



REPORT

20-0662 S

September 24, 2021

Subsurface Explorations and Laboratory Testing Services

Overlook Circle
Barrington, New Hampshire

Prepared For:

Hoyle, Tanner & Associates, Inc.
Attention: Heidi J. Marshall, PE
150 Dow Street
Manchester, NH 03101

Prepared By:

S. W. Cole Engineering, Inc.
10 Centre Road
Somersworth, NH 03878
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TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 Scope and Purpose	1
1.2 Site and Proposed Construction	1
2.0 EXPLORATION AND TESTING	2
2.1 Explorations	2
2.2 Field Testing	2
2.3 Laboratory Testing	2
3.0 SUBSURFACE CONDITIONS	3
3.1 Pavement	3
3.2 Base and Subbase	4
3.3 Groundwater	4
4.0 EVALUATION	5
4.1 Summary	5
4.2 Clarifications	5
4.3 Additional Testing	6
5.0 CLOSURE	6
 Appendix A	Limitations
Appendix B	Figures
Appendix C	Exploration Logs & Key
Appendix D	Laboratory Test Results

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September 24, 2021

Hoyle, Tanner & Associates, Inc.
Attention: Heidi J. Marshall, PE
150 Dow Street
Manchester, NH 03101

Subject: Subsurface Explorations and Laboratory Testing Services
Overlook Circle
Barrington, New Hampshire

Dear Heidi:

In accordance with our Proposal, dated July 12, 2021, we have performed subsurface explorations and performed laboratory testing for the subject project. This report summarizes our findings and its contents are subject to the limitations set forth in Appendix A.

1.0 INTRODUCTION

1.1 Scope and Purpose

The purpose of our services was to explore subsurface conditions at the site, provide laboratory testing and compare the findings to the approved construction plans. Our scope of services included 8 test boring explorations, soils laboratory testing, comparison of findings to the approved plans, and preparation of this report.

1.2 Site and Proposed Construction

We understand Overlook Circle was constructed and paved in late 2019. The roadway is about 3,000 feet long. The roadway was constructed by a private developer and the Town of Barrington is now being requested to take possession and maintenance responsibility for the road. According to Hoyle, Tanner & Associates, Inc. (HTA) the pavement section shown on the approved plans consists of 1" asphalt wearing course, 2" asphalt binder course, 6" of NHDOT 304.3 Crushed Gravel, and 12" NHDOT 302.4 Bank Run Gravel. We

understand that the wearing course pavement was placed in late Fall and there was an agreement to increase the wearing course to 1.5".

It is our understanding the Town is looking to determine if the existing pavement section complies with the approved plans. Further, we understand there is a question of if the aggregate base course was a "crushed" product per NHDOT 304.3.

The road configuration is shown on the "Exploration Location Plan" attached in Appendix B.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Eight test borings (B-1 through B-8) were made at the site on August 13, 2021 by S. W. Cole Engineering, Inc. (S.W.COLE). The exploration locations were selected by S.W.COLE and the Town of Barrington Highway Department and established in the field by S.W.COLE using taped measurements with the intersection of Overlook Circle and Boulder Drive established as Station 0+00 progressing around the circle clockwise with stationing. The approximate exploration locations are shown on the "Exploration Location Plan" attached in Appendix B. Logs of the explorations and a key to the notes and symbols used on the logs are attached in Appendix C.

2.2 Field Testing

The test borings were made using a portable electric core drill with a 6-inch diameter core barrel to penetrate the pavement and hand excavation tools to extract the base and subbase soils. Bulk samples of the base and subbase (where encountered) were collected, labeled, and returned to our laboratory. The pavement cores were collected, labeled and returned to our laboratory.

2.3 Laboratory Testing

Laboratory testing included gradation testing (ASTM C-117 / C-136) on 4 select samples of base material and 4 select samples of subbase material. Laboratory testing included Bulk Specific Gravity (AASHTOT 166) on 4 pavement cores of the wearing course and 4 pavement cores of the binder course. Theoretical Maximum Specific

Gravity (AASHTO T 209) was performed on one sample of the wearing course pavement and one sample of the binder course pavement.

Laboratory results are presented in Appendix D.

3.0 SUBSURFACE CONDITIONS

3.1 Pavement

The pavement obtained at the core locations was measured as follows:

Boring	Wearing Course Thickness (in)	Targeted Wearing Course Thickness ¹ (in)	Binder Course Thickness (in)	Specified Binder Course Thickness (in)	Total Thickness (in)	Specified Total Thickness (in)
B-1	2	1.5	1.25	2	3.25	3.5
B-2	1.125	1.5	1.5	2	2.625	3.5
B-3	1.25	1.5	1.75	2	3	3.5
B-4	1.875	1.5	1.75 – 2	2	3.625 – 3.875	3.5
B-5	1	1.5	1.75	2	2.75	3.5
B-6	1	1.5	1.5 – 2	2	2.5 – 3	3.5
B-7	1.25	1.5	2	2	3.25	3.5
B-8	1.25	1.5	2	2	3.25	3.5

Bold denotes the result is less than the required specification.

¹ Design Specified Wearing Course Thickness is 1 inch, however given the late time of year the wearing course pavement was placed (as low as 40 degree surface temperature), we understand the agreement was to increase the thickness to 1.5 inches.

Bulk Specific Gravity testing indicates the in-situ density of samples of wearing course from B-2, B-4, B-6, and B-8 result in 87.7, 90.9, 91.0, and 93.0 percent of the Theoretical Maximum Specific Gravity, respectively.

