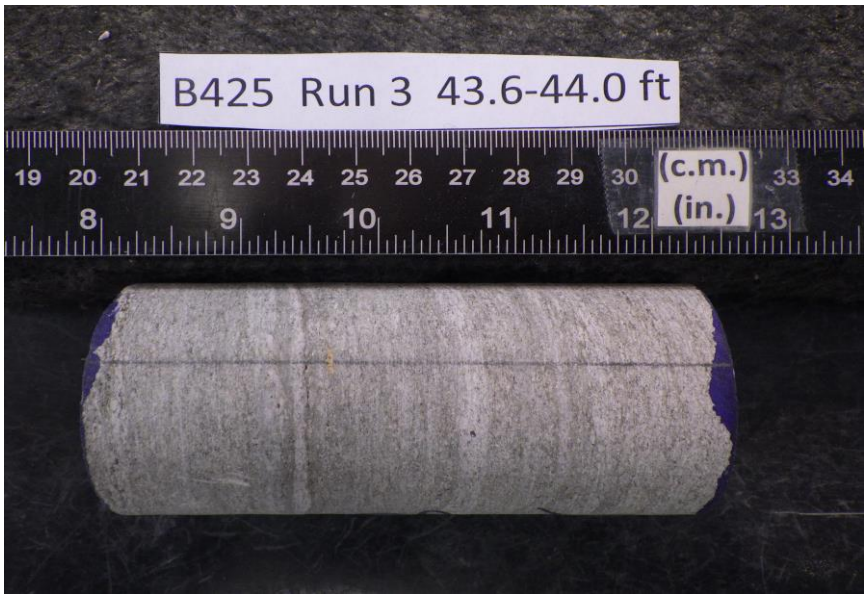
Client:	WSP USA, Inc.	Test Date:	12/10/2024
Project Name:	Vtrans Jamaica Bridge 42	Tested By:	jss
Project Location:	Jamaica, VT	Checked By:	smd
GTX #:	320233		
Boring ID:	B425	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	Run 3		
Depth (ft):	43.6-44.0		
Visual Description:	See photographs		

BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

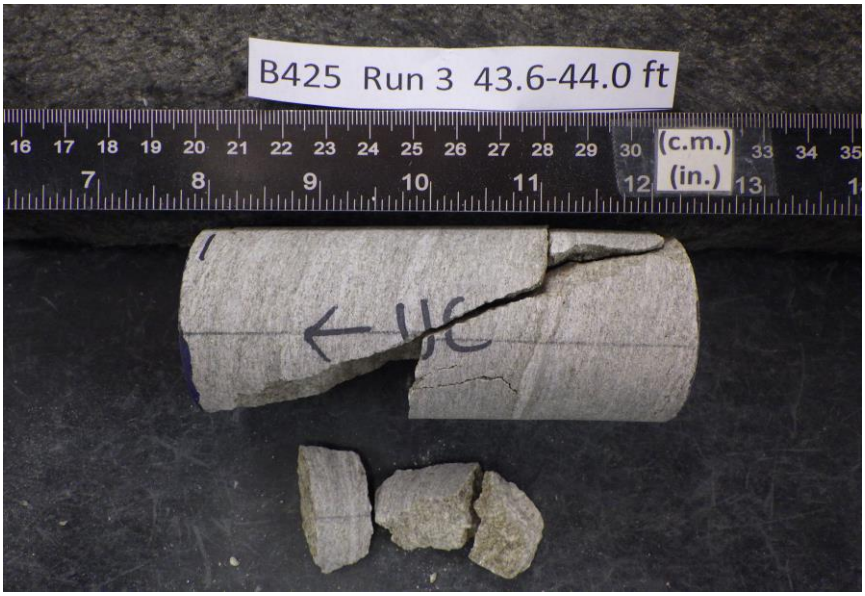
END FLATNESS		
END 1		
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES
END 2		
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES

End Flatness Tolerance Met? YES

Client:	WSP USA, Inc.
Project Name:	VTrans Jamaica Bridge 42
Project Location:	Jamaica, VT
GTX #:	320233
Test Date:	12/11/2024
Tested By:	gp
Checked By:	smd
Boring ID:	B425
Sample ID:	Run 3
Depth, ft:	43.6-44.0



After cutting and grinding



After break

Client:	WSP USA, Inc.	Test Date:	12/10/2024
Project Name:	Vtrans Jamaica Bridge 42	Tested By:	jss
Project Location:	Jamaica, VT	Checked By:	smd
GTX #:	320233		
Boring ID:	B545		
Sample ID:	Run 1		
Depth, ft:	38.54-38.91		
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:	4.19	4.20	4.20
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	566.65		
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 ≤ 0.02 in.? NO

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? NO

END FLATNESS AND PARALLELISM (Procedure FP1)

