



GEOTECHNICAL INVESTIGATION REPORT

TAXIWAY AND APRON EXPANSIONS

Morrisville-Stowe State Airport
Morrisville, Vermont 05661

Prepared for:

Jacobs
2 Executive Park Drive, Suite 205
Bedford, New Hampshire 03110

Prepared by:

John Turner Consulting, Inc.
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JTC Project No. 23-04-017

July 12, 2023

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July 12, 2023

John Hehir
Jacobs
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P: 603-630-4919
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**RE: Geotechnical Investigation Report
Taxiway and Apron Expansions
Morrisville-Stowe State Airport
Morrisville, Vermont**

Dear Mr. Hehir:

In accordance with our proposal and your authorization to proceed, John Turner Consulting, Inc. (JTC) has completed the geotechnical investigation for the above captioned project. Presented herein and attached are the results of the site subsurface investigation.

This report completes our approved geotechnical services under the contract agreement. We appreciate the opportunity to assist you and we look forward to working with you on this project through its completion. Please do not hesitate to contact us if you have any questions or require additional information.

Sincerely,
JOHN TURNER CONSULTING, INC.



Stephen C. Lanne, PE
Vice President of Engineering
slanne@consultjtc.com
Ph: (413) 222-1675

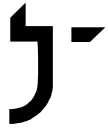
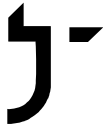


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1.0 INTRODUCTION

John Turner Consulting, Inc. (JTC) is pleased to present this *Geotechnical Investigation Report* for the proposed taxiway and apron expansions located at the Morrisville-Stowe State Airport. JTC conducted geotechnical explorations, laboratory testing, and engineering evaluations in general accordance with our proposed scope of services submitted to Jacobs.

This report summarizes available project information, presents the geotechnical exploration and laboratory testing programs, describes the subsurface conditions encountered, and provides geotechnical engineering recommendations to support the planning, design, and construction of the proposed taxiway and apron expansions. Geotechnical explorations and laboratory testing services were performed in May and June of 2023. The contents of this report are subject to the attached *Limitations*.

2.0 PROJECT INFORMATION

The following subsections provide general descriptions of the site, the regional geologic setting, and the proposed development.

2.1 Site Description

The subject property is the Morrisville-Stowe State Airport facility located at 2305 Laporte Rd, in Morrisville, Vermont. The airport consists of several small structures, an apron, a taxiway, and a runway. The site is bounded by Vermont Route 100 to the west and undeveloped land to the north, east, and south.

2.2 Regional Geologic Setting

The *Surficial Geologic Map of Parts of Clarendon, Vermont (2020)* indicates that native site soils consist of till deposits including poorly sorted mixture of clay, silt, sand, gravel, cobbles, and boulders. Some thickness of previously placed fill associated with the construction of the airport is also expected.

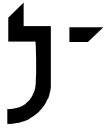
2.3 Proposed Development

JTC understands that the proposed project is to complete a pavement design that extends the existing taxiway and apron.

3.0 GEOTECHNICAL EXPLORATIONS

3.1 Soil Borings

JTC subcontracted Cascade to perform ten (10) geotechnical test borings, designated as B-1 through B-10 (including B-2A), via a track-mounted drill rig on May 24th and 25th, 2023. JTC directed the drilling, testing, and sampling activities and logged the subsurface conditions encountered at each boring location.



The exploration locations were selected in relation to the existing site features and proposed development, and under the constraints of drill rig access and utility conflicts. Subsequently, the relative location of each exploration was established via measurements from existing site features and scaling the dimensions onto the provided *Exploration Location Plan*.

The borings were advanced to depths ranging from 1.5 to 10 feet below the ground surface (bgs) utilizing 4¼-inch inside-diameter, continuous-flight, hollow-stem-augers. As the borings were advanced, standard penetration tests (SPTs) were conducted at regular intervals and soil samples were obtained via 2-inch outside-diameter split-spoon samplers driven by a 140-pound safety (SAFE-T) hammer. SPTs were performed in general accordance with *ASTM D1586 Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils*.

Selected soil samples were sealed in moisture-tight containers and returned to JTC's office for further review, classification, and/or geotechnical laboratory testing. The borings were backfilled with soil cuttings upon completion of drilling. Detailed records of the soil, drilling, testing, sampling performed, and groundwater conditions observed at each boring location are provided on the attached *Exploration Logs*.

4.0 GEOTECHNICAL FIELD TESTING

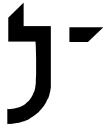
Infiltration Tests

Infiltration testing was performed in general accordance with local standards. The testing procedure at each location was performed as follows:

- A borehole was advanced to the infiltration depth using a hollow stem auger. A 3-inch diameter Schedule 40 polyvinyl chloride (PVC) casing was placed inside and seated into the soils at the bottom of the hole. The annulus between the pipe and the borehole was backfilled with soil cuttings;
- An approximately 2-inch thick layer of drainage gravel was placed at the bottom and inside of the casing to protect the soil from scouring and sedimentation;
- The casing was filled with water to about 2 feet above the bottom of the boring to pre-soak for approximately 24 hours; After the 24-hour soaking period, JTC performed infiltration testing at the prepared locations.

The testing procedure consisted of:

- Filling the pipe with water to a height of 2 feet above the bottom of the casing;
- Taking regular water level measurements over the following hour;
- Refilling the water after each hour and repeating the process for a total of four cycles.



4.1.1 Infiltration Testing Results

The infiltration testing results are summarized in the following table:

Table 1 – Summary of Infiltration Testing Results							
Infiltration Test #	Test Depth (ft)	Soil Type	Measured Infiltration Rate (in/hr)				Average Measured Rate (in/hr)
			Round 1	Round 2	Round 3	Round 4	
IT-1	9.5	SP	16.8	12.0	12.0	12.0	13.2
IT-2	9.6	SP	18.0	18.0	19.2	19.2	18.6
IT-3	9.3	SP	14.4	14.4	14.4	14.4	14.4

No factors of safety have been applied to the measured rates presented in the table. JTC recommends applying a minimum safety factor of 2 to the measured rates for design purposes.

5.0 GEOTECHNICAL LABORATORY TESTING

JTC selected representative soil samples for geotechnical laboratory testing. The following tests were performed:

- 8 Moisture Content Determinations
- 8 Washed Sieve Analyses
- 2 Hydrometer Analyses
- 4 Modified Proctors
- 4 California Bearing Ratios

Geotechnical laboratory testing was performed in general accordance with ASTM procedures. Test results are provided on the attached *Geotechnical Laboratory Testing Reports* appendix.

5.1 California Bearing Ratio (CBR) and Modified Proctors

The results of the CBR lab testing and field CBR values are provided in Table 1. CBR values are based on the CBR at 0.1-inch penetration.

Modified proctor tests (ASTM D1557) were performed on all CBR samples. CBR testing was performed in accordance with ASTM D1883. CBR samples were soaked and compacted to 92.0 percent of maximum modified proctor density prior to testing.

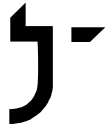


Table 1 – California Bearing Ratio					
Sample/ Location #	USCS Soil Type	Laboratory CBR Values & Test Conditions			
		Depth of Lab Sample (feet bgs)	Laboratory CBR Value (Corrected)	Soaked Moisture Content (%)	In-Situ Moisture Content (%)
CBR-1 (B-2)	SP	2 - 4	14	11.4	5.3
CBR-2 (B-9)	SP	2 - 4	5	17.6	2.7
CBR-3 (B-6)	SP	2 - 4	10	13.9	4.5
CBR-4 (B-5)	SM	2 - 4	20	15.1	-

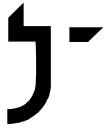
Table 2 – Modified Proctor Analysis Summary			
Exploration and Sample Depth (feet bgs)	USCS Soil Type	Maximum Dry Density (pcf)	Optimum Moisture (%)
CBR-1 (2 - 4)	SP	127.9	7.7
CBR-2 (2 - 4)	SP	105.2	14.0
CBR-3 (2 - 4)	SP	117.7	9.2
CBR-4 (2 - 4)	SM	123.1	11.1

6.0 SUBSURFACE CONDITIONS

The following subsections describe the site soil, bedrock, and groundwater conditions encountered, based on results of the geotechnical explorations and laboratory testing. Detailed descriptions of the conditions observed at each boring are provided on the attached *Exploration Logs*.

6.1 Soil Profile

The primary soil strata are briefly described in the paragraphs below.



6.1.1 Surface Materials

Topsoil was encountered at the ground surface at all exploration locations. The topsoil generally consisted of dark brown, silty Sand (SM) and was approximately 6 to 12 inches in thickness.

6.1.2 Existing Fill

Materials interpreted to be Fill materials were encountered underlying the Topsoil at B-2A through B-6, B-8, and B-10. Where encountered, the Fill materials typically consisted of brown, poorly graded Sand (SP) and silty Sand (SM). The Fill extended to depths of approximately 2 to 6 feet bgs and was typically dense to very dense based on SPT N-values.

6.1.3 Native Sands

Materials interpreted to be Native Sands were encountered underlying the existing Fill at B-2A through B-6, B-8, and B-10 and the surface materials at B-1, B-7, and B-9. The Native Sands consisted of grey-brown, poorly graded Sand (SP) with various amounts of silt and gravel. The Native Sands were typically loose to medium dense based on SPT N-values.

6.2 Bedrock

Bedrock was not encountered during the explorations. Practical refusal of the auger and/or split spoon sampler was encountered at B-2 at a depth of approximately 1.5 feet bgs. The practical refusal at this location is believed to be on top of a boulder.

6.3 Groundwater

Groundwater was encountered at B-9 at an approximate depth of 7 feet bgs. Short-term (i.e., during drilling, upon completion of drilling, and/or a few hours after drilling) water levels observed in test borings should be considered approximate.

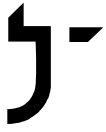
JTC estimates that this investigation occurred during a period of seasonally low to normal ground water levels. Site groundwater levels should be expected to fluctuate seasonally and in response to precipitation events, construction activity, site use, and adjacent site use.

7.0 GEOTECHNICAL ANALYSIS & RECOMMENDATIONS

The evaluation of the site and the proposed project was based on the subsurface conditions encountered at the exploration locations and results of geotechnical laboratory and field testing.

7.1 California Bearing Ratio and Subgrade Preparation

The existing fill and Native Sands appear to periodically have high fines content at the expected subgrade level, i.e about 2 feet bgs. As such, these soils are expected to be susceptible to seasonal softening from freeze-thaw cycles. To account for this potential softening, we recommend the CBR used for pavement design be less than the typical values reported in the laboratory results.



We recommend designing the pavement section using a CBR value of 10.

Existing topsoil, and any other identified unsuitable materials, should be completely removed from the proposed pavement areas. Underlying soils should then be removed to design subgrade level and segregated from the topsoil/unsuitable soils. The resulting subgrade soils should be compacted to the FAA standards provided in *AC 150/5320-6F*. Based on JTC's observations, existing taxiway and proposed subgrade soils should be suitable to meet the FAA standards. A geotechnical engineer should evaluate the subgrade soils.

Any loose, soft, wet, and/or otherwise unsuitable soils should be over-excavated to expose suitable soils, or other remedial measures should be taken, as approved by the on-site geotechnical engineer. The over-excavation should then be backfilled with properly placed and compacted *Structural Fill*.

7.2 Frost Susceptibility

Based on field observations and laboratory analyses, the existing Fill and Native Sands at the expected subgrade level, i.e about 2 feet bgs, periodically have elevated fines content. Based on the gradation results and Table 2-2 of *FAA AC 150/5320-6F*, JTC recommends the subgrade soils be classified as frost group FG-3.

7.3 Seismic Considerations

Based on site class definitions of the American Society of Civil Engineers (ASCE) Standard 7-16, Minimum Design Loads for Buildings and Other Structures and the conditions encountered at the test boring locations, the site is classified as:

Site Class D: Stiff Soil Profile.

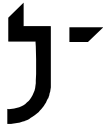
Liquefaction refers to the loss of strength in saturated cohesionless soils due to the buildup of pore water pressures during cyclic or seismic loading. Based on the conditions encountered at the test boring locations, the soils are not considered to be susceptible to liquefaction.

7.4 Re-Use of Site Soils

Based on the gradation requirements provided in the *FAA AC 150/5370-10H* and the results of the particle size analyses, the native materials do not meet the specification for *P-154 Subbase Course*, or the specification for *P-209 Crushed Aggregate Base Course*. Soils may be re-used in areas to be landscaped, subject to conformance with the project specifications.