Bulk Specific Gravity testing indicates the in-situ density of samples of binder course from B-2, B-4, B-6, and B-8 result in 92.3, 90.7, 90.6, and 93.4 percent of the Theoretical Maximum Specific Gravity, respectively.

Although no compaction percentage was specified a typical industry standard is to achieve greater than 92 percent of the Theoretical Maximum Specific Gravity.

3.2 Base and Subbase

The base material varied in thickness from 6.75 to 18 inches of 1.5-inch minus bank run gravel. The material consisted of sand and gravel with trace silt. Gradation testing on samples from explorations B-1, B-3, B-5, and B-7 when compared to NHDOT 304.3 Crushed Gravel did not meet the specification on the No. 4 sieve for each sample and did not meet the specification on the 1" sieve for 3 of the 4 samples. The results indicate the material is finer than the specified product. Further, based on observations the material was not a crushed product as required by the specification.

The subbase material appeared very similar in composition to the base with the exception that the maximum particle size increased to about 5 inches. The material consisted of bank run sand and gravel with trace silt. The subbase was not specifically encountered in explorations B-4, B-5 and B-8 where the base material was observed to continue deeper. Where encountered the subbase varied in thickness from 6 to 11 inches. Explorations B-2 and B-3 were terminated on a refusal (cobble) within the subbase at depths of 1.6 and 1.3 feet, respectively. Exploration B-4 was terminated on a refusal (cobble) at a depth of 1.3 feet which was inferred as the top of the subbase layer. Gradation testing on samples from explorations B-1, B-2, B-6, and B-7 when compared to NHDOT 304.2 Gravel meet the specification.

3.3 Groundwater

No free water or evidence of groundwater was observed within the depth explored at the explorations. Groundwater and surface water conditions can change in response to seasonal conditions.

4.0 EVALUATION

4.1 Summary

Based on our observations, explorations, and laboratory testing, the following is a summary of our services compared to the approved plans:

- The pavement layer (wearing and binder) thickness and total pavement thickness at the boring locations is thinner than the specified thickness at 6 or more of the 8 locations.
- The base material thickness exceeds the minimum requirement of 6 inches as outlined in the approved project plans, thus meets the requirement.
- The base material consists of a bank run product and is not a crushed material as required by the approved plans.
- The base material does not meet the gradation specification for NHDOT 304.3 as required by the approved plans.
- The combined base and subbase material thickness, where refusal was not met, exceeds the minimum requirement of 18 inches as outlined in the approved project plans, thus in our opinion meets the requirement.
- The subbase material meets the gradation specification for NHDOT 304.2 as required by the approved plans.

4.2 Clarifications

It must be understood that minimum sample sizes as required by ASTM for gradation testing could not be obtained within the explorations due to the size of the pavement penetration. Proper sample size would require a larger, more intrusive pavement penetration. The implication of small sample size can impact materials with large maximum particle size, such as in the subbase. The presence or lack of larger rock particles obtained with small samples can render the sample unrepresentative of the

overall product, resulting in a gradation that does not accurately represent the overall material.

4.3 Additional Testing

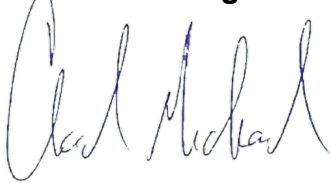
Additional gravel and pavement samples obtained from the explorations are stored in our facility. Additional testing can be performed on the stored samples upon request.

5.0 CLOSURE

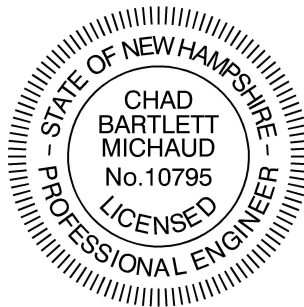
It has been a pleasure to be of assistance to you with this phase of your project. Please contact us if you have any questions relative to our findings

Sincerely,

S. W. Cole Engineering, Inc.



Chad B. Michaud, P.E.
Principal Geotechnical Engineer



CBM:rec

APPENDIX B

Figures



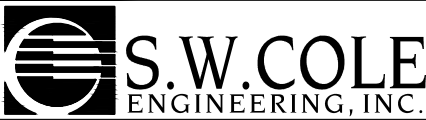
LEGEND:

 APPROXIMATE BORING LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM IMAGERY PROVIDED BY MICROSOFT AND AUTODESK.
2. THE BORINGS WERE LOCATED IN THE FIELD BY MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

0 100 200
Feet



HOYLE, TANNER & ASSOCIATES, INC.

EXPLORATION LOCATION PLAN

OVERLOOK CIRCLE
BARRINGTON, NEW HAMPSHIRE

Job No.: 20-0662 Scale: 1" = 100'
Date: 09/01/2021 Sheet: 1

APPENDIX C

Exploration Logs and Key



BORING LOG

CLIENT: Hoyle, Tanner & Associates, Inc.
PROJECT: Overlook Circle
LOCATION: , Barrington, NH

BORING NO.: B-1
SHEET: 1 of 1
PROJECT NO. 20-0662
DATE START: 8/13/2021
DATE FINISH: 8/13/2021

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 1.8 LOGGED BY: Chad Michaud
DRILLING CO.: S. W. Cole Engineering, Inc. DRILLER: Chad Michaud DRILLING METHOD: Core Drill / Hand Sampler
RIG TYPE: AUGER ID/OD: N/A / N/A SAMPLER:
HAMMER TYPE: N/A HAMMER WEIGHT (lbs): N/A CASING ID/OD: N/A / N/A CORE BARREL:
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): N/A
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									2" Wearing Course Pavement		
								0.2	1.25" Binder Course Pavement		
								0.3	9.75" of 1.5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Base)		
								1.1	8" of 5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Subbase)		

1.8 Bottom of Exploration at 1.75 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. 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.