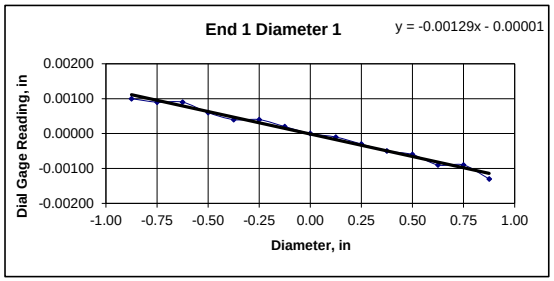
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00100	0.00090	0.00090	0.00060	0.00040	0.00040	0.00020	0.00000	-0.00010	-0.00030	-0.00050	-0.00060	-0.00090	-0.00090	-0.00130
Diameter 2, in (rotated 90°)	0.00120	0.00120	0.00100	0.00080	0.00050	0.00020	0.00010	0.00000	-0.00010	-0.00050	-0.00070	-0.00090	-0.00100	-0.00140	-0.00160

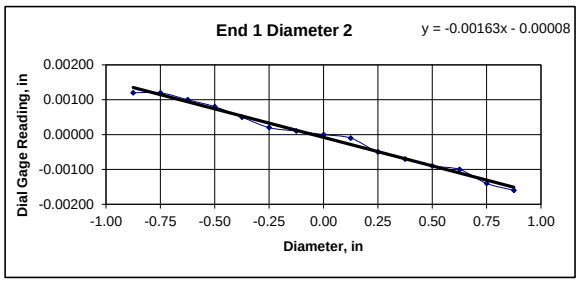
Difference between max and min readings, in:
0° = 0.00230 90° = 0.00280

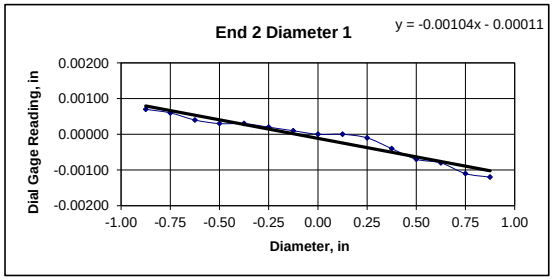
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00070	0.00060	0.00040	0.00030	0.00030	0.00020	0.00010	0.00000	0.00000	-0.00010	-0.00040	-0.00070	-0.00080	-0.00110	-0.00120
Diameter 2, in (rotated 90°)	-0.00180	-0.00160	-0.00130	-0.00090	-0.00070	-0.00040	-0.00010	0.00000	0.00010	0.00030	0.00040	0.00060	0.00080	0.00090	0.00110

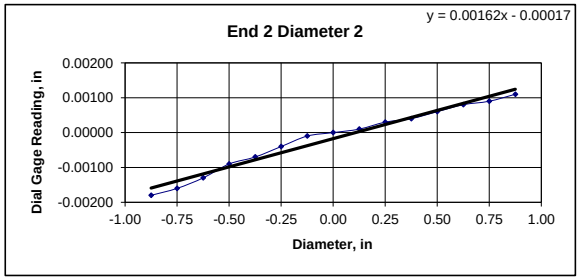
Difference between max and min readings, in:
0° = 0.0019 90° = 0.0029

Maximum difference must be < 0.0020 in. Difference = ± 0.00145
Flatness Tolerance Met? NO









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00129
Angle of Best Fit Line: 0.07383

End 2:
Slope of Best Fit Line 0.00104
Angle of Best Fit Line: 0.05942

Maximum Angular Difference: 0.01441

Parallelism Tolerance Met? NO
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00163
Angle of Best Fit Line: 0.09364

End 2:
Slope of Best Fit Line 0.00162
Angle of Best Fit Line: 0.09282

Maximum Angular Difference: 0.00082

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	0.00230	1.987	0.00116	0.066	YES
Diameter 2, in (rotated 90°)	0.00280	1.987	0.00141	0.081	YES
END 2					
Diameter 1, in	0.00190	1.987	0.00096	0.055	YES
Diameter 2, in (rotated 90°)	0.00290	1.987	0.00146	0.084	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