7.5 Construction Monitoring and Quality Control Testing

A qualified geotechnical engineer or representative should be retained to review the site preparation and grading activities at a minimum. Similarly, quality control testing, including in-place field density and moisture tests, should be performed to confirm that the specified compaction is achieved. It is recommended that JTC be retained to provide earthwork



construction monitoring and quality control testing services.

Quality control testing recommendations are provided as follows:

- During site grading, 3 field density tests should be performed for every 1,000 square feet (per lift) of fill placement, at a minimum. At least 3 tests should be performed on each lift of material even if the lift is less than 1,000 square feet;
- During backfilling of utility trenches, at least 1 test should be conducted per 50 linear feet (per lift) of trench; and
- During site grading and pavement subgrade preparation, 3 field density tests should be performed for every 1,000 square feet (per lift) at a minimum. At least 3 tests should be performed on each lift even if the lift is less than 1,000 square feet.

If FAA specifications require more frequent testing, then the quality control testing provider should adhere to the stricter requirements.

7.6 Additional Considerations

Additional design recommendations are provided as follows:

- Permanent fill or cut slopes should have a maximum slope of 2.5H:1V (horizontal to vertical) or flatter for dry conditions. Permanent fill or cut slopes should be no steeper than 3H:1V for wet/submerged conditions (e.g., stormwater basin) unless a properly designed surface slope stabilization system (e.g. rip rap, geosynthetics) is provided.

Additional construction considerations/recommendations are provided as follows:

- Safe temporary excavation and/or fill slopes are the responsibility of the Contractor. Excavations should be conducted in accordance with local, state, and federal (OSHA 29 CFR 1926) requirements, at a minimum.
- Proper groundwater control and stormwater management are necessary to maintain site stability. Groundwater should be removed in advance and continuously maintained at least 2 feet below the working construction grade until earthworks and/or backfilling are complete;
- All slopes should be protected from erosion during (and after) construction.

8.0 CLOSING

We trust the contents of this report are responsive to your needs at this time. Should you have any questions or require additional assistance, please do not hesitate to contact our office.

APPENDIX A: LIMITATIONS

Explorations

1. The analyses and recommendations presented in this report are based in part upon the data obtained from widely-spaced subsurface explorations. Subsurface conditions between exploration locations may vary from those encountered at the exploration locations. The nature and extent of variations between explorations may not become evident until construction. If variations appear, it will be necessary to re-evaluate the recommendations of this report.
2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely-spaced explorations and samples; actual strata transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.
3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

Review

4. It is recommended that John Turner Consulting, Inc. be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the geotechnical engineering recommendations provided herein.
5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and conclusions of the report modified or verified in writing by John Turner Consulting, Inc.

Construction

6. It is recommended that John Turner Consulting, Inc. be retained to provide geotechnical engineering services during the installation phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of the addressee for the noted project. All considerations are based on the available information and is in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
8. This report has been prepared for this project by John Turner Consulting, Inc. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to preliminary geotechnical design considerations.

APPENDIX B: RECOMMENDED SOIL GRADATION & COMPACTION SPECIFICATIONS

TABLE 1: Structural Fill

SIEVE SIZE	PERCENT PASSING BY WEIGHT
5-inch	100
¾-inch	60 - 100
No. 4	20 - 80
No. 200	0 - 10

NOTES:

1. For use as structural load support below foundations and within the building pad. Structural Fill placed beneath building foundations should include the Footing Zone of Influence which is defined as that area extending laterally one foot from the edge of the footing then outward and downward at a 1:1.5 (H:V) splay.
2. ¾-inch crushed stone may be used in wet conditions.
3. Structural Fill should be free of construction and demolition debris, frozen soil, organic soil, peat, stumps, brush, trash, and refuse;
4. Structural Fill should not be placed on soft, saturated, or frozen subgrade soils;
5. Structural Fill should be placed in lifts not exceeding 12 inches for heavy vibratory rollers and 8 inches for vibratory plate compactors.
6. Place and compact within $\pm 3\%$ of optimum moisture content.
7. Compact to at least 95% relative compaction per ASTM D1557.
8. The adequacy of the compaction efforts should be verified by field density testing.

TABLE 2: Clean Granular Fill

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3-inch	100
¾-inch	60 – 90
No. 4	20 – 70
No. 200	2 – 8

NOTES:

1. Should consist of crushed stone beneath the concrete pad, as approved by on-site geotechnical engineer.
2. For minimum 9-inch base below the cast-in-place concrete equipment pads.
3. For minimum 12-inch base for exterior concrete slabs exposed to frost.
4. For minimum 18-inch base at exterior ramps, aprons, and loading bays adjacent to entrances/exit ways.
5. For use as footing and foundation wall backfill.
6. For use as backfill behind unbalanced foundation/retaining walls.
7. Place in lifts not exceeding 12 inches for heavy vibratory rollers and 8 inches for vibratory plate compactors.
8. Place and compact within $\pm 3\%$ of optimum moisture content.
9. Compact to at least 95% relative compaction per ASTM D1557.
10. Compact to at least 95% relative compaction per ASTM D1557 when placed as foundation wall backfill in conjunction with a bond break.
11. The adequacy of the compaction efforts should be verified by field density testing.

TABLE 3: Common Fill

SIEVE SIZE	PERCENT PASSING BY WEIGHT
6-inch	100
¾-inch	60 – 100
No. 4	20 – 85
No. 200	0 – 25


NOTES:


1. For use as common/subgrade fill in parking areas and roadway embankments.
2. For use as foundation wall backfill if used in conjunction with a bond break and sized/screened to 3-inch minus.
3. Place in lifts not exceeding 12 inches.
4. Maximum stone size should not exceed ½ the actual lift thickness.
5. Compact to at least 92% relative compaction per ASTM D1557 when placed as subgrade fill in parking areas or roadway embankments.
6. Compact to at least 95% relative compaction per ASTM D1557 when placed as foundation wall backfill in conjunction with a bond break.
7. The adequacy of the compaction efforts should be verified by field density testing.

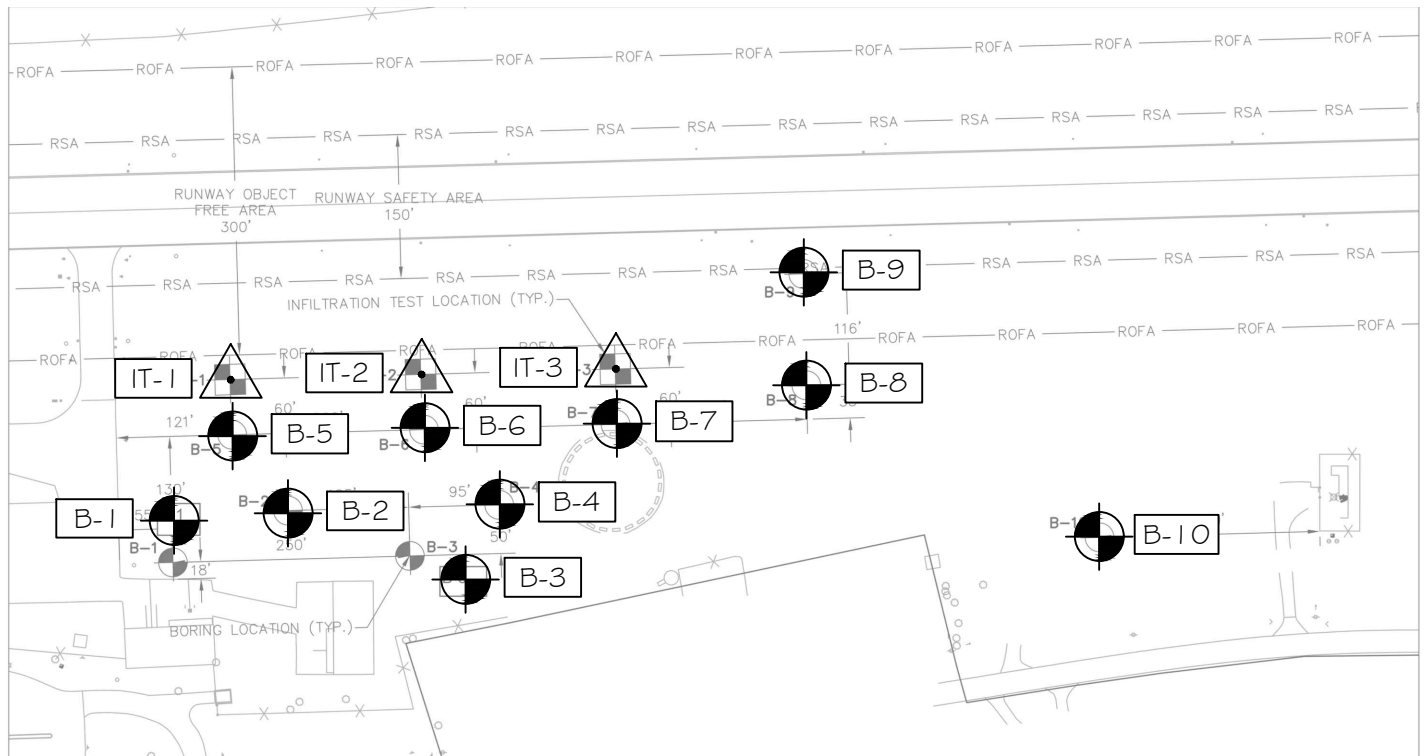
APPENDIX C: SITE PLAN & EXPLORATION LOCATION PLAN



LEGEND

 BORING

 INFILTRATION TEST



Notes:

1. Explorations were performed on May 24, 2023 under the direction of JTC.
2. Exploration locations should be considered approximate.
3. Refer to the Exploration Logs for the subsurface conditions encountered at each exploration location.
4. Basemap source: "Boring Location Plan", prepared by Jacobs, sheet # SK-B1, dated March, 2022
5. Drawing Scale: 1 inch = 200 feet

DATE:	6/6/23	DRAWING NAME:	EXPLORATION LOCATION PLAN
JOB #	23-04-017	PROJECT:	
DRAFT:	TM	PROJECT:	TAXIWAY EXTENSION AND APRON EXPANSION
DESIGN:	QG		STOWE, VERMONT
REVIEW:	SL	CLIENT:	JACOBS
REVISIONS:			BEDFORD, NEW HAMPSHIRE



DRAWING #:

1

APPENDIX D: EXPLORATION LOGS & KEY TO SYMBOLS AND DESCRIPTIONS



LOG OF BORING No. B-1

PROJECT: Taxiway Extention and Apron Expansion **PROJECT NO.:** 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport **ELEVATION:**
DRILLER: Cascade Drilling **LOGGED BY:** Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA **DATE:** 5/30/2023
DEPTH TO - WATER> INITIAL: **AFTER 24 HOURS:**

This information pertains only to this boring and should not be interpreted as being indicative of the site.


Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS				
							Plastic Limit	—	Liquid Limit	Water Content - •	Penetration -
0	[TOPSOIL] 7 inches dark brown, silty Sand (SM); organics; rootlets			SS01	3						
					5						
					10						
					11						
	[NATIVE SANDS] Grey-brown, poorly graded Sand (SP) with gravel; medium dense			SS02	8						
					12						
					7						
					8						
	Grey-brown, silty Sand (SM); medium dense			SS03	5						
5					14						
	-mottling				7						
	-becomes grey				6						
	Grey-brown, poorly graded Sand (SP); medium dense			SS04	4						
					5						
					9						
	-becomes loose			SS05	14						
					6						
					5						
					3						
					4						
10	Boring terminated at 10 ft.										
15											
20											
25											
30											
35											



LOG OF BORING
No. B-2

PROJECT: Taxiway Extention and Apron Expansion PROJECT NO.: 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport ELEVATION:
DRILLER: Cascade Drilling LOGGED BY: Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA DATE: 5/30/2023
DEPTH TO - WATER> INITIAL: AFTER 24 HOURS:

This information pertains only to this boring and should not be interpreted as being indicative of the site.



