

Geotechnical Data Report

PERU STP SCRP(4)
Bromley Mountain Ski Resort
Peru, Vermont
PIN: 07b106
July 01, 2014
Terracon Project No. J1145128

Prepared for:
Vermont Agency of Transportation
Montpelier, Vermont

Prepared by:
Terracon Consultants, Inc.
Manchester, New Hampshire

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials

July 01, 2014



Vermont Agency of Transportation
Materials and Research
One National Life Drive
Montpelier, Vermont 05633

Attn: Mr. Christopher Benda, PE
P: [802] 828-6910
E: chris.benda@state.vt.us

Re: Geotechnical Data Report
PERU STP SCRP (4)
Peru, Vermont
PIN: 07b106
July 01, 2014
Terracon Project No. J1145128

Dear Mr. Benda:

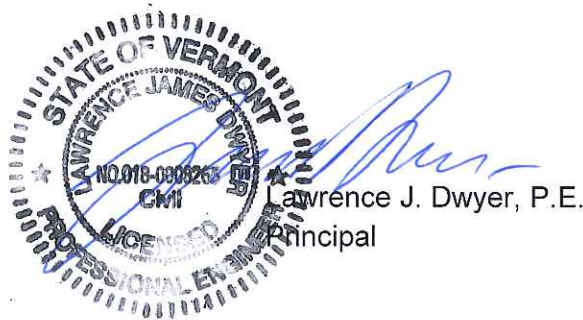
Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal number PJ1140104 dated May 28, 2014. This report presents the findings of the subsurface exploration and laboratory testing for the proposed project as well as preliminary recommendations for the proposed culvert wing walls.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

A handwritten signature in blue ink, appearing to read "Anant Panwalkar".

Anant Panwalkar, P.E.
Senior Project Engineer



Lawrence J. Dwyer, P.E.
Principal

Enclosures
cc: 1 - Client (PDF)
1 - File

Terracon Consultants, Inc. 77 Sundial Ave. Suite 401W Manchester, New Hampshire 03103
P [603] 647 9700 F [603] 647 4432 terracon.com

	Page
EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	2
2.0 PROJECT INFORMATION	2
2.1 Project Description.....	2
2.2 Site Location and Description	3
3.0 SUBSURFACE CONDITIONS	3
3.1 Geology	3
3.2 Typical Profile	3
3.3 Groundwater	4
3.4 Laboratory Testing	4
4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION	4
4.1 Geotechnical Considerations	4
4.2 Wingwall Footing Design Recommendations	5
4.2.1 Design Parameters.....	5
4.2.2 General Construction Considerations	5
4.3 Global Stability Analyses.....	6
4.3.1 Assumptions.....	6
4.4 Findings & Recommendations.....	6
5.0 GENERAL COMMENTS	7

APPENDIX A – FIELD EXPLORATION

Exhibit A-1	Site Location Map
Exhibit A-2	Boring Location Plan and Geologic Cross Section
Exhibit A-3	Field Exploration Description
Exhibit A-4 to A-8	Boring Logs
Exhibit A-9	Pavement Core Photograph

APPENDIX B – LABORATORY TESTING

Exhibit B-1	Laboratory Testing Results
-------------	----------------------------

APPENDIX C – GLOBAL STABILITY ANALYSIS

APPENDIX D – SUPPORTING DOCUMENTS

Exhibit D-2	General Notes
Exhibit D-3	Unified Soil Classification System

**GEOTECHNICAL DATA REPORT
PERU STP SCRP(4),
PERU, VERMONT**

PIN:07b106

Terracon Project No. J1145128

July 01, 2014

EXECUTIVE SUMMARY

A geotechnical engineering data report has been completed for the proposed culvert design and construction in Peru, Vermont. Five test borings were advanced to depths ranging from approximately 22 to 45 feet below existing grade to provide geotechnical information. The following geotechnical considerations for wingwall design and construction were identified and are discussed in the report:

- Site subsurface conditions generally consist of topsoil or asphalt pavement underlain by granular fill underlain by glacial till. The proposed wing walls may be supported on shallow foundations designed for factored bearing resistance of 8 ksf bearing on undisturbed glacial till.
- Global stability analyses indicate a resistance factor of 0.65 (FS=1.54) for the proposed geometry with construction loading. Stability analyses indicate the FS for the proposed slope configuration will satisfy the AASHTO recommended maximum resistance factor of 0.65 (FS=1.54).

This summary should be used in conjunction with the entire report for design purposes. Details are not included or fully developed in this summary; the report must be read in its entirety for a comprehensive understanding of the information contained herein. The section titled GENERAL COMMENTS should be read for an understanding of the report limitations.

1.0 INTRODUCTION

This geotechnical data report presents the results of drilling for the proposed replacement culvert under Route 11 in front of Bromley Mountain Ski Resort in Peru, Vermont. The purpose of our services is to provide potential design-builders with the subsurface information for the proposed culvert replacement.

Our geotechnical engineering scope of services included advancing up to five test borings, designated B-101 thru B-105, to depths identified on the Geotechnical Services Request Form prepared by Vermont Agency of Transportation (VAOT) and perform stability analyses for the proposed wing walls.

The borings were drilled to depths varying from 22 feet to 45 feet. B-101 and B102 were inaccessible due to a steep embankment slope and were relocated upslope from the proposed boring location. Test borings were completed from June 3, 2014 through June 6, 2014 using a mud rotary drilling method. Borings were advanced using both an all-terrain vehicle and truck mounted rotary drill rig, owned and operated by New Hampshire Boring Inc. of Londonderry, New Hampshire. Terracon personnel monitored advancement of the borings within the project site.

The proposed borings were located by a Terracon representative using a scaled site plan provided by VAOT. Ground surface elevations indicated on the boring logs were estimated based on the grading plan provided by VAOT. The locations and elevations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

The boring locations are shown on the Exploration Location Plan and Geologic Cross Section in Appendix A. Logs of the borings along with a Site Location Map are also included in Appendix A.

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Site layout	See Appendix A, Exhibit A-2: Exploration Location Plan and Geologic Cross Section.
Structure	The project consists of replacing existing culverts beneath the Route 11 embankment.
Cut and fill slopes	Cut and fill slopes will depend on the construction method selected.

Item	Description
Finish Elevation	Anticipated to be similar grade as the existing culverts and roadways with minor benches and wing walls constructed for the new culvert, where it outlets into a pond.

2.2 Site Location and Description

Item	Description
Location	The proposed culvert will be located beneath Route 11, in front of the Bromley Mountain Ski Resort. The new culvert alignment starts at the ski lift tower, proceeds beneath the parking lot, and Route 11, and terminates at a detention pond to the south.
Existing improvements	The existing cuverts consist of 42 inch diameter ACCMPs draining to the south.
Current ground cover	Paved roadway with sloping embankment shoulders lined with riprap as well as asphalt parking lot and landscape areas.
Existing topography	Approximate elevation (EI) 1,997 feet at the ski lift tower, and EI 1,930 feet at the detention pond.

3.0 SUBSURFACE CONDITIONS

3.1 Geology

As mapped in the Surficial Geology Map of Vermont (1970), surficial soils at the project site primarily consist of glacial till which is then underlain by bedrock. The till typically blankets the bedrock with thicker deposits in the valleys and thinner deposits on the uplands.

3.2 Typical Profile

Based on the results of the borings, subsurface conditions can be generalized as follows:

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency/ Density
Bituminous Concrete	0.7	N/A	N/A
Imported Fill (Roadway Base/Subbase)	3.5	Silty, fine to coarse sandy gravel, brown.	Dense to very dense.

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency/Density
Embankment Fill (reworked till)	3.0 to 32.0	Fine to coarse sand, silt, and gravel mixture, brown. Pockets of medium dense organic silt and silty gravelly sand encountered in B-102 and B-103.	Medium dense to very dense.
Glacial Till	22.0 to Undetermined	Fine to coarse well graded sand, silt, and gravel, gray-brown.	Dense to very dense.

Conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the exploration logs represent the approximate location of changes in soil types; in situ, the transition between materials may be gradual. Details for each of the explorations can be found on the logs in Appendix A of this report. A picture of the pavement core from B-103 can be found in Exhibit A-9. Interpreted subsurface profile along the culvert centerline is also presented in Appendix A.

3.3 Groundwater

Groundwater was not observed in the borings during drilling because water was introduced in the borings during drilling. However, based on our observations of the samples the borings appeared to be dry at the time of our investigation. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, pond elevation, and other factors not evident at the time the explorations were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. Groundwater level fluctuations should be considered when developing the design and construction plans for the project.

3.4 Laboratory Testing

Laboratory testing was performed on soil samples obtained from the test borings to assist in classification and evaluate engineering properties. Laboratory testing was performed by VTrans staff in the VTrans facility located in Berlin, Vermont. The results of the laboratory tests are presented in Appendix B of this report.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

Based on the subsurface conditions encountered, spread foundations bearing directly on undisturbed glacial till are a suitable foundation option for the proposed wingwalls. We

recommend a geotechnical engineer evaluate the exposed subgrades after excavation to proposed grade before placing concrete, or lean concrete fill. The recommendations for foundation design presented herein were developed using the 2012 *American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications with Interim Revisions*.

4.2 Wingwall Footing Design Recommendations

4.2.1 Design Parameters

Design recommendations for shallow foundations for the proposed wingwalls are presented in the following table.

Description	Value
Foundation Type	Conventional shallow spread footings
Bearing Materials	Undisturbed glacial till
Approximate Footing Elevation	1924 feet
Nominal Bearing Resistance	19 kips per square foot
Bearing Resistance Factor, ϕ_b	0.45 (AASHTO 10.5.5.2.2)
Nominal Sliding Resistance, R_τ	0.7 * Total Vertical Force, V (kips) (AASHTO 10.6.3.4) ⁽¹⁾
Sliding Resistance Factor, ϕ_τ	0.80 (AASHTO 10.5.5.2.2)
Moist Unit Weight, γ_m (Glacial till)	130 pounds per cubic foot
Minimum Footing Embedment below Finished Grade for Frost Protection	48 inches
Settlement	Less than 0.5 inch

1. Nominal sliding resistance for cast-in-place concrete. Multiply cast-in-place value by 0.8 for precast concrete footings.

Foundation excavations should be observed by a geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

4.2.2 General Construction Considerations

Based on an estimated bottom of footing at approximately El 1924 feet and detention pond near El 1,930 feet, cofferdams may be necessary for foundation construction. The individual contractor(s) is responsible for designing and constructing stable, temporary excavations, as required, to maintain stability of the excavation sides and the excavation bottom.

Based upon the encountered subsurface conditions, subgrade soils exposed during construction are anticipated to be relatively stable. However, the subgrade stability may be affected by precipitation, repetitive construction traffic, or other factors.

Construction dewatering should be anticipated for foundation construction. The contractor should select a dewatering method to facilitate footing construction. The use of a crushed stone layer above the glacial till may facilitate dewatering and protect the till subgrade. Crushed stone, if used, should be underlain by a geotextile filter such as Mirafi 160N.

4.3 Global Stability Analyses

4.3.1 Assumptions

The site currently slopes from approximately EL 1,994 feet at the resort parking lot and Route 11 to EL 1928 at the detention pond. The slope is approximately 150 feet long and is overall inclined at about 2.5 horizontal (H) to 1 vertical (V). The existing slope is segmented by two benches within the existing slope with steeper middle slope.

Global stability analyses were performed for the proposed wing wall geometry to evaluate the stability of the overall slope. Our stability analyses were performed using ground surface contours depicted on the site plan provided by VAOT. Soil strength parameters and groundwater conditions were estimated from test boring data and laboratory test results. A uniform surcharge load equal to 250 pounds per square foot (psf) was incorporated into the global stability analyses for construction loading.

The existing conditions were modeled using the *SLIDE Version 5.0* software. The computer program analyzes the stability of a slope using a two-dimensional, limit-equilibrium method. Limit-equilibrium method of slices is used to compute the Factor of Safety (FS) against slope failure under normal loading conditions.

For the analyses, unsaturated conditions were assumed from the test boring data. Soil strength parameters for each soil layer were modeled as presented in the table below.

Soil Layer	Friction Angle (degrees)	Cohesion (psf)	Moist Soil Unit Weight (pcf)
Layer 1 (Roadway Base Fill)	38	0	125
Layer 2 (Embankment Fill: reworked till)	36	0	125
Layer 3 (Glacial Till)	38	0	130

4.4 Findings & Recommendations

Based on *AASHTO LRFD Bridge Design Specifications 2012*, a recommended resistance factor against slope failure under normal loading conditions is 0.65 (FS=1.54) for external stability of a slope containing or supporting a structural element. A structural element as discussed in

AASHTO C11-6.2.3 would be a bridge or pipe arch foundation, a building foundation, a pipeline, a critical utility or a retaining wall. In our opinion, the culvert headwall is a type of retaining wall and therefore we recommend use of resistance factor of 0.65 (FS=1.54) for external stability.

Our global stability analyses indicated the primary mode of failure is a relatively shallow circular failure surface extending from mid-slope to the toe of the slope and beneath the headwall foundation. Our analyses indicates a resistance factor of 0.65 (FS=1.54) against slope failure under construction loading conditions for the proposed slope configuration. A plot of the critical failure surface as well as the soil properties are shown in Appendix C.

Since the existing slope configuration appears suitable, we recommend final ground surface contours above the proposed culvert be restored and surface water at the top of the slope be diverted away from the slope. Disturbed or removed vegetation should be replaced with similar vegetation to provide erosion protection. The finished slope near the detention pond should also be restored with riprap similar to the riprap currently in place.

5.0 GENERAL COMMENTS

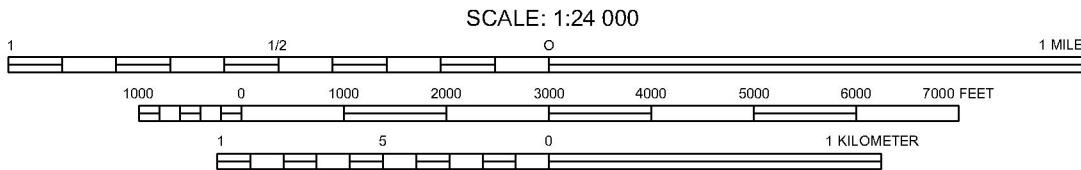
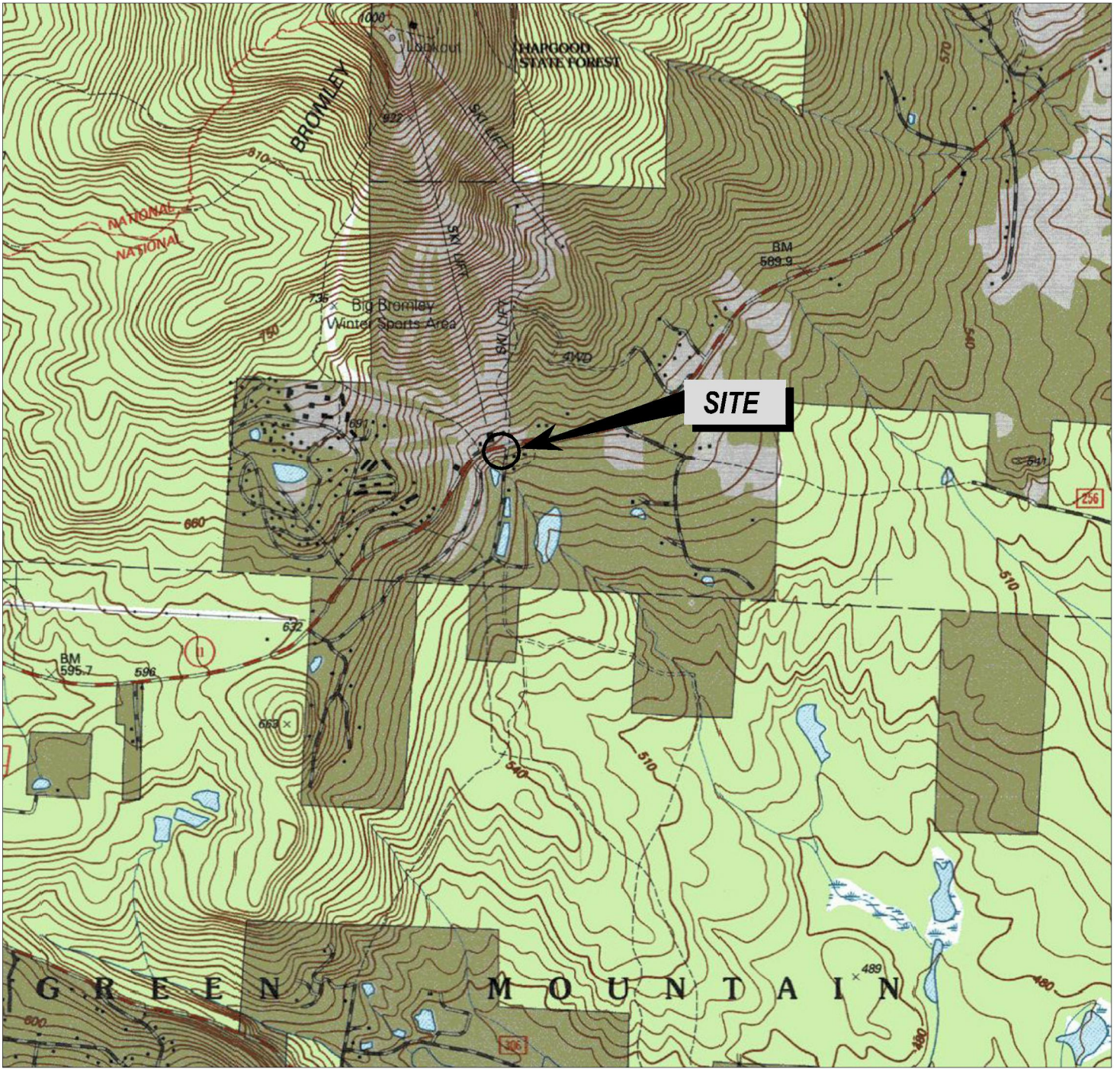
The interpretations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

FIELD EXPLORATION



CONTOUR INTERVAL 6 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION
SOURCE:
USGS PERU, VT
1997

Project Mgr:	ASP	Project No.	J1145128
Drawn By:	MCR	Scale:	AS SHOWN
Checked By:	ASP	File No.	J1145128.dwg
Approved By:	LJD	Date:	June 2014

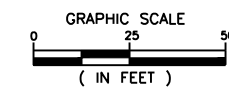
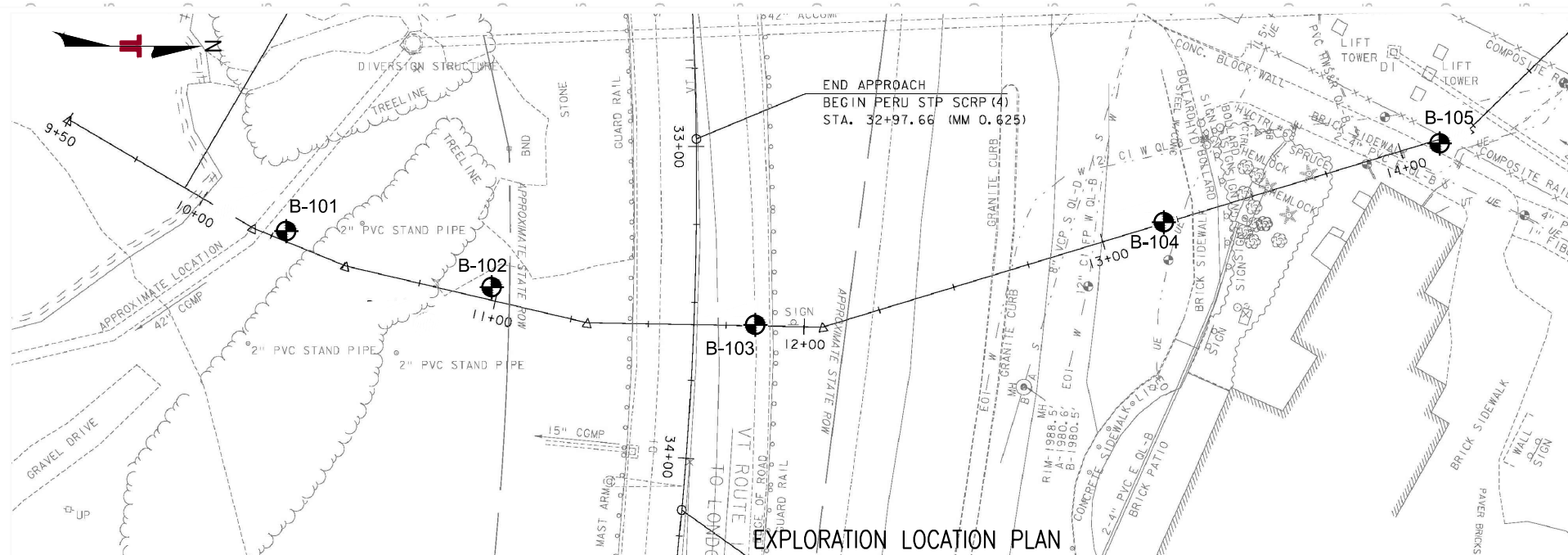
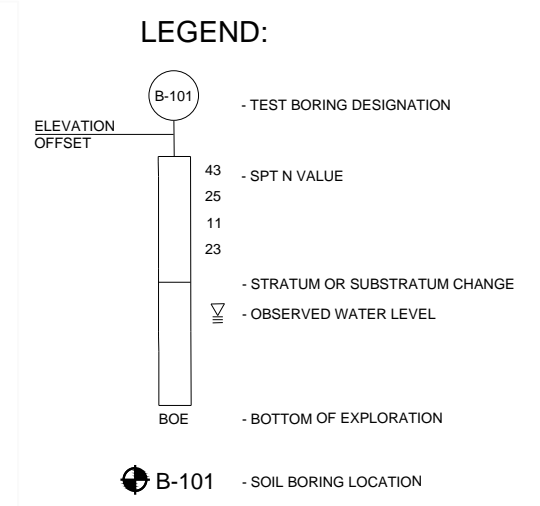
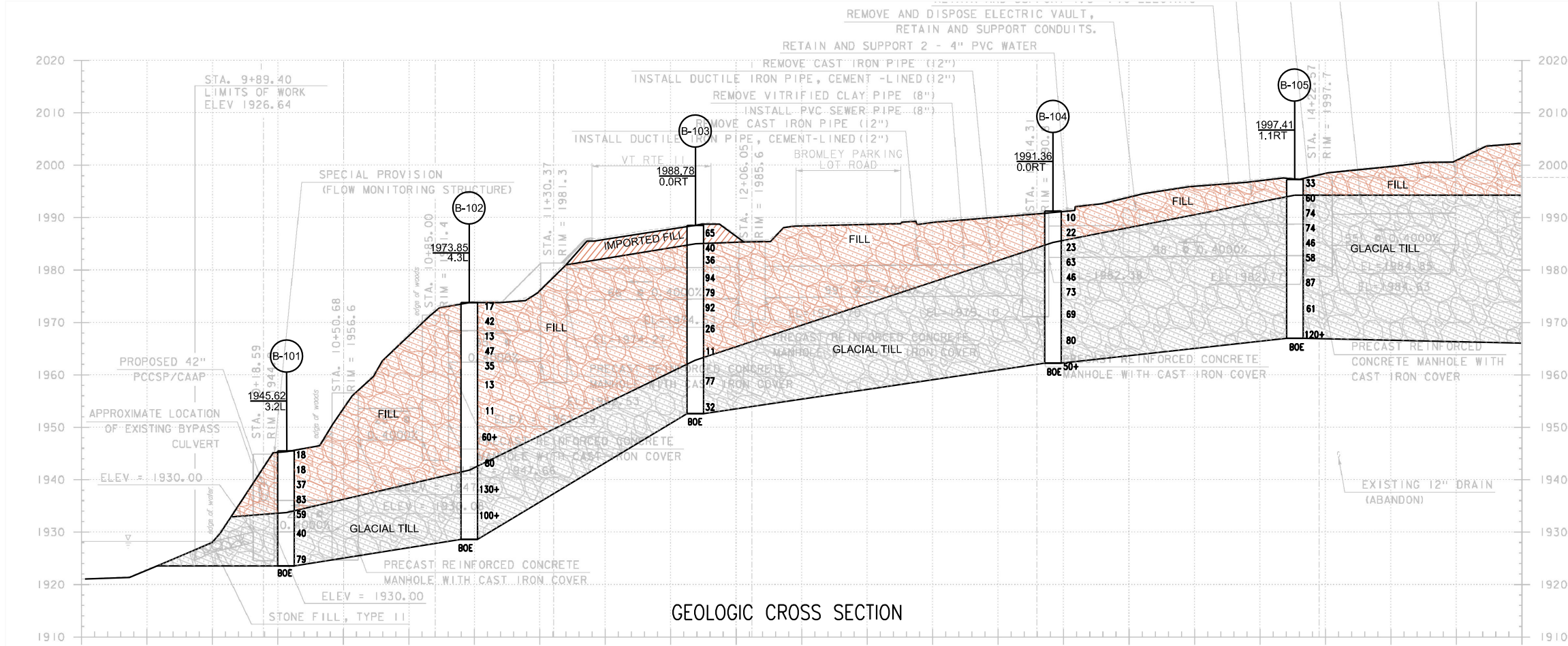
Terracon

77 Sundial Ave. Manchester, NH 03103
PH. (603)647-9700 FAX (603) 647-4432

SITE LOCATION MAP
PERU
PERU, VERMONT
PERU STP SCRP(4)

EXHIBIT
A-1

N:\PROJECTS\2014\J1145128\Working Files\Diagrams-Drawings-Figures\J1145128.DWG



- NOTES:**
1. EXPLORATION LOCATION PLAN WAS BASED ON "PROFILE SHEET 1" PREPARED BY GREEN INTERNATIONAL AFFILIATES, INC. DATED 4/28/2014.
 2. TEST BORINGS SHOWN WERE ADVANCED ON JUNE 3 TO 6, 2014 UNDER THE DIRECTION OF TERRACON WITH EQUIPMENT OWNED AND OPERATED BY NEW HAMPSHIRE BORING, INC. OF DERRY, NEW HAMPSHIRE.
 3. DATA CONCERNING THE VARIOUS STRATA HAVE BEEN INTERPOLATED AT BORING LOCATIONS ONLY. THE STRATIGRAPHY BETWEEN BORINGS MAY VARY FROM THAT SHOWN.
 4. THE APPROXIMATE LOCATIONS OF THE TEST BORINGS SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.
 5. BORINGS ARE PROJECTED ON CULVERT PROFILE ALONG ELEVATION CONTOURS TO MATCH TOP OF BORINGS.
 6. USE OF THIS PLAN IS LIMITED TO THE ILLUSTRATION OF THE APPROXIMATE LOCATION OF THE TEST BORINGS AND OTHER PERTINENT SITE FEATURES. OTHER USE OF THIS PLAN WITHOUT PERMISSION FROM TERRACON IS PROHIBITED.
 7. GEOLOGIC CROSS SECTION IS PREPARED ALONG THE PROPOSED CULVERT STATIONING.