BORING NO.: B-1



BORING LOG

BORING NO.: **B-2**
SHEET: 1 of 1
PROJECT NO. 20-0662
DATE START: 8/13/2021
DATE FINISH: 8/13/2021

CLIENT: Hoyle, Tanner & Associates, Inc.
PROJECT: Overlook Circle
LOCATION: , Barrington, NH

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 1.6 LOGGED BY: Chad Michaud
DRILLING CO.: S. W. Cole Engineering, Inc. DRILLER: Chad Michaud DRILLING METHOD: Core Drill / Hand Sampler
RIG TYPE: AUGER ID/OD: N/A / N/A SAMPLER:
HAMMER TYPE: N/A HAMMER WEIGHT (lbs): N/A CASING ID/OD: N/A / N/A CORE BARREL:
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): N/A
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									1.125" Wearing Course Pavement		
								0.1	1.5" Binder Course Pavement		
								0.2	9" of 1.5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Base)		
								1.0	7" of 5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Subbase)		

1.6 Refusal at 1.6 feet
refusal on cobble

Stratification lines represent approximate boundary between soil types, transitions may be gradual. 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.

BORING NO.: **B-2**



BORING LOG

BORING NO.: **B-3**
SHEET: 1 of 1
PROJECT NO. 20-0662
DATE START: 8/13/2021
DATE FINISH: 8/13/2021

CLIENT: Hoyle, Tanner & Associates, Inc.
PROJECT: Overlook Circle
LOCATION: , Barrington, NH

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 1.4 LOGGED BY: Chad Michaud
DRILLING CO.: S. W. Cole Engineering, Inc. DRILLER: Chad Michaud DRILLING METHOD: Core Drill / Hand Sampler
RIG TYPE: AUGER ID/OD: N/A / N/A SAMPLER:
HAMMER TYPE: N/A HAMMER WEIGHT (lbs): N/A CASING ID/OD: N/A / N/A CORE BARREL:
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): N/A
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
✓ At time of Drilling
✓ At Completion of Drilling
✓ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									1.25" Wearing Course Pavement		
								0.1	1.75" Binder Course Pavement		
								0.3	8" of 1.5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Base)		
								0.9	6" of 5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Subbase)		

Refusal at 1.4 feet
refusal on cobble

Stratification lines represent approximate boundary between soil types, transitions may be gradual. 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.

BORING NO.: **B-3**



BORING LOG

BORING NO.: **B-4**
SHEET: 1 of 1
PROJECT NO. 20-0662
DATE START: 8/13/2021
DATE FINISH: 8/13/2021

CLIENT: Hoyle, Tanner & Associates, Inc.
PROJECT: Overlook Circle
LOCATION: , Barrington, NH

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 1.3 LOGGED BY: Chad Michaud
DRILLING CO.: S. W. Cole Engineering, Inc. DRILLER: Chad Michaud DRILLING METHOD: Core Drill / Hand Sampler
RIG TYPE: AUGER ID/OD: N/A / N/A SAMPLER:
HAMMER TYPE: N/A HAMMER WEIGHT (lbs): N/A CASING ID/OD: N/A / N/A CORE BARREL:
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): N/A
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
✓ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
✓ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
✓ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									1.875" Wearing Course Pavement		
								0.2	variable thickness - 1.75 - 2" Binder Course Pavement		
								0.3	12" of 1.5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Base)		

1.3

Refusal at 1.3 feet
refusal on cobble

Stratification lines represent approximate boundary between soil types, transitions may be gradual. 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.

BORING NO.: **B-4**



BORING LOG

CLIENT: Hoyle, Tanner & Associates, Inc.
PROJECT: Overlook Circle
LOCATION: , Barrington, NH

BORING NO.: B-5
SHEET: 1 of 1
PROJECT NO. 20-0662
DATE START: 8/13/2021
DATE FINISH: 8/13/2021

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 1.1 LOGGED BY: Chad Michaud
DRILLING CO.: S. W. Cole Engineering, Inc. DRILLER: Chad Michaud DRILLING METHOD: Core Drill / Hand Sampler
RIG TYPE: AUGER ID/OD: N/A / N/A SAMPLER:
HAMMER TYPE: N/A HAMMER WEIGHT (lbs): N/A CASING ID/OD: N/A / N/A CORE BARREL:
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): N/A
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
								0.1	1" Wearing Course Pavement 1.75" Binder Course Pavement		
								0.2	10.25" of 1.5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Base)		
								1.1	Refusal at 1.1 feet refusal on cobble		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. 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.

BORING NO.: B-5



BORING LOG

BORING NO.: **B-6**
SHEET: 1 of 1
PROJECT NO. 20-0662
DATE START: 8/13/2021
DATE FINISH: 8/13/2021

CLIENT: Hoyle, Tanner & Associates, Inc.
PROJECT: Overlook Circle
LOCATION: , Barrington, NH

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 1.8 LOGGED BY: Chad Michaud
DRILLING CO.: S. W. Cole Engineering, Inc. DRILLER: Chad Michaud DRILLING METHOD: Core Drill / Hand Sampler
RIG TYPE: AUGER ID/OD: N/A / N/A SAMPLER:
HAMMER TYPE: N/A HAMMER WEIGHT (lbs): N/A CASING ID/OD: N/A / N/A CORE BARREL:
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): N/A
WATER LEVEL DEPTHS (ft):

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
✓ At time of Drilling
✓ At Completion of Drilling
✓ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									0.1 1" Wearing Course Pavement variable thickness 1.5 - 2" Binder Course Pavement		
									0.2 7" of 1.5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Base)		
									0.8 11" of 5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Subbase)		

Bottom of Exploration at 1.8 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. 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.