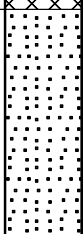
Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS				
							Plastic Limit	—	Liquid Limit	Water Content - •	Penetration - 
0	Auger Refusal Boring terminated at 1.5 ft.	↑		SS01	3 20 50/4		10	20	30	40	50
5											
10											
15											
20											
25											
30											
35											



LOG OF BORING No. B-2A

PROJECT: Taxiway Extension and Apron Expansion PROJECT NO.: 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport ELEVATION:
DRILLER: Cascade Drilling LOGGED BY: Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA DATE: 5/30/2023
DEPTH TO - WATER> INITIAL: AFTER 24 HOURS:

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS				
							Plastic Limit	—	Liquid Limit	Water Content - •	Penetration - 
0	[TOPSOIL] 8 inches dark brown, silty Sand (SM); organics; rootlets		0.7	SS01	2 14 50/3	6.3					
	[FILL] Brown, silty Sand (SM) with gravel; very dense			SS02	50/3						
5	[NATIVE SANDS] Grey-brown, poorly graded Sand (SP) with silt; dense -becomes loose		4	SS03	11 21 19 19						
				SS04	5 3 4						
	-becomes medium dense			SS05	6 8 14 10 5						
10	Boring terminated at 10 ft.										
15											
20											
25											
30											
35											



LOG OF BORING No. B-3

PROJECT: Taxiway Extention and Apron Expansion PROJECT NO.: 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport ELEVATION: _____
DRILLER: Cascade Drilling LOGGED BY: Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA DATE: 5/30/2023
DEPTH TO - WATER> INITIAL: AFTER 24 HOURS:

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS	
							Plastic Limit Water Content -	Liquid Limit
0	[TOPSOIL] 6 inches dark brown, silty Sand (SM); organics; rootlets		0.5	SS01	2 16 50/3			
	[FILL] Brown, poorly graded Sand (SP) with gravel; very dense			SS02	50/3			
5	[NATIVE SANDS] Grey, poorly graded Sand (SP); very dense -becomes medium dense		4	SS03	35 36 43 46			79
	-becomes loose			SS04	10 7 7 8 3	3.8		
				SS05	2 3 4			
10	Boring terminated at 10 ft.							
15								
20								
25								
30								
35								



LOG OF BORING No. B-4

PROJECT: Taxiway Extention and Apron Expansion **PROJECT NO.:** 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport **ELEVATION:**
DRILLER: Cascade Drilling **LOGGED BY:** Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA **DATE:** 5/30/2023
DEPTH TO - WATER> INITIAL: **AFTER 24 HOURS:**

This information pertains only to this boring and should not be interpreted as being indicative of the site.

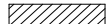



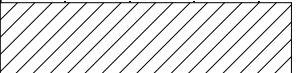
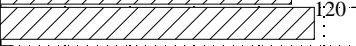
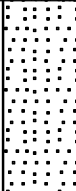


Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS				
							Plastic Limit	—	Liquid Limit	Water Content - •	Penetration -
0	[TOPSOIL] 10 inches dark brown, silty Sand (SM); organics; rootlets			SS01	2 10 24						
0.9	[FILL] Light brown, poorly graded Sand (SP); dense			SS02	7 6 8						
2	[NATIVE SANDS] Grey-brown, poorly graded Sand (SP) with silt; medium dense			SS03	1 4 6 5	7.6					
				SS04	4 4 8						
	-becomes loose			SS05	11 3 4 3 3						
10	Boring terminated at 10 ft.										
15											
20											
25											
30											
35											



LOG OF BORING No. B-5

PROJECT: Taxiway Extension and Apron Expansion **PROJECT NO.:** 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport **ELEVATION:**
DRILLER: Cascade Drilling **LOGGED BY:** Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA **DATE:** 5/30/2023
DEPTH TO - WATER> INITIAL: **AFTER 24 HOURS:**

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS				
							Plastic Limit	Liquid Limit		Water Content - •	Penetration - 
0	[TOPSOIL] 6 inches dark brown, silty Sand (SM); organics; rootlets			SS01	2 3 4 5						
	[FILL] Light brown, silty Sand (SM); loose -becomes dense -becomes grey -becomes very dense			SS02	2 10 35 50/3						
5				SS03	28 70 50/2					120 →	
	[NATIVE SANDS] Grey, poorly graded Sand (SP) with silt and gravel; medium dense -becomes loose			SS04	5 5 5 5						
					5 5 5 1 4 5 11						
10	Boring terminated at 10 ft.			SS05							
15											
20											
25											
30											
35											



LOG OF BORING No. B-6

PROJECT: Taxiway Extension and Apron Expansion **PROJECT NO.:** 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport **ELEVATION:**
DRILLER: Cascade Drilling **LOGGED BY:** Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA **DATE:** 5/30/2023
DEPTH TO - WATER> INITIAL: **AFTER 24 HOURS:**

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS
							Plastic Limit ——— Liquid Limit Water Content - • Penetration -
0	[TOPSOIL] 8 inches dark brown, silty Sand (SM); organics; rootlets			SS01	1 5 8 10		
	[FILL] Light brown, silty Sand (SM); medium dense -becomes very dense -becomes dense		0.7	SS02	10 10 20 20 48 25/0		
5				SS03	4 10 30 30		
	[NATIVE SANDS] Grey-brown, poorly graded Sand (SP) with silt and gravel; medium dense Grey, poorly graded Sand (SP) with silt; loose		6	SS04	50/5 30 12	8.1	
				SS05	9 8 5 4 4 5		
10	Boring terminated at 10 ft.						
15							
20							
25							
30							
35							



LOG OF BORING No. B-7

PROJECT: Taxiway Extention and Apron Expansion **PROJECT NO.:** 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport **ELEVATION:** _____
DRILLER: Cascade Drilling **LOGGED BY:** Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA **DATE:** 5/30/2023
DEPTH TO - WATER> INITIAL: _____ **AFTER 24 HOURS:** _____

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS				
							Plastic Limit	—	Liquid Limit	Water Content - •	Penetration -
0	[TOPSOIL] 12 inches dark brown, silty Sand (SM); organics; rootlets			SS01	2 4 14 49						
	[NATIVE SANDS] Grey-brown, poorly graded Sand (SP) with silt and gravel; medium dense -split spoon refusal			SS02	50/6						
5				SS03	2 12 15 12	9.5					
				SS04	3 4 6 7						
				SS05	8 6 7 5						
10	Boring terminated at 10 ft.										
15											
20											
25											
30											
35											



LOG OF BORING No. B-8

PROJECT: Taxiway Extention and Apron Expansion PROJECT NO.: 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport ELEVATION:
DRILLER: Cascade Drilling LOGGED BY: Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA DATE: 5/30/2023
DEPTH TO - WATER> INITIAL: AFTER 24 HOURS:

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS				
							Plastic Limit	—	Liquid Limit	Water Content -	Penetration -
0	[TOPSOIL] 8 inches dark brown, silty Sand (SM); organics; rootlets		0.7	SS01	1 15 22 11	4.7					
	[FILL] Light brown, poorly graded Sand (SP); loose -becomes medium dense			SS02	7 9 7 12						
5	[NATIVE SANDS] Brown, poorly graded Sand (SP); loose -becomes medium dense		4	SS03	3 4 3 8						
	-becomes loose			SS04	8 11 9 11						
				SS05	wh 4 3 3						
10	Boring terminated at 10 ft.										
15											
20											
25											
30											
35											



LOG OF BORING No. B-9

PROJECT: Taxiway Extention and Apron Expansion **PROJECT NO.:** 23-04-017
CLIENT: Morrisville-Stowe State Airport
PROJECT LOCATION: Morristown, Vermont
LOCATION: Morrisville-Stowe State Airport **ELEVATION:** _____
DRILLER: Cascade Drilling **LOGGED BY:** Q. Guglielmo
DRILLING METHOD: 4.25-inch HSA **DATE:** 5/30/2023
DEPTH TO - WATER> INITIAL: 7 **AFTER 24 HOURS:** _____

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS				
							Plastic Limit	—	Liquid Limit	Water Content - •	Penetration -
0	[TOPSOIL] 8 inches dark brown, silty Sand (SM); organics; rootlets			SS01	w/h 1 1 2						
	[NATIVE SANDS] Grey-brown, poorly graded Sand (SP); very loose -becomes loose			SS02	3 3 4 9 2	5.8					
5	-becomes very loose			SS03	3 2 1						
	Boring Terminated at 8.5 feet due to Flowing Sands			SS04	1/12						
	Boring terminated at 8.5 ft.			SS05	1 25/0 - -						
10											
15											
20											
25											
30											
35											



LOG OF BORING No. B-10

PROJECT: Taxiway Extention and Apron Expansion

PROJECT NO.: 23-04-017

CLIENT: Morrisville-Stowe State Airport

PROJECT LOCATION: Morristown, Vermont

LOCATION: Morrisville-Stowe State Airport

ELEVATION:

DRILLER: Cascade Drilling

LOGGED BY: Q. Guglielmo

DRILLING METHOD: 4.25-inch HSA

DATE: 5/30/2023













DEPTH TO - WATER> INITIAL:

AFTER 24 HOURS:

This information pertains only to this boring and should not be interpreted as being indicative of the site.

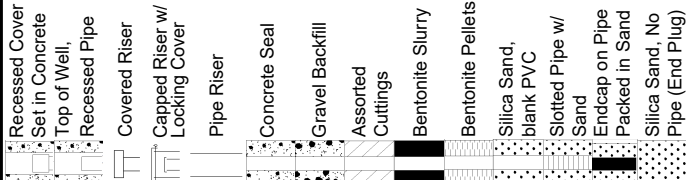
Depth (feet)	Description	Graphic	Elevation (feet)	Sample No.	Blow Counts	% < #200	TEST RESULTS
							Plastic Limit — Liquid Limit Water Content - • Penetration -
0	[TOPSOIL] 6 inches dark brown, silty Sand (SM); organics; rootlets			SS01	1 4 14 12		
	[FILL] Brown, poorly graded Sand (SP) with gravel; very dense		-0.5	SS02	6 7 10 8		
5	[NATIVE SANDS] Grey-brown, poorly graded Sand (SP); medium dense		-2	SS03	6 7 11 11		
				SS04	7 10 5 5	4.0	
				SS05	4 6 14 12		
10	Boring terminated at 10 ft.						
15							
20							
25							
30							
35							

KEY TO SYMBOLS AND DESCRIPTIONS

	Shelby Tube		Auger Cuttings
	Standard Split Spoon Sample		3" Split Spoon Sample
	Rock Core		Dynamic Cone Penetrometer
	Vane Shear		Bulk/Grab Sample
	Geoprobe Sample		Sonic or Vibro-Core Sample
	Water Table (at time of drilling)		Water Table (after 24 hours)
TYPICAL SYMBOLS			
SOIL MOISTURE MODIFIERS			
Term	Description		
Dry	Absence of moisture; dusty, dry to touch		
Moist	Damp but no visible water		
Wet	Visible free water		
The descriptor "damp" should not be used (use "moist"). The descriptor "saturated" should not be used (use "wet").			

	Recessed Cover Set in Concrete Top of Well,
	Recessed Pipe
	Covered Riser
	Capped Riser w/ Locking Cover
	Pipe Riser
	Concrete Seal
	Gravel Backfill
	Assorted Cuttings
	Bentonite Slurry
	Bentonite Pellets
	Silica Sand, blank PVC
	Slotted Pipe w/ Sand
	Endcap on Pipe Packed in Sand
	Silica Sand, No Pipe (End Plug)