BORING CHART

BORING	STATION (ft)	OFFSET (ft)	NORTHING (ft)	EASTING (ft)
B-101	10+28.6	3.0L	9936.08	50213.63
B-102	10+75.4	4.0L	10003.10	50224.48
B-103	11+84.4	0.0R	10089.25	50229.26
B-104	13+11.8	0.0R	10216.83	50183.59
B-105	14+25.0	1.1R	10298.35	50147.43



STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION



77 Sundial Ave. Manchester, NH 03103
PH. (603)647-9700 FAX (603) 647-4432

EXHIBIT A-2
EXPLORATION LOCATION PLAN AND GEOLOGIC CROSS SECTION

Project Name: PERU
Location: Peru, Vermont
Number: Peru STP SCRP(4)

Field Exploration Description

Five test borings were completed at the site on June 3, 2014 through June 6, 2014 and monitored by Terracon personnel. Borings were advanced using an all-terrain vehicle and truck mounted rotary drill rig and a truck mounted rotary drill rigs, owned and operated by New Hampshire Boring Inc. of Derry, New Hampshire. Borings (B-1 through B-5) were advanced to depths ranging from approximately 22 to 45 feet below existing grade.

The proposed borings were located by a Terracon representative using a scaled site plan provided by Vermont of Agency of Transportation (VAOT). Ground surface elevations indicated on the boring logs were estimated based on the grading plan provided by VAOT. The locations and elevations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

Samples of the soil encountered in the borings were obtained using the split-barrel sampling procedures. In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is used to estimate the in-situ relative density of cohesionless soils and consistency of cohesive soils.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to the VAOT laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled with cuttings prior to the drill crew leaving the site.

A field log of each boring was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.



STATE OF VERMONT
 AGENCY OF TRANSPORTATION
 MATERIALS & RESEARCH SECTION
 SUBSURFACE INFORMATION

BORING LOG

Peru
 STP SCR(4)

Boring No.: B-101
 Page No.: 1 of 1
 Pin No.: 07b106
 Checked By: ASP

Boring Crew: Roger Burn, TT
 Date Started: 6/05/14 Date Finished: 6/05/14
 VTSPG NAD83: N 9936.08 ft E 50213.63 ft
 Station: 10+28.60 Offset: 3.0L
 Ground Elevation: 1945.62 ft

Casing Flushwall Sampler SPT
 Type: Flushwall SPT
 I.D.: 4 in 2 in
 Hammer Wt: 300 lb. 140 lb.
 Hammer Fall: 30 in. 30 in.
 Hammer/Rod Type: Safety
 Rig: D-50 C_E = 1.3

Groundwater Observations		
Date	Depth (ft)	Notes
06/15/14		Dry, after drilling

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
5		A-4, SiSa, Rec. = 1.17 ft, 2-inches topsoil over Fill	6-10-8-16 (18)	23.2	18.6	44.6	36.8
		A-2-4, GrSiSa, Rec. = 0.5 ft, Fill	21-10-8-9 (18)	16.6	23.5	45.7	30.8
		A-2-4, GrSiSa, Rec. = 1.5 ft, Fill	13-17-20-38 (37)	18.8	20.1	50.3	29.6
		A-2-4, SiSa, Rec. = 0.67 ft, Fill	20-33-50-50 (83)	13.6	4.4	68.2	27.4
10		A-1-a, SaGr, Rec. = 0.67 ft, Fill	13-16-43-50/3" (59)	10.7	57.9	34.5	7.6
		(FILL) (TILL)					
15		A-2-4, GrSiSa, Rec. = 0.83 ft, Till	14-15-25-25 (40)	12.6	27.4	37.5	35.1
20		A-4, GrSiSa, Rec. = 1.0 ft, Till	26-40-39-42 (79)	12.2	23.3	38.7	38.0
Hole stopped @ 22.0 ft							
25							
30							
35							
40							
45							

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. C_e is an estimated value.
3. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
4. Ground surface elevations indicated on the boring logs were estimated based on the grading plan provided by VAOT.





STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

Peru
STP SCR(4)

Boring No.: B-102
Page No.: 1 of 1
Pin No.: 07b106
Checked By: ASP

Boring Crew: Roger Burn, TT
Date Started: 6/05/14 Date Finished: 6/05/14
VTSPG NAD83: N 10003.10 ft E 50224.48 ft
Station: 10+75.40 Offset: 4.0L
Ground Elevation: 1973.85 ft

Casing: Flushwall Sampler: SPT
Type: Flushwall I.D.: 4 in 2 in
Hammer Wt: 300 lb. 140 lb.
Hammer Fall: 30 in. 30 in.
Hammer/Rod Type: Safety
Rig: D-50 C_E = 1.3

Groundwater Observations		
Date	Depth (ft)	Notes
06/15/14		Dry, after drilling

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
5		A-1-B, SiGrSa, Rec. = 0.83 ft, 4-inches topsoil over Fill	1-4-13-20 (17)	13.6	27.1	47.9	25.0
		A-2-4, SiGrSa, Rec. = 0.5 ft, Fill	20-16-26-16 (42)	11.2	28.7	43.5	27.8
		Rec. = 0.0 ft, 4.0 ft - 6.0 ft, boulders from 5 to 14 feet, Fill	12-10-3-3 (13)				
10		A-2-4, SiSa, Rec. = 0.33 ft, broken rock, wood pieces, Fill	28-29-18-10 (47)	15.8	13.5	53.5	33.0
		A-1-B, SaGr, Rec. = 0.67 ft, Fill	22-15-20-21 (35)	8.1	50.8	32.1	17.1
15		A-2-4, GrSiSa, Rec. = 1.0 ft, Fill	4-5-8-15 (13)	29.8	23.4	41.5	35.1
		Organic silt with broken rock, Fill, Rec. = 1.2 ft	9-5-6-11 (11)	93.7			
25		Silt with organic matter and broken rock, Fill, Rec. = 0.33 ft	39-60/6" (60+)	29.4			
30		A-4, GrSaSi, Rec. = 0.83 ft, Fill	30-40-40-57 (80)	14.1	29.6	34.2	36.2
		(FILL) (TILL)					
35		A-2-4, SaSiGr, Rec. = 0.07 ft, Till	46-80-50/1" (130+)	12.7	38.2	28.4	33.4
40		A-2-4, SaSiGr, Rec. = 0.5 ft, Till	51-100/5" (100+)	13.8	36.8	30.2	33.0
45		A-1-B, SiSaGr, Rec. = 0.2 ft, Till	100/3"	18.1	39.5	38.4	22.1

Hole stopped @ 45.3 ft

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. C_e is an estimated value.
3. Water level readings have been made at times and under conditions stated.
Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
4. Ground surface elevations indicated on the boring logs were estimated based on the grading plan provided by VAOT.



2010 COPY J1145128.GPJ VERMONT AOT.GDT 7/2/14



STATE OF VERMONT
 AGENCY OF TRANSPORTATION
 MATERIALS & RESEARCH SECTION
 SUBSURFACE INFORMATION

BORING LOG

Peru
 STP SCR(4)

Boring No.: B-103
 Page No.: 1 of 1
 Pin No.: 07b106
 Checked By: ASP

Boring Crew: Peter Labossion, TT
 Date Started: 6/04/14 Date Finished: 6/04/14
 VTSPG NAD83: N 10089.25 ft E 50229.26 ft
 Station: 11+84.40 Offset: 0.0R
 Ground Elevation: 1988.78 ft

Casing: Flushwall Sampler: SPT
 I.D.: 4 in 2 in
 Hammer Wt: 300 lb. 140 lb.
 Hammer Fall: 30 in. 30 in.
 Hammer/Rod Type: Cathead
 Rig: B-47 C_E = 1.0

Groundwater Observations		
Date	Depth (ft)	Notes
06/14/14		Dry, after drilling

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		8-inches bituminous asphalt pavement					
		A-1-B, SaGr, Rec. = 0.67 ft, Fill	16-26-29-31 (65)	4.7	53.4	28.0	18.6
		A-2-4, SiSaGr, Rec. = 0.67 ft, Fill	26-24-16-18 (40)	7.7	39.1	30.6	30.3
		(IMPORTED FILL)					
		(FILL)					
5		A-4, GrSaSi, Rec. = 1.0 ft, Fill	11-16-20-20 (36)	11.8	26.0	34.9	39.1
		A-4, GrSaSi, Rec. = 0.83 ft, drill rig rocking and grinding noises, Fill	20-34-60-75 (94)	9.9	28.1	35.4	36.5
10		A-4, SaSi, Rec. = 1.17 ft, drill rig rocking and grinding noises, Fill	35-39-40-44 (79)	11.4	18.8	39.2	42.0
15		A-2-4, GrSiSa, Rec. = 1.0 ft, Fill	38-42-50-60 (92)	11.5	28.2	40.0	31.8
20		A-1-B, SaGr, Rec. = 0.33 ft, Fill	14-12-14-11 (26)	9.1	48.7	32.0	19.3
25		A-2-4, GrSiSa, Rec. = 0.5 ft, Fill	5-5-6-8 (11)	16.5	31.8	34.5	33.7
		(FILL)					
		(TILL)					
30		A-1-B, SiSaGr, Rec. = 1.0 ft, Till	16-36-41-39 (77)	12.6	41.8	38.0	20.2
35		A-1-B, SiSaGr, Rec. = 0.83 ft, Till	16-16-16-17 (32)	11.2	46.3	29.2	24.5
		Hole stopped @ 36.0 ft					
40							
45							

2010 COPY J1145128.GPJ VERMONT AOT.GDT 7/2/14

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. C_e is an estimated value.
 3. Water level readings have been made at times and under conditions stated.
 Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
 4. Ground surface elevations indicated on the boring logs were estimated based on the grading plan provided by VAOT.





STATE OF VERMONT
 AGENCY OF TRANSPORTATION
 MATERIALS & RESEARCH SECTION
 SUBSURFACE INFORMATION

BORING LOG

Peru
 STP SCR(4)

Boring No.: B-104
 Page No.: 1 of 1
 Pin No.: 07b106
 Checked By: ASP

Boring Crew: Peter Labossion, TT
 Date Started: 6/03/14 Date Finished: 6/03/14
 VTSPG NAD83: N 10216.83 ft E 50183.59 ft
 Station: 13+11.80 Offset: 0.0R
 Ground Elevation: 1991.36 ft

Casing: Flushwall Sampler: SPT
 Type: Flushwall I.D.: 4 in 2 in
 Hammer Wt: 300 lb. 140 lb.
 Hammer Fall: 30 in. 30 in.
 Hammer/Rod Type: Cathead
 Rig: B-47 C_E = 1.0

Groundwater Observations		
Date	Depth (ft)	Notes
06/13/14		Dry, after drilling

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		2-inches asphalt pavement					
		A-2-4, SiGrSa, Rec. = 0.67 ft, Fill	10-7-3-5 (10)	9.7	29.0	42.6	28.4
		Rec. = 0.2 ft, 2.5 ft - 4.5 ft, Fill	11-10-12-14 (22)	6.2			
5		A-2-4, SiGrSa, Rec. = 0.83 ft, Fill	9-12-11-15 (23)	10.8	34.0	39.6	26.4
		(FILL) (TILL)	21-23-40-25 (63)	15.1	23.3	42.8	33.9
		A-2-4, GrSiSa, Rec. = 1.17 ft, drill rig rocking and grinding noises, Till					
10		A-2-4, SiGrSa, Rec. = 1.0 ft, Till	19-19-27-27 (46)	11.5	30.3	43.8	25.9
15		A-2-4, SaGrSi, Rec. = 0.67 ft, Till	30-30-43-52 (73)	10.6	33.9	31.0	35.1
		Tough drilling at 18 feet					
20		A-2-4, GrSiSa, Rec. = 0.25 ft, Till	22-32-37-56 (69)	20.9	32.0	35.1	32.9
25		A-2-4, GrSiSa, Rec. = 1.17 ft, Till, weathered shale in the tip	38-38-42-52 (80)	12.6	28.0	37.6	34.4
30		Weathered shale, Rec. = 0.0 ft Hole stopped @ 29.1 ft	50/1" (50+)				
35							
40							
45							

2010 COPY J1145128.GPJ VERMONT AOT.GDT 7/2/14

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. C_e is an estimated value.
 3. Water level readings have been made at times and under conditions stated.
 Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
 4. Ground surface elevations indicated on the boring logs were estimated based on the grading plan provided by VAOT.





STATE OF VERMONT
 AGENCY OF TRANSPORTATION
 MATERIALS & RESEARCH SECTION
 SUBSURFACE INFORMATION

BORING LOG

Peru
 STP SCR(4)

Boring No.: B-105
 Page No.: 1 of 1
 Pin No.: 07b106
 Checked By: ASP

Boring Crew: Peter Labossion, TT
 Date Started: 6/03/14 Date Finished: 6/03/14
 VTSPG NAD83: N 10298.35 ft E 50147.43 ft
 Station: 14+25.00 Offset: 1.1R
 Ground Elevation: 1997.41 ft

Casing: Flushwall Sampler: SPT
 I.D.: 4 in 2 in
 Hammer Wt: 300 lb. 140 lb.
 Hammer Fall: 30 in. 30 in.
 Hammer/Rod Type: Cathead
 Rig: B-47 C_E = 1.0

Groundwater Observations		
Date	Depth (ft)	Notes
06/13/14		Dry, after drilling

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
5		A-1-B, SiGrSa, Rec. = 0.83 ft, Fill	11-15-18-16	7.9	39.4	39.6	21.0
		A-2-4, SiGrSa, Rec. = 1.0 ft, Fill	(33)	11.1	34.1	39.5	26.4
		(FILL)	12-20-40-42				
		(TILL)	(60)				
		A-4, SiSa, Rec. = 1.17 ft, drill rig rocking and grinding noises, Till	24-40-34-38	13.6	17.4	41.9	40.7
		A-4, GrSaSi, Rec. = 1.0 ft, Till	(74)	14.3	21.3	38.2	40.5
			42-34-40-38				
			(74)				
10		A-2-4, SaSiGr, Rec. = 0.67 ft, roller bit grinding on cobbles/gravel, Till	16-16-30-47	10.8	40.6	29.3	30.1
			(46)				
15		A-2-4, SiSaGr, Rec. = 0.67 ft, Till	30-30-28-39	11.4	35.0	33.4	31.6
			(58)				
20		A-4, GrSaSi, Rec. = 1.0 ft, Till	24-45-42-45	10.8	23.5	36.7	39.8
			(87)				
25		A-4, GrSaSi, Rec. = 1.0 ft, Till	23-29-32-44	10.9	21.8	37.0	41.2
			(61)				
30		A-4, GrSaSi, Rec. = 1.0 ft, Till	38-40-80/5"	11.4	25.7	32.7	41.6
		Hole stopped @ 30.4 ft	(120+)				
35							
40							
45							

2010 COPY J1145128.GPJ VERMONT AOT.GDT 7/2/14

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. C_e is an estimated value.
 3. Water level readings have been made at times and under conditions stated.
 Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
 4. Ground surface elevations indicated on the boring logs were estimated based on the grading plan provided by VAOT.





Project Mngr: ASP
Drawn By: ASP
Checked By: LJD
Approved By:

Project No. J1145128
Scale: As shown.
File No. Exhibit A9
Date: 07/01/14

Terracon
77 Sundial Ave. Manchester, NH 03103
PH. (603) 647 9700 FAX (603) 647 4432

Pavement Core - B103
PERU STP SCRP (4)
Peru, VT

EXHIBIT
A9

APPENDIX B

LABORATORY TEST RESULTS

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140882 Corrected copy: N/A Report Date: 6/9/2014 2:38:30 P
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/6/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-101 Depth: 0 FT to: 2 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-1

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	97.2%
4.75 mm (#4):	90.2%
2.00 mm (#10):	81.4%
850 µm (#20):	73.2%
425 µm (#40):	64.8%
250 µm (#60):	57.3%
150 µm (#100):	50.0%
75 µm (#200):	36.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits

T-265 Moisture content: 23.2%

T-89 Liquid Limit:

T-90 Plastic Limit:

T-90 Plasticity Index: NP

Moisture Density

Test method: T-180 Method:

Maximum density: pcf

Optimum moisture:


T-100 Specific Gravity:

Gr: 18.6% D2487: SM

Sa: 44.6% M145: A-4 Silty Sand

Si: 36.8%

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140882

Corrected copy: N/A

Report Date: 6/9/2014 2:38:36 P

Project: PERU

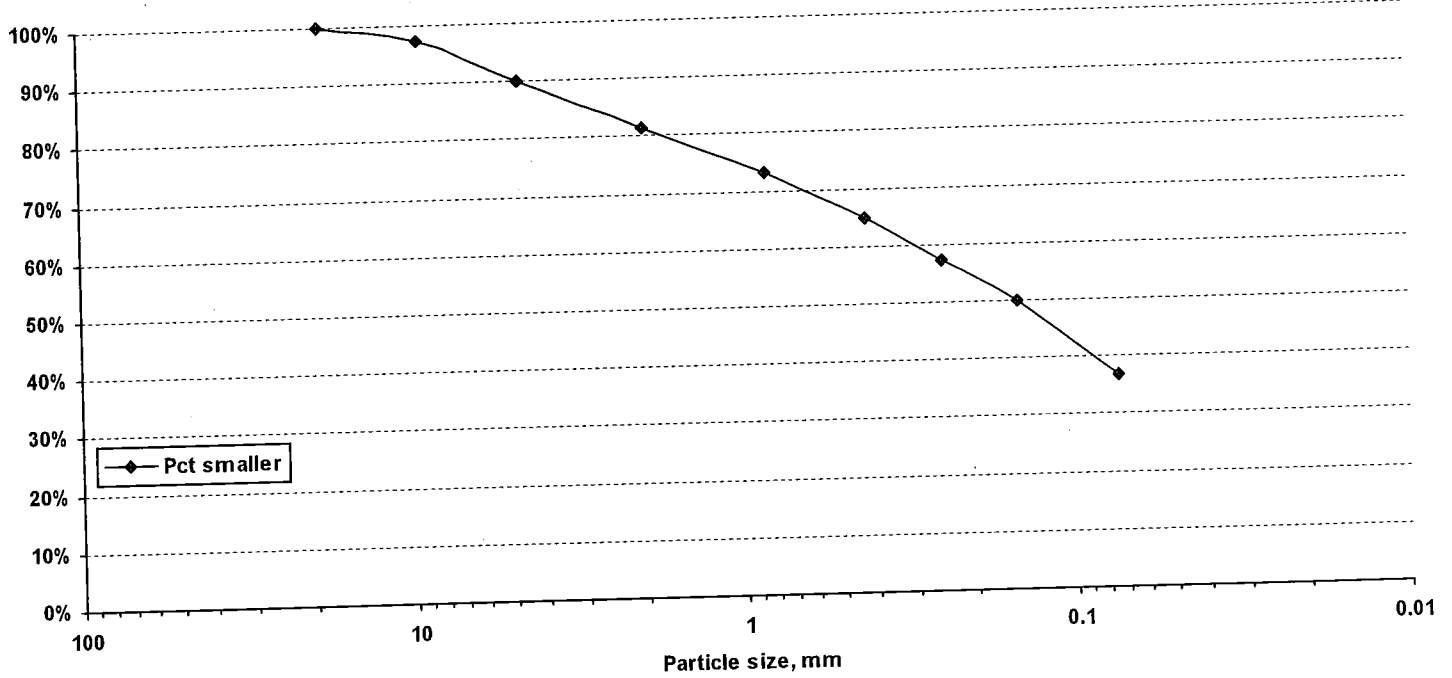
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-101

Depth: 0 FT - 2 FT

T-88 Particle size analysis



Vermont Agency of Transportation
 Materials and Research Section
 1 National Life Drive
 Montpelier, VT 05633-5001

Distribution list
 TERRACON
 T. ELIASSEN
 J. TOUCHETTE

Report on Soil Sample

Lab number: E140883

Corrected copy: N/A

Report Date: 6/9/2014 2:40:48 P

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/6/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset: Hole: B-101 Depth: 2 FT to: 4 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-2

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	90.7%
9.5 mm (3/8"):	86.9%
4.75 mm (#4):	82.7%
2.00 mm (#10):	76.5%
850 µm (#20):	67.2%
425 µm (#40):	58.7%
250 µm (#60):	51.2%
150 µm (#100):	43.3%
75 µm (#200):	30.8%

Limits	
T-265 Moisture content:	16.6%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP

Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	23.5%
Sa:	45.7%
Si:	30.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Gravelly Silty Sand

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140883

Corrected copy: N/A

Report Date: 6/9/2014 2:40:52 P

Project: PERU

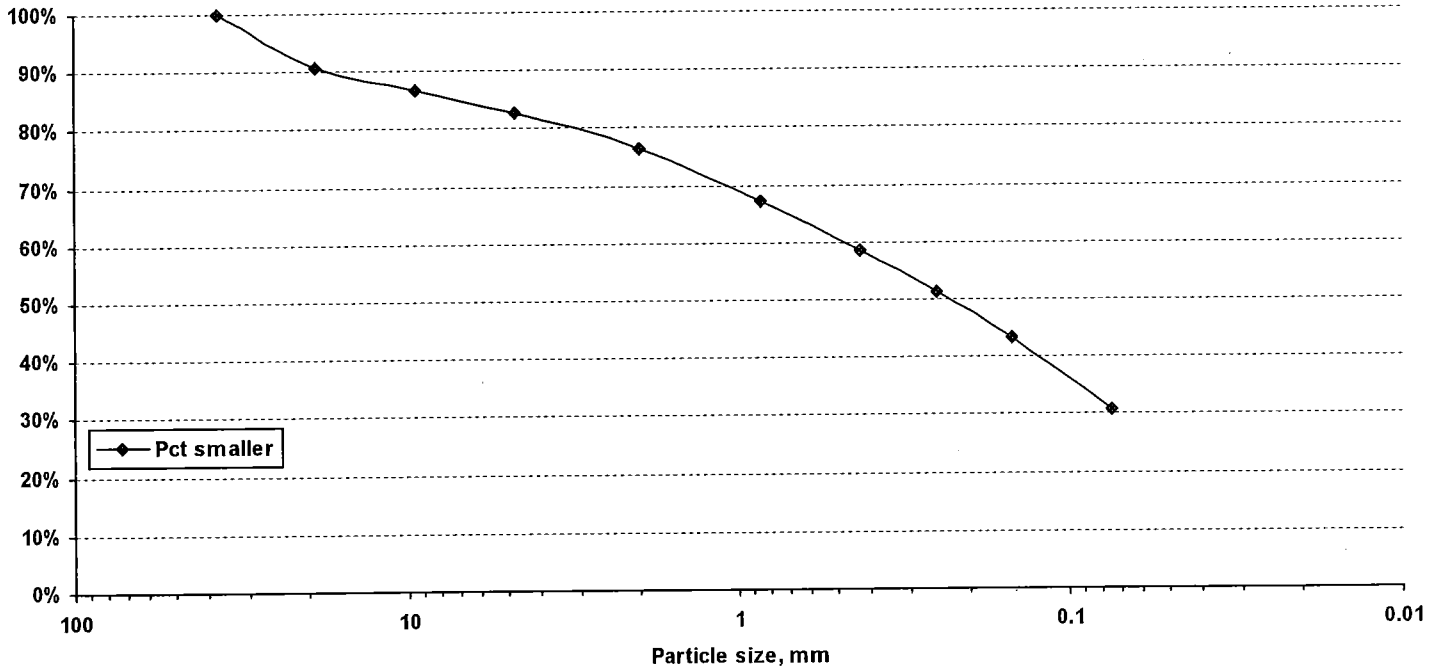
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-101

Depth: 2 FT - 4 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140884

Corrected copy: N/A

Report Date: 6/9/2014 2:43:07 P

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/6/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset:

Hole: B-101

Depth:

4 FT to: 6 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-3

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	98.3%
9.5 mm (3/8"):	94.1%
4.75 mm (#4):	87.5%
2.00 mm (#10):	79.9%
850 µm (#20):	68.8%
425 µm (#40):	59.0%
250 µm (#60):	50.4%
150 µm (#100):	42.5%
75 µm (#200):	29.6%

Limits	
T-265 Moisture content:	18.8%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	20.1%
Sa:	50.3%
Si:	29.6%
D2487:	SM
M145:	A-2-4
Gravelly Silty Sand	

Hydrometer Analysis

Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140884

Corrected copy: N/A

Report Date: 6/9/2014 2:43:12 P

Project: PERU

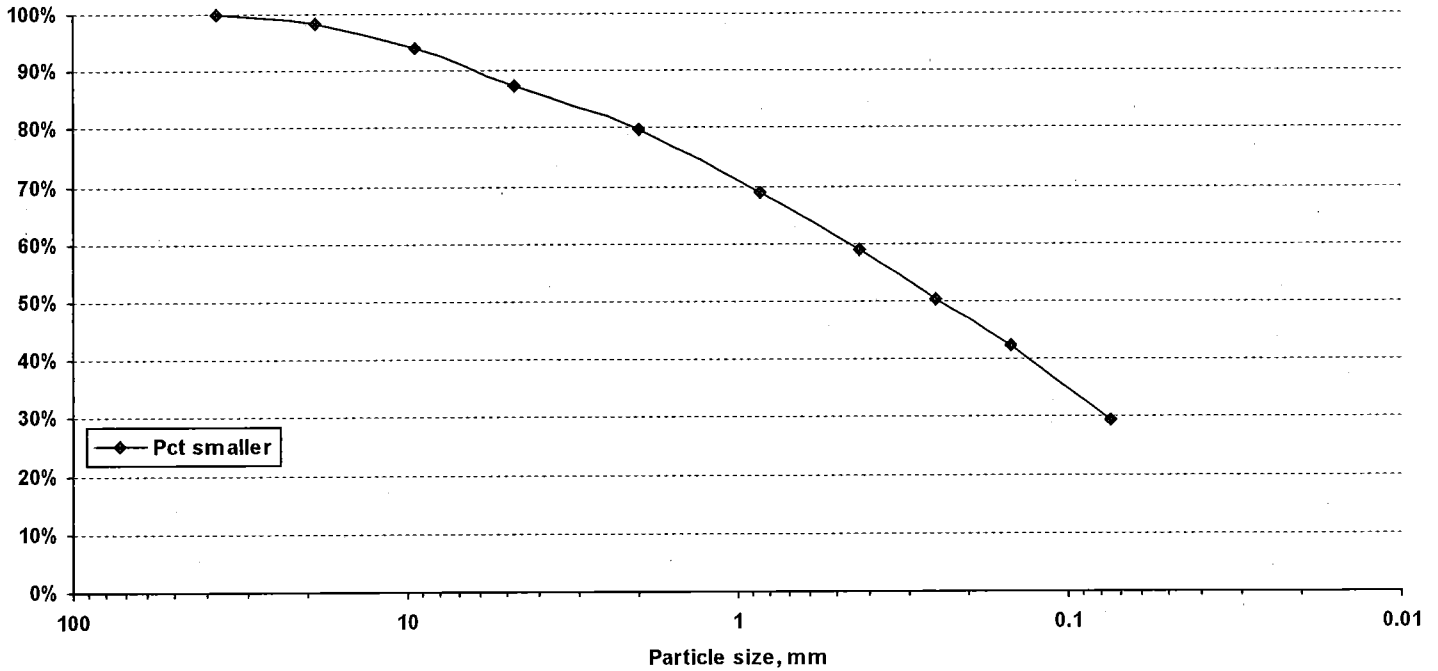
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-101