BORING NO.: **B-6**



BORING LOG

BORING NO.: **B-7**
SHEET: 1 of 1
PROJECT NO. 20-0662
DATE START: 8/13/2021
DATE FINISH: 8/13/2021

CLIENT: Hoyle, Tanner & Associates, Inc.
PROJECT: Overlook Circle
LOCATION: , Barrington, NH

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 1.8 LOGGED BY: Chad Michaud
DRILLING CO.: S. W. Cole Engineering, Inc. DRILLER: Chad Michaud DRILLING METHOD: Core Drill / Hand Sampler
RIG TYPE: AUGER ID/OD: N/A / N/A SAMPLER:
HAMMER TYPE: N/A HAMMER WEIGHT (lbs): N/A CASING ID/OD: N/A / N/A CORE BARREL:
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): N/A
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
✓ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
✓ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
✓ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									1.25" Wearing Course Pavement		
								0.1	2" Binder Course Pavement		
								0.3	6.75" of 1.5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Base)		
								0.8	11" of 5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Subbase)		

Bottom of Exploration at 1.8 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. 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.

BORING NO.: **B-7**



BORING LOG

BORING NO.: **B-8**
SHEET: 1 of 1
PROJECT NO. 20-0662
DATE START: 8/13/2021
DATE FINISH: 8/13/2021

CLIENT: Hoyle, Tanner & Associates, Inc.
PROJECT: Overlook Circle
LOCATION: , Barrington, NH

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): N/A TOTAL DEPTH (FT): 1.8 LOGGED BY: Chad Michaud
DRILLING CO.: S. W. Cole Engineering, Inc. DRILLER: Chad Michaud DRILLING METHOD: Core Drill / Hand Sampler
RIG TYPE: AUGER ID/OD: N/A / N/A SAMPLER:
HAMMER TYPE: N/A HAMMER WEIGHT (lbs): N/A CASING ID/OD: N/A / N/A CORE BARREL:
HAMMER EFFICIENCY FACTOR: HAMMER DROP (inch): N/A
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									1.25" Wearing Course Pavement		
								0.1	2" Binder Course Pavement		
								0.3	18" of 1.5-inch minus Bank Run Gravel (SAND and GRAVEL trace silt - Base)		

Bottom of Exploration at 1.8 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. 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.

BORING NO.: **B-8**

KEY TO NOTES & SYMBOLS

Test Boring and Test Pit Explorations

Stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q _u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S _v	-	field vane shear strength, kips/sq. ft.
L _v	-	lab vane shear strength, kips/sq. ft.
q _p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W _L	-	liquid limit - Atterberg test
W _P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ _T	-	total soil weight
γ _B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%
With	Undifferentiated

Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to 1/2" thickness
Layer:	1/2" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

REFUSAL: Test Boring Explorations - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: Test Pit Explorations - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

APPENDIX D

Laboratory Test Results

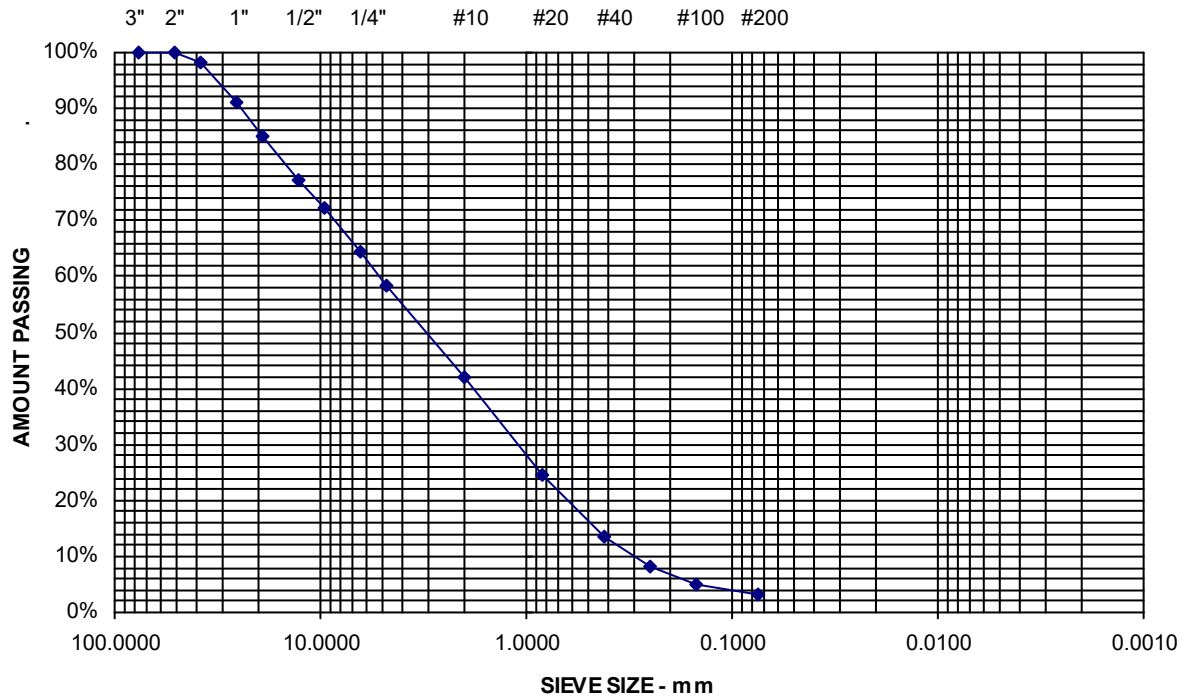
Project Name BARRINGTON NH - OVERLOOK CIRCLE - PAVEMENT
 EXPLORATIONS - GEOTECHNICAL ENGINEERING SERVICES
 Client HOYLE TANNER & ASSOCIATES, INC.
 Material Type 1.5" MINUS SCREENED BANK RUN GRAVEL
 Material Source B-1, 3-13"