WELL SYMBOLS

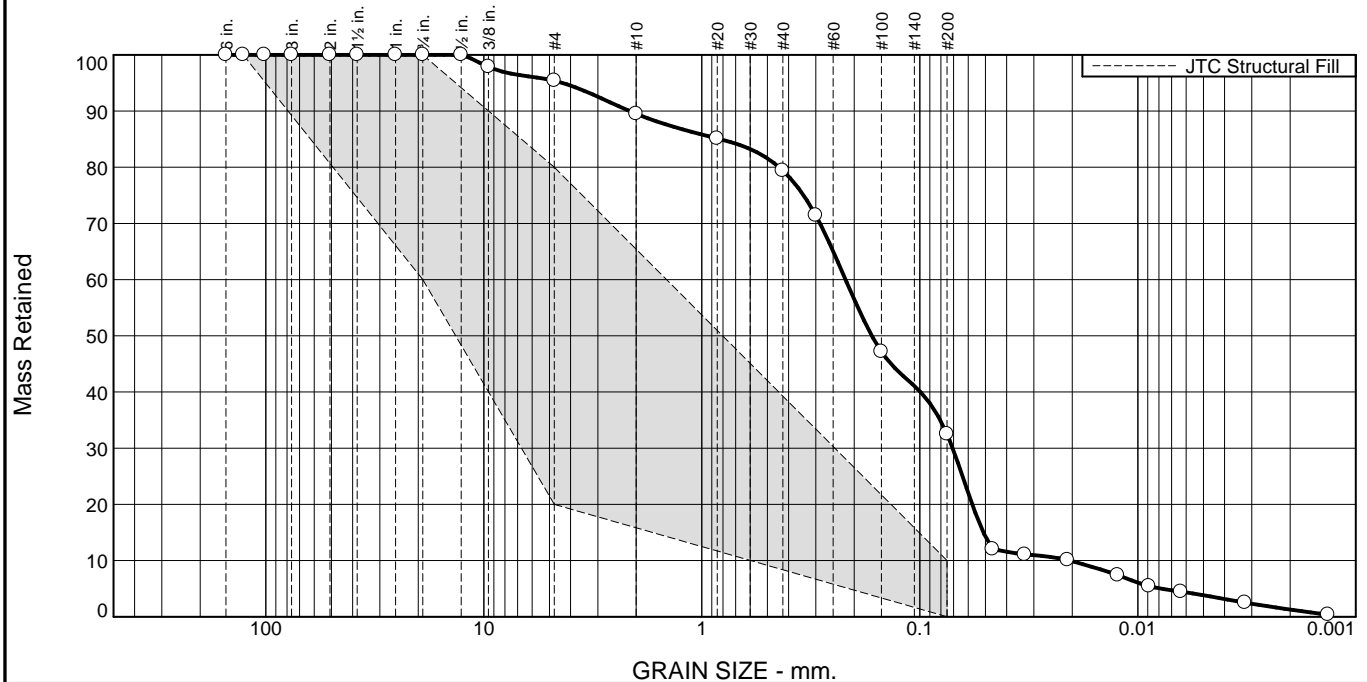


CLASSIFICATION	RANGE OF GRAIN SIZES		RELATIVE DENSITY/CONSISTENCY				PERCENT OR PORTIONS OF SOIL	
	U.S. Standard Sieve Size	Grain Size in Millimeters	Gravel, Sand, and Silt (nonplastic)		Silt (plastic) and Clay		Term	Description
BOULDERS	Above 12"	Above 305	N-Value	Relative Density	N-Value	Su	Consistency	
COBBLES	12" to 3"	305 to 76.2	0 - 4	Very Loose	0 - 2	0 - 250	Very Soft	Parting:
GRAVEL coarse fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.75 76.2 to 19.1 19.1 to 4.75	5 - 10	Loose	3 - 4	251 - 500	Soft	Seam:
			11-30	Medium Dense	5 - 8	501 - 1000	Medium Stiff	Layer:
			31 - 50	Dense	9 - 15	1001 - 2000	Stiff	Stratum:
			51 +	Very Dense	16 - 30	2001 - 4000	Very Stiff	Pocket:
SAND coarse medium fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.75 to 0.075 4.75 to 2.00 2.00 to 0.425 0.425 to 0.075			31 +	4001 +	Hard	Lens:
			Standard Penetration Testing (SPT) N ₆₀ based on blows per 12 inches.				Occasional:	One or less per foot of thickness
							Frequent	More than one per foot of thickness
SILT & CLAY	Below No. 200	Below 0.075	WR = Weight of Rods; WH = Weight of Hammer				Varved	Alternating seams or layers of silt and/or clay and sometimes f. sand

REFERENCE: UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D2488-93

APPENDIX E: GEOTECHNICAL LABORATORY TESTING REPORTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.6	5.9	10.1	46.9	28.7	3.8

Test Results (ASTM D 6913 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
6	100.0	100.0	
5	100.0		
4	100.0		
3	100.0	60.0 - 100.0	
2	100.0		
1.5	100.0		
1	100.0	20.0 - 80.0	X
3/4	100.0		
1/2	100.0		
3/8	97.9	0.0 - 10.0	X
#4	95.4		
#10	89.5		
#20	85.1	0.0 - 10.0	
#40	79.4		
#50	71.4		
#100	47.2		
#200	32.5		
0.0463 mm.	12.0		
0.0330 mm.	11.1		
0.0210 mm.	10.1		
0.0124 mm.	7.4		
0.0089 mm.	5.5		
0.0063 mm.	4.5		
0.0032 mm.	2.5		
0.0013 mm.	0.4		

* JTC Structural Fill

Material Description	
SILTY SAND (SM)	
Atterberg Limits (ASTM D 4318)	
PL=	LL= PI=
Classification	
USCS (D 2487)= SM	AASHTO (M 145)=
Coefficients	
D ₉₀ = 2.1452	D ₈₅ = 0.8271 D ₆₀ = 0.2191
D ₅₀ = 0.1660	D ₃₀ = 0.0707 D ₁₅ = 0.0511
D ₁₀ = 0.0205	C _u = 10.69 C _c = 1.11
Remarks	
Date Received: 6-23-23 Date Tested: 6-27-23	
Tested By: Laura Mroz	
Checked By: Mike Bronstein	
Title: Branch Manager	

Location: B-1 SS02
Sample Number: 23-341 Depth: 2'-4'

Date Sampled: 6-2-23

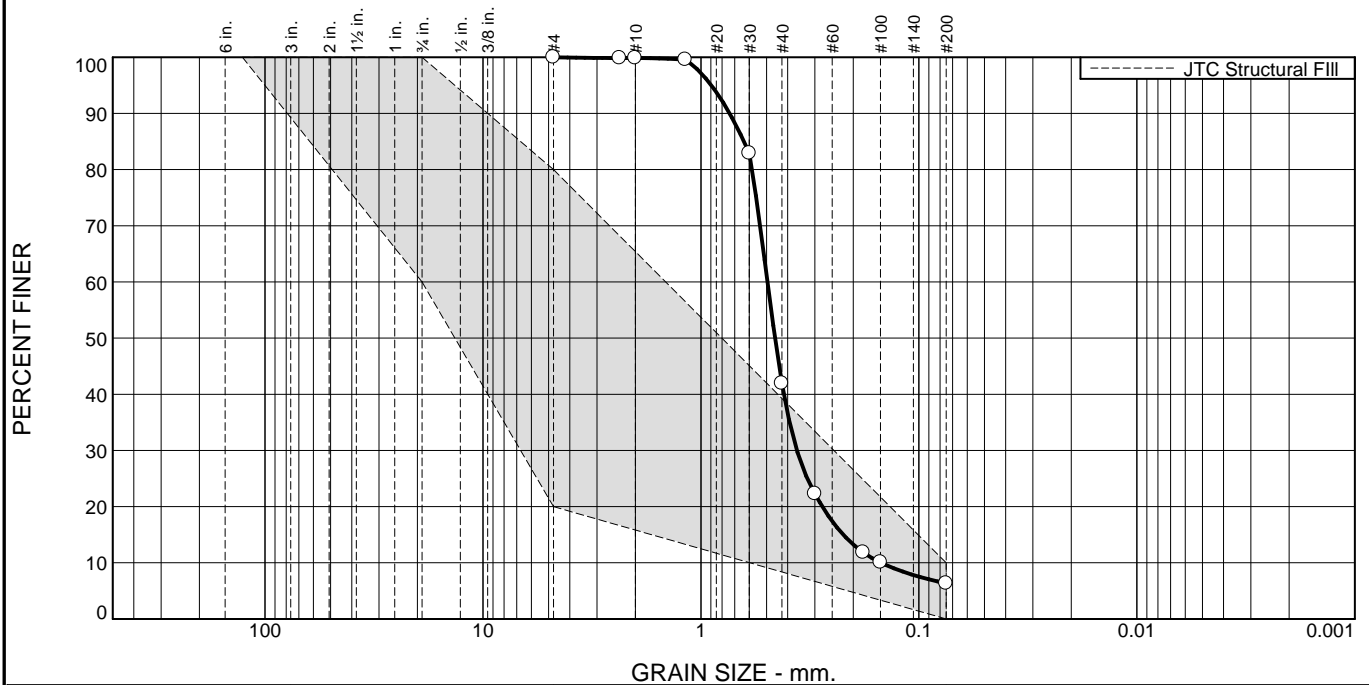


Client: Jacobs
Project: Morrisville-Stowe Airport

Project No: 23-04-017

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	58.0	35.6	6.3	

Test Results (ASTM C 136 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0	20.0 - 80.0	X
#8	99.9		
#10	99.9		
#16	99.6		
#30	82.9		
#40	41.9	0.0 - 10.0	
#50	22.3		
#80	11.8		
#100	10.1		
#200	6.3		

* JTC Structural Fill

Material Description
Poorly Graded Sand with Silt

Atterberg Limits (ASTM D 4318)
PL= - LL= - PI= -

Classification
USCS (D 2487)= AASHTO (M 145)=

Coefficients
D₉₀= 0.7389 D₈₅= 0.6346 D₆₀= 0.4954
D₅₀= 0.4573 D₃₀= 0.3628 D₁₅= 0.2224
D₁₀= 0.1489 C_u= 3.33 C_c= 1.78

Remarks
Moisture: 5.3%

Date Received: 6/3/23 **Date Tested:** 6/9/23
Tested By: SF
Checked By: Adam Allen
Title: Lab Manager

Location: B-2 SS03

Sample Number: VT23-086

Depth: 4'-6'

Date Sampled: 5/30/23



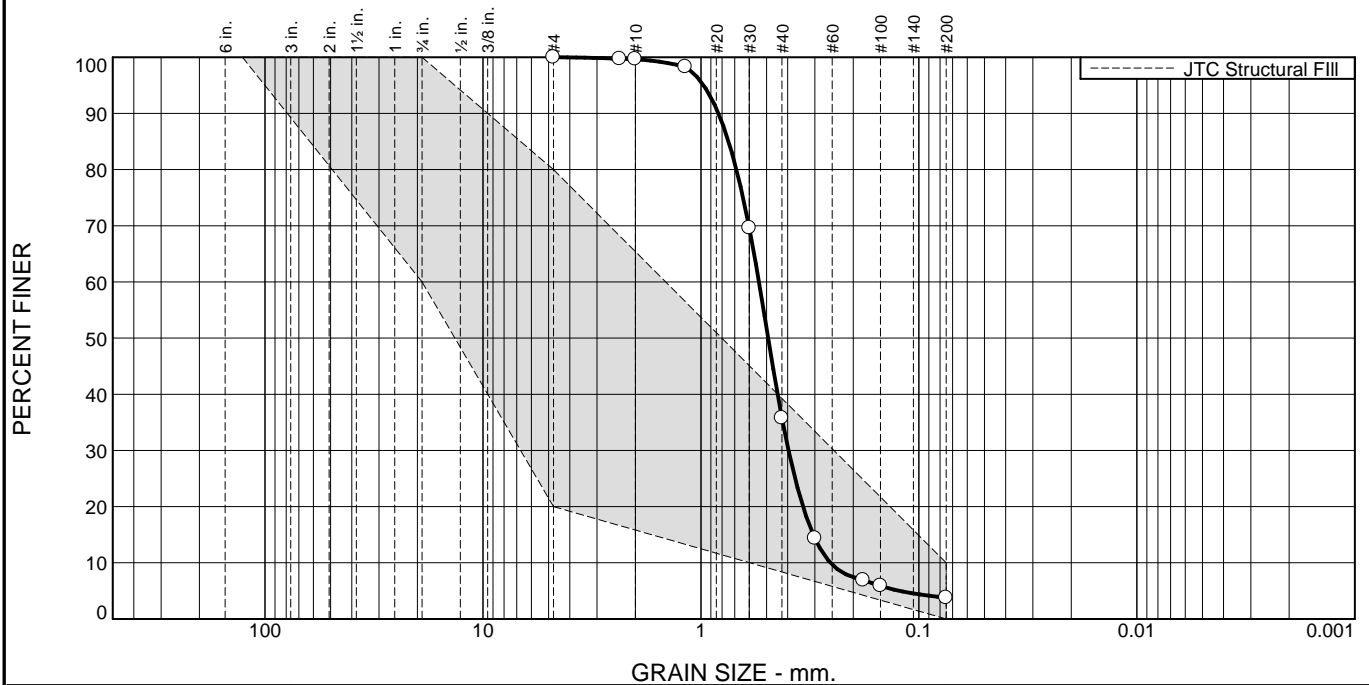
Client: Jacobs

Project: Morrisville-Stowe Airport

Project No: 23-04-017

Figure 001

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	63.9	31.9	3.8	

Test Results (ASTM C 136 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0	20.0 - 80.0	X
#8	99.7		
#10	99.6		
#16	98.3		
#30	69.6		
#40	35.7	0.0 - 10.0	
#50	14.3		
#80	6.9		
#100	5.9		
#200	3.8		

* JTC Structural Fill

Material Description

Poorly Graded Sand

Atterberg Limits (ASTM D 4318)

PL= - LL= - PI= -

Classification

USCS (D 2487)= SP AASHTO (M 145)=

Coefficients

D₉₀= 0.8312 D₈₅= 0.7471 D₆₀= 0.5422
D₅₀= 0.4918 D₃₀= 0.3966 D₁₅= 0.3053
D₁₀= 0.2548 C_u= 2.13 C_c= 1.14

Remarks

Moisture: 4.4%

Date Received: 6/9/23 Date Tested: 6/9/23

Tested By: SF

Checked By: Adam Allen

Title: Lab Manager

Location: B-3 SS04

Sample Number: VT23-091

Depth: 6'-8'