Depth: 4 FT - 6 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140885 Corrected copy: N/A Report Date: 6/9/2014 2:44:40 P
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/6/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-101 Depth: 6 FT to: 8 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-4

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	99.5%
4.75 mm (#4):	99.0%
2.00 mm (#10):	95.6%
850 µm (#20):	83.3%
425 µm (#40):	69.0%
250 µm (#60):	56.4%
150 µm (#100):	44.1%
75 µm (#200):	27.4%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	13.6%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 4.4%	D2487: SM
Sa: 68.2%	M145: A-2-4 Silty Sand
Si: 27.4%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140885

Corrected copy: N/A

Report Date: 6/9/2014 2:44:44 P

Project: PERU

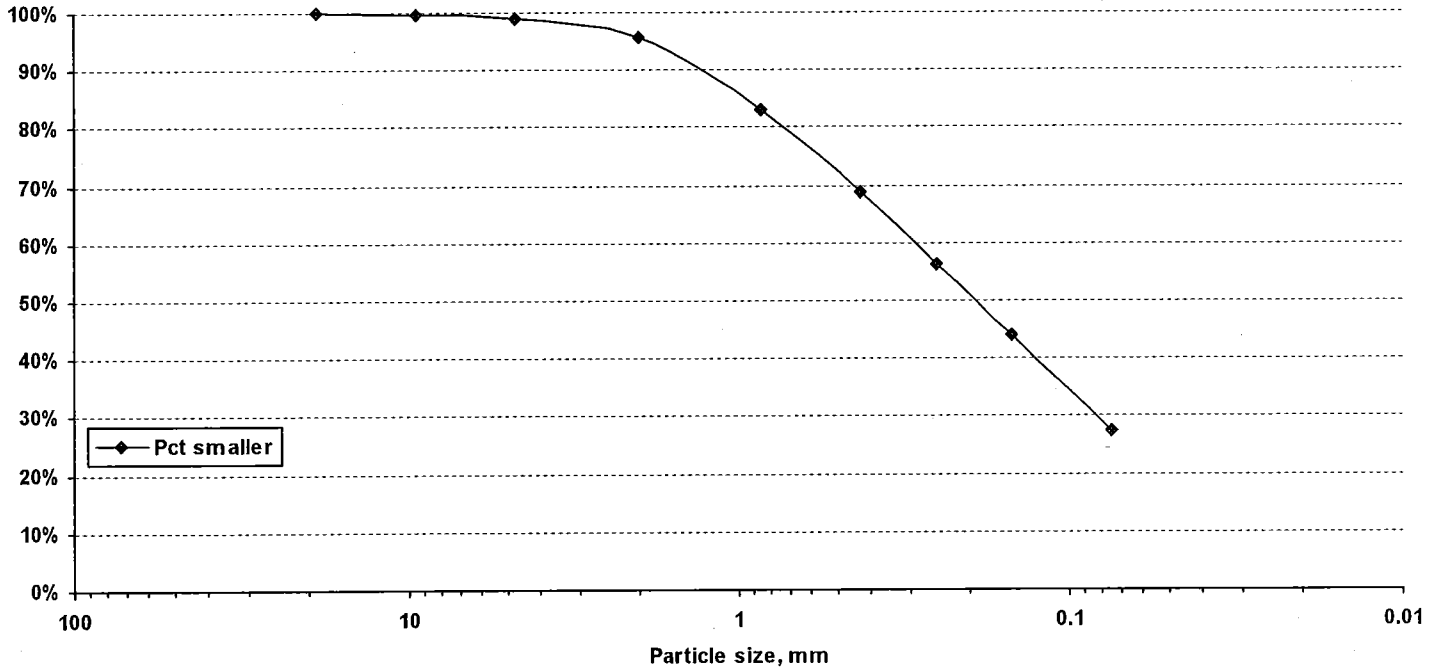
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-101

Depth: 6 FT - 8 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140886 Corrected copy: N/A Report Date: 6/9/2014 2:46:34 P
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/6/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-101 Depth: 10 FT to: 11.8 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-5

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	97.6%
9.5 mm (3/8"):	88.5%
4.75 mm (#4):	68.4%
2.00 mm (#10):	42.1%
850 µm (#20):	25.6%
425 µm (#40):	17.1%
250 µm (#60):	13.2%
150 µm (#100):	10.7%
75 µm (#200):	7.6%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits
T-265 Moisture content: 10.7%
T-89 Liquid Limit:
T-90 Plastic Limit:
T-90 Plasticity Index: NP
Moisture Density
Test method: T-180 Method:
Maximum density: pcf
Optimum moisture:
T-100 Specific Gravity:
Gr: 57.9% D2487: SP-SM
Sa: 34.5% M145: A-1-a Sandy Gravel
Si: 7.6%

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140886

Corrected copy: N/A

Report Date: 6/9/2014 2:46:38 P

Project: PERU

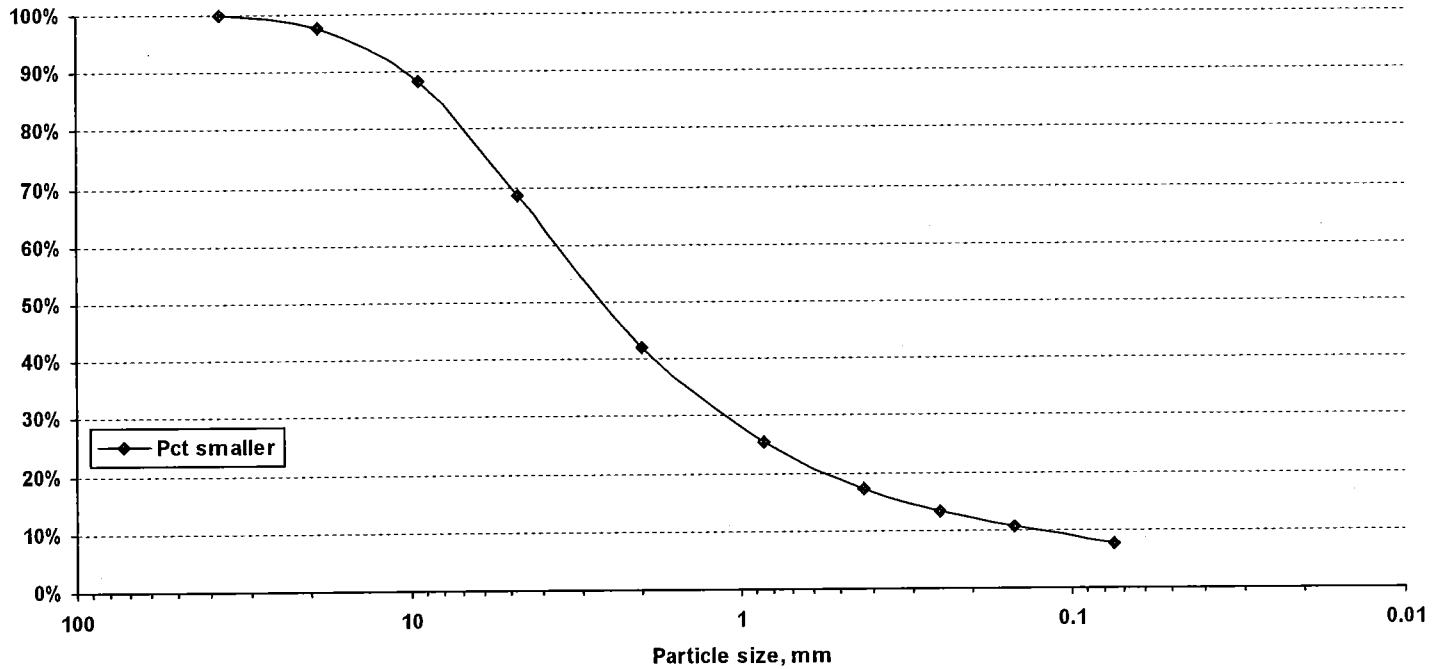
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-101

Depth: 10 FT - 11.8 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140887

Corrected copy: N/A

Report Date: 6/9/2014 2:48:33 P

Project: PERU

Number: STP SCR(4)

Site: VT-11 CULVERT

Date sampled: 6/6/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE

Station: Offset: Hole: B-101 Depth: 15 FT to: 17 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-6

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	92.2%
9.5 mm (3/8"):	83.1%
4.75 mm (#4):	78.7%
2.00 mm (#10):	72.6%
850 µm (#20):	63.9%
425 µm (#40):	56.4%
250 µm (#60):	50.7%
150 µm (#100):	44.9%
75 µm (#200):	35.1%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	12.6%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	27.4%
Sa:	37.6%
Si:	35.1%
D2487:	SM
M145:	A-2-4
Gravelly Silty Sand	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140887

Corrected copy: N/A

Report Date: 6/9/2014 2:48:37 P

Project: PERU

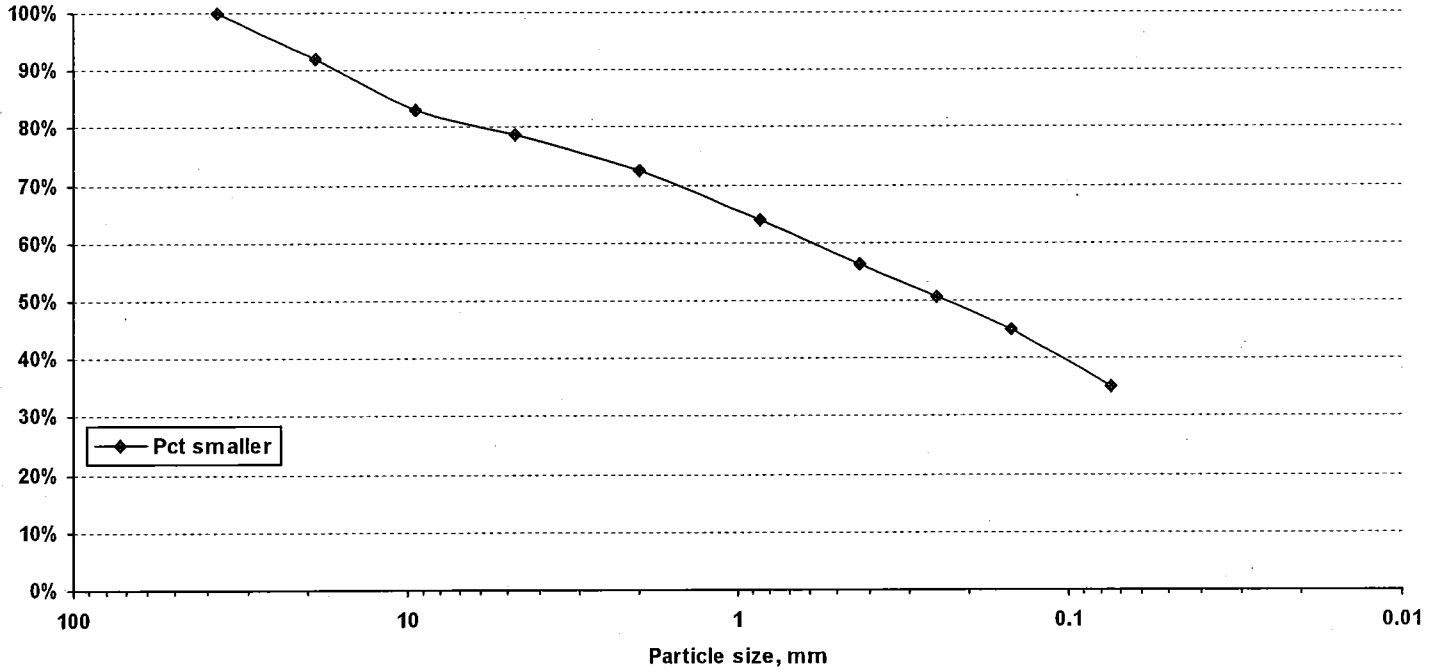
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-101

Depth: 15 FT - 17 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140888

Corrected copy: N/A

Report Date: 6/9/2014 2:50:23 P

Project: PERU

Number: STP SCR(4)

Site: VT-11 CULVERT

Date sampled: 6/6/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE

Station: Offset: Hole: B-101 Depth: 20 FT to: 22 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: MC, GS

Comment: S-7

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	98.5%
9.5 mm (3/8"):	90.9%
4.75 mm (#4):	82.7%
2.00 mm (#10):	76.7%
850 µm (#20):	68.4%
425 µm (#40):	61.4%
250 µm (#60):	55.4%
150 µm (#100):	49.3%
75 µm (#200):	38.0%

Limits	
T-265 Moisture content:	12.2%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP

Moisture Density		
Test method:	T-180	Method:
Maximum density:		pcf
Optimum moisture:		
T-100 Specific Gravity:		
Gr:	23.3%	D2487: SM
Sa:	38.7%	M145: A-4 Gravelly Silty Sand
Si:	38.0%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140888

Corrected copy: N/A

Report Date: 6/9/2014 2:50:26 P

Project: PERU

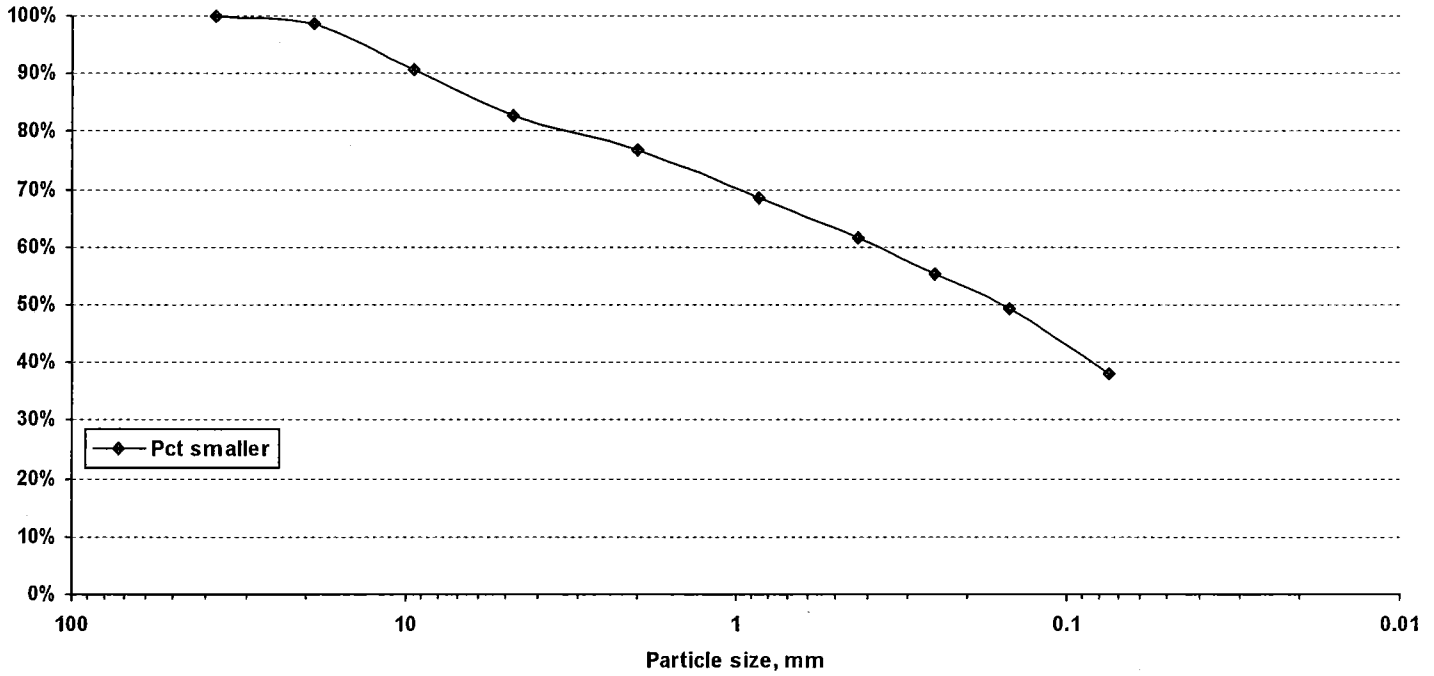
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-101

Depth: 20 FT - 22 FT

T-88 Particle size analysis



Vermont Agency of Transportation
 Materials and Research Section
 1 National Life Drive
 Montpelier, VT 05633-5001

Distribution list
 TERRACON
 T. ELIASSEN
 J. TOUCHETTE

Report on Soil Sample

Lab number: E140889

Corrected copy: N/A

Report Date: 6/9/2014 2:52:11 P

Project: PERU

Number: STP SCR(4)

Site: VT-11 CULVERT

Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset: Hole: B-102 Depth: 0 FT to: 2 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-1

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	96.3%
9.5 mm (3/8"):	91.8%
4.75 mm (#4):	83.1%
2.00 mm (#10):	72.9%
850 µm (#20):	60.8%
425 µm (#40):	49.8%
250 µm (#60):	42.0%
150 µm (#100):	35.2%
75 µm (#200):	25.0%

Limits	
T-265 Moisture content:	13.6%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 27.1%	D2487: SM
Sa: 47.9%	M145: A-1-b Silty Gravelly Sand
Si: 25.0%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140889

Corrected copy: N/A

Report Date: 6/9/2014 2:52:14 P

Project: PERU

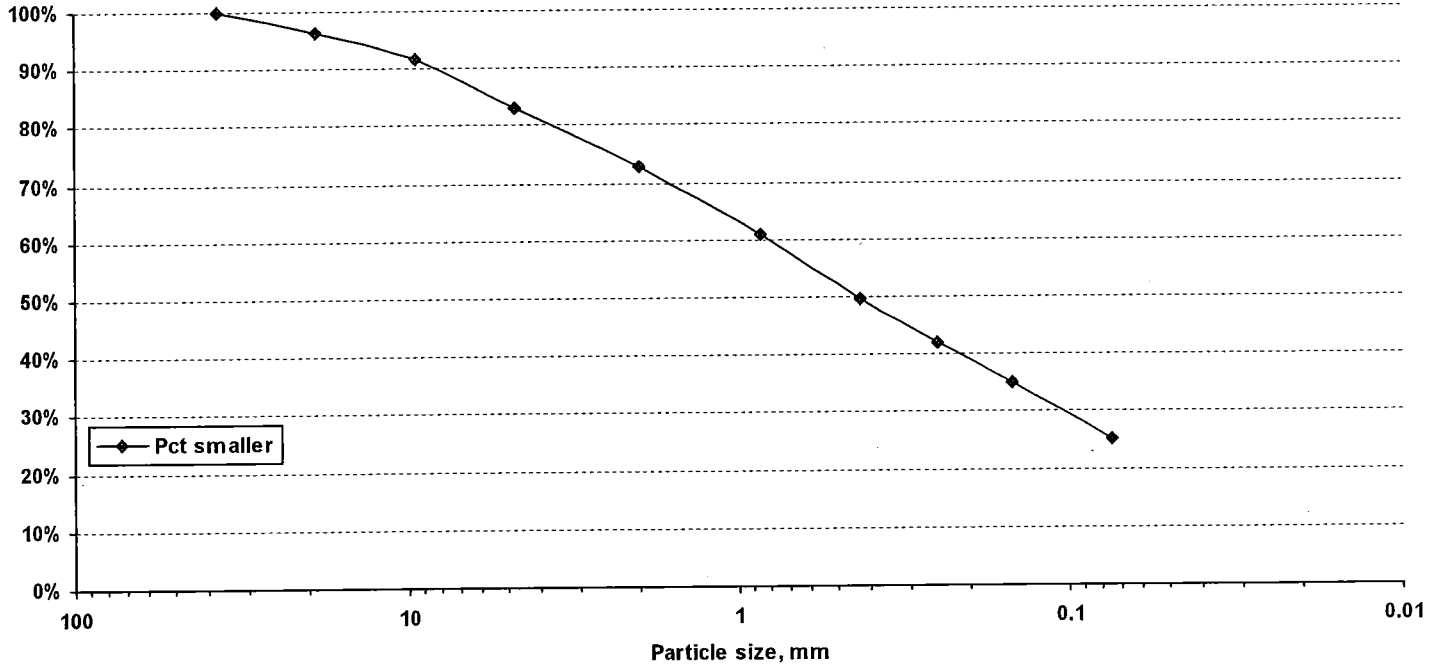
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 0 FT - 2 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140890

Corrected copy: N/A

Report Date: 6/9/2014 2:53:49 P

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset:

Hole: B-102

Depth:

2 FT to: 4 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-2

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	92.8%
9.5 mm (3/8"):	86.4%
4.75 mm (#4):	80.2%
2.00 mm (#10):	71.3%
850 µm (#20):	60.7%
425 µm (#40):	51.6%
250 µm (#60):	44.2%
150 µm (#100):	37.8%
75 µm (#200):	27.8%

Limits	
T-265 Moisture content:	11.2%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	28.7%
Sa:	43.5%
Si:	27.8%
D2487:	SM
M145:	A-2-4
Silty Gravelly Sand	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140890

Corrected copy: N/A

Report Date: 6/9/2014 2:53:53 P

Project: PERU

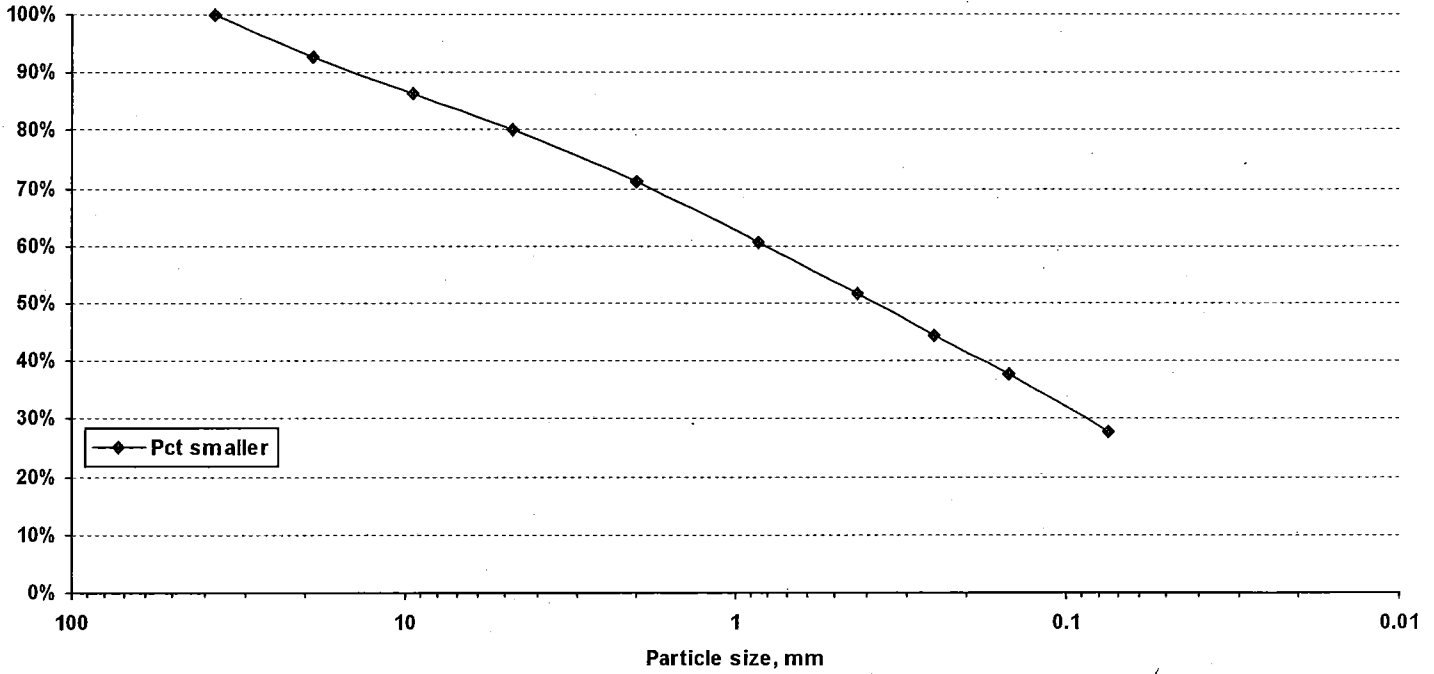
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 2 FT - 4 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140891

Corrected copy: N/A

Report Date: 6/9/2014 2:55:31 P

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset:

Hole: B-102

Depth:

6 FT to: 8 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-4

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	99.1%
4.75 mm (#4):	94.3%
2.00 mm (#10):	86.5%
850 µm (#20):	76.5%
425 µm (#40):	66.8%
250 µm (#60):	57.7%
150 µm (#100):	48.2%
75 µm (#200):	33.0%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	15.8%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	13.5% D2487: SM
Sa:	53.5% M145: A-2-4 Silty Sand
Si:	33.0%

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140891

Corrected copy: N/A

Report Date: 6/9/2014 2:55:34 P

Project: PERU

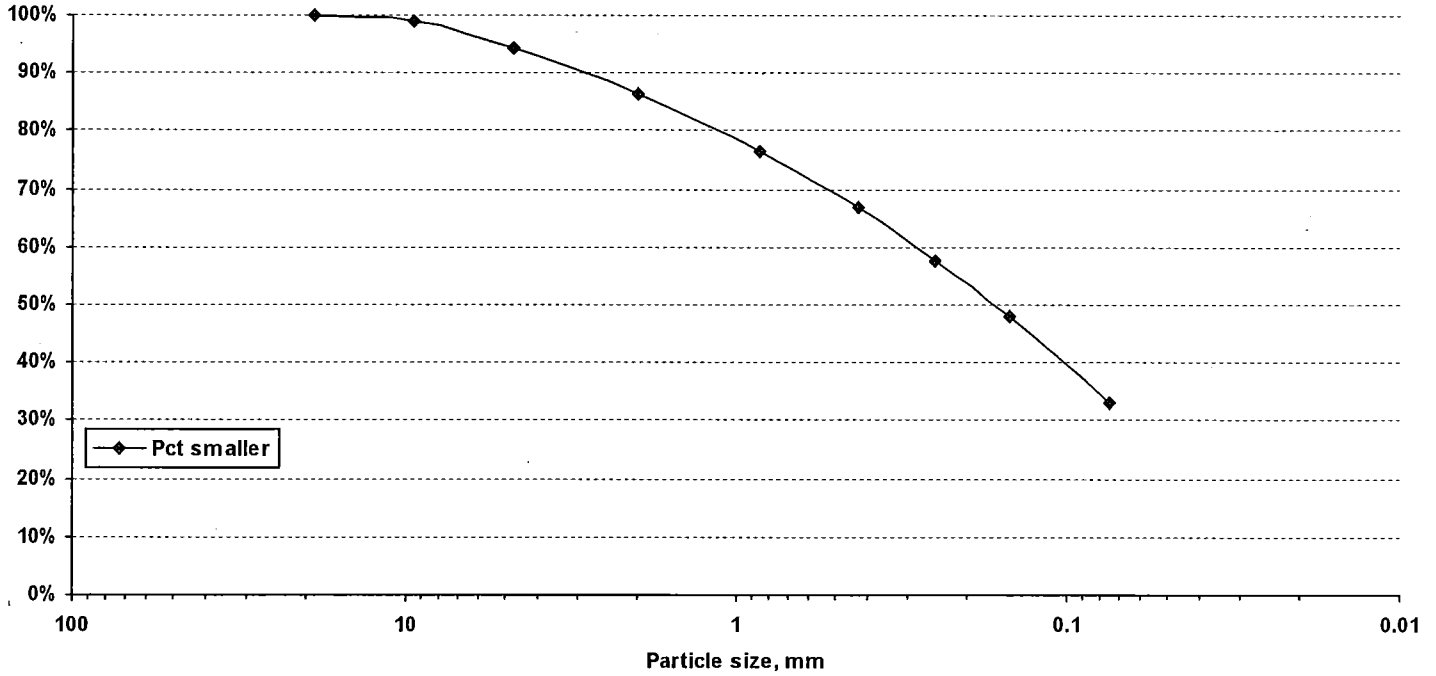
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 6 FT - 8 FT