Project Number 20-0662
 Lab ID 21053S
 Date Received 8/13/2021
 Date Completed 8/20/2021
 Tested By BRADLEY GERSCHWILER

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	<u>NHDOT 304.3 CR. GRAVEL</u> <u>SPECIFICATIONS (%)</u>
75 mm	3"	100	100
50 mm	2"	100	95 - 100
38.1 mm	1-1/2"	98	
25.0 mm	1"	91	55 - 85 †
19.0 mm	3/4"	85	
12.5 mm	1/2"	77	
9.5 mm	3/8"	72	
6.3 mm	1/4"	64	
4.75 mm	No. 4	58	27 - 52 †
2.00 mm	No. 10	42	
850 μm	No. 20	25	
425 μm	No. 40	13	
250 μm	No. 60	8	
150 μm	No. 100	5	
75 μm	No. 200	3.1	
75 μm	No. 200*	5.4	0 - 12

* OF THE FRACTION PASSING THE NO. 4 SIEVE

† SAMPLE DOES NOT MEET SPECIFICATION



Comments

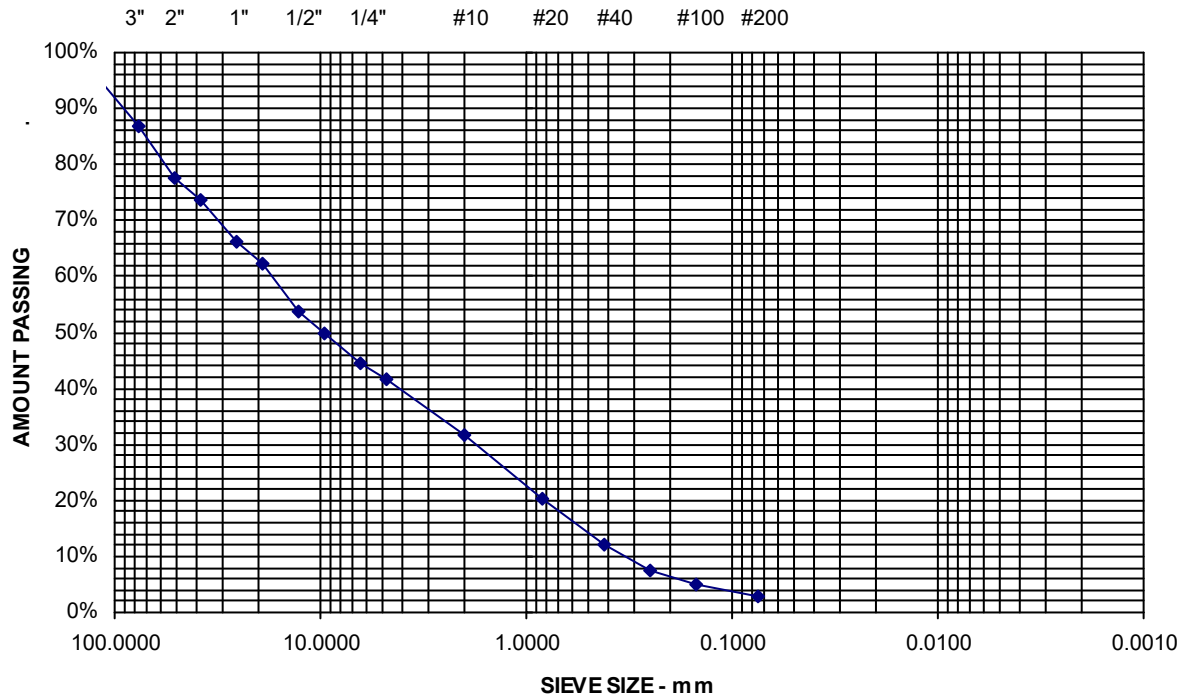
Project Name BARRINGTON NH - OVERLOOK CIRCLE - PAVEMENT
 EXPLORATIONS - GEOTECHNICAL ENGINEERING SERVICES
 Client HOYLE TANNER & ASSOCIATES, INC.
 Material Type 5" MINUS SCREENED BANK RUN GRAVEL
 Material Source B-1, 13-21"

Project Number 20-0662
 Lab ID 21054S
 Date Received 8/13/2021
 Date Completed 8/20/2021
 Tested By BRADLEY GERSCHWILER