Date Sampled: 5/30/23



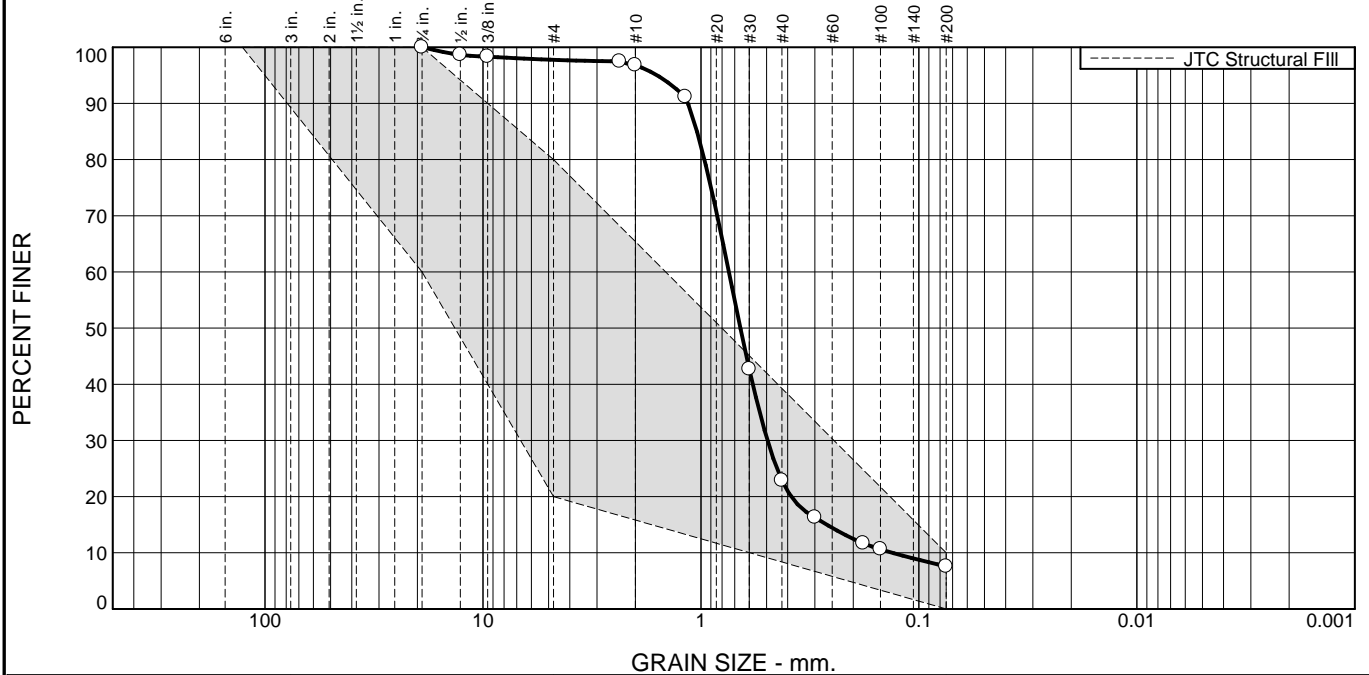
Client: Jacobs

Project: Morrisville-Stowe Airport

Project No: 23-04-017

Figure 006

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.2	1.0	73.9	15.3	7.6	

Test Results (ASTM C 136 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0	60.0 - 100.0	
1/2"	98.7		
3/8"	98.3		
#8	97.5		
#10	96.8		
#16	91.1		
#30	42.7		
#40	22.9		
#50	16.3		
#80	11.7		
#100	10.6	0.0 - 10.0	
#200	7.6		

* JTC Structural Fill

Material Description
Poorly Graded Sand w/ Silt

Atterberg Limits (ASTM D 4318)
 PL= - LL= - PI= -

Classification
 USCS (D 2487)= SP AASHTO (M 145)=

Coefficients
 D₉₀= 1.1479 D₈₅= 1.0423 D₆₀= 0.7446
 D₅₀= 0.6591 D₃₀= 0.4953 D₁₅= 0.2644
 D₁₀= 0.1323 C_u= 5.63 C_c= 2.49

Remarks
Moisture: 4.1%

Date Received: 6/9/23 Date Tested: 6/9/23
 Tested By: SF
 Checked By: Adam Allen
 Title: Lab Manager

Location: B-4 SS03

Sample Number: VT23-090

Depth: 4'-6'

Date Sampled: 5/30/23



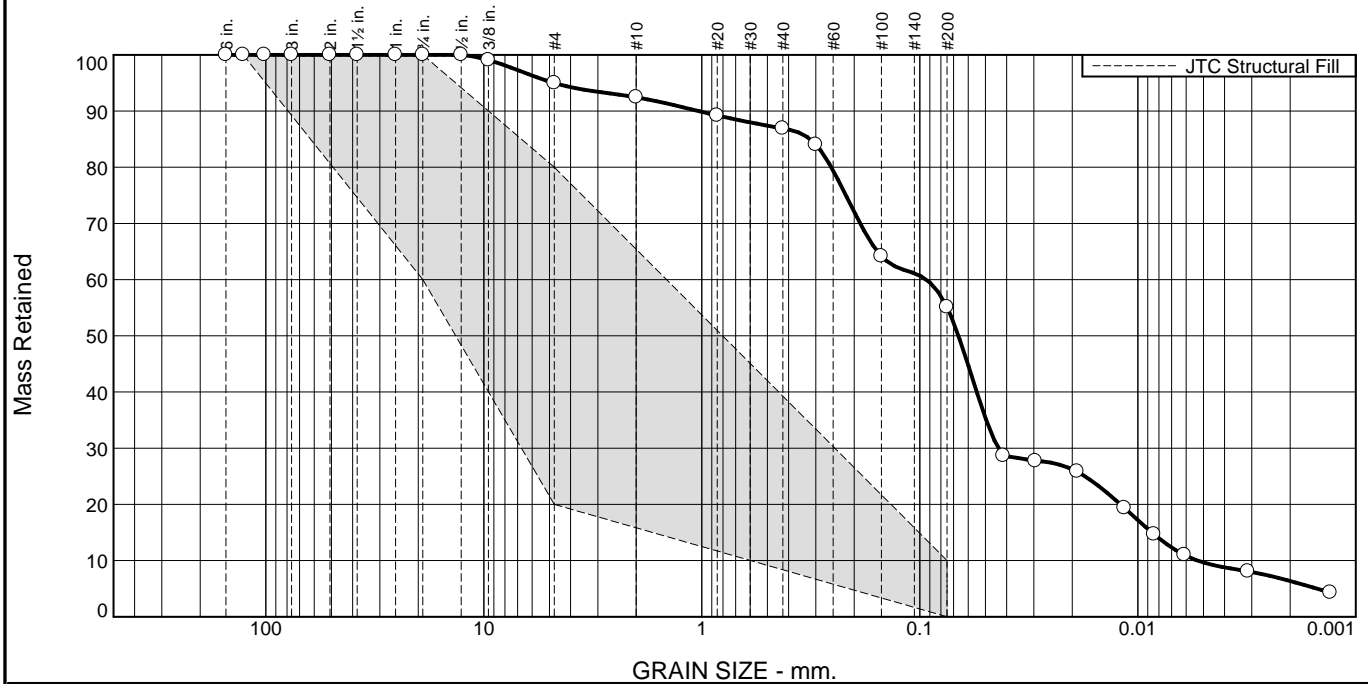
Client: Jacobs

Project: Morrisville-Stowe Airport

Project No: 23-04-017

Figure 005

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.0	2.5	5.6	31.8	45.5	9.6

Test Results (ASTM C 136 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
6	100.0	100.0	
5	100.0		
4	100.0		
3	100.0	60.0 - 100.0	
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
1/2	100.0	20.0 - 80.0	X
3/8	99.1		
#4	95.0		
#10	92.5		
#20	89.2		
#40	86.9	0.0 - 10.0	X
#50	84.0		
#100	64.2		
#200	55.1		
0.0414 mm.	28.7		
0.0296 mm.	27.7		
0.0190 mm.	25.8		
0.0115 mm.	19.4		
0.0084 mm.	14.7		
0.0061 mm.	11.0		
0.0031 mm.	8.1		
0.0013 mm.	4.3		

* JTC Structural Fill

Material Description		
Sandy SILT (ML)		
Atterberg Limits (ASTM D 4318)		
PL=	LL=	PI=
Classification		
USCS (D 2487)=	ML	AASHTO (M 145)=
Coefficients		
D ₉₀ = 1.0355	D ₈₅ = 0.3185	D ₆₀ = 0.0934
D ₅₀ = 0.0665	D ₃₀ = 0.0436	D ₁₅ = 0.0086
D ₁₀ = 0.0053	C _u = 17.52	C _c = 3.82
Remarks		
Date Received: 6-23-23 Date Tested: 6-27-23		
Tested By: Laura Mroz		
Checked By: Mike Bronstein		
Title: Branch Manager		

Location: B-5 SS02

Sample Number: 23-342

Depth: 2'-4'

Date Sampled: 6-2-23



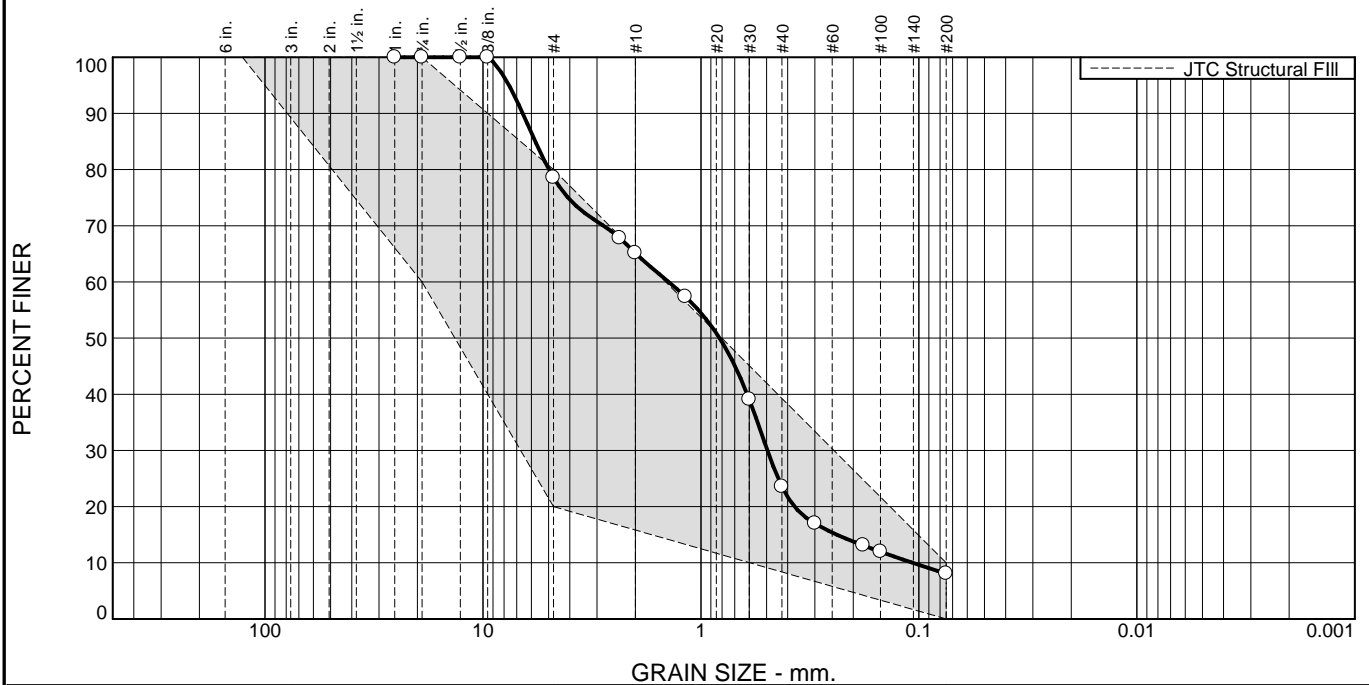
Client: Jacobs

Project: Morrisville-Stowe Airport

Project No: 23-04-017

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.4	13.5	41.5	15.5	8.1	

Test Results (ASTM C 136 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0	60.0 - 100.0	
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	78.6		
#8	67.8	20.0 - 80.0	
#10	65.1		
#16	57.4		
#30	39.1		
#40	23.6		
#50	17.0	0.0 - 10.0	
#80	13.1		
#100	12.0		
#200	8.1		

* JTC Structural Fill

Material Description

Poorly Graded Sand w/ Silt Gravel

Atterberg Limits (ASTM D 4318)