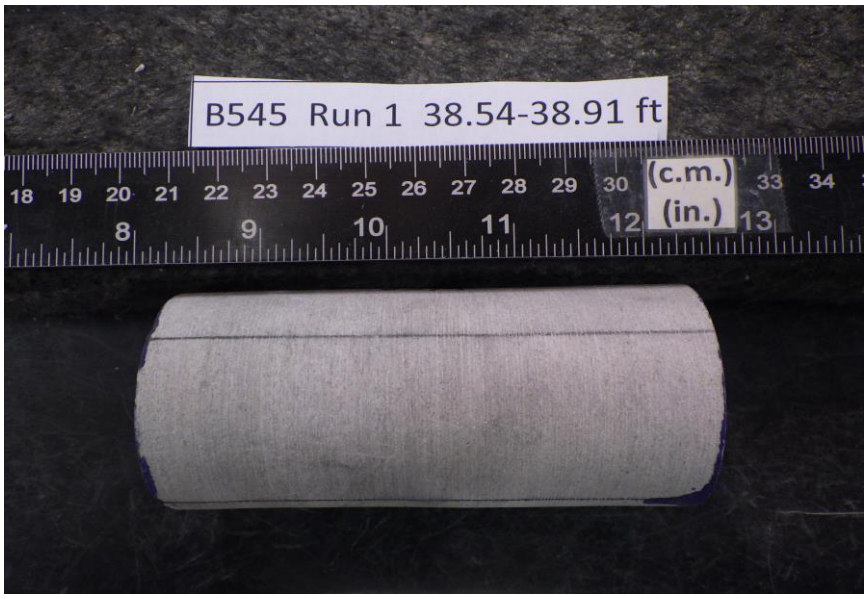
Client:	WSP USA, Inc.	Test Date:	12/10/2024
Project Name:	Vtrans Jamaica Bridge 42	Tested By:	jss
Project Location:	Jamaica, VT	Checked By:	smd
GTX #:	320233		
Boring ID:	B545	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	Run 1		
Depth (ft):	38.54-38.91		
Visual Description:	See photographs		

BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

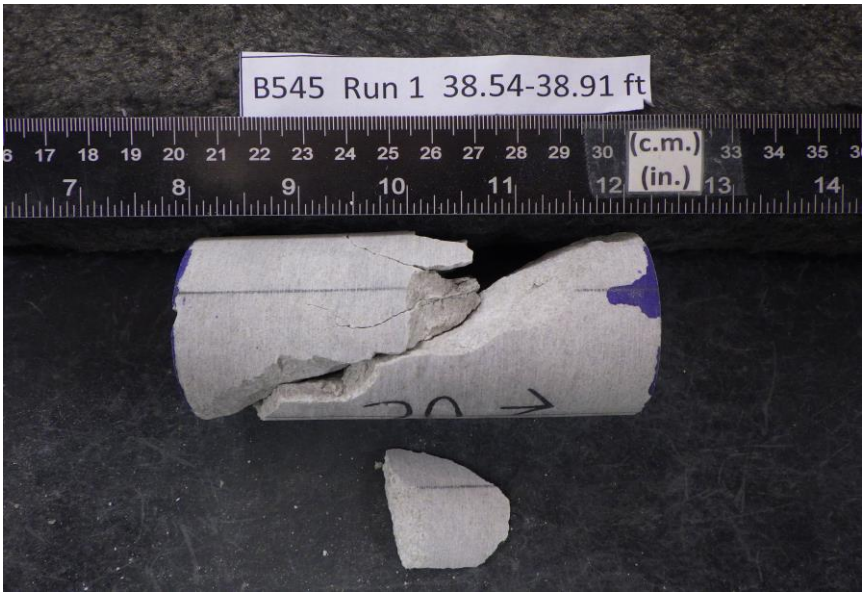
END FLATNESS		
END 1		
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES
END 2		
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES

End Flatness Tolerance Met? YES

Client:	WSP USA, Inc.
Project Name:	VTrans Jamaica Bridge 42
Project Location:	Jamaica, VT
GTX #:	320233
Test Date:	12/11/2024
Tested By:	gp
Checked By:	smd
Boring ID:	B545
Sample ID:	Run 1
Depth, ft:	38.54-38.91



After cutting and grinding



After break

Client:	WSP USA, Inc.	Test Date:	12/10/2024
Project Name:	Vtrans Jamaica Bridge 42	Tested By:	jss
Project Location:	Jamaica, VT	Checked By:	smd
GTX #:	320233		
Boring ID:	B545		
Sample ID:	Run 2		
Depth, ft:	44.23-44.61		
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:	4.39	4.39	4.39
Specimen Diameter, in:	1.99	1.99	1.99
Specimen Mass, g:	595.98		
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 ≤ 0.02 in.? NO

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? NO

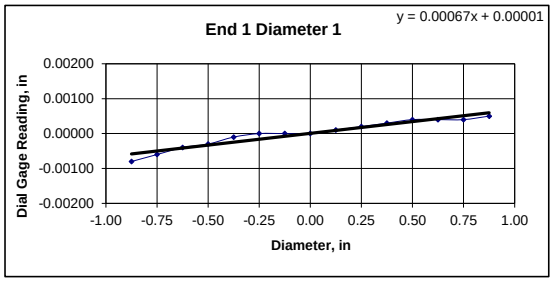
END FLATNESS AND PARALLELISM (Procedure FP1)