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	<u>NHDOT 304.2 GRAVEL</u> <u>SPECIFICATIONS (%)</u>
150 mm	6"	100	100
75 mm	3"	87	
50 mm	2"	77	
38.1 mm	1-1/2"	74	
25.0 mm	1"	66	
19.0 mm	3/4"	62	
12.5 mm	1/2"	54	
9.5 mm	3/8"	50	
6.3 mm	1/4"	45	
4.75 mm	No. 4	41	25 - 70
2.00 mm	No. 10	32	
850 μm	No. 20	20	
425 μm	No. 40	12	
250 μm	No. 60	8	
150 μm	No. 100	5	
75 μm	No. 200	2.9	
75 μm	No. 200*	7.1	0 - 12

* OF THE FRACTION PASSING THE NO. 4 SIEVE

SAMPLE MEETS SPECIFICATION



Comments

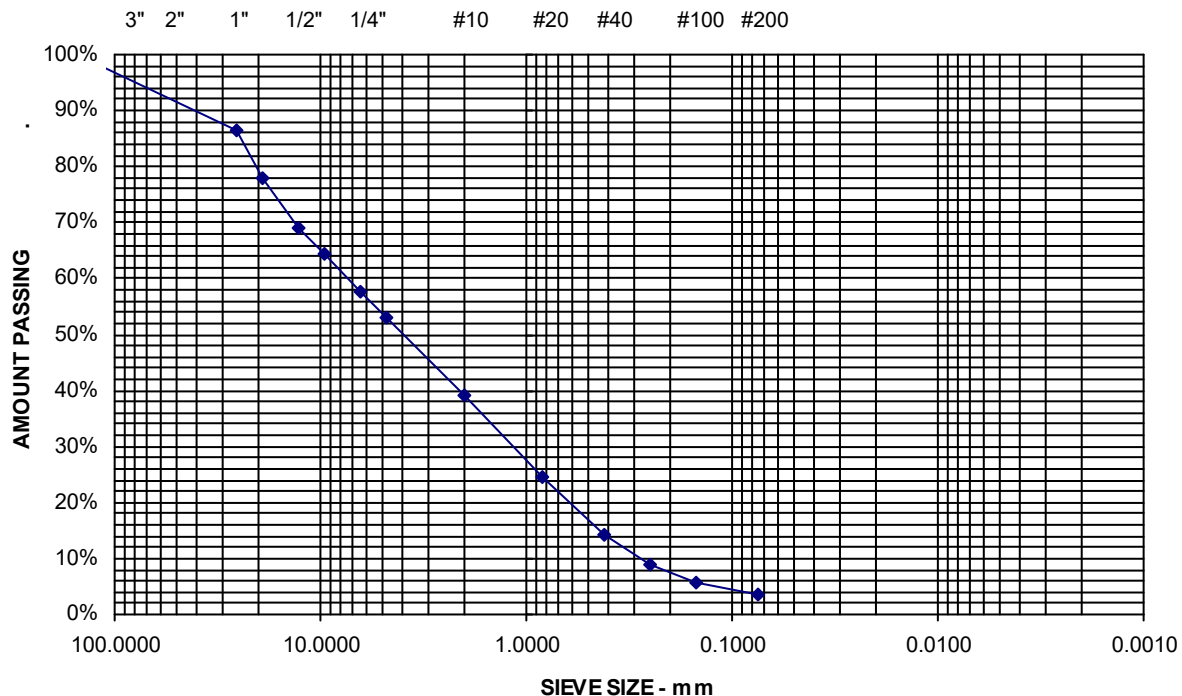
Project Name BARRINGTON NH - OVERLOOK CIRCLE - PAVEMENT
 EXPLORATIONS - GEOTECHNICAL ENGINEERING SERVICES
 Client HOYLE TANNER & ASSOCIATES, INC.
 Material Type 5" MINUS SCREENED BANK RUN GRAVEL
 Material Source B-2, 12-19"

Project Number 20-0662
 Lab ID 21055S
 Date Received 8/13/2021
 Date Completed 8/20/2021
 Tested By BRADLEY GERSCHWILER

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	<u>NHDOT 304.2 GRAVEL</u> <u>SPECIFICATIONS (%)</u>
150 mm	6"	100	100
25.0 mm	1"	86	
19.0 mm	3/4"	78	
12.5 mm	1/2"	69	
9.5 mm	3/8"	65	
6.3 mm	1/4"	58	
4.75 mm	No. 4	53	25 - 70
2.00 mm	No. 10	39	
850 μm	No. 20	25	
425 μm	No. 40	14	
250 μm	No. 60	9	
150 μm	No. 100	6	
75 μm	No. 200	3.7	
75 μm	No. 200*	7	0 - 12