T-88 Particle size analysis



**Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001**

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140892 **Corrected copy:** N/A **Report Date:** 6/9/2014 2:58:26 P
Project: PERU **Number:** STP SCRP(4) **Site:** VT-11 CULVERT
Date sampled: 6/5/2014 **Received:** 6/6/2014 **Tested:** 6/6/2014 **Tested by:** J. TOUCHETTE
Station: **Offset:** **Hole:** B-102 **Depth:** 8 FT to: 10 FT
Field description:
Submitted by: TERRACON **Address:**
Sample type: SPLIT BARREL **Quantity:**
Sample source/Outside agency name:
Location used: **Examined for:** MC, GS
Comment: S-5

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	76.4%
9.5 mm (3/8"):	63.5%
4.75 mm (#4):	56.9%
2.00 mm (#10):	49.2%
850 µm (#20):	41.8%
425 µm (#40):	35.8%
250 µm (#60):	30.6%
150 µm (#100):	25.4%
75 µm (#200):	17.1%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	8.1%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method: T-180	Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 50.8%	D2487: GM
Sa: 32.2%	M145: A-1-b Sandy Gravel
Si: 17.1%	

Comments: LAB NOTE: BROKEN ROCK & WOOD PIECES WERE WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140892

Corrected copy: N/A

Report Date: 6/9/2014 2:58:30 P

Project: PERU

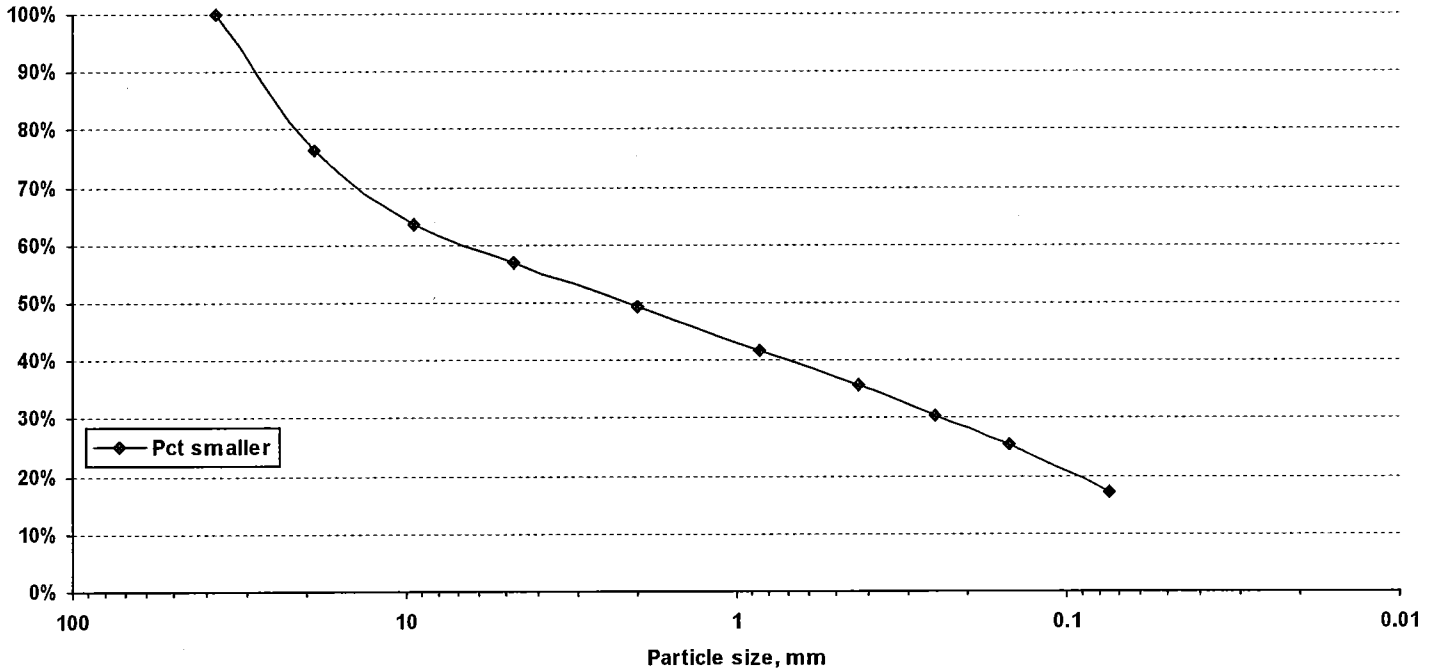
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 8 FT - 10 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140893

Corrected copy: N/A

Report Date: 6/9/2014 3:00:46 P

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/5/2014

Received: 6/6/2014

Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station:

Offset:

Hole: B-102

Depth:

15 FT to: 17 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-6

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	95.7%
9.5 mm (3/8"):	89.7%
4.75 mm (#4):	85.4%
2.00 mm (#10):	76.6%
850 µm (#20):	65.1%
425 µm (#40):	56.9%
250 µm (#60):	50.7%
150 µm (#100):	44.8%
75 µm (#200):	35.1%

Limits	
T-265 Moisture content:	29.8%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP

Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	23.4%
Sa:	41.5%
Si:	35.1%
D2487:	SM
M145:	A-2-4
Gravelly Silty Sand	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: LAB NOTE: BROKEN ROCK & WOOD CHUNKS WERE WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140893

Corrected copy: N/A

Report Date: 6/9/2014 3:00:49 P

Project: PERU

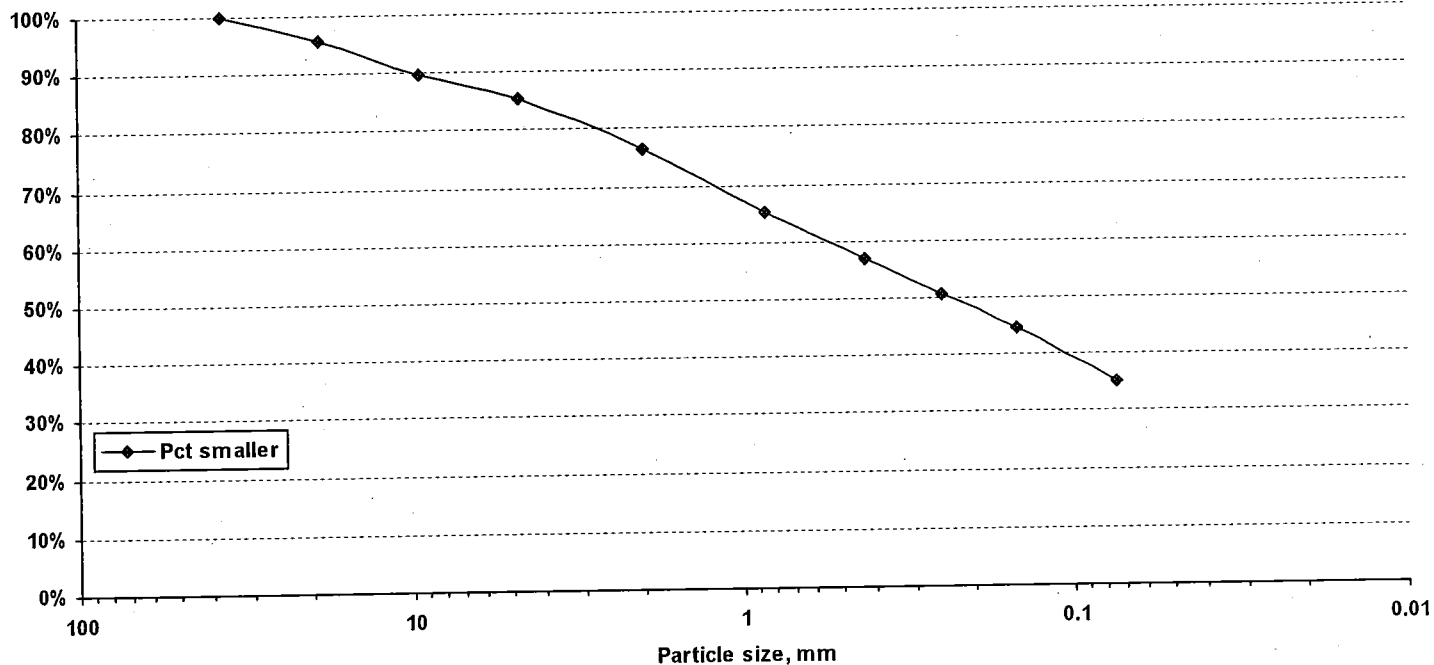
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 15 FT - 17 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140894 Corrected copy: N/A Report Date: 6/9/2014 3:10:07 P
Project: PERU Number: STP SCR(4) Site: VT-11 CULVERT
Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-102 Depth: 20 FT to: 22 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, OR
Comment: S-7

Test Results

Sieve Analysis		Limits	
T-88	% Passing		
	Total Sample	T-265 Moisture content:	93.7%
		T-89 Liquid Limit:	
		T-90 Plastic Limit:	
		T-90 Plasticity Index:	NP
		Moisture Density	
		Test method:	T-180 Method:
		Maximum density:	pcf
		Optimum moisture:	
		T-100 Specific Gravity:	
		Gr:	D2487: N/A
		Sa:	M145: N/A
		Si:	
Hydrometer Analysis			
Particles smaller	% total sample		
0.05 mm:			
0.02 mm:			
0.005 mm:			
0.002 mm:			
0.001 mm:			

Comments: LAB NOTES:
MATERIAL TESTED: ORGANIC SILT (24.0%) AASHTO T267
BROKEN ROCK AND SAND WERE WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140895

Corrected copy: N/A

Report Date: 6/9/2014 3:10:40 P

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset:

Hole: B-102

Depth: 25 FT to: 27 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, OR

Location used:

Comment: S-8

Test Results

Sieve Analysis		Limits	
T-88	% Passing		
	Total Sample	T-265 Moisture content:	29.4%
		T-89 Liquid Limit:	
		T-90 Plastic Limit:	
		T-90 Plasticity Index:	NP
		Moisture Density	
		Test method:	T-180 Method:
		Maximum density:	pcf
		Optimum moisture:	
		T-100 Specific Gravity:	
		Gr:	D2487: N/A
		Sa:	M145: N/A
		Si:	
Hydrometer Analysis			
Particles smaller	% total sample		
0.05 mm:			
0.02 mm:			
0.005 mm:			
0.002 mm:			
0.001 mm:			

Comments: LAB NOTES:

MATERIAL TESTED: TRACE OF ORGANICS (9.8%) AASHTO T267
BROKEN ROCK AND SAND WERE WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TZ*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140896 Corrected copy: N/A Report Date: 6/9/2014 3:12:37 P
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-102 Depth: 30 FT to: 32 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-9

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	97.5%
9.5 mm (3/8"):	90.1%
4.75 mm (#4):	79.2%
2.00 mm (#10):	70.4%
850 µm (#20):	62.1%
425 µm (#40):	55.5%
250 µm (#60):	50.3%
150 µm (#100):	45.2%
75 µm (#200):	36.2%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	14.1%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 29.6%	D2487: SM
Sa: 34.2%	M145: A-4 Gravelly Sandy Silt
Si: 36.2%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140896

Corrected copy: N/A

Report Date: 6/9/2014 3:12:43 P

Project: PERU

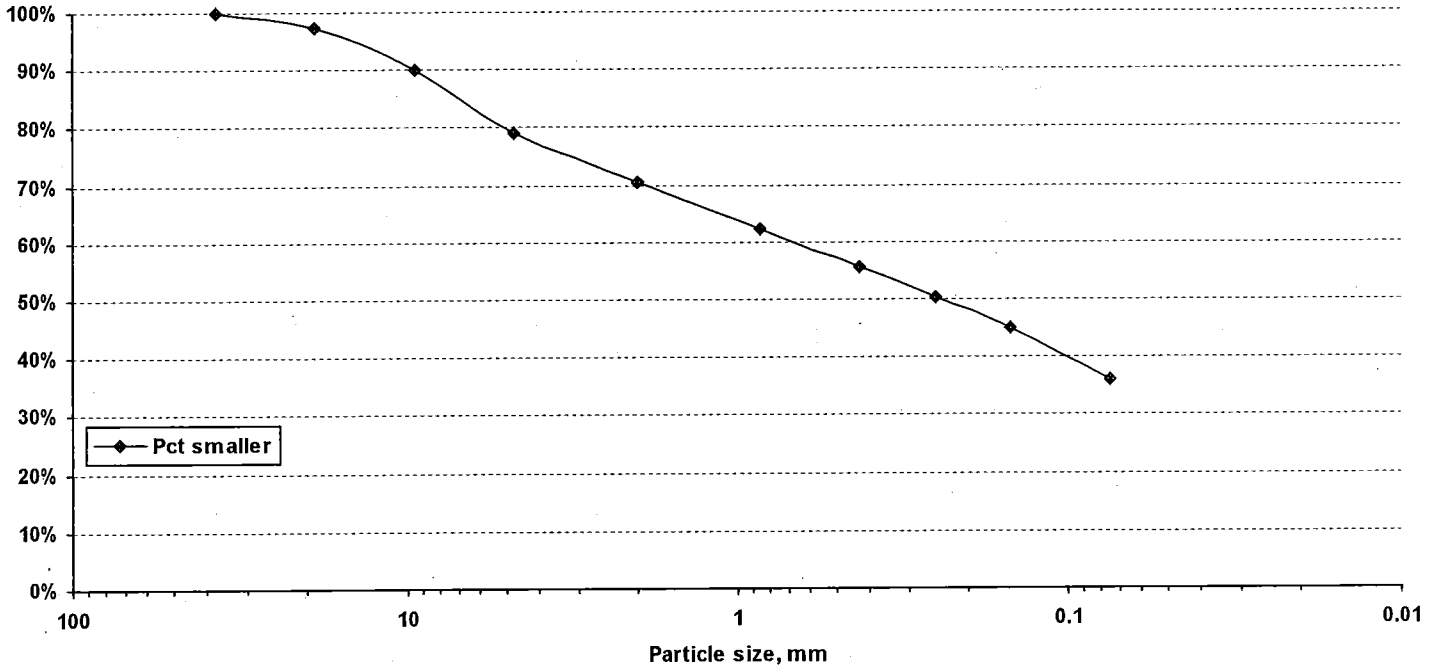
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 30 FT - 32 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140897 Corrected copy: N/A Report Date: 6/9/2014 3:15:17 P
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-102 Depth: 35 FT to: 37 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-10

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	81.8%
9.5 mm (3/8"):	79.0%
4.75 mm (#4):	67.8%
2.00 mm (#10):	61.8%
850 µm (#20):	55.5%
425 µm (#40):	50.1%
250 µm (#60):	45.6%
150 µm (#100):	41.4%
75 µm (#200):	33.4%

Limits	
T-265 Moisture content:	12.7%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 38.2%	D2487: SM
Sa: 28.3%	M145: A-2-4 Sandy Silty Gravel
Si: 33.4%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TZ*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140897

Corrected copy: N/A

Report Date: 6/9/2014 3:15:20 P

Project: PERU

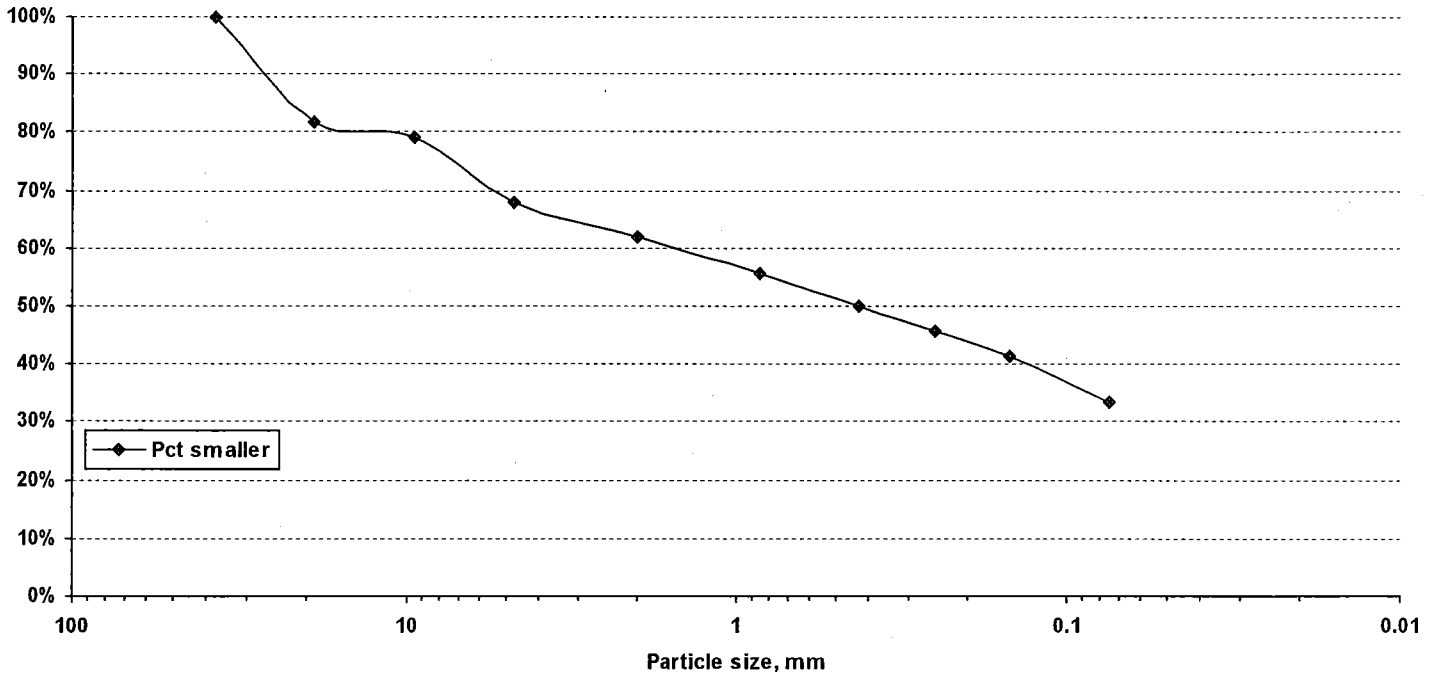
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 35 FT - 37 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140898 Corrected copy: N/A Report Date: 6/9/2014 3:18:33 P
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-102 Depth: 40 FT to: 41.9 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-11

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	92.5%
9.5 mm (3/8"):	79.8%
4.75 mm (#4):	71.2%
2.00 mm (#10):	63.2%
850 µm (#20):	56.1%
425 µm (#40):	50.7%
250 µm (#60):	46.3%
150 µm (#100):	41.5%
75 µm (#200):	33.0%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits
T-265 Moisture content: 13.8%
T-89 Liquid Limit:
T-90 Plastic Limit:
T-90 Plasticity Index: NP
Moisture Density
Test method: T-180 Method:
Maximum density: pcf
Optimum moisture:
T-100 Specific Gravity:
Gr: 36.8% D2487: SM
Sa: 30.2% M145: A-2-4 Sandy Silty Gravel
Si: 33.0%

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140898

Corrected copy: N/A

Report Date: 6/9/2014 3:18:37 P

Project: PERU

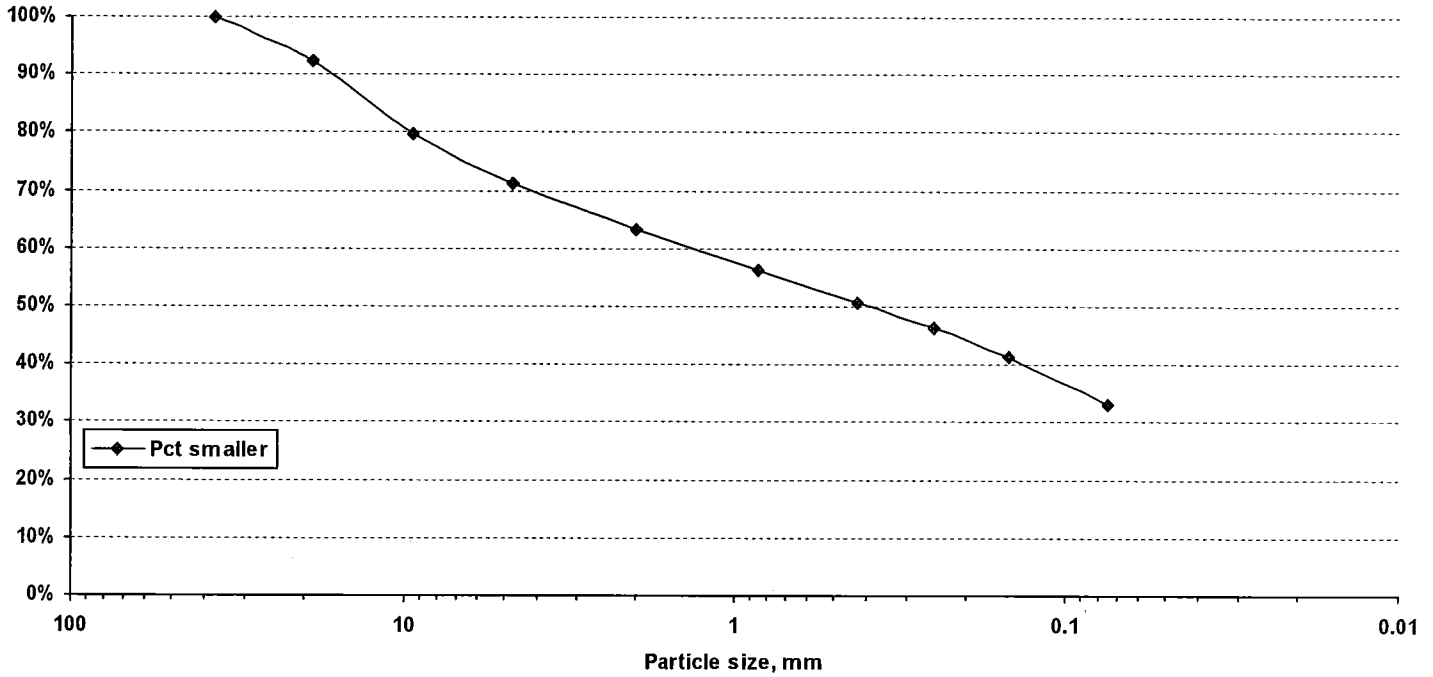
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 40 FT - 41.9 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140899 Corrected copy: N/A Report Date: 6/9/2014 3:23:14 P
Project: PERU Number: STP-SCRIP(4) Site: VT-11 CULVERT
Date sampled: 6/5/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-102 Depth: 45 FT to: 45.3 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-12

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	88.0%
9.5 mm (3/8"):	82.7%
4.75 mm (#4):	70.7%
2.00 mm (#10):	60.5%
850 µm (#20):	52.4%
425 µm (#40):	45.3%
250 µm (#60):	38.3%
150 µm (#100):	32.1%
75 µm (#200):	22.1%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	18.1%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	39.5% D2487: SM
Sa:	38.4% M145: A-1-b Silty Sandy Gravel
Si:	22.1%

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140899

Corrected copy: N/A

Report Date: 6/9/2014 3:23:22 P

Project: PERU

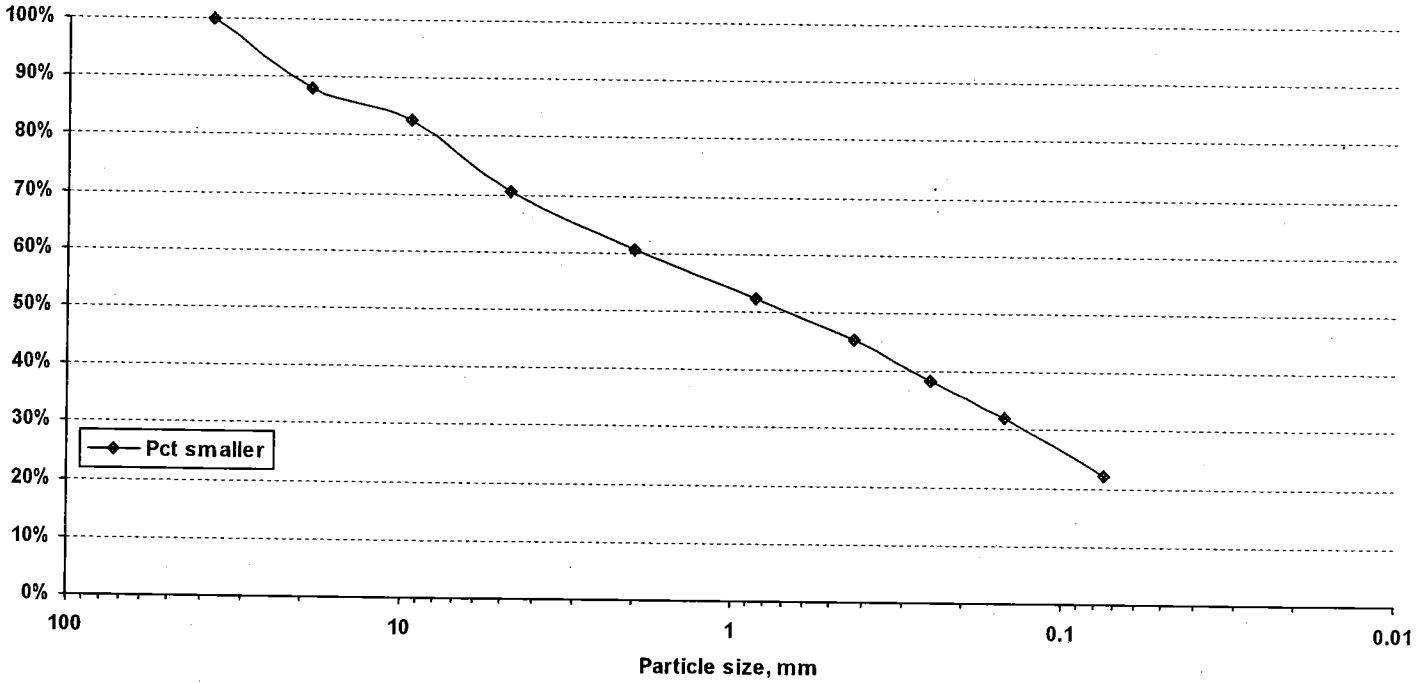
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-102

Depth: 45 FT - 45.3 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140900

Corrected copy: N/A

Report Date: 6/12/2014 7:51:13 A

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset:

Hole: B-103

Depth: 0.7 FT to: 2.7 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-1

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	80.0%
9.5 mm (3/8"):	68.8%
4.75 mm (#4):	55.8%
2.00 mm (#10):	46.6%
850 µm (#20):	37.2%
425 µm (#40):	29.7%
250 µm (#60):	26.0%
150 µm (#100):	23.4%
75 µm (#200):	18.6%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	4.7%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	53.4%
Sa:	28.0%
Si:	18.6%
D2487:	GM
M145:	A-1-b
	Sandy Gravel