PL= - LL= - PI= -

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D₉₀= 6.5739 D₈₅= 5.7515 D₆₀= 1.4072
D₅₀= 0.8213 D₃₀= 0.4957 D₁₅= 0.2379
D₁₀= 0.1069 C_u= 13.16 C_c= 1.63

Remarks

Moisture: 4.5%

Date Received: 6/9/23 Date Tested: 6/9/23

Tested By: SF

Checked By: Adam Allen

Title: Lab Manager

Location: B-6 SS04

Sample Number: VT23-088

Depth: 6'-8'

Date Sampled: 5/30/23



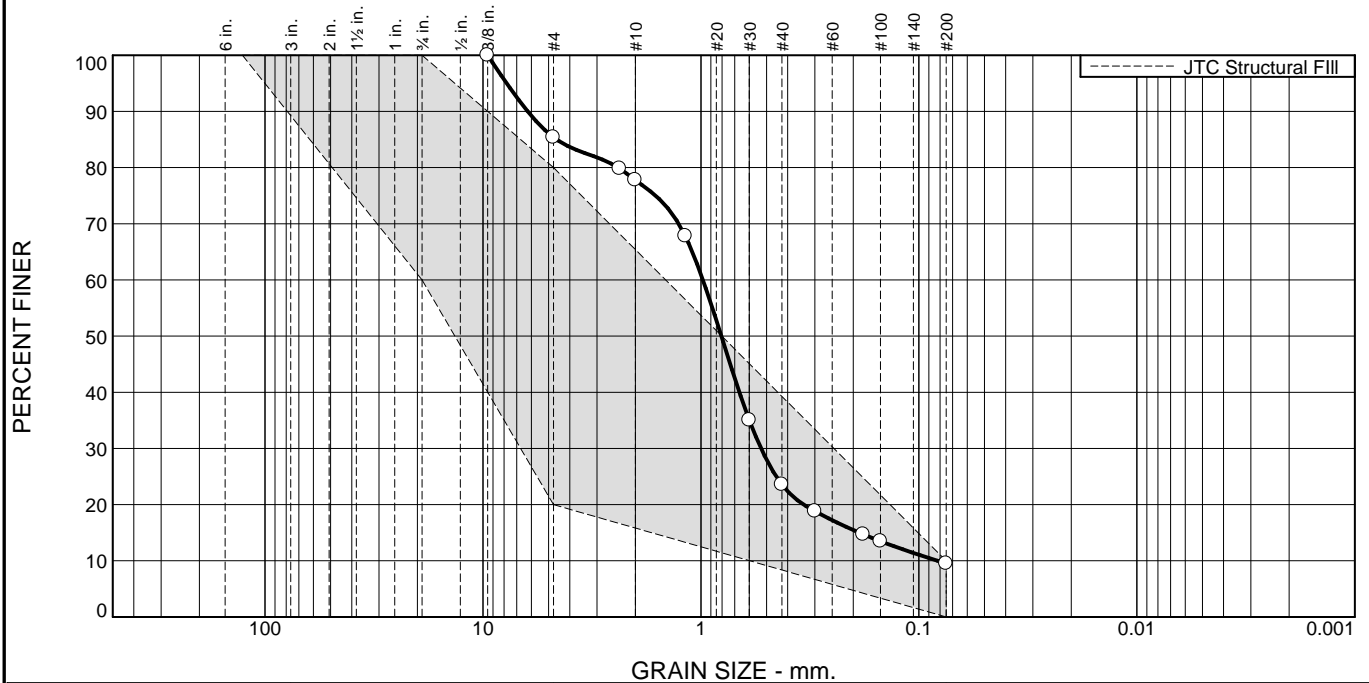
Client: Jacobs

Project: Morrisville-Stowe Airport

Project No: 23-04-017

Figure 003

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.6	7.6	54.2	14.1	9.5	

Test Results (ASTM C 136 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0	20.0 - 80.0	X
#4	85.4		
#8	79.8		
#10	77.8		
#16	67.8		
#30	35.0		
#40	23.6	0.0 - 10.0	
#50	18.8		
#80	14.7		
#100	13.5		
#200	9.5		

* JTC Structural Fill

Material Description

Poorly Graded Sand w/ Silt and Gravel

Atterberg Limits (ASTM D 4318)

PL= - LL= - PI= -

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)=

Coefficients

D₉₀= 6.2367 D₈₅= 4.5978 D₆₀= 0.9793
D₅₀= 0.8062 D₃₀= 0.5301 D₁₅= 0.1876
D₁₀= 0.0822 C_u= 11.91 C_c= 3.49

Remarks

Moisture: 3.6%

Date Received: 6/3/23 Date Tested: 6/9/23

Tested By: SF

Checked By: Adam Allen

Title: Lab Manager

Location: B-7 SS03

Sample Number: VT23-087

Depth: 4'-6'

Date Sampled: 5/30/23



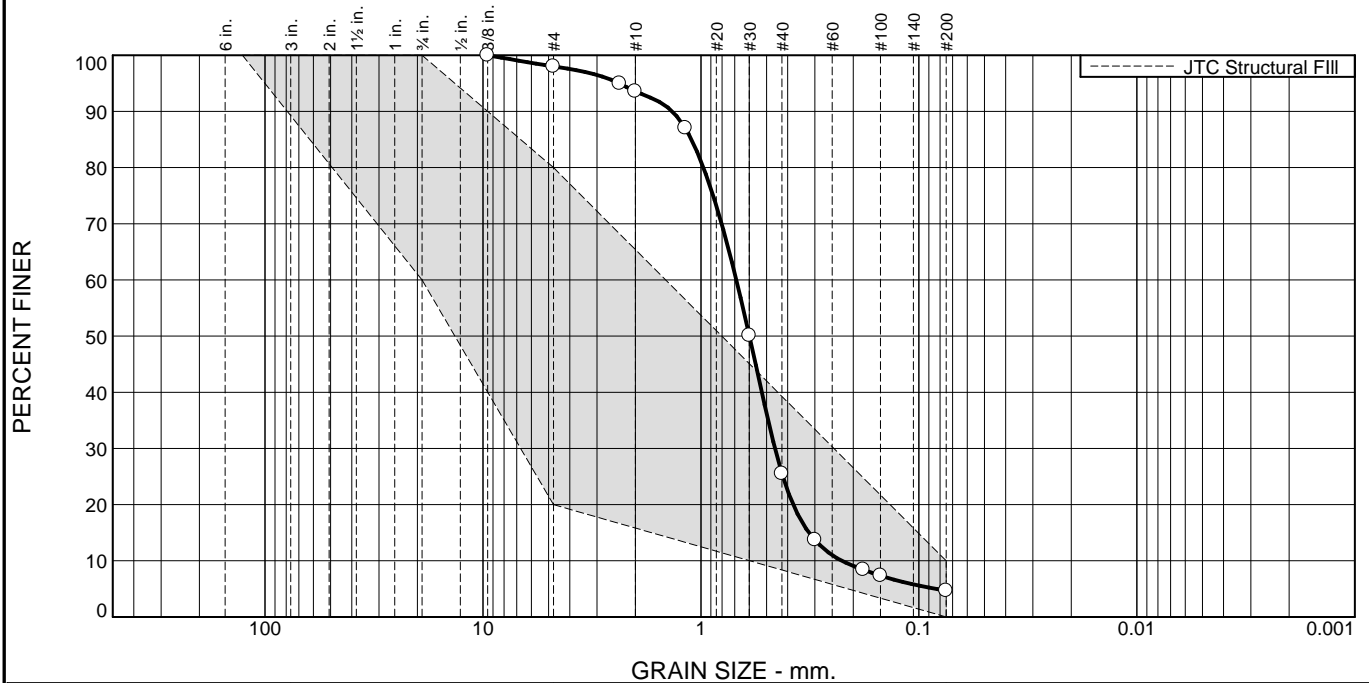
Client: Jacobs

Project: Morrisville-Stowe Airport

Project No: 23-04-017

Figure 002

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.0	4.4	68.1	20.8	4.7	

Test Results (ASTM C 136 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0	20.0 - 80.0	X
#4	98.0		
#8	95.0		
#10	93.6		
#16	87.0		
#30	50.1	0.0 - 10.0	
#40	25.5		
#50	13.7		
#80	8.4		
#100	7.4		
#200	4.7		

* JTC Structural Fill

Material Description

Poorly Graded Sand

Atterberg Limits (ASTM D 4318)

PL= - LL= - PI= -

Classification

USCS (D 2487)= SP AASHTO (M 145)=

Coefficients

D₉₀= 1.3542 D₈₅= 1.1050 D₆₀= 0.6880
D₅₀= 0.5991 D₃₀= 0.4575 D₁₅= 0.3194
D₁₀= 0.2259 C_u= 3.05 C_c= 1.35

Remarks

Moisture: 4.6%

Date Received: 6/9/23 Date Tested: 6/9/23

Tested By: SF

Checked By: Adam Allen

Title: Lab Manager

Location: B-8 SS04

Sample Number: VT23-092

Depth: 6'-8'

Date Sampled: 5/30/23



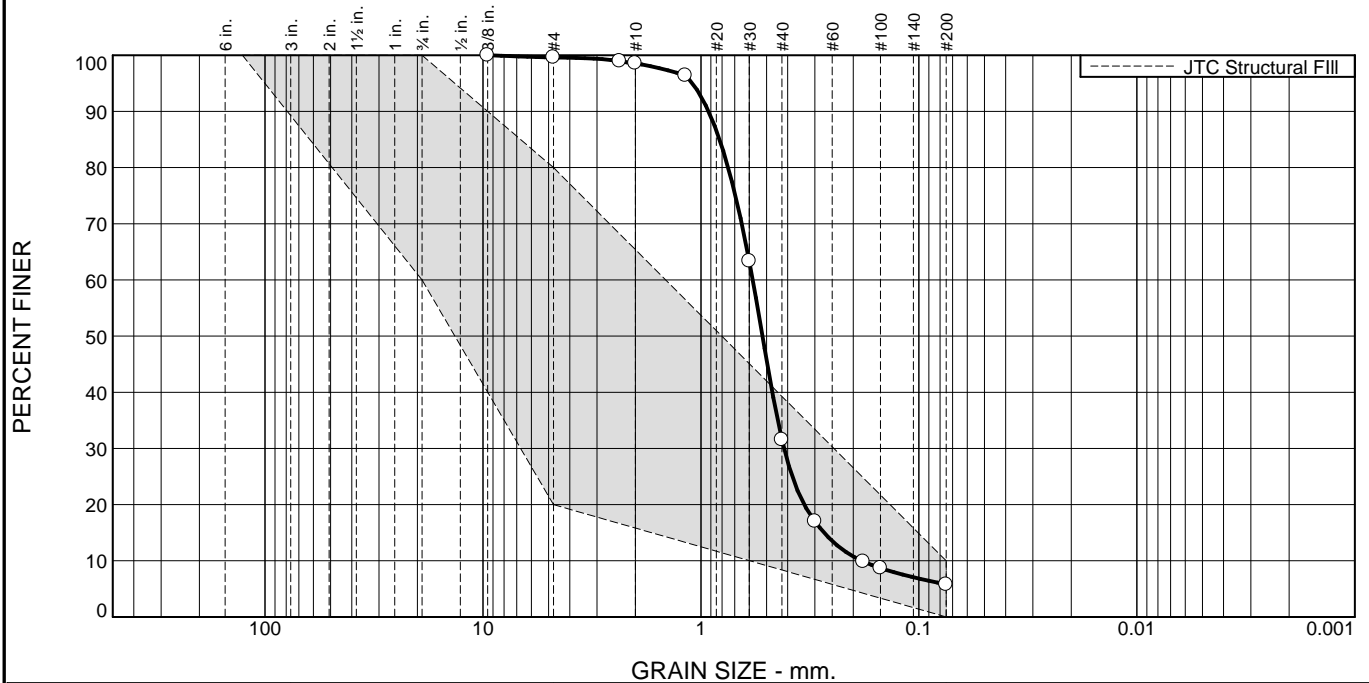
Client: Jacobs

Project: Morrisville-Stowe Airport

Project No: 23-04-017

Figure 007

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.0	67.0	25.8	5.8	

Test Results (ASTM C 136 & ASTM C 117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0	20.0 - 80.0	X
#4	99.6		
#8	98.9		
#10	98.6		
#16	96.4		
#30	63.3		
#40	31.6	0.0 - 10.0	
#50	17.0		
#80	9.9		
#100	8.7		
#200	5.8		

* JTC Structural Fill

Material Description

Poorly Graded Sand

Atterberg Limits (ASTM D 4318)