* OF THE FRACTION PASSING THE NO. 4 SIEVE

SAMPLE MEETS SPECIFICATION



Comments

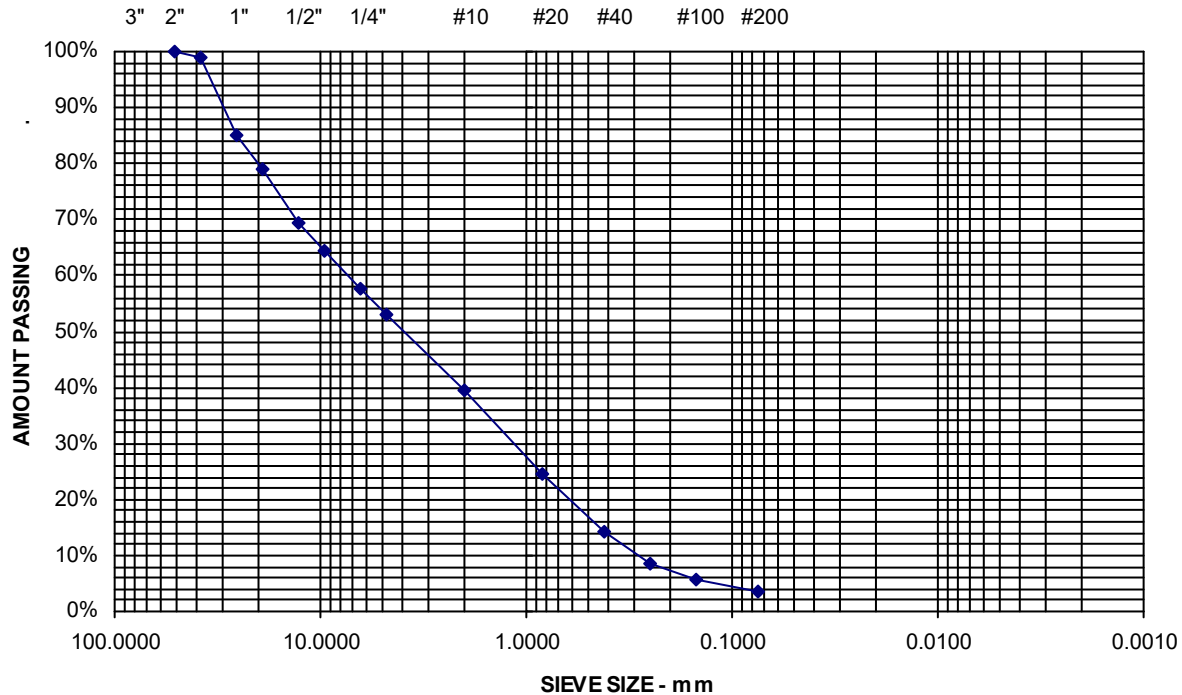
Project Name BARRINGTON NH - OVERLOOK CIRCLE - PAVEMENT
 EXPLORATIONS - GEOTECHNICAL ENGINEERING SERVICES
 Client HOYLE TANNER & ASSOCIATES, INC.
 Material Type 1.5" MINUS SCREENED BANK RUN GRAVEL
 Material Source B-3, 3-11"

Project Number 20-0662
 Lab ID 21056S
 Date Received 8/13/2021
 Date Completed 8/20/2021
 Tested By BRADLEY GERSCHWILER

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	<u>NHDOT 304.3 CR. GRAVEL</u> <u>SPECIFICATIONS (%)</u>
50 mm	2"	100	95 - 100
38.1 mm	1-1/2"	99	
25.0 mm	1"	85	55 - 85
19.0 mm	3/4"	79	
12.5 mm	1/2"	70	
9.5 mm	3/8"	65	
6.3 mm	1/4"	58	
4.75 mm	No. 4	53	27 - 52 †
2.00 mm	No. 10	40	
850 μm	No. 20	24	
425 μm	No. 40	14	
250 μm	No. 60	9	
150 μm	No. 100	6	
75 μm	No. 200	3.7	
75 μm	No. 200*	7	0 - 12

* OF THE FRACTION PASSING THE NO. 4 SIEVE

† SAMPLE DOES NOT MEET SPECIFICATION



Comments

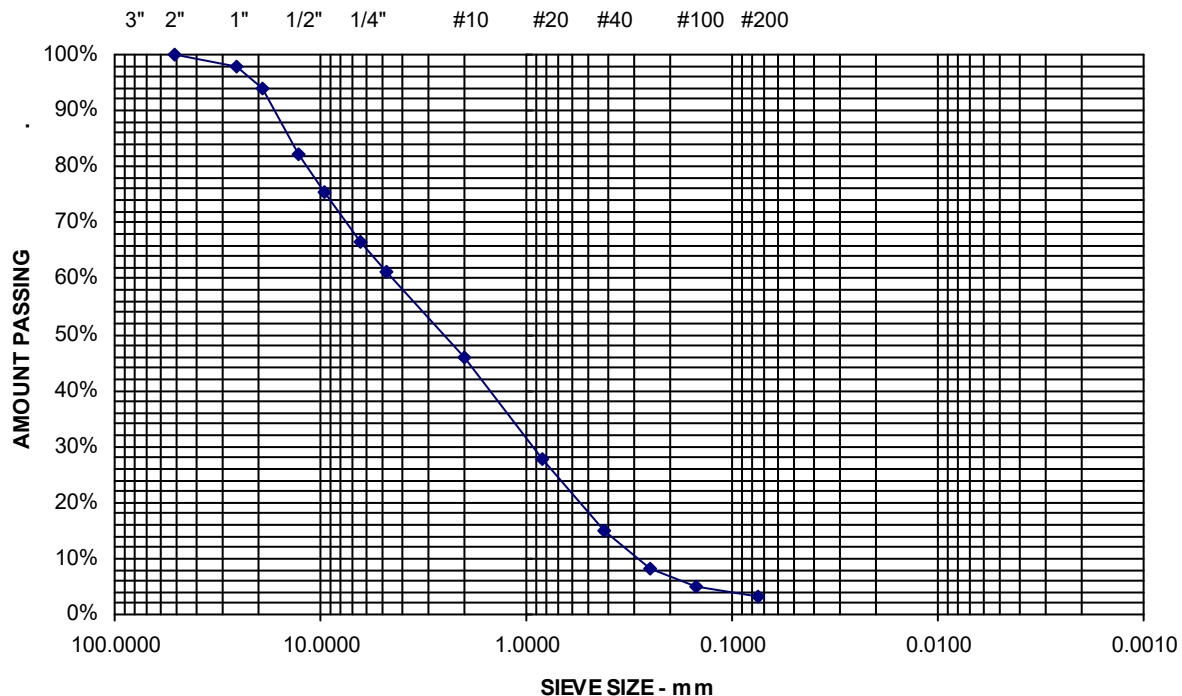
Project Name BARRINGTON NH - OVERLOOK CIRCLE - PAVEMENT
 EXPLORATIONS - GEOTECHNICAL ENGINEERING SERVICES
 Client HOYLE TANNER & ASSOCIATES, INC.
 Material Type 1.5" MININUS SCREENED BANK RUN GRAVEL
 Material Source B-5, 3-13"