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140900

Corrected copy: N/A

Report Date: 6/12/2014 7:51:21 A

Project: PERU

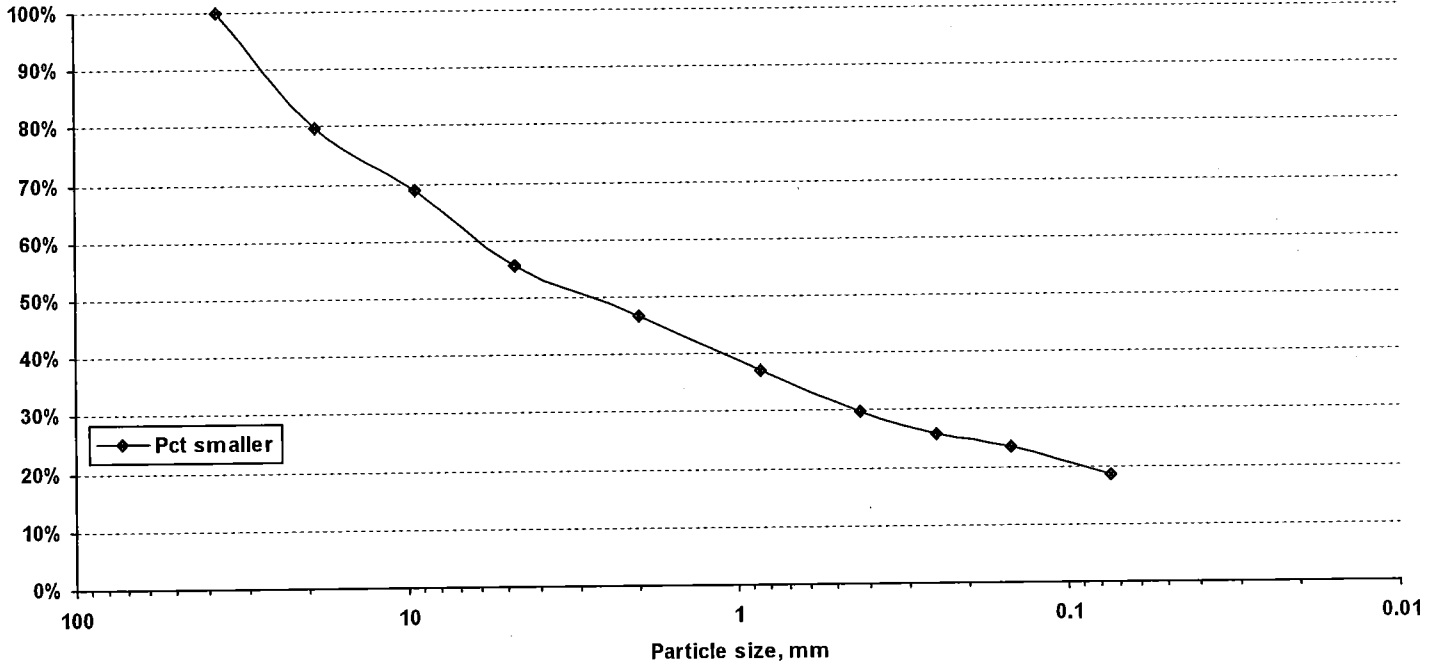
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 0.7 FT - 2.7 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140901

Corrected copy: N/A

Report Date: 6/12/2014 7:53:10 A

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset:

Hole: B-103

Depth: 2.7 FT to: 4.7 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-2


Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	89.0%
9.5 mm (3/8"):	77.7%
4.75 mm (#4):	70.3%
2.00 mm (#10):	60.9%
850 µm (#20):	52.4%
425 µm (#40):	45.7%
250 µm (#60):	41.3%
150 µm (#100):	37.6%
75 µm (#200):	30.3%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	7.7%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	39.1%
Sa:	30.6%
Si:	30.3%
D2487:	SM
M145:	A-2-4 Silty Sandy Gravel

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140901

Corrected copy: N/A

Report Date: 6/12/2014 7:53:16 A

Project: PERU

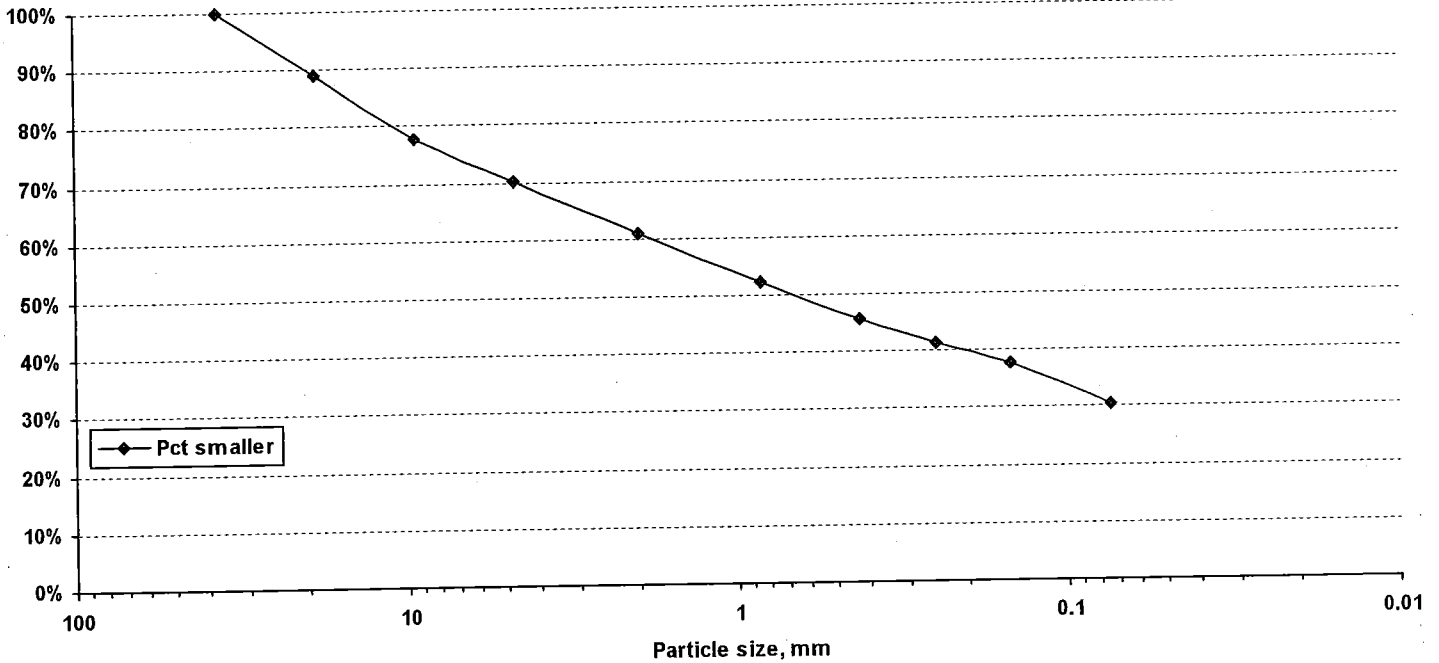
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 2.7 FT - 4.7 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140902 Corrected copy: N/A Report Date: 6/12/2014 7:54:58 A
Project: PERU Number: STP SCR(4) Site: VT-11 CULVERT
Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-103 Depth: 4.7 FT to: 6.7 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-3

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	97.2%
9.5 mm (3/8"):	86.3%
4.75 mm (#4):	81.2%
2.00 mm (#10):	74.0%
850 µm (#20):	66.0%
425 µm (#40):	59.9%
250 µm (#60):	55.2%
150 µm (#100):	49.8%
75 µm (#200):	39.1%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	11.8%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 26.0%	D2487: SM
Sa: 35.0%	M145: A-4 Gravelly Sandy Silt
Si: 39.1%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140902

Corrected copy: N/A

Report Date: 6/12/2014 7:55:04 A

Project: PERU

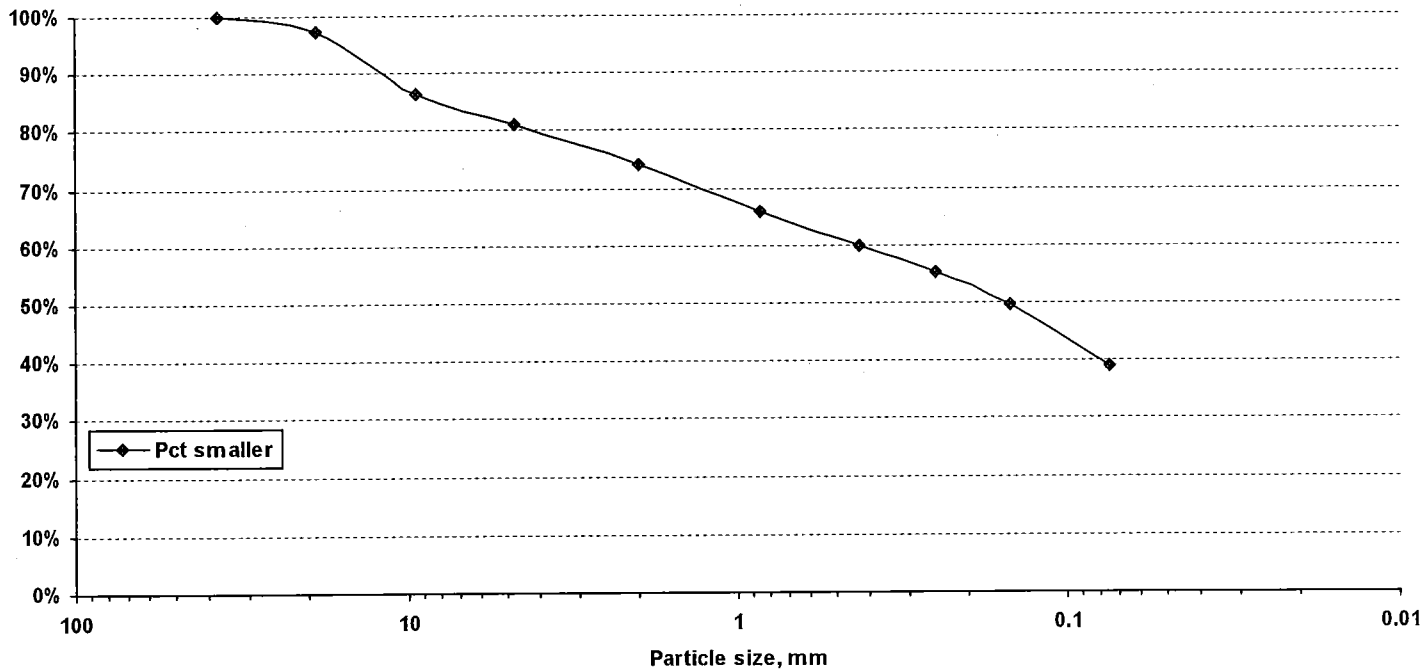
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 4.7 FT - 6.7 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140903 Corrected copy: N/A Report Date: 6/12/2014 7:56:44 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-103 Depth: 6.7 FT to: 8.7 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-4

Test Results

Sieve Analysis		Limits	
T-88	% Passing		
	Total Sample	T-265 Moisture content:	9.9%
		T-89 Liquid Limit:	
		T-90 Plastic Limit:	
		T-90 Plasticity Index:	NP
		Moisture Density	
		Test method:	T-180 Method:
		Maximum density:	pcf
		Optimum moisture:	
		T-100 Specific Gravity:	
		Gr: 28.1%	D2487: SM
		Sa: 35.4%	M145: A-4 Gravelly Sandy Silt
		Si: 36.5%	

Hydrometer Analysis

Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140903

Corrected copy: N/A

Report Date: 6/12/2014 7:57:05 A

Project: PERU

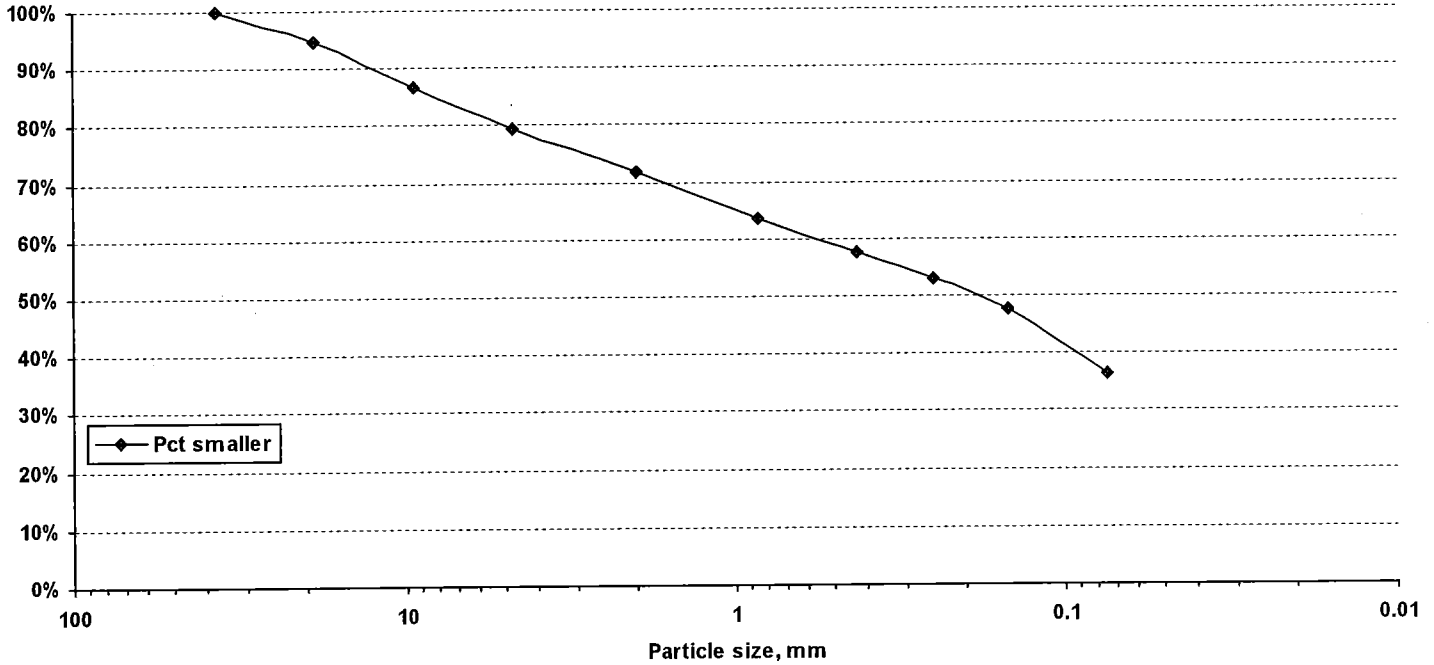
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 6.7 FT - 8.7 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140904 Corrected copy: N/A Report Date: 6/12/2014 7:58:46 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-103 Depth: 9 FT to: 11 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-5


Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	97.5%
9.5 mm (3/8"):	91.8%
4.75 mm (#4):	87.6%
2.00 mm (#10):	81.2%
850 µm (#20):	73.4%
425 µm (#40):	66.4%
250 µm (#60):	60.4%
150 µm (#100):	54.0%
75 µm (#200):	42.0%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	11.4%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 18.8%	D2487: SM
Sa: 39.2%	M145: A-4 Sandy Silt
Si: 42.0%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140904

Corrected copy: N/A

Report Date: 6/12/2014 7:58:51 A

Project: PERU

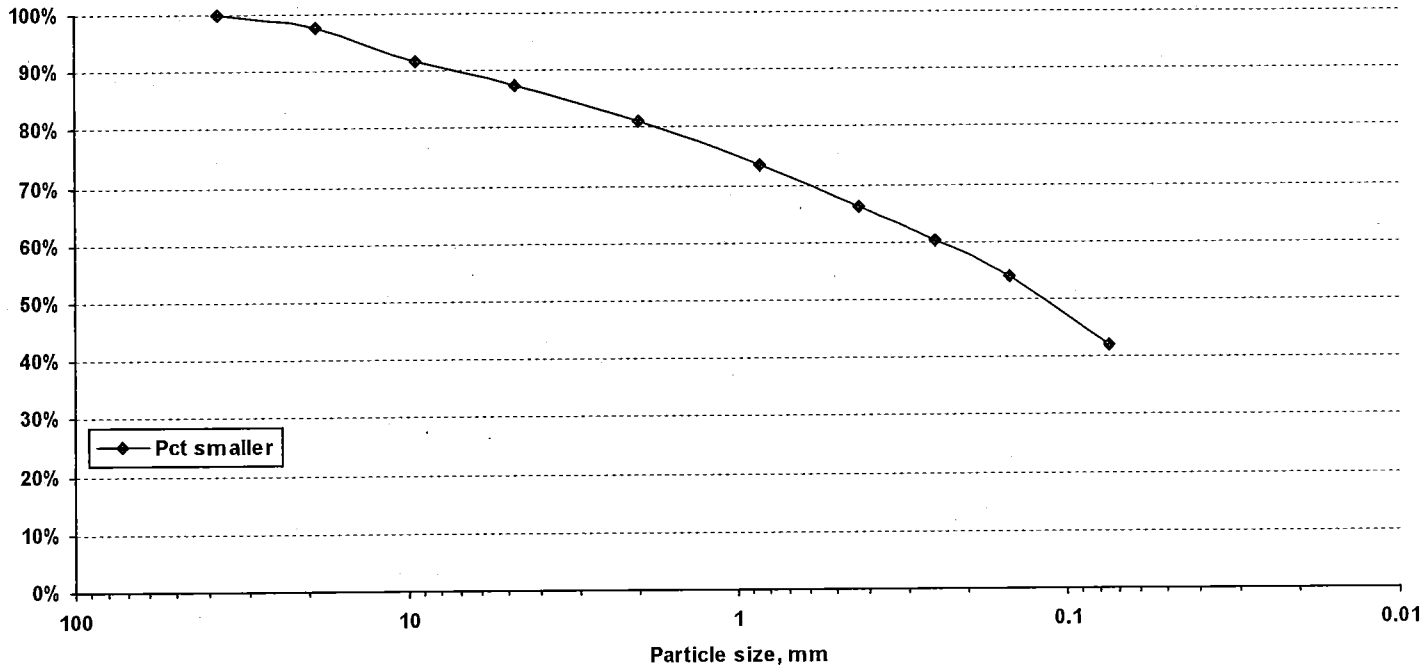
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 9 FT - 11 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140905 Corrected copy: N/A Report Date: 6/12/2014 8:00:28 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-103 Depth: 14 FT to: 16 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-6

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	94.3%
9.5 mm (3/8"):	83.7%
4.75 mm (#4):	78.8%
2.00 mm (#10):	71.8%
850 µm (#20):	63.9%
425 µm (#40):	56.6%
250 µm (#60):	49.8%
150 µm (#100):	43.0%
75 µm (#200):	31.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	11.5%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 28.2%	D2487: SM
Sa: 40.0%	M145: A-2-4 Gravelly Silty Sand
Si: 31.8%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TZ*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140905

Corrected copy: N/A

Report Date: 6/12/2014 8:00:33 A

Project: PERU

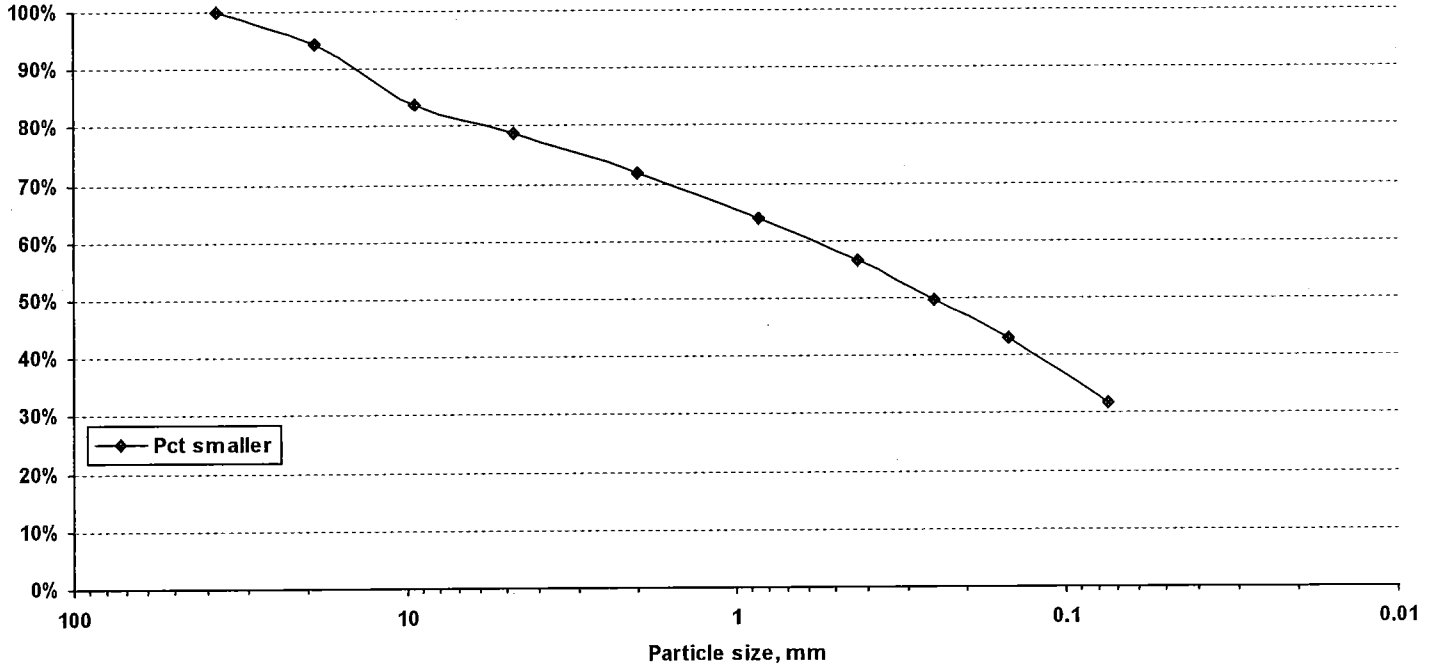
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 14 FT - 16 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140906 Corrected copy: N/A Report Date: 6/12/2014 8:02:01 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-103 Depth: 19 FT to: 21 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-7


Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	85.4%
9.5 mm (3/8"):	76.8%
4.75 mm (#4):	63.8%
2.00 mm (#10):	51.3%
850 µm (#20):	40.9%
425 µm (#40):	32.6%
250 µm (#60):	28.3%
150 µm (#100):	25.3%
75 µm (#200):	19.3%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	9.1%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 48.7%	D2487: SM
Sa: 32.0%	M145: A-1-b Sandy Gravel
Si: 19.3%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140906

Corrected copy: N/A

Report Date: 6/12/2014 8:02:05 A

Project: PERU

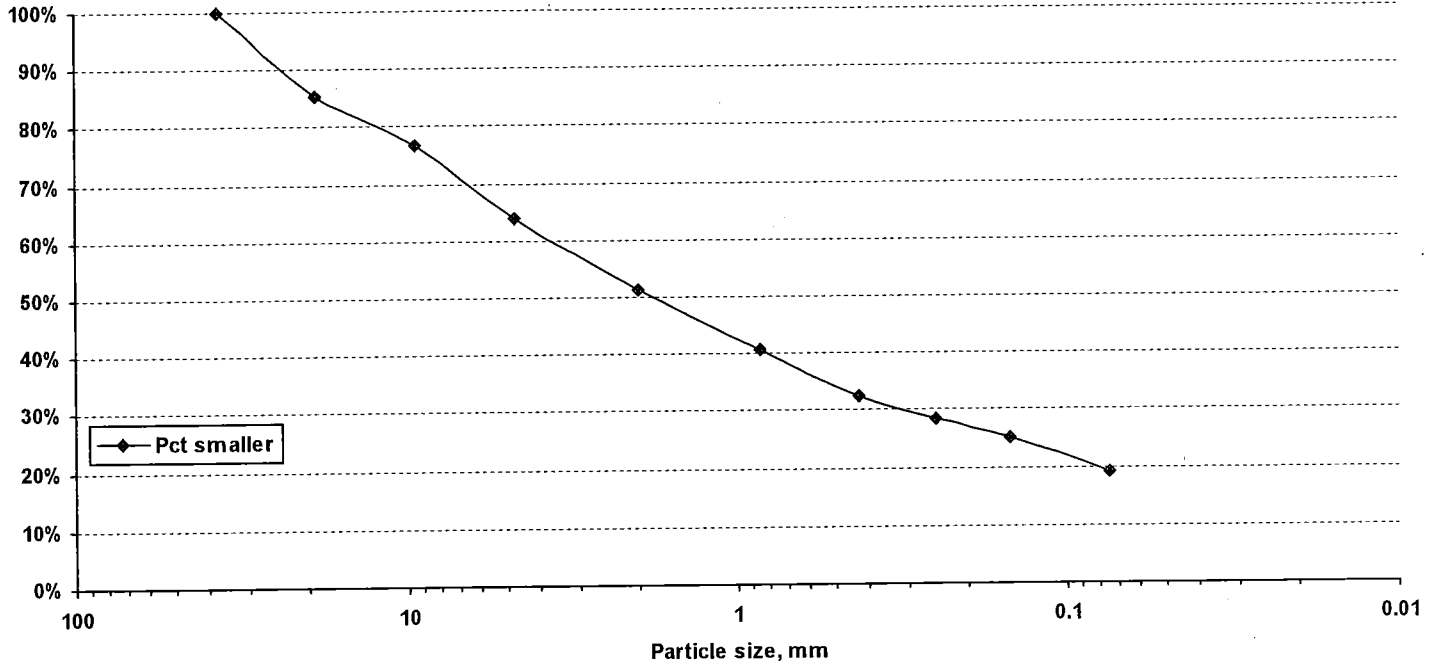
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 19 FT - 21 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140907 Corrected copy: N/A Report Date: 6/12/2014 8:03:50 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-103 Depth: 24 FT to: 26 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-8


Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	82.7%
9.5 mm (3/8"):	79.3%
4.75 mm (#4):	74.6%
2.00 mm (#10):	68.2%
850 µm (#20):	60.6%
425 µm (#40):	53.9%
250 µm (#60):	48.2%
150 µm (#100):	42.9%
75 µm (#200):	33.7%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	16.5%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	31.8% D2487: SM
Sa:	34.5% M145: A-2-4 Gravelly Silty Sand
Si:	33.7%