PL= - LL= - PI= -

Classification

USCS (D 2487)= SP AASHTO (M 145)=

Coefficients

D₉₀= 0.9222 D₈₅= 0.8219 D₆₀= 0.5787
D₅₀= 0.5222 D₃₀= 0.4156 D₁₅= 0.2722
D₁₀= 0.1832 C_u= 3.16 C_c= 1.63

Remarks

Moisture: 2.7%

Date Received: 6/9/23 Date Tested: 6/9/23

Tested By: SF

Checked By: Adam Allen

Title: Lab Manager

Location: B-9 SS02

Sample Number: VT23-093

Depth: 2'-4'

Date Sampled: 5/30/23



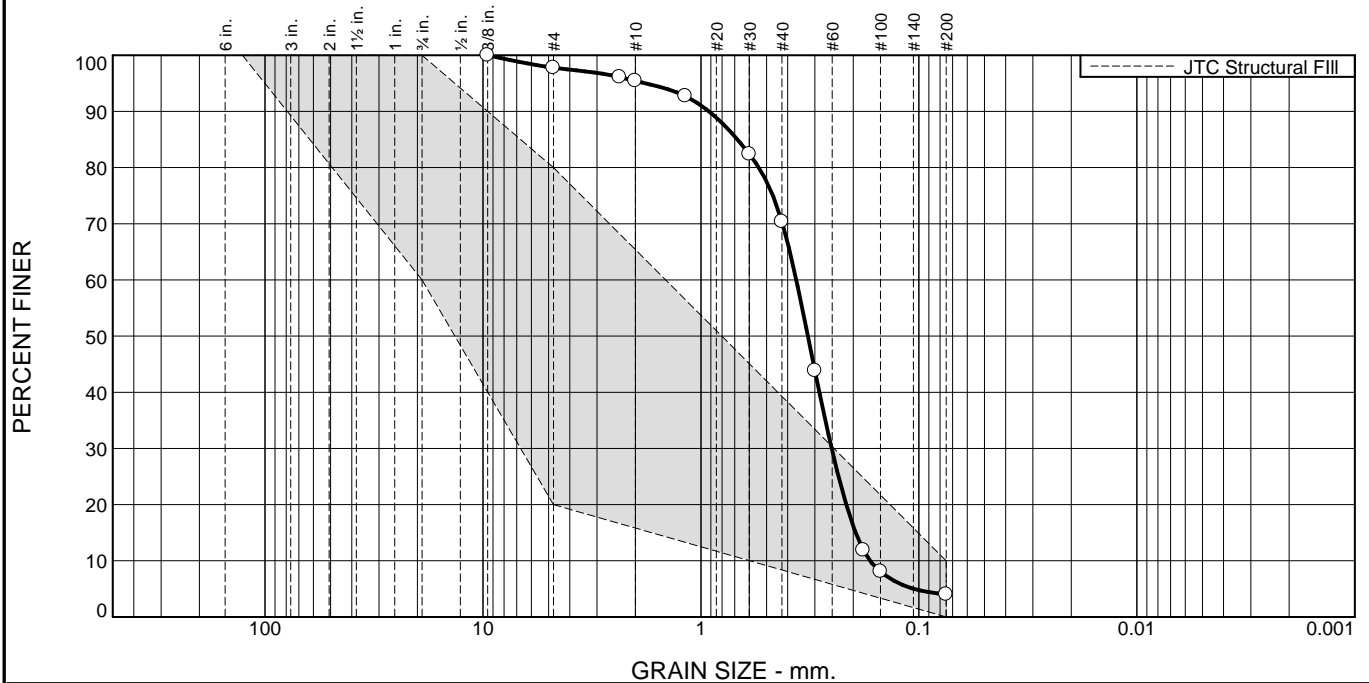
Client: Jacobs

Project: Morrisville-Stowe Airport

Project No: 23-04-017

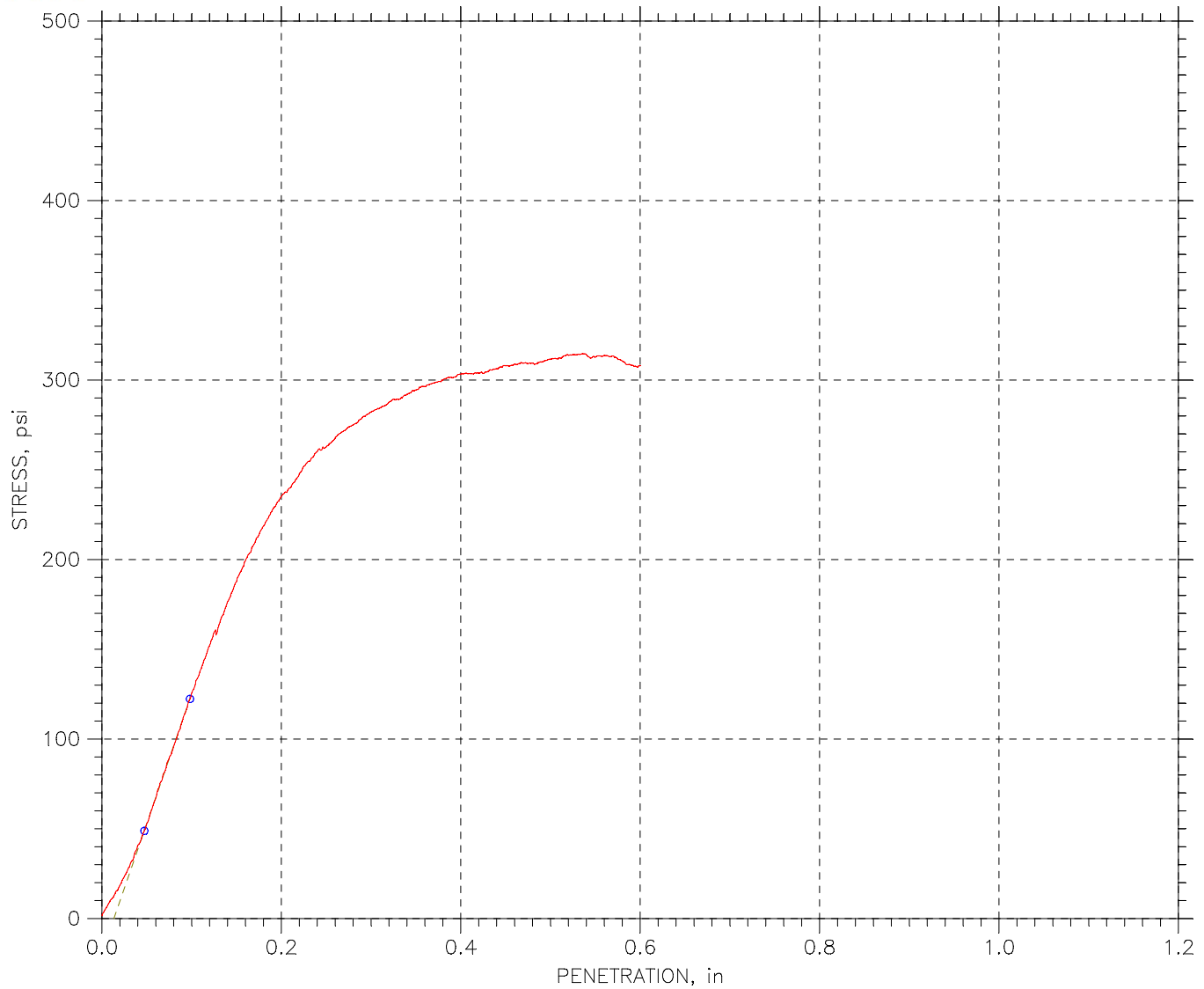
Figure 008

Particle Size Distribution Report



CALIFORNIA BEARING RATIO TEST REPORT

ASTM D1883

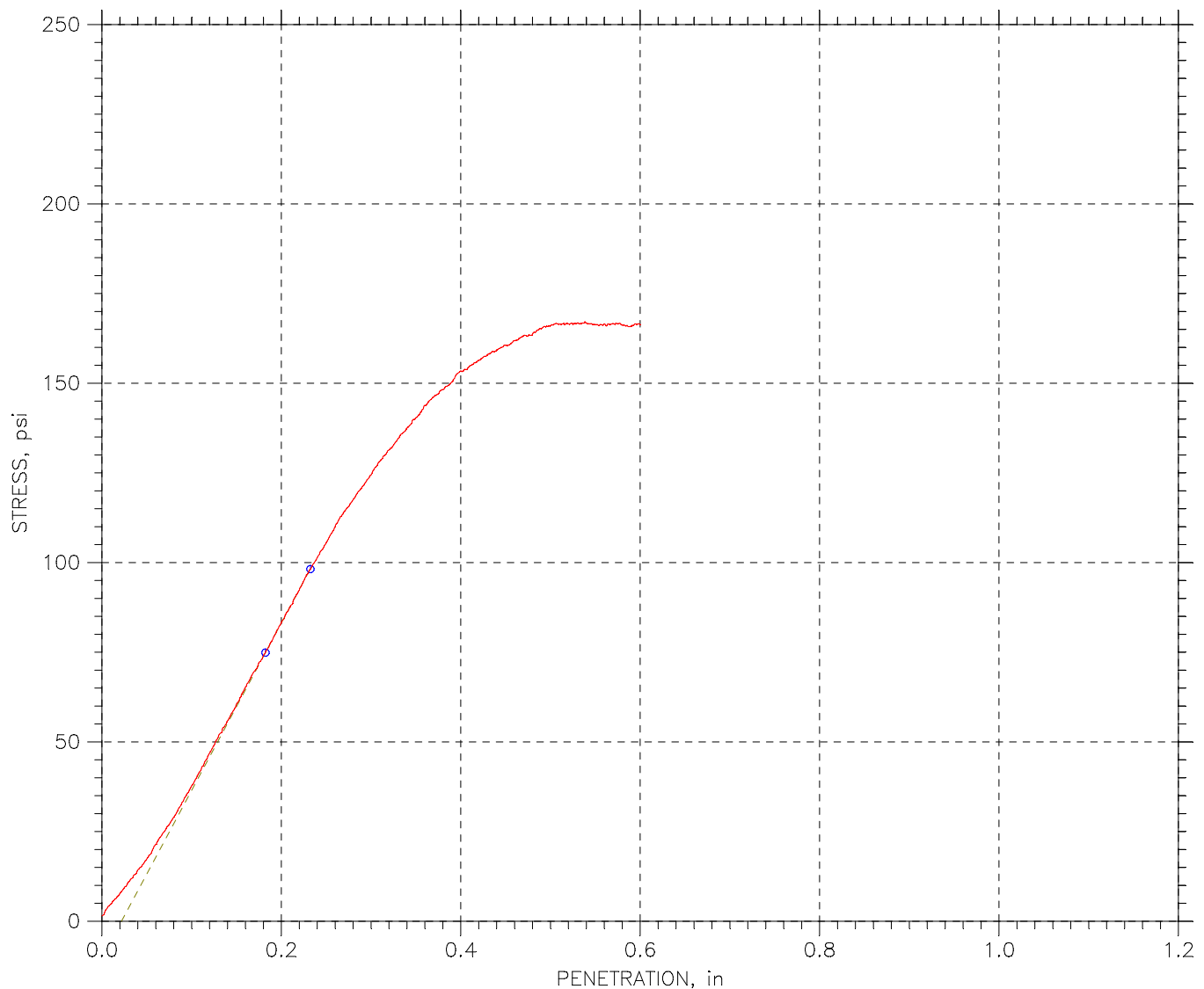


Sample Height: 4.58 in	California Bearing Ratio			
Sample Area: 28.274 in^2	at 0.1 in: 14	at 0.3 in: 15	at 0.5 in: 12	
Sample Volume: 0.07494 ft^3	at 0.2 in: 16	at 0.4 in: 13		
Sample Mass: 4311 gm				
Sample Condition: Soaked	Water Content	Before	Top	Average
Swell: 0.01 %	Tare ID	E1168	E4411	E4558
Surcharge: 4540 gm	Tare Mass, gm	8.21	8.21	8.26
Void Ratio: 0.40	Mass Tare + Wet Soil, gm	223.07	312.8	404.94
Wet Unit Weight: 126.82 pcf	Mass Tare + Dry Soil, gm	207.73	281.68	363.22
Dry Unit Weight: 117.77 pcf	Water Content, %	7.69	11.38	11.75

Project: Morrisville-Stowe AP	Location: Stowe, VT	Project No.: GTX-317320
Boring No.: B-2	Tested By: cwd	Checked By: ank
Sample No.: ---	Test Date: 6/23/23	Depth: 2-4'
Test No.: cbr-1	Sample Type: remolded	Elevation: ---
Description: Moist, dark olive brown sand with gravel		
Remarks: 92% of 127.9 pcf @ 7.7% moisture content		