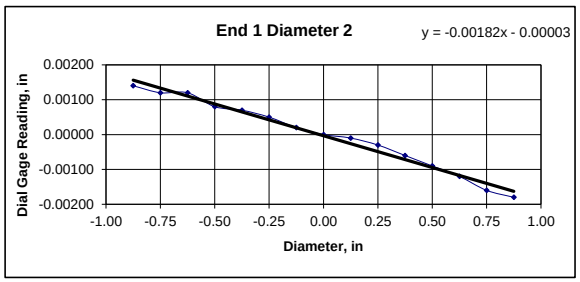
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00080	-0.00060	-0.00040	-0.00030	-0.00010	0.00000	0.00000	0.00000	0.00010	0.00020	0.00030	0.00040	0.00040	0.00040	0.00050
Diameter 2, in (rotated 90°)	0.00140	0.00120	0.00120	0.00080	0.00070	0.00050	0.00020	0.00000	-0.00010	-0.00030	-0.00060	-0.00090	-0.00120	-0.00160	-0.00180

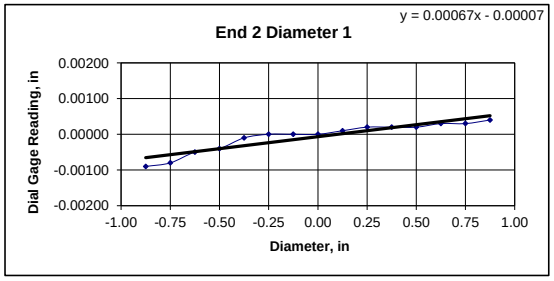
Difference between max and min readings, in:
0° = 0.00130 90° = 0.00320

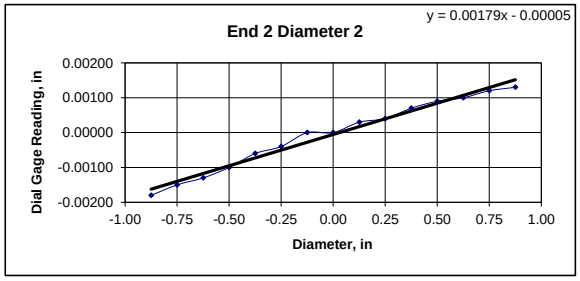
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00090	-0.00080	-0.00050	-0.00040	-0.00010	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020	0.00020	0.00030	0.00030	0.00040
Diameter 2, in (rotated 90°)	-0.00180	-0.00150	-0.00130	-0.00100	-0.00060	-0.00040	0.00000	0.00000	0.00030	0.00040	0.00070	0.00090	0.00100	0.00120	0.00130

Difference between max and min readings, in:
0° = 0.0013 90° = 0.0031
Maximum difference must be < 0.0020 in. Difference = ± 0.00160
Flatness Tolerance Met? NO









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00067
Angle of Best Fit Line: 0.03863

End 2:
Slope of Best Fit Line 0.00067
Angle of Best Fit Line: 0.03847

Maximum Angular Difference: 0.00016

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00182
Angle of Best Fit Line: 0.10444

End 2:
Slope of Best Fit Line 0.00179
Angle of Best Fit Line: 0.10280

Maximum Angular Difference: 0.00164

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	0.00130	1.986	0.00065	0.038	YES
Diameter 2, in (rotated 90°)	0.00320	1.986	0.00161	0.092	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

END 2					
Diameter 1, in	0.00130	1.986	0.00065	0.038	YES
Diameter 2, in (rotated 90°)	0.00310	1.986	0.00156	0.089	YES

Client:	WSP USA, Inc.	Test Date:	12/10/2024
Project Name:	Vtrans Jamaica Bridge 42	Tested By:	jss
Project Location:	Jamaica, VT	Checked By:	smd
GTX #:	320233		
Boring ID:	B545	Reliable dial gauge measurements could not be performed on this rock type. Tolerance measurements were performed using a machinist straightedge and feeler gauges to ASTM specifications.	
Sample ID:	Run 2		
Depth (ft):	44.23-44.61		
Visual Description:	See photographs		

BEST EFFORT END FLATNESS TOLERANCES OF ROCK CORE SPECIMENS TO ASTM D4543

END FLATNESS		
END 1		
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES
END 2		
Diameter 1	Is the maximum gap $\leq \pm 0.001$ in.?	YES
Diameter 2 (rotated 90°)	Is the maximum gap $\leq \pm 0.001$ in.?	YES

End Flatness Tolerance Met? YES

Client:	WSP USA, Inc.
Project Name:	VTrans Jamaica Bridge 42
Project Location:	Jamaica, VT
GTX #:	320233
Test Date:	12/11/2024
Tested By:	gp
Checked By:	smd
Boring ID:	B545
Sample ID:	Run 2
Depth, ft:	44.23-44.61

After cutting and grinding

After break