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140907

Corrected copy: N/A

Report Date: 6/12/2014 8:03:54 A

Project: PERU

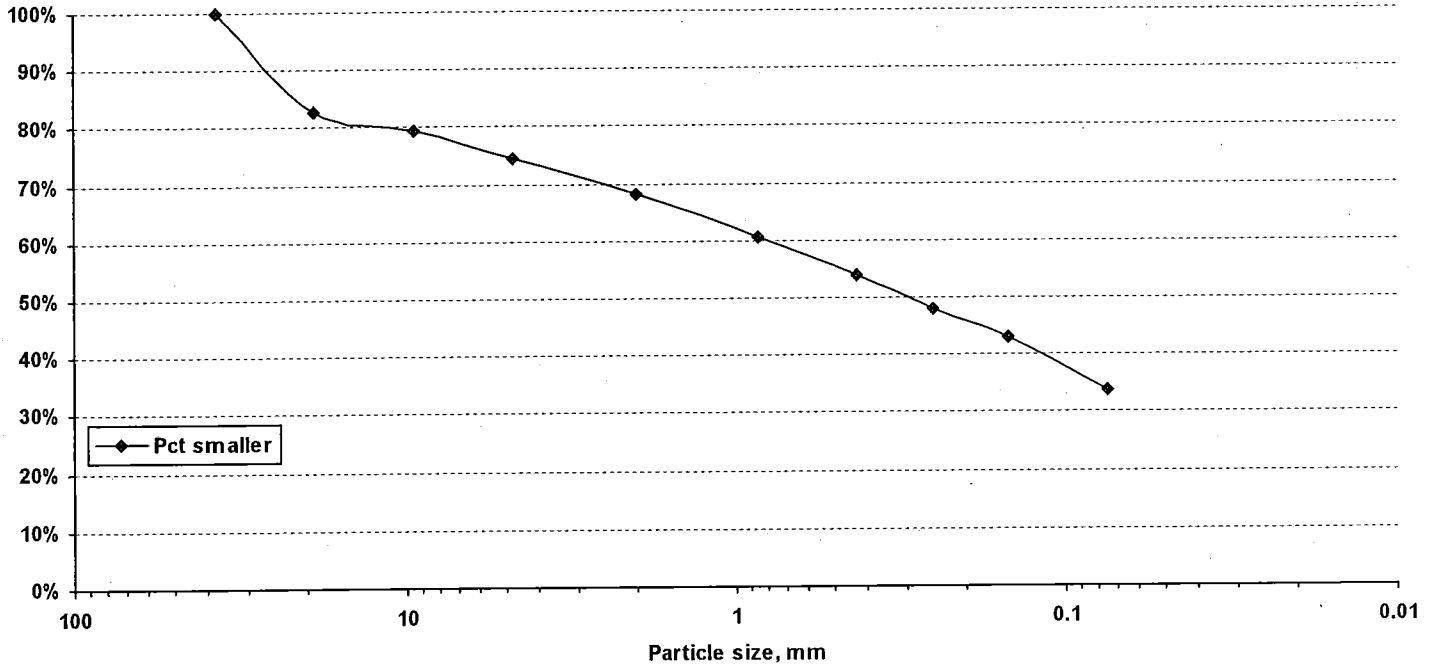
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 24 FT - 26 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140908 Corrected copy: N/A Report Date: 6/12/2014 8:06:13 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-103 Depth: 29 FT to: 31 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-9

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	83.5%
9.5 mm (3/8"):	73.6%
4.75 mm (#4):	67.0%
2.00 mm (#10):	58.2%
850 µm (#20):	47.5%
425 µm (#40):	39.6%
250 µm (#60):	34.5%
150 µm (#100):	28.9%
75 µm (#200):	20.2%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	12.6%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 41.8%	D2487: SM
Sa: 38.0%	M145: A-1-b Silty Sandy Gravel
Si: 20.2%	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140908

Corrected copy: N/A

Report Date: 6/12/2014 8:06:19 A

Project: PERU

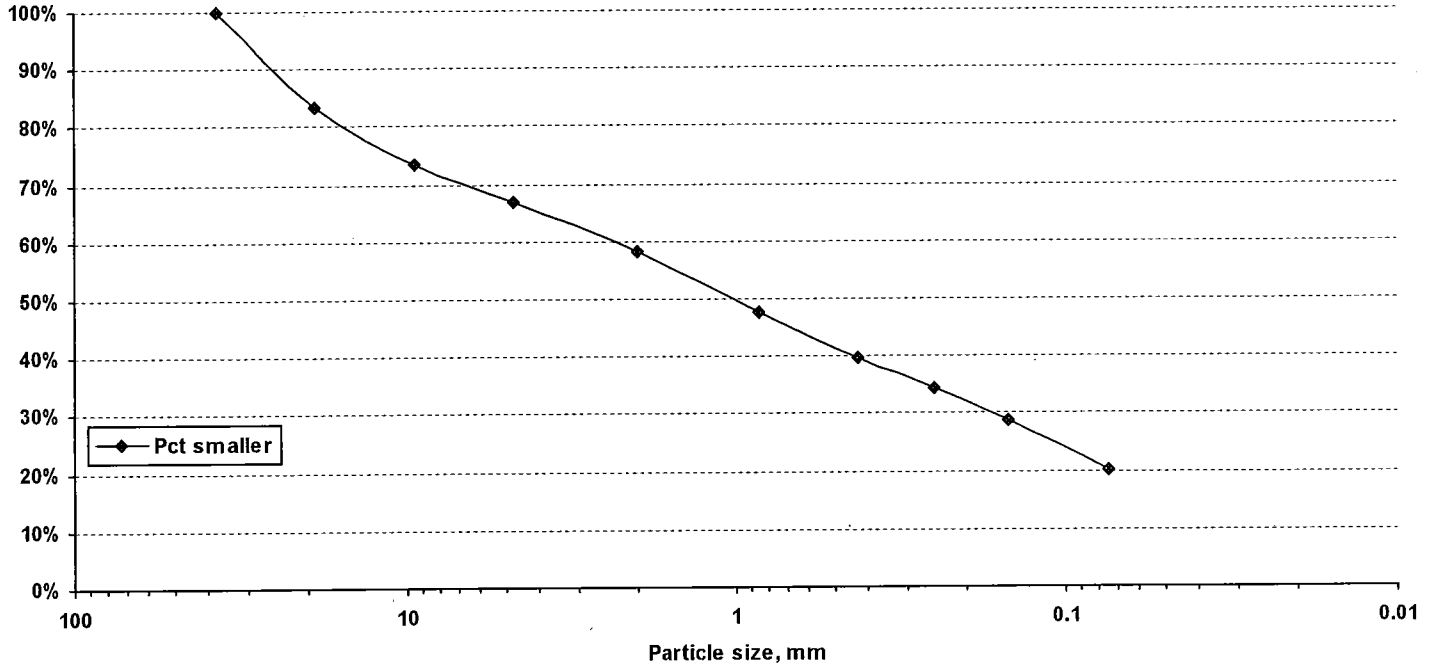
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 29 FT - 31 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140909 Corrected copy: N/A Report Date: 6/12/2014 8:07:58 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/4/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-103 Depth: 34 FT to: 36 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-10


Test Results

Sieve Analysis		Limits	
T-88	% Passing		
Total Sample		T-265 Moisture content:	11.2%
75 mm (3.0"):		T-89 Liquid Limit:	
37.5 mm (1.5"):		T-90 Plastic Limit:	
19 mm (3/4"):	81.5%	T-90 Plasticity Index:	NP
9.5 mm (3/8"):	72.9%	Moisture Density	
4.75 mm (#4):	64.1%	Test method:	T-180 Method:
2.00 mm (#10):	53.7%	Maximum density:	pcf
850 µm (#20):	46.0%	Optimum moisture:	
425 µm (#40):	39.6%	T-100 Specific Gravity:	
250 µm (#60):	35.0%	Gr: 46.3%	D2487: SM
150 µm (#100):	31.1%	Sa: 29.3%	M145: A-1-b Silty Sandy Gravel
75 µm (#200):	24.5%	Si: 24.5%	

Hydrometer Analysis

Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140909

Corrected copy: N/A

Report Date: 6/12/2014 8:08:02 A

Project: PERU

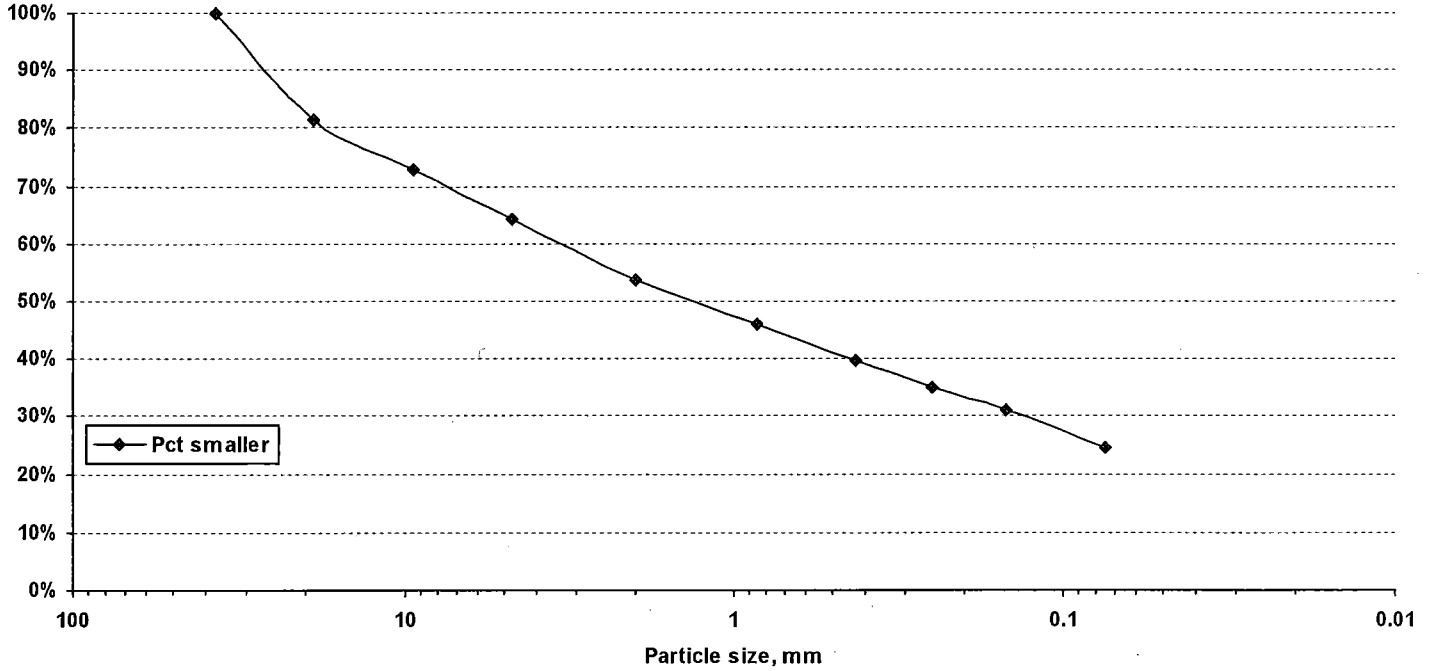
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-103

Depth: 34 FT - 36 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140910 Corrected copy: N/A Report Date: 6/12/2014 8:09:53 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-104 Depth: 0.5 FT to: 2.5 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-1

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	90.9%
4.75 mm (#4):	82.9%
2.00 mm (#10):	71.0%
850 µm (#20):	60.0%
425 µm (#40):	51.7%
250 µm (#60):	45.3%
150 µm (#100):	38.7%
75 µm (#200):	28.4%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	9.7%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 29.0%	D2487: SM
Sa: 42.6%	M145: A-2-4 Silty Gravelly Sand
Si: 28.4%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140910

Corrected copy: N/A

Report Date: 6/12/2014 8:09:57 A

Project: PERU

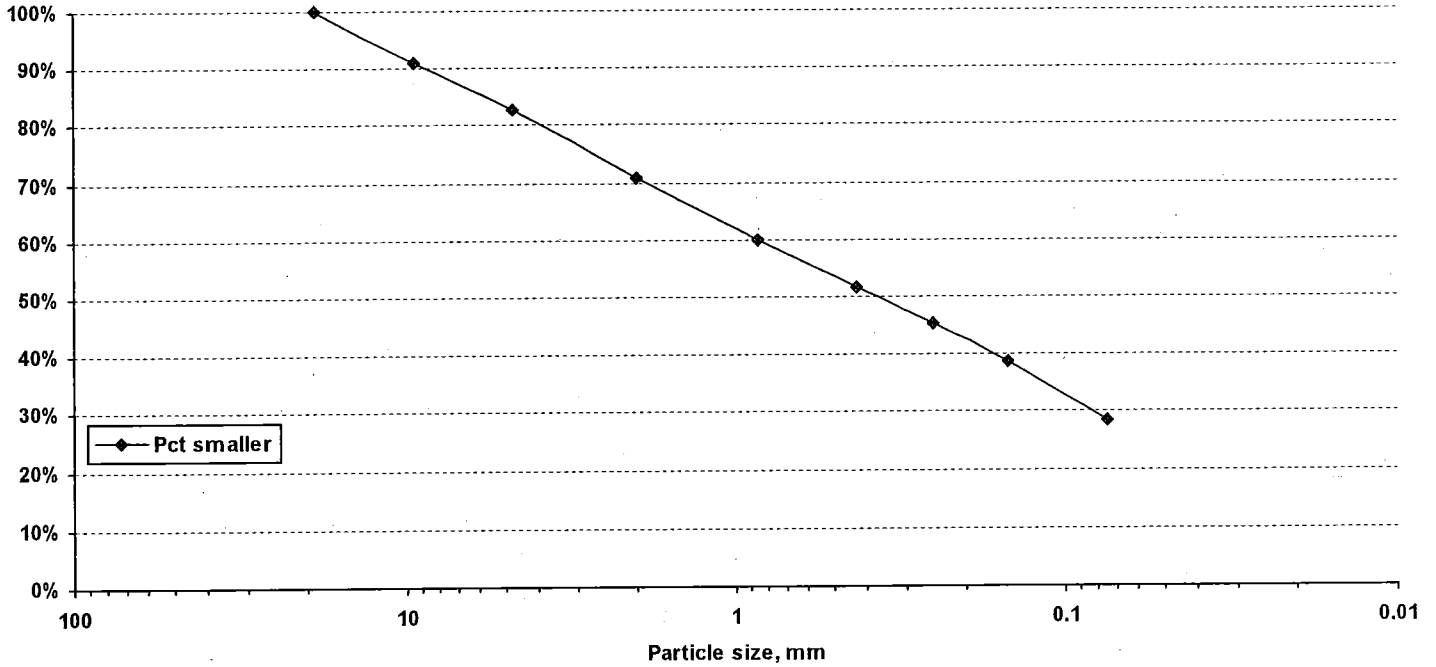
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-104

Depth: 0.5 FT - 2.5 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140911 Corrected copy: N/A Report Date: 6/12/2014 8:12:06 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-104 Depth: 2.5 FT to: 4.5 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-2

Test Results

Sieve Analysis		Limits	
T-88	% Passing		
	Total Sample	T-265 Moisture content:	6.2%
		T-89 Liquid Limit:	
		T-90 Plastic Limit:	
		T-90 Plasticity Index:	NP
		Moisture Density	
		Test method: T-180	Method:
		Maximum density:	pcf
		Optimum moisture:	
		T-100 Specific Gravity:	
		Gr: D2487:	N/A
		Sa: M145:	N/A
		Si:	
Hydrometer Analysis			
Particles smaller	% total sample		
0.05 mm:			
0.02 mm:			
0.005 mm:			
0.002 mm:			
0.001 mm:			

Comments: VISUAL DESCRIPTION: ONE LARGE BROKEN ROCK WITH SILT & SAND.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140912 Corrected copy: N/A Report Date: 6/12/2014 8:15:39 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-104 Depth: 4.5 FT to: 6.5 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-3

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	90.0%
9.5 mm (3/8"):	82.0%
4.75 mm (#4):	75.6%
2.00 mm (#10):	66.0%
850 µm (#20):	56.8%
425 µm (#40):	49.0%
250 µm (#60):	42.8%
150 µm (#100):	36.6%
75 µm (#200):	26.4%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	10.8%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 34.0%	D2487: SM
Sa: 39.5%	M145: A-2-4 Silty Gravelly Sand
Si: 26.4%	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140912

Corrected copy: N/A

Report Date: 6/12/2014 8:15:43 A

Project: PERU

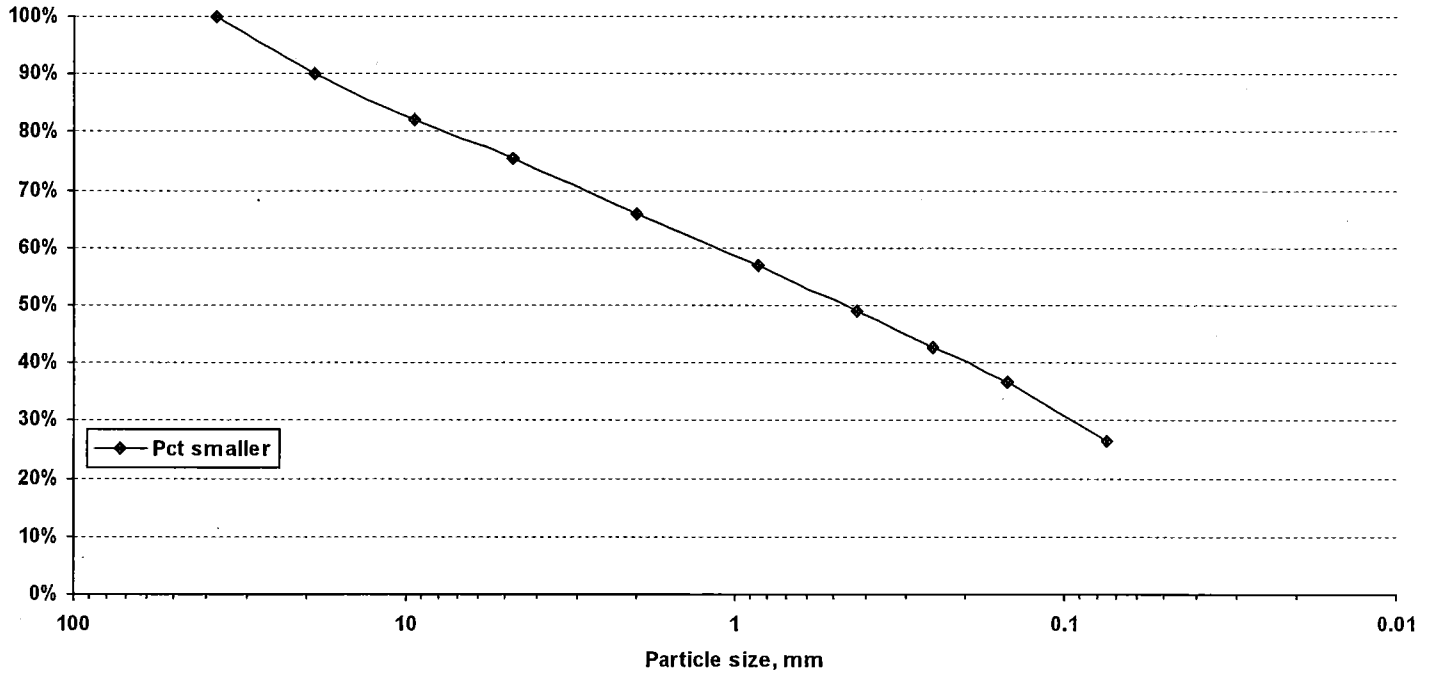
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-104

Depth: 4.5 FT - 6.5 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140913 Corrected copy: N/A Report Date: 6/12/2014 8:18:13 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-104 Depth: 6.5 FT to: 8.5 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-4


Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	96.7%
9.5 mm (3/8"):	87.2%
4.75 mm (#4):	83.4%
2.00 mm (#10):	76.7%
850 µm (#20):	67.8%
425 µm (#40):	59.8%
250 µm (#60):	53.3%
150 µm (#100):	46.3%
75 µm (#200):	33.9%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	15.1%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 23.3%	D2487: SM
Sa: 42.8%	M145: A-2-4 Gravelly Silty Sand
Si: 33.9%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140913

Corrected copy: N/A

Report Date: 6/12/2014 8:18:18 A

Project: PERU

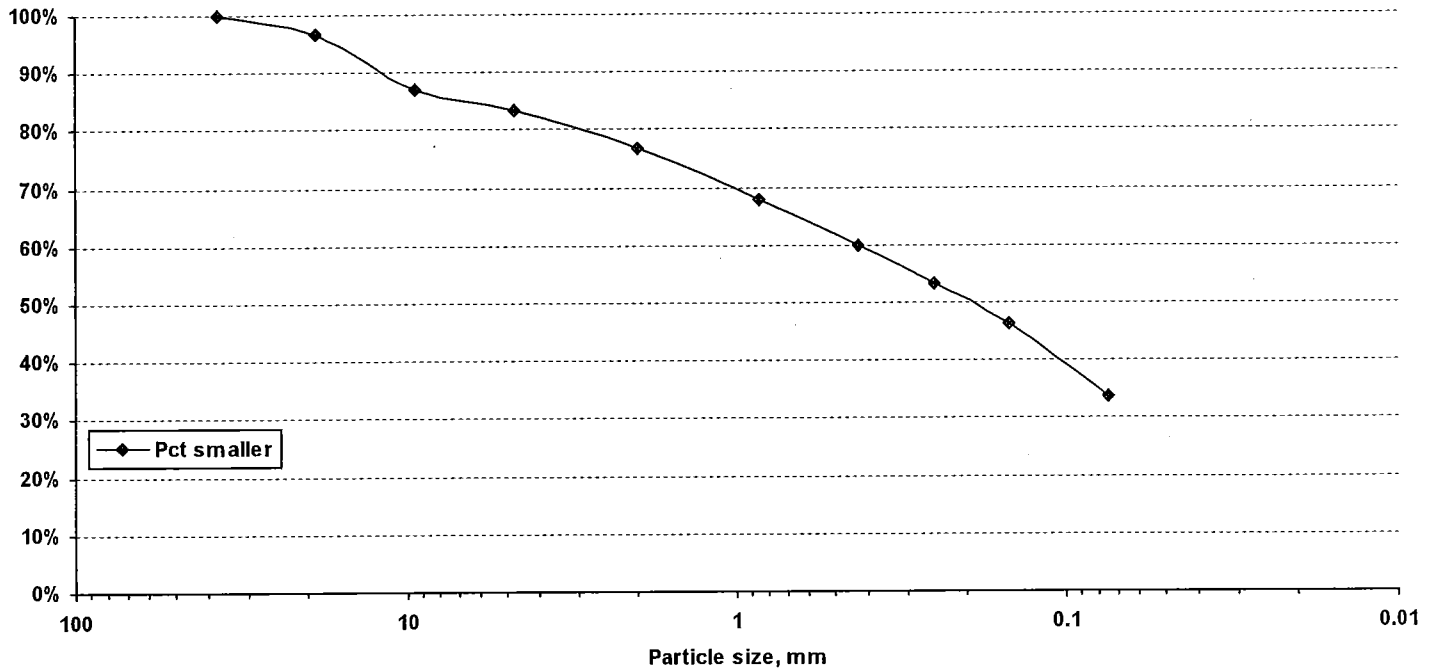
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-104

Depth: 6.5 FT - 8.5 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140914 Corrected copy: N/A Report Date: 6/12/2014 8:19:58 A
Project: PERU Number: STP SCR(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-104 Depth: 9 FT to: 11 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-5


Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	96.7%
9.5 mm (3/8"):	87.9%
4.75 mm (#4):	81.3%
2.00 mm (#10):	69.7%
850 µm (#20):	57.4%
425 µm (#40):	48.6%
250 µm (#60):	42.0%
150 µm (#100):	35.9%
75 µm (#200):	25.9%

Limits	
T-265 Moisture content:	11.5%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 30.3%	D2487: SM
Sa: 43.8%	M145: A-2-4 Silty Gravelly Sand
Si: 25.9%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140914

Corrected copy: N/A

Report Date: 6/12/2014 8:20:04 A

Project: PERU

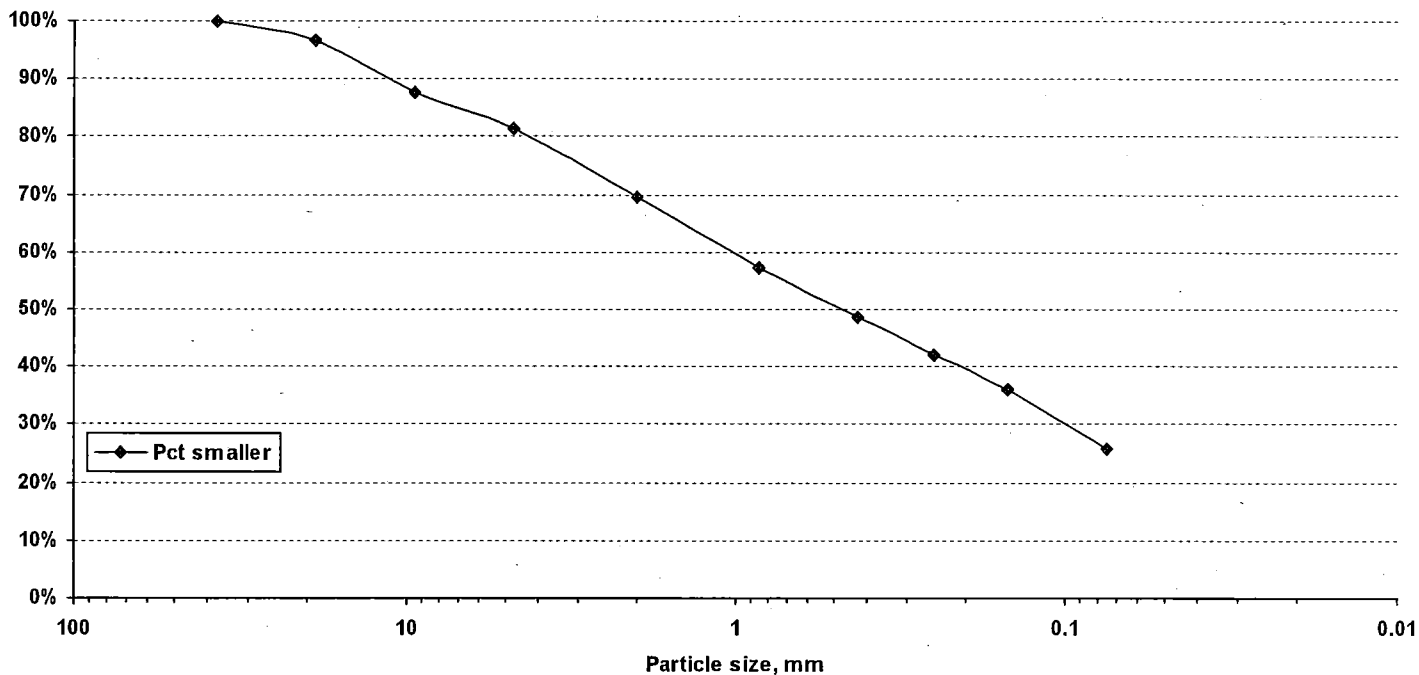
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-104

Depth: 9 FT - 11 FT

T-88 Particle size analysis



Vermont Agency of Transportation
 Materials and Research Section
 1 National Life Drive
 Montpelier, VT 05633-5001

Distribution list
 TERRACON
 T. ELIASSEN
 J. TOUCHETTE

Report on Soil Sample

Lab number: E140915 Corrected copy: N/A Report Date: 6/12/2014 8:21:44 A
 Project: PERU Number: STP SCR(4) Site: VT-11 CULVERT
 Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
 Station: Offset: Hole: B-104 Depth: 14 FT to: 16 FT
 Field description:
 Submitted by: TERRACON Address:
 Sample type: SPLIT BARREL Quantity:
 Sample source/Outside agency name:
 Location used: Examined for: MC, GS
 Comment: S-6