CALIFORNIA BEARING RATIO TEST REPORT

ASTM D1883

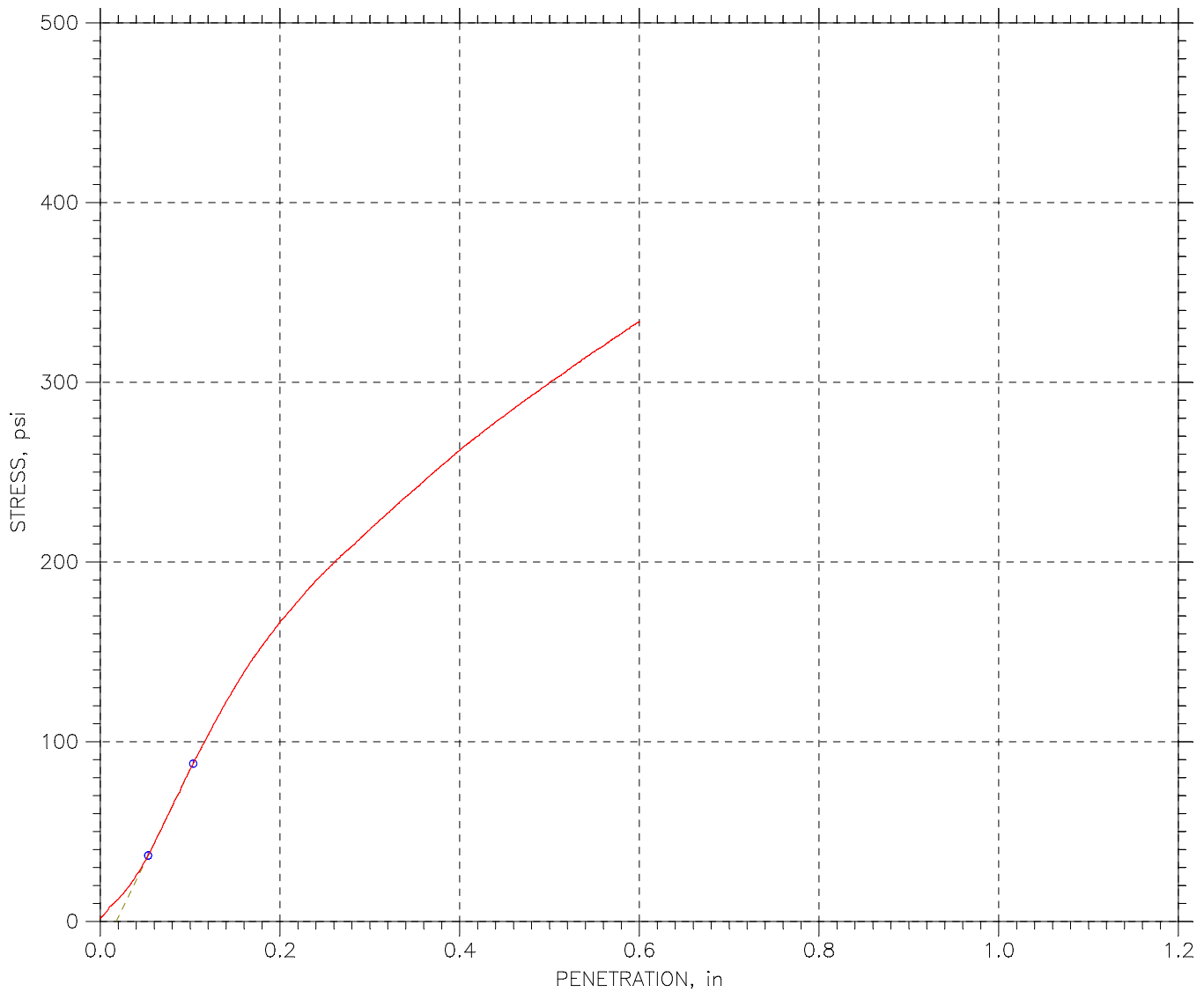


Sample Height: 4.58 in	California Bearing Ratio			
Sample Area: 28.274 in^2	at 0.1 in: 5	at 0.3 in: 7	at 0.5 in: 6	
Sample Volume: 0.07494 ft^3	at 0.2 in: 6	at 0.4 in: 7		
Sample Mass: 3760 gm				
Sample Condition: Soaked	Water Content	Before	Top	Average
Swell: -0.01 %	Tare ID	E2227	E4832	E4853
Surcharge: 4540 gm	Tare Mass, gm	24.94	8.17	8.14
Void Ratio: 0.71	Mass Tare + Wet Soil, gm	965.33	179.85	207.72
Wet Unit Weight: 110.61 pcf	Mass Tare + Dry Soil, gm	849.71	154.14	173.47
Dry Unit Weight: 97.014 pcf	Water Content, %	14.02	17.61	20.72

Project: Morrisville-Stowe AP	Location: Stowe, VT	Project No.: GTX-317320
Boring No.: B-9	Tested By: cwd	Checked By: ank
Sample No.: ---	Test Date: 6/23/23	Depth: 2-4'
Test No.: cbr-4	Sample Type: remolded	Elevation: ---
Description: Moist, very dark grayish brown sand		
Remarks: 92% of 105.2 pcf @ OMC 14.0% moisture content		

CALIFORNIA BEARING RATIO TEST REPORT

ASTM D1883

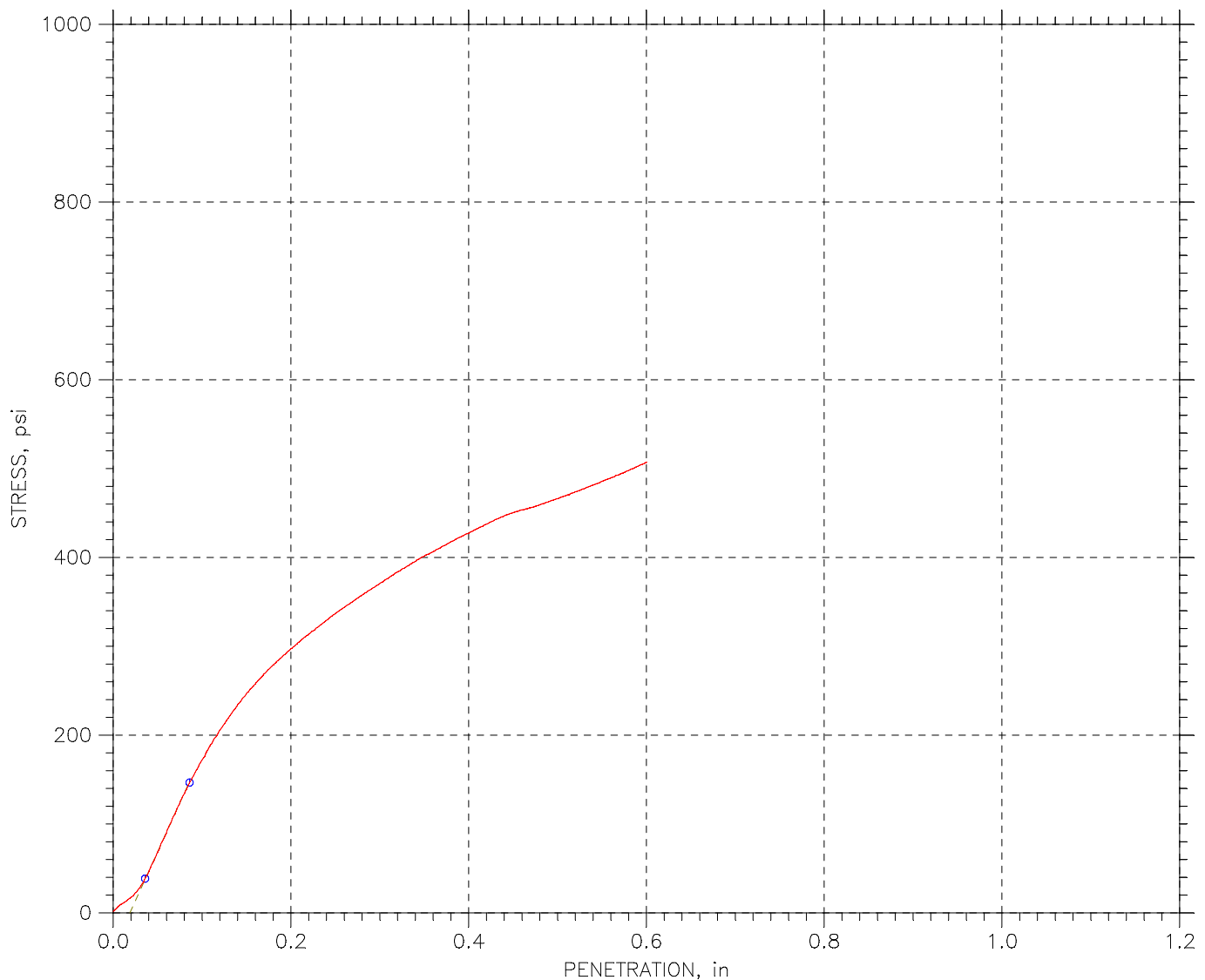


Sample Height: 4.58 in	California Bearing Ratio			
Sample Area: 28.274 in^2	at 0.1 in: 10	at 0.3 in: 12	at 0.5 in: 12	
Sample Volume: 0.07494 ft^3	at 0.2 in: 12	at 0.4 in: 12		
Sample Mass: 4027 gm				
Sample Condition: Soaked	Water Content	Before	Top	Average
Swell: 0.04 %	Tare ID	E6580	E3320	E3837
Surcharge: 4540 gm	Tare Mass, gm	24.52	8.21	8.53
Void Ratio: 0.53	Mass Tare + Wet Soil, gm	697.35	391.87	398.37
Wet Unit Weight: 118.47 pcf	Mass Tare + Dry Soil, gm	640.12	345.04	346.17
Dry Unit Weight: 108.39 pcf	Water Content, %	9.30	13.90	15.46

Project: Morrisville-Stowe AP	Location: Stowe, VT	Project No.: GTX-317320
Boring No.: B-6	Tested By: cwd	Checked By: ank
Sample No.: ---	Test Date: 6/29/23	Depth: 2-4'
Test No.: cbr-3	Sample Type: remolded	Elevation: ---
Description: Moist, dark yellowish brown silty sand		
Remarks: Compacted to 92% of 117.7 pcf at 9.2% moisture content		

CALIFORNIA BEARING RATIO TEST REPORT

ASTM D1883





Sample Height: 4.58 in	California Bearing Ratio			
Sample Area: 28.274 in^2	at 0.1 in: 20	at 0.3 in: 20	at 0.5 in: 18	
Sample Volume: 0.07494 ft^3	at 0.2 in: 21	at 0.4 in: 19		
Sample Mass: 4289 gm				
Sample Condition: Soaked	Water Content	Before	Top	Average
Swell: 0.26 %	Tare ID	E6537	E6204	E7214
Surcharge: 4540 gm	Tare Mass, gm	24.44	7.64	8.55
Void Ratio: 0.46	Mass Tare + Wet Soil, gm	595.67	363.38	410.11
Wet Unit Weight: 126.18 pcf	Mass Tare + Dry Soil, gm	537.95	316.71	359.37
Dry Unit Weight: 113.43 pcf	Water Content, %	11.24	15.10	14.46

Project: Morrisville-Stowe AP	Location: Stowe, VT	Project No.: GTX-317320
Boring No.: B-5	Tested By: cwd	Checked By: ank
Sample No.: ---	Test Date: 6/29/23	Depth: 2-4'
Test No.: cbr-2redo	Sample Type: remolded	Elevation: ---
Description: Moist, dark olive brown silty sand with gravel		
Remarks: Compacted to 92% of 123.1 pcf at 11.1% moisture content		

APPENDIX F: SITE PHOTOGRAPHS

PHOTO LOG

John Turner Consulting, Inc.		Site Location: Morrisville-Stowe State Airport, Stowe, VT	
Photo No. 1	Date: 5/24/2023	Photo No. 2	Date: 5/24/2023
 <p>Description: Typical Drilling Rig</p>		 <p>Description: Site Facing Southwest</p>	
Photo No. 3	Date: 5/24/2023	Photo No. 4	Date: 5/24/2023
 <p>Description: Example of Poorly Graded Sand (SP)</p>		 <p>Description: Example of Poorly Graded Sand with Silt and Gravel (SP)</p>	

John Turner Consulting, Inc.		Site Location: Morrisville-Stowe State Airport, Stowe, VT	
Photo No. 5	Date: 5/24/2023	Photo No. 6	Date: 5/24/2023
 <p>Description: Example of Silty Sand (SM)</p>		 <p>Description: Example of Poorly Graded Sand with Silt (SP)</p>	