Test Results

Sieve Analysis		Limits	
T-88	% Passing		
Total Sample			
75 mm (3.0"):		T-265 Moisture content:	10.6%
37.5 mm (1.5"):		T-89 Liquid Limit:	
19 mm (3/4"):	83.2%	T-90 Plastic Limit:	
9.5 mm (3/8"):	77.5%	T-90 Plasticity Index:	NP
4.75 mm (#4):	73.0%	Moisture Density	
2.00 mm (#10):	66.1%	Test method:	T-180 Method:
850 µm (#20):	59.2%	Maximum density:	pcf
425 µm (#40):	53.5%	Optimum moisture:	
250 µm (#60):	48.8%	T-100 Specific Gravity:	
150 µm (#100):	43.8%	Gr: 33.9%	D2487: SM
75 µm (#200):	35.1%	Sa: 31.0%	M145: A-2-4 Sandy Gravelly Silt
		Si: 35.1%	

Hydrometer Analysis

Particles smaller % total sample

0.05 mm:
 0.02 mm:
 0.005 mm:
 0.002 mm:
 0.001 mm:

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *E*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140915

Corrected copy: N/A

Report Date: 6/12/2014 8:21:50 A

Project: PERU

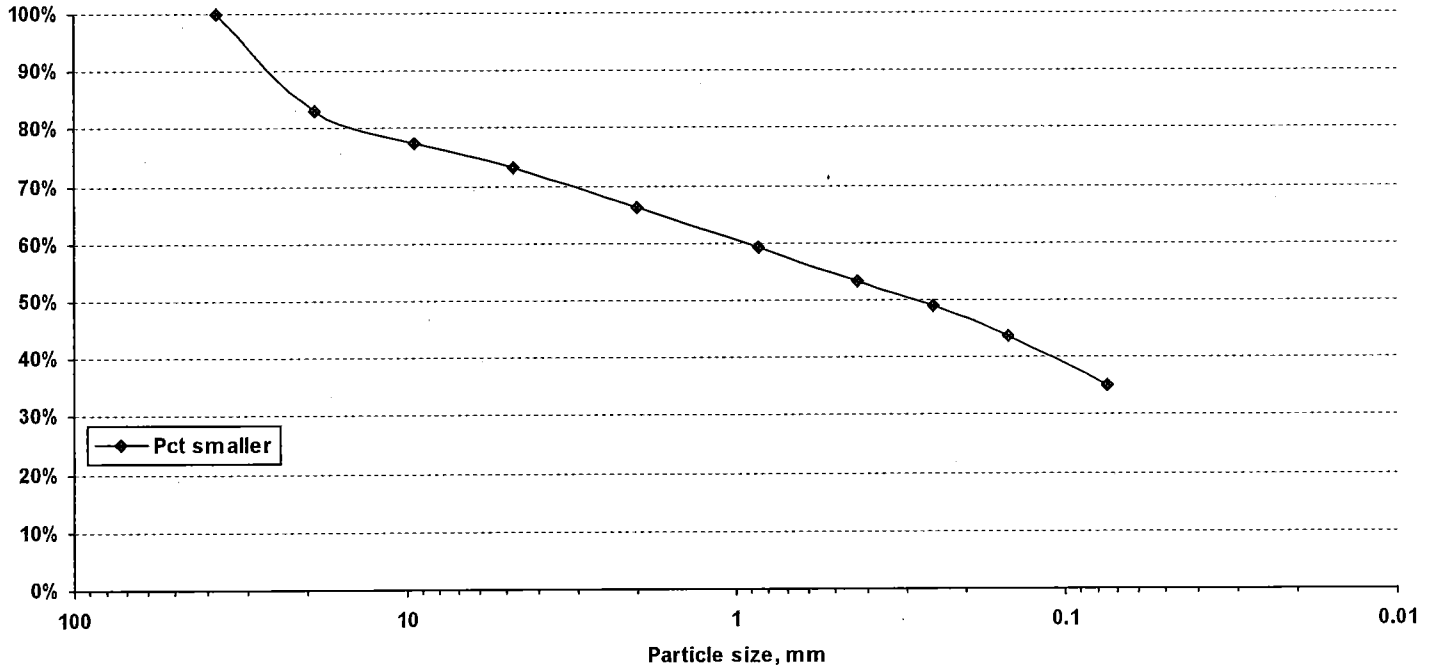
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-104

Depth: 14 FT - 16 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140916 Corrected copy: N/A Report Date: 6/12/2014 8:23:38 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-104 Depth: 19 FT to: 21 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-7

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	84.3%
9.5 mm (3/8"):	77.6%
4.75 mm (#4):	74.3%
2.00 mm (#10):	68.0%
850 µm (#20):	59.5%
425 µm (#40):	51.8%
250 µm (#60):	45.5%
150 µm (#100):	40.6%
75 µm (#200):	32.9%

Limits	
T-265 Moisture content:	20.9%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 32.0%	D2487: SM
Sa: 35.1%	M145: A-2-4 Gravelly Silty Sand
Si: 32.9%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140916

Corrected copy: N/A

Report Date: 6/12/2014 8:23:41 A

Project: PERU

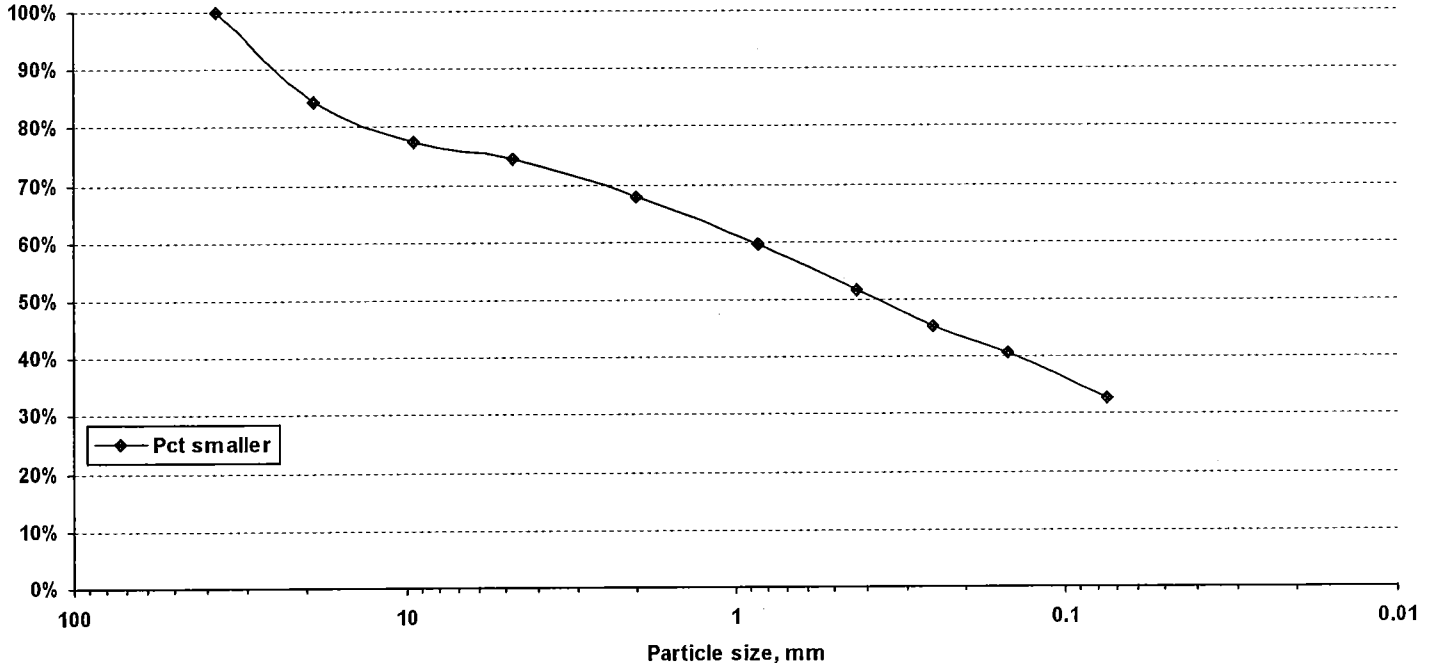
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-104

Depth: 19 FT - 21 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140917 Corrected copy: N/A Report Date: 6/12/2014 8:25:17 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-104 Depth: 24 FT to: 26 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-8

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	95.2%
9.5 mm (3/8"):	87.0%
4.75 mm (#4):	81.5%
2.00 mm (#10):	72.0%
850 µm (#20):	62.7%
425 µm (#40):	54.9%
250 µm (#60):	49.0%
150 µm (#100):	43.3%
75 µm (#200):	34.4%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	12.6%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 28.0%	D2487: SM
Sa: 37.5%	M145: A-2-4 Gravelly Silty Sand
Si: 34.4%	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140917

Corrected copy: N/A

Report Date: 6/12/2014 8:25:19 A

Project: PERU

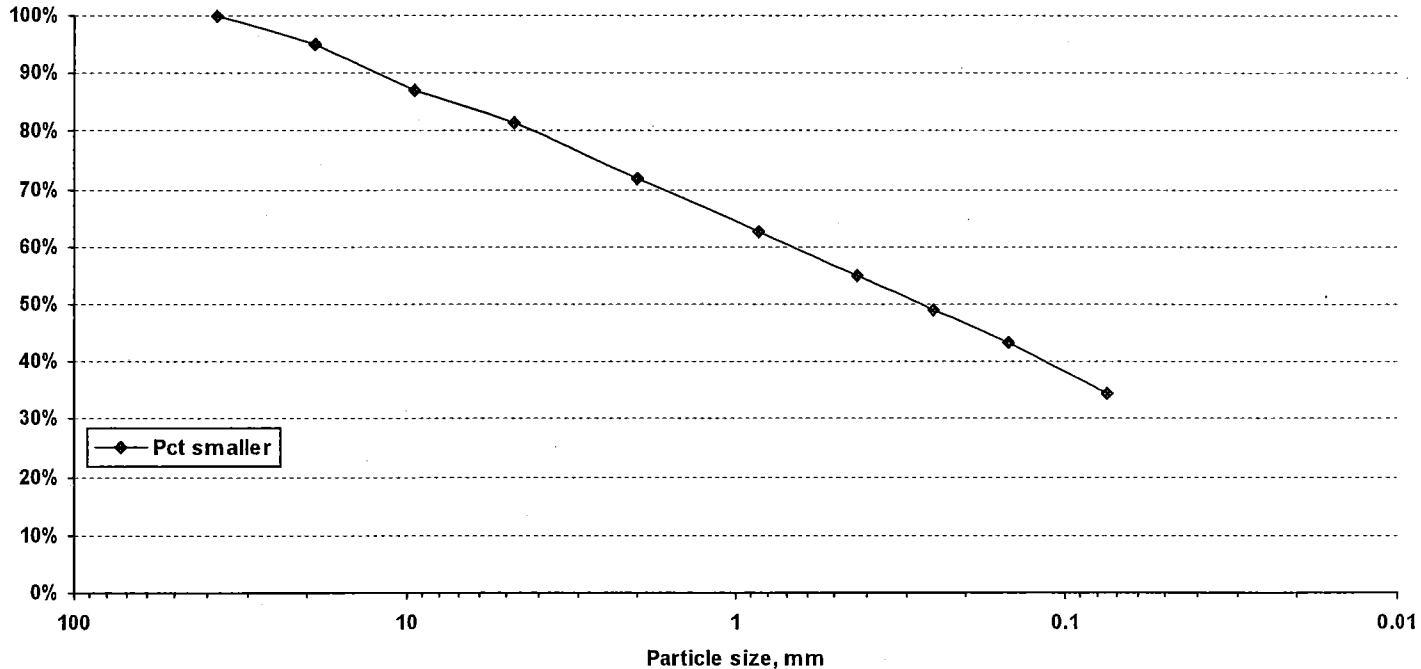
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-104

Depth: 24 FT - 26 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140918 Corrected copy: N/A Report Date: 6/12/2014 8:27:06 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-105 Depth: 0 FT to: 2 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-1


Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	96.0%
9.5 mm (3/8"):	81.7%
4.75 mm (#4):	72.2%
2.00 mm (#10):	60.6%
850 µm (#20):	50.2%
425 µm (#40):	42.9%
250 µm (#60):	37.1%
150 µm (#100):	31.4%
75 µm (#200):	21.0%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	7.9%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 39.4%	D2487: SM
Sa: 39.6%	M145: A-1-b Silty Gravelly Sand
Si: 21.0%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140918

Corrected copy: N/A

Report Date: 6/12/2014 8:27:10 A

Project: PERU

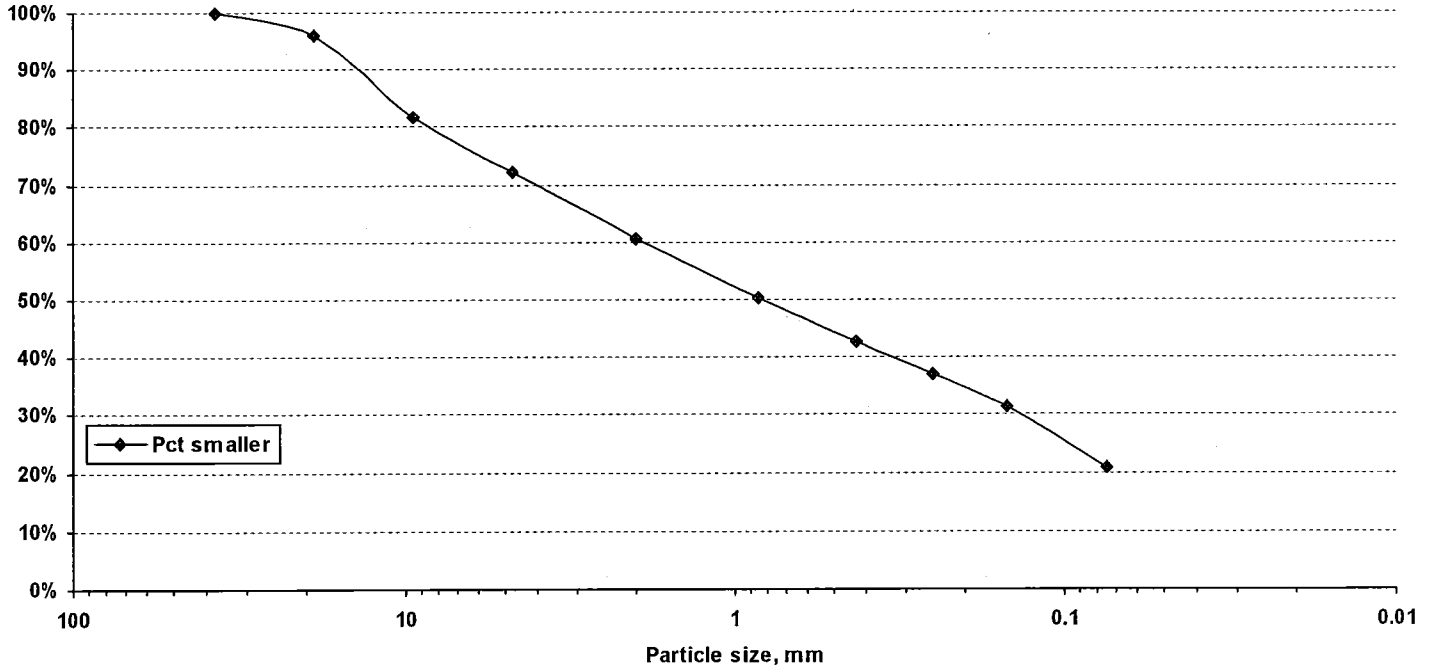
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-105

Depth: 0 FT - 2 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140919 Corrected copy: N/A Report Date: 6/12/2014 8:29:01 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-105 Depth: 2 FT to: 4 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-2


Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	85.2%
9.5 mm (3/8"):	77.7%
4.75 mm (#4):	73.7%
2.00 mm (#10):	65.9%
850 µm (#20):	57.1%
425 µm (#40):	50.1%
250 µm (#60):	43.7%
150 µm (#100):	36.9%
75 µm (#200):	26.4%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	11.1%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 34.1%	D2487: SM
Sa: 39.6%	M145: A-2-4 Silty Gravelly Sand
Si: 26.4%	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140919

Corrected copy: N/A

Report Date: 6/12/2014 8:29:05 A

Project: PERU

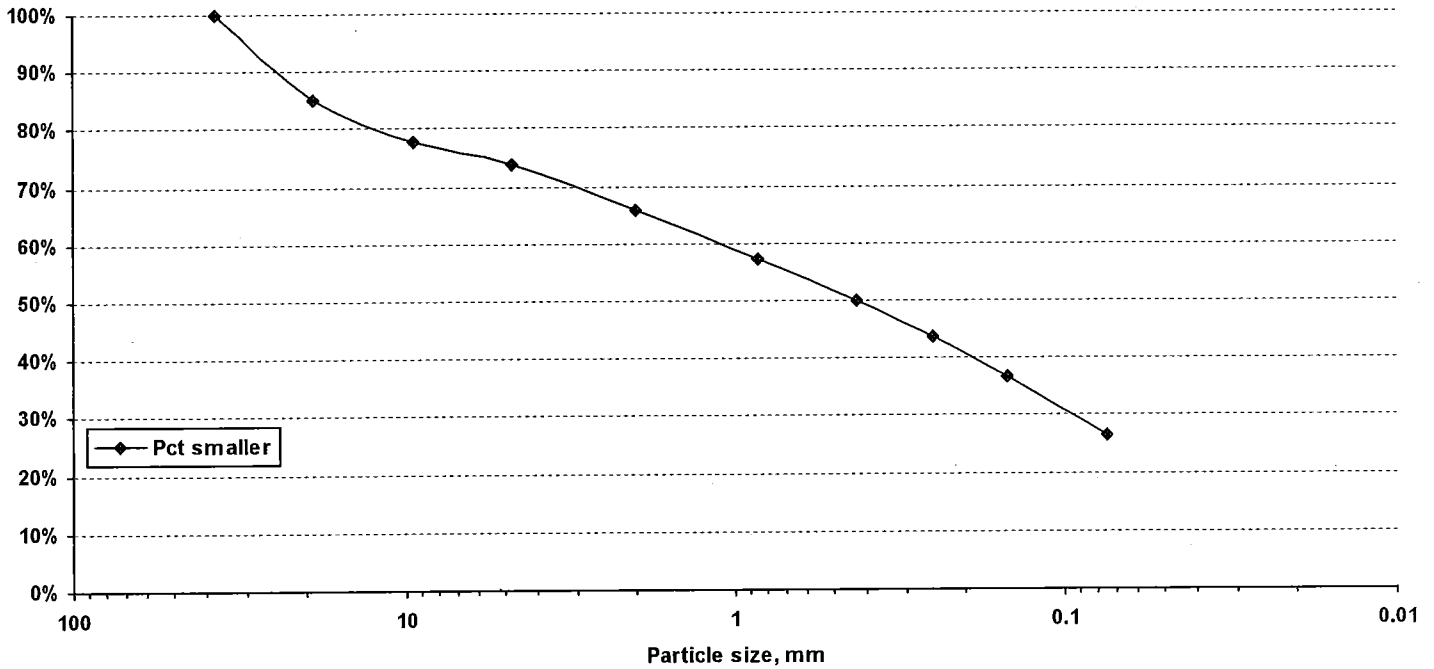
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-105

Depth: 2 FT - 4 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140920 Corrected copy: N/A Report Date: 6/12/2014 8:30:48 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-105 Depth: 4 FT to: 6 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-3

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	95.8%
4.75 mm (#4):	89.4%
2.00 mm (#10):	82.6%
850 µm (#20):	73.9%
425 µm (#40):	66.1%
250 µm (#60):	59.1%
150 µm (#100):	52.1%
75 µm (#200):	40.7%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	13.6%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	17.4% D2487: SM
Sa:	41.8% M145: A-4 Silty Sand
Si:	40.7%

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140920

Corrected copy: N/A

Report Date: 6/12/2014 8:30:52 A

Project: PERU

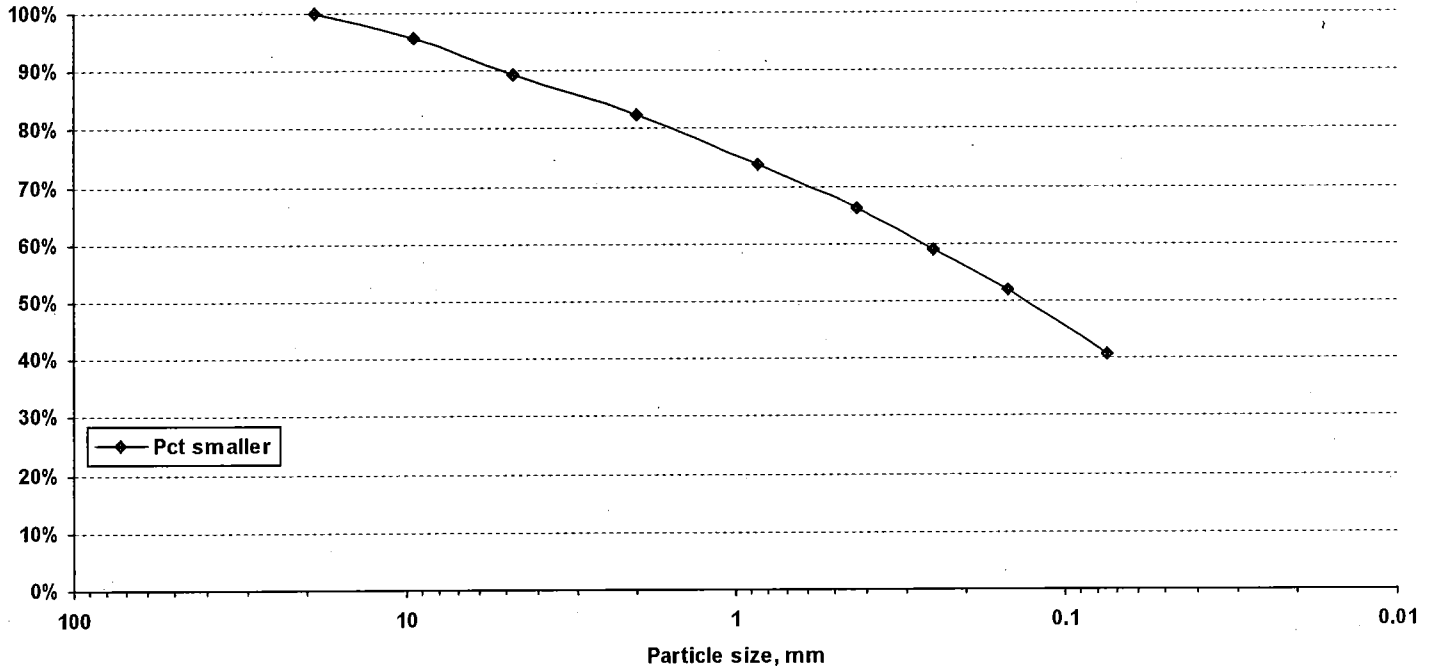
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-105

Depth: 4 FT - 6 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140921 Corrected copy: N/A Report Date: 6/12/2014 8:32:40 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-105 Depth: 6 FT to: 8 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-4

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	97.6%
9.5 mm (3/8"):	92.0%
4.75 mm (#4):	86.0%
2.00 mm (#10):	78.7%
850 µm (#20):	71.9%
425 µm (#40):	65.7%
250 µm (#60):	60.1%
150 µm (#100):	53.3%
75 µm (#200):	40.5%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	14.3%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method: T-180	Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 21.3%	D2487: SM
Sa: 38.2%	M145: A-4 Gravelly Sandy Silt
Si: 40.5%	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140921

Corrected copy: N/A

Report Date: 6/12/2014 8:32:44 A

Project: PERU

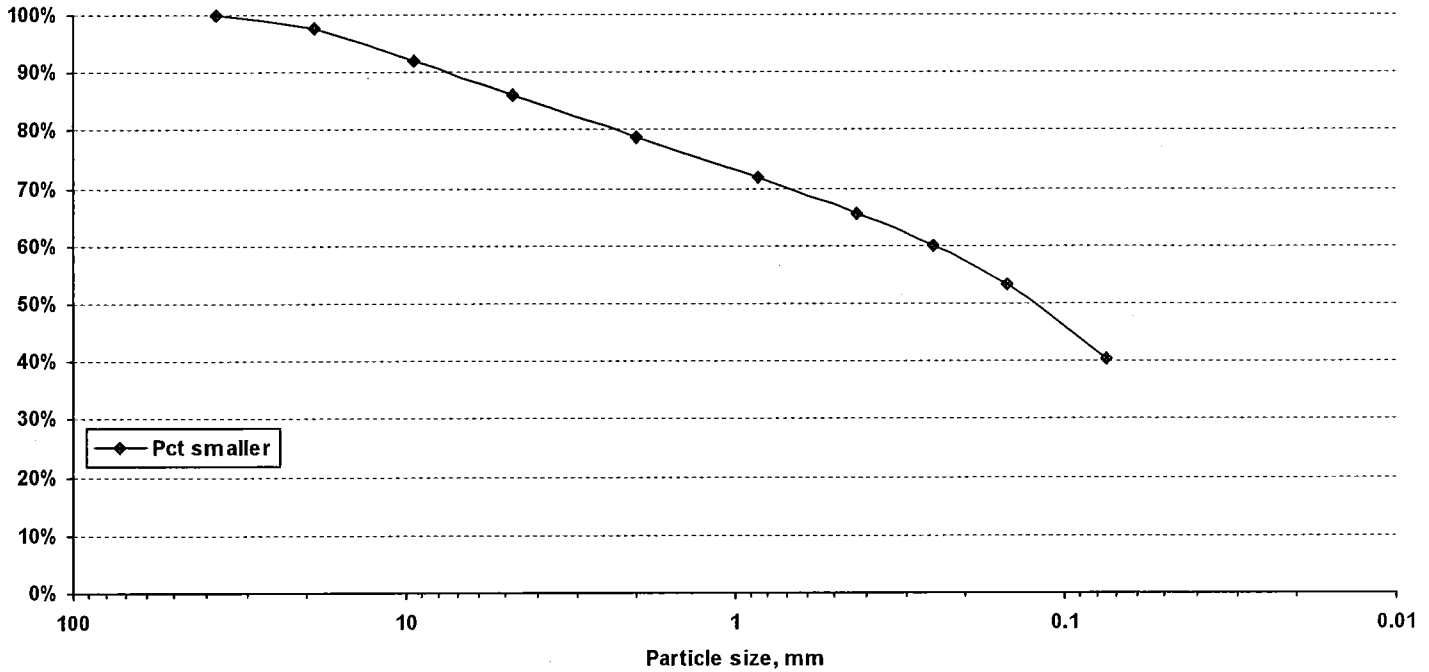
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-105

Depth: 6 FT - 8 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140922 Corrected copy: N/A Report Date: 6/12/2014 8:34:30 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-105 Depth: 9 FT to: 11 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-5

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	83.0%
9.5 mm (3/8"):	74.6%
4.75 mm (#4):	67.9%
2.00 mm (#10):	59.4%
850 µm (#20):	51.5%
425 µm (#40):	45.9%
250 µm (#60):	41.6%
150 µm (#100):	37.7%
75 µm (#200):	30.1%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	10.8%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 40.6%	D2487: SM
Sa: 29.3%	M145: A-2-4 Sandy Silty Gravel
Si: 30.1%	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140922

Corrected copy: N/A

Report Date: 6/12/2014 8:34:39 A

Project: PERU

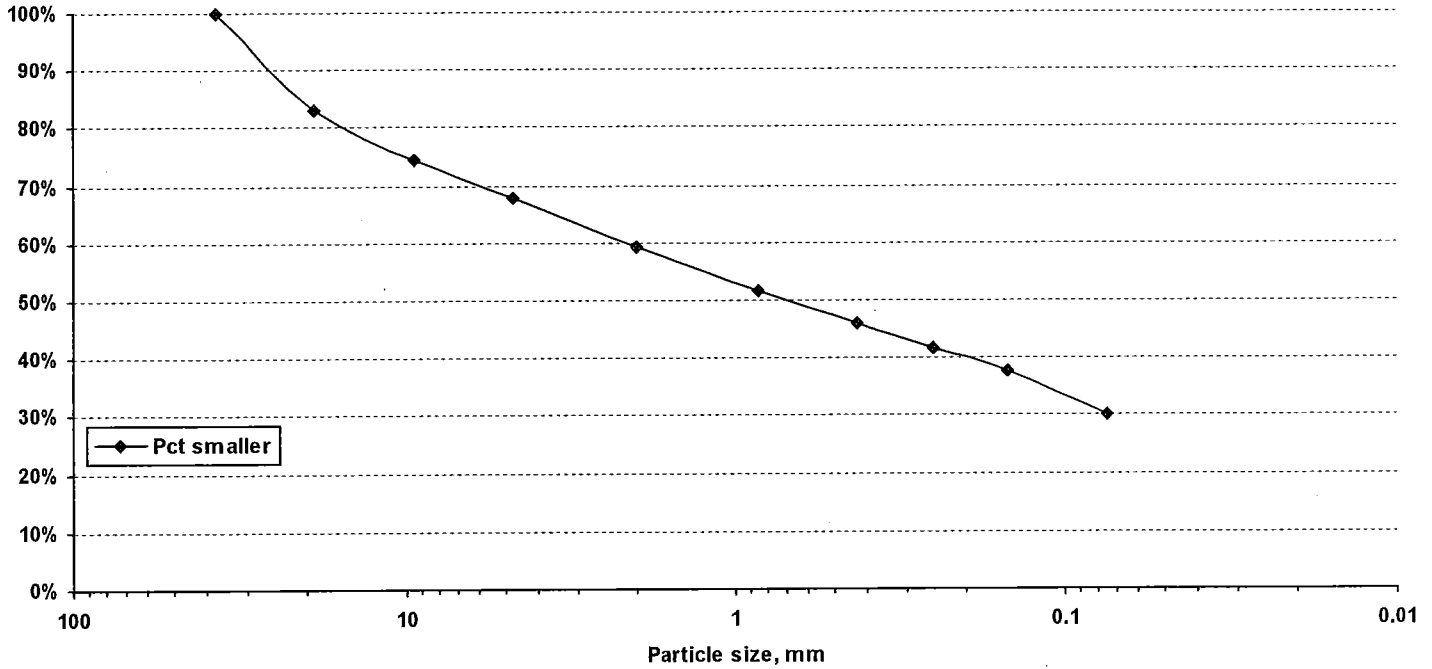
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-105

Depth: 9 FT - 11 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140923

Corrected copy: N/A

Report Date: 6/12/2014 8:36:19 A

Project: PERU

Number: STP SCRP(4)

Site: VT-11 CULVERT

Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014

Tested by: J. TOUCHETTE

Station: Offset: Hole: B-105 Depth: 14 FT to: 16 FT

Field description:

Submitted by: TERRACON

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Examined for: MC, GS

Location used:

Comment: S-6

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	90.2%
9.5 mm (3/8"):	81.0%
4.75 mm (#4):	73.1%
2.00 mm (#10):	65.0%
850 µm (#20):	57.3%
425 µm (#40):	50.6%
250 µm (#60):	45.4%
150 µm (#100):	40.2%
75 µm (#200):	31.6%

Limits	
T-265 Moisture content:	11.4%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP


Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	

Gr:	35.0%	D2487:	SM
Sa:	33.4%	M145:	A-2-4 Silty Sandy Gravel
Si:	31.6%		

Hydrometer Analysis

Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140923

Corrected copy: N/A

Report Date: 6/12/2014 8:36:23 A

Project: PERU

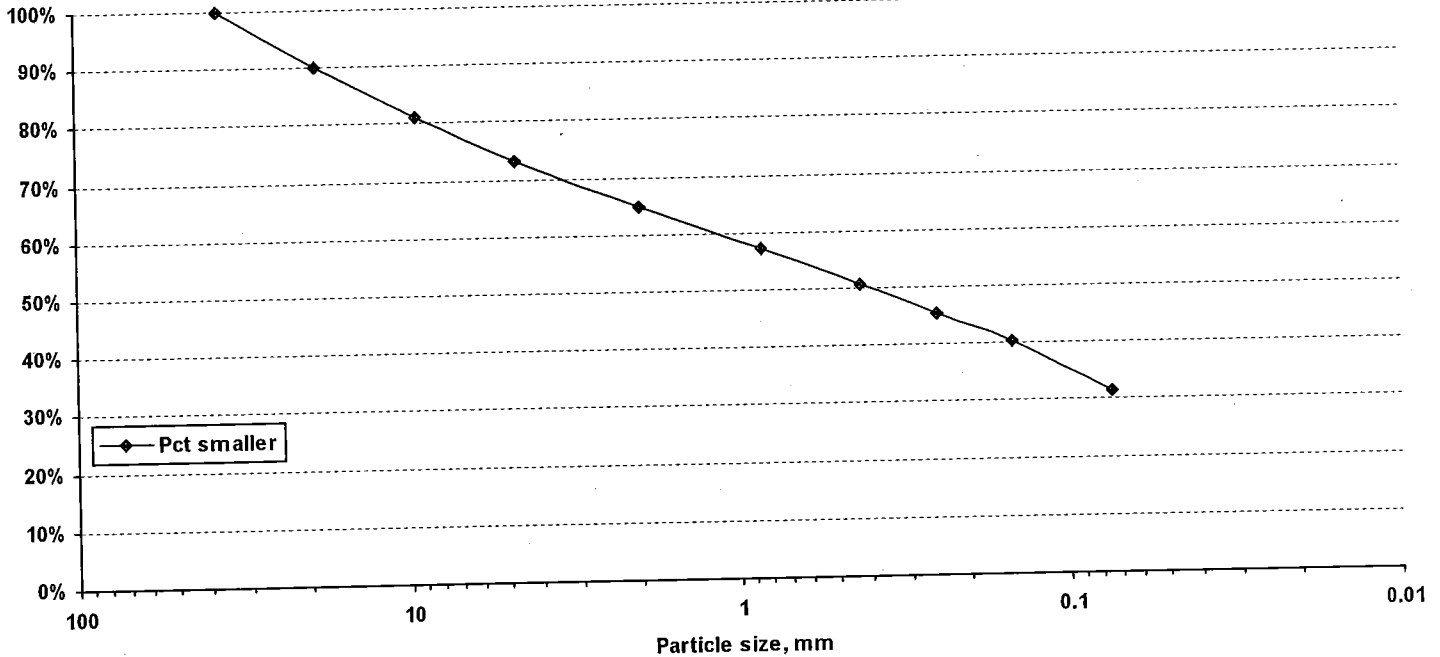
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-105

Depth: 14 FT - 16 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140924 Corrected copy: N/A Report Date: 6/12/2014 8:37:58 A
Project: PERU Number: STP SCR(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-105 Depth: 19 FT to: 21 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-7


Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	98.2%
9.5 mm (3/8"):	88.8%
4.75 mm (#4):	84.6%
2.00 mm (#10):	76.5%
850 µm (#20):	68.2%
425 µm (#40):	60.9%
250 µm (#60):	55.1%
150 µm (#100):	49.7%
75 µm (#200):	39.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	10.8%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 23.5%	D2487: SM
Sa: 36.7%	M145: A-4 Gravelly Sandy Silt
Si: 39.8%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140924

Corrected copy: N/A

Report Date: 6/12/2014 8:38:02 A

Project: PERU

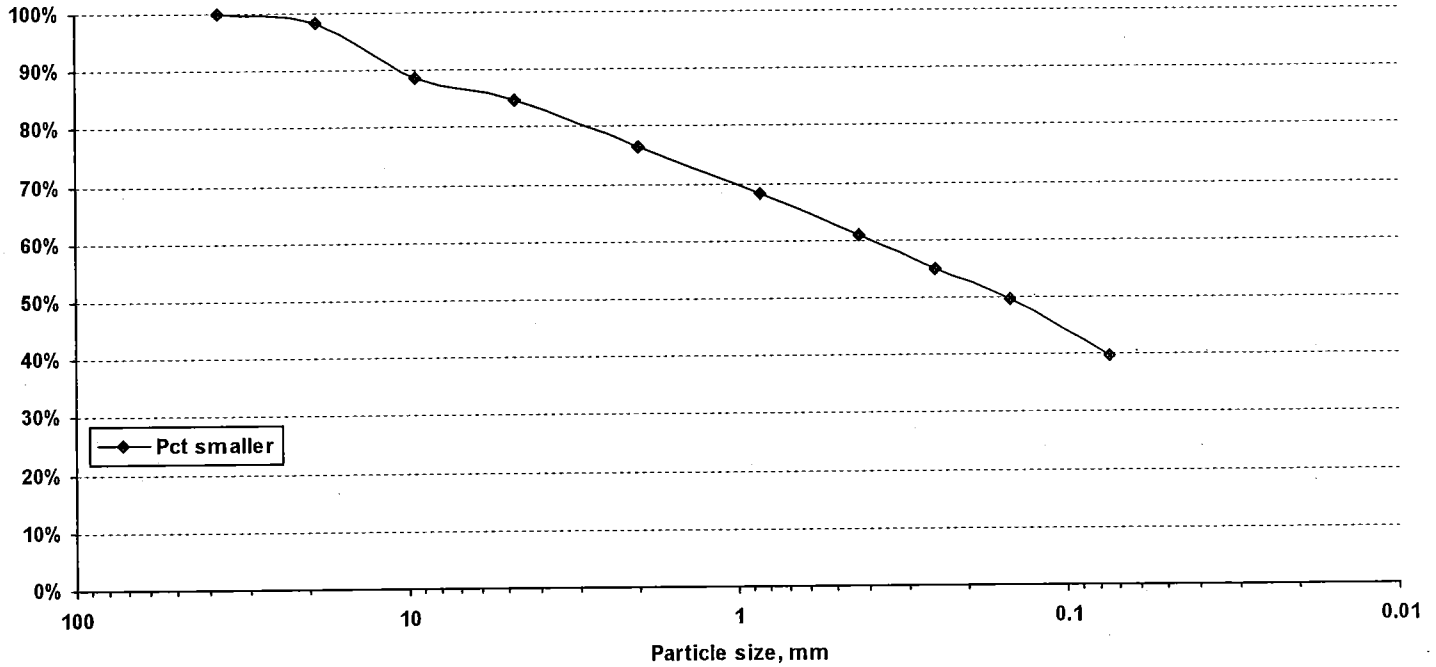
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-105

Depth: 19 FT - 21 FT

T-88 Particle size analysis



Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140925 Corrected copy: N/A Report Date: 6/12/2014 8:39:42 A
Project: PERU Number: STP SCRP(4) Site: VT-11 CULVERT
Date sampled: 6/3/2014 Received: 6/6/2014 Tested: 6/6/2014 Tested by: J. TOUCHETTE
Station: Offset: Hole: B-105 Depth: 24 FT to: 26 FT
Field description:
Submitted by: TERRACON Address:
Sample type: SPLIT BARREL Quantity:
Sample source/Outside agency name:
Location used: Examined for: MC, GS
Comment: S-8

Test Results


Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	97.6%
9.5 mm (3/8"):	91.3%
4.75 mm (#4):	85.7%
2.00 mm (#10):	78.2%
850 µm (#20):	70.5%
425 µm (#40):	63.8%
250 µm (#60):	58.5%
150 µm (#100):	52.5%
75 µm (#200):	41.2%

Limits
T-265 Moisture content: 10.9%
T-89 Liquid Limit:
T-90 Plastic Limit:
T-90 Plasticity Index: NP

Moisture Density
Test method: T-180 Method:
Maximum density: pcf
Optimum moisture:
T-100 Specific Gravity:
Gr: 21.8% D2487: SM
Sa: 37.0% M145: A-4 Gravelly Sandy Silt
Si: 41.2%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist 

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140925

Corrected copy: N/A

Report Date: 6/12/2014 8:39:46 A

Project: PERU

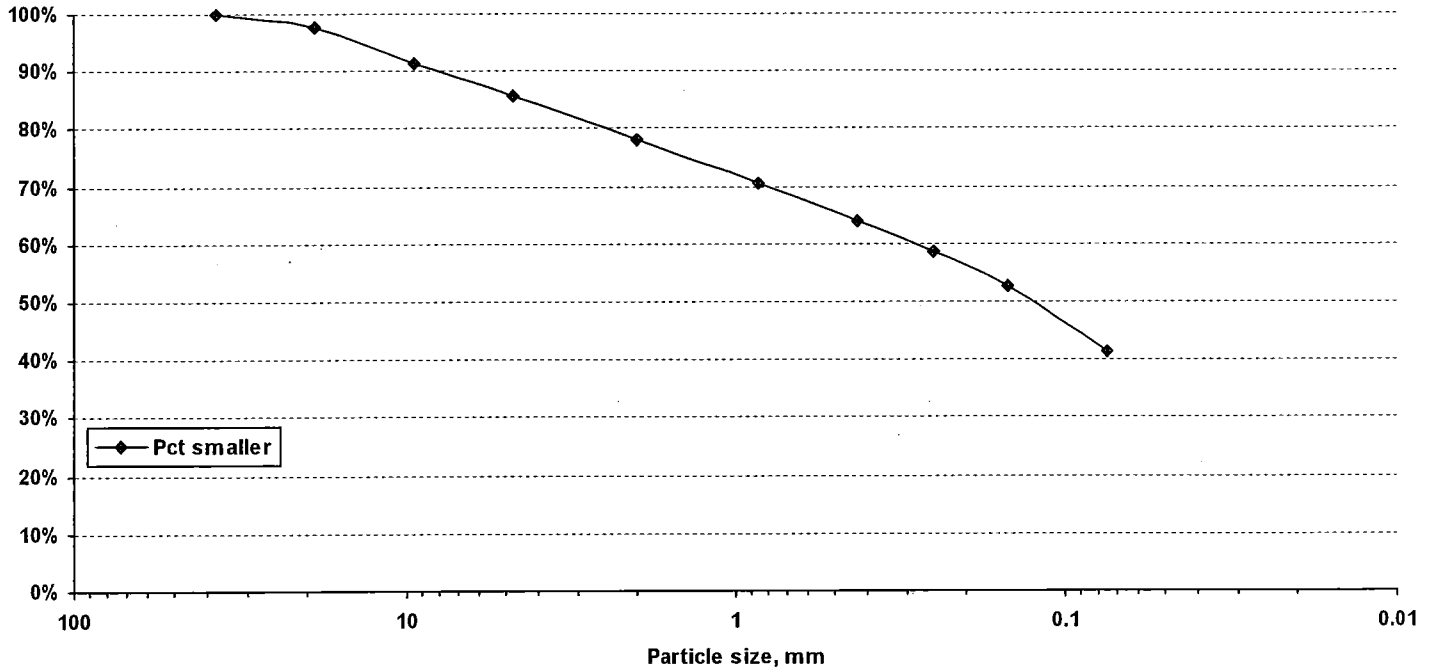
Number: STP SCRP(4)

Site: VT-11 CULVERT

Hole: B-105

Depth: 24 FT - 26 FT

T-88 Particle size analysis



**Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001**

Distribution list
TERRACON
T. ELIASSEN
J. TOUCHETTE

Report on Soil Sample

Lab number: E140926 **Corrected copy:** N/A **Report Date:** 6/12/2014 8:41:42 A
Project: PERU **Number:** STP SCRP(4) **Site:** VT-11 CULVERT
Date sampled: 6/3/2014 **Received:** 6/6/2014 **Tested:** 6/6/2014 **Tested by:** J. TOUCHETTE
Station: **Offset:** **Hole:** B-105 **Depth:** 29 FT to: 30.4 FT
Field description:
Submitted by: TERRACON **Address:**
Sample type: SPLIT BARREL **Quantity:**
Sample source/Outside agency name:
Location used: **Examined for:** MC, GS
Comment: S-9

Test Results

T-88	Sieve Analysis % Passing Total Sample	Limits
75 mm (3.0"):		T-265 Moisture content: 11.4%
37.5 mm (1.5"):		T-89 Liquid Limit:
19 mm (3/4"):	92.3%	T-90 Plastic Limit:
9.5 mm (3/8"):	84.4%	T-90 Plasticity Index: NP
4.75 mm (#4):	79.8%	Moisture Density
2.00 mm (#10):	74.3%	Test method: T-180 Method:
850 µm (#20):	67.5%	Maximum density: pcf
425 µm (#40):	61.7%	Optimum moisture:
250 µm (#60):	56.7%	T-100 Specific Gravity:
150 µm (#100):	51.7%	Gr: 25.7% D2487: SM
75 µm (#200):	41.6%	Sa: 32.7% M145: A-4 Gravelly Sandy Silt
		Si: 41.6%
Hydrometer Analysis		
Particles smaller	% total sample	
0.05 mm:		
0.02 mm:		
0.005 mm:		
0.002 mm:		
0.001 mm:		

Comments: LAB NOTE: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation
Materials and Research Section
1 National Life Drive
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E140926

Corrected copy: N/A

Report Date: 6/12/2014 8:41:48 A

Project: PERU

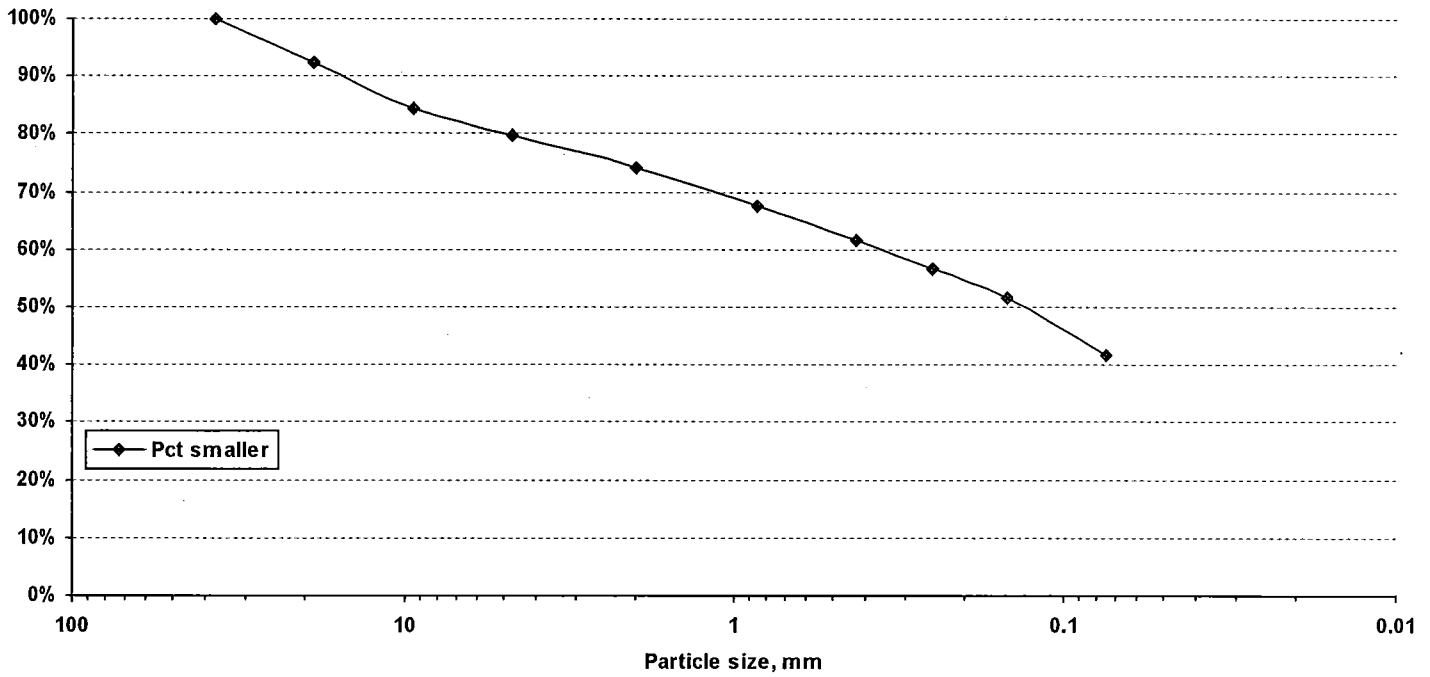
Number: STP SCR(4)

Site: VT-11 CULVERT

Hole: B-105

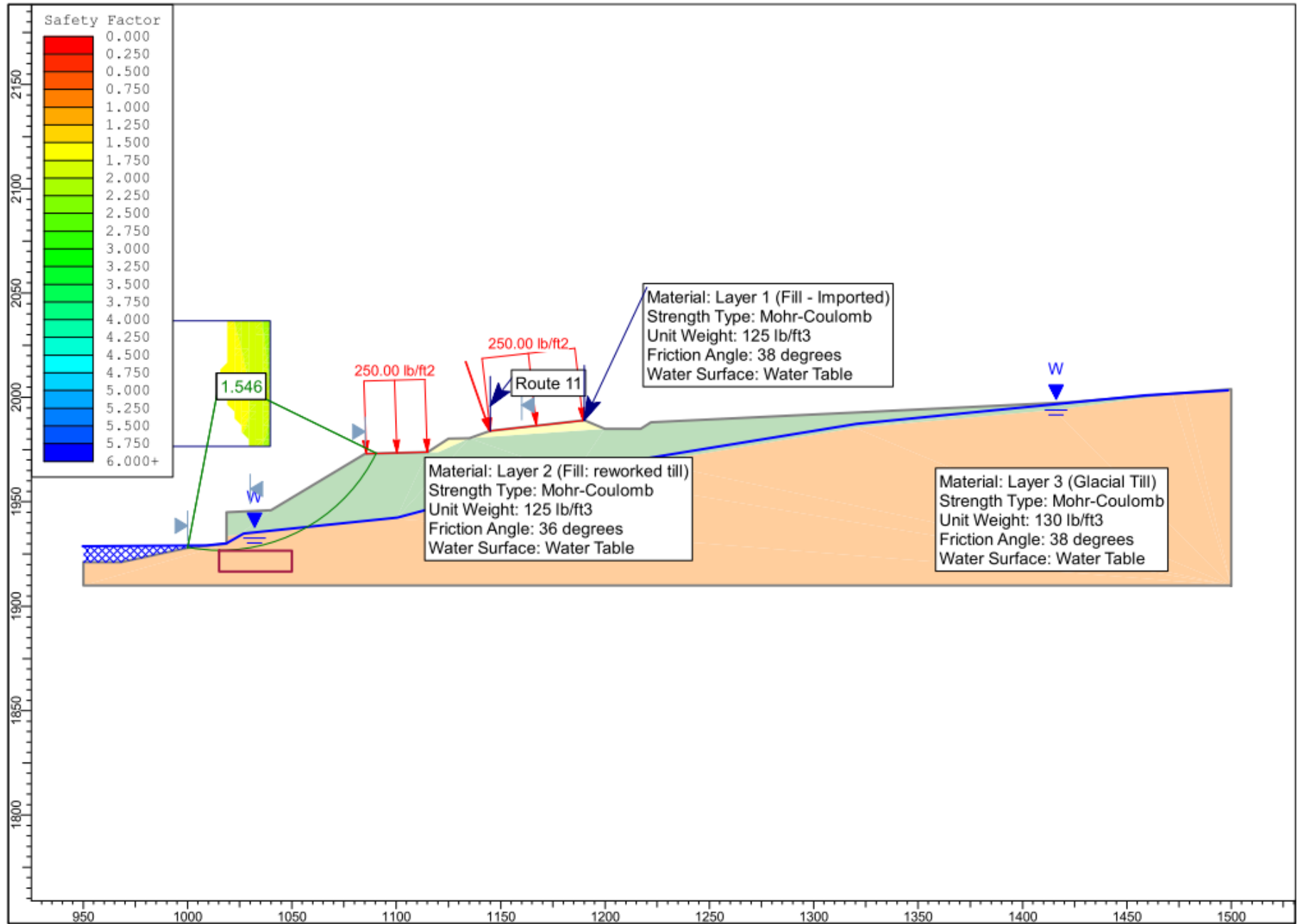
Depth: 29 FT - 30.4 FT

T-88 Particle size analysis



APPENDIX C

GLOBAL STABILITY ANALYSIS



Project Mngr:	Project No.
Drawn By:	Scale:
Checked By:	File No.
Approved By:	Date:

Terracon

77 Sundial Ave. Manchester, NH 03103
 PH. (603) 647 9700 FAX (603) 647 4432

--

EXHIBIT

APPENDIX D

SUPPORTING DOCUMENTS

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1- ³ / ₈ " I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube – 2" O.D., 3" O.D., unless otherwise noted	PA:	Power Auger (Solid Stem)
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) typically the middle 12 inches of the total 24-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	BCR:	Before Casing Removal
WCI:	Wet Cave in	WD:	While Drilling	ACR:	After Casing Removal
DCI:	Dry Cave in	AB:	After Boring	N/E:	Not Encountered

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

<u>Unconfined Compressive Strength, Qu, psf</u>	<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Consistency</u>
< 500	0 - 1	Very Soft
500 – 1,000	2 - 4	Soft
1,000 – 2,000	4 - 8	Medium Stiff
2,000 – 4,000	8 - 15	Stiff
4,000 – 8,000	15 - 30	Very Stiff
8,000+	> 30	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Relative Density</u>
0 – 3	Very Loose
4 – 9	Loose
10 – 29	Medium Dense
30 – 50	Dense
> 50	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 – 29
Modifier	≥ 30

GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75mm)
Sand	#4 to #200 sieve (4.75 to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 – 12
Modifier	> 12

PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1-10
Medium	11-30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification			
				Group Symbol	Group Name ^B		
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F		
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GP	Poorly graded gravel ^F		
			Fines classify as CL or CH	GM	Silty gravel ^{F,G,H}		
		Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	GC	Clayey gravel ^{F,G,H}	
	Sands with Fines: More than 12% fines ^D		Fines classify as ML or MH	SW	Well-graded sand ^I		
			Fines Classify as CL or CH	SP	Poorly graded sand ^I		
				Fines Classify as ML or MH	SM	Silty sand ^{G,H,I}	
		Fines Classify as CL or CH		SC	Clayey sand ^{G,H,I}		
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}		
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K,L,M}		
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K,L,M,N}	
			Liquid limit - not dried			Organic silt ^{K,L,M,O}	
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K,L,M}		
			PI plots below "A" line	MH	Elastic Silt ^{K,L,M}		
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K,L,M,P}	
			Liquid limit - not dried			Organic silt ^{K,L,M,Q}	
		Highly organic soils: Primarily organic matter, dark in color, and organic odor				PT	Peat

^A Based on the material passing the 3-in. (75-mm) sieve

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

^E $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.