Project Number 20-0662
 Lab ID 21057S
 Date Received 8/13/2021
 Date Completed 8/20/2021
 Tested By BRADLEY GERSCHWILER

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	<u>NHDOT 304.3 CR. GRAVEL</u> <u>SPECIFICATIONS (%)</u>
50 mm	2"	100	95 - 100
25.0 mm	1"	98	55 - 85 †
19.0 mm	3/4"	94	
12.5 mm	1/2"	82	
9.5 mm	3/8"	75	
6.3 mm	1/4"	67	
4.75 mm	No. 4	61	27 - 52 †
2.00 mm	No. 10	46	
850 μm	No. 20	28	
425 μm	No. 40	15	
250 μm	No. 60	8	
150 μm	No. 100	5	
75 μm	No. 200	3.1	
75 μm	No. 200*	5	0 - 12

* OF THE FRACTION PASSING THE NO. 4 SIEVE

† SAMPLE DOES NOT MEET SPECIFICATION



Comments

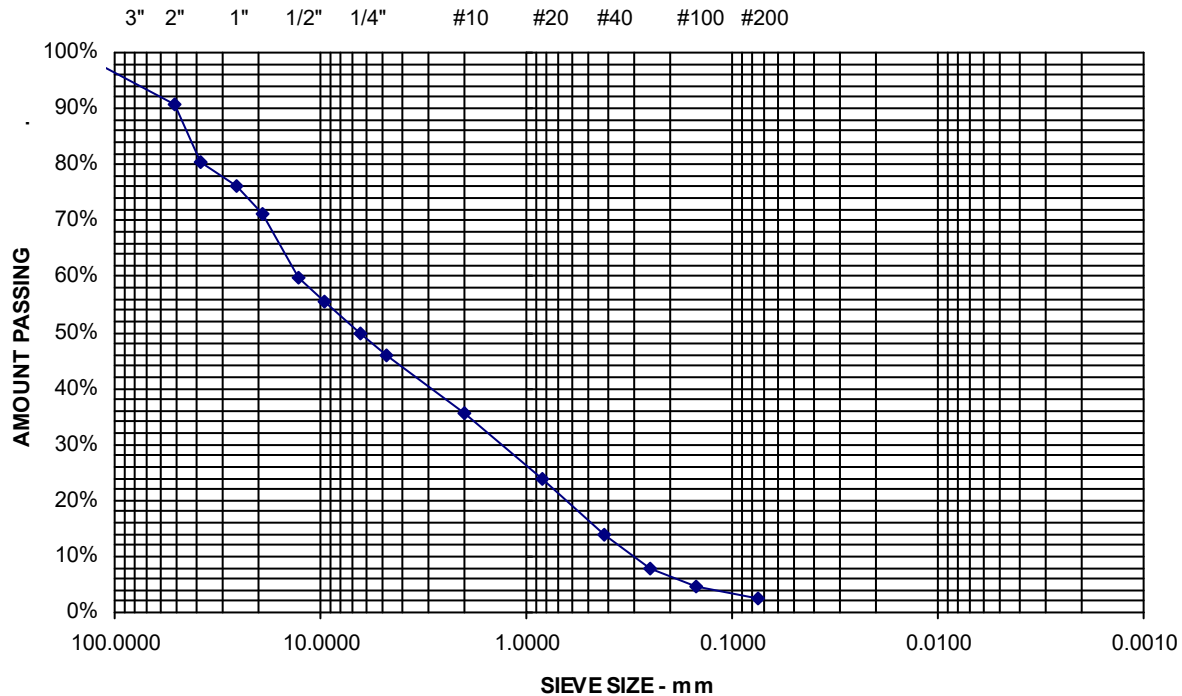
Project Name BARRINGTON NH - OVERLOOK CIRCLE - PAVEMENT
 EXPLORATIONS - GEOTECHNICAL ENGINEERING SERVICES
 Client HOYLE TANNER & ASSOCIATES, INC.
 Material Type 5" MINUS SCREENED BANK RUN GRAVEL
 Material Source B-6, 10-21"

Project Number 20-0662
 Lab ID 21058S
 Date Received 8/13/2021
 Date Completed 8/20/2021
 Tested By BRADLEY GERSCHWILER

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	<u>NHDOT 304.2 GRAVEL</u> <u>SPECIFICATIONS (%)</u>
150 mm	6"	100	100
50 mm	2"	91	
38.1 mm	1-1/2"	80	
25.0 mm	1"	76	
19.0 mm	3/4"	71	
12.5 mm	1/2"	60	
9.5 mm	3/8"	56	
6.3 mm	1/4"	50	
4.75 mm	No. 4	46	25 - 70
2.00 mm	No. 10	36	
850 μm	No. 20	24	
425 μm	No. 40	14	
250 μm	No. 60	8	
150 μm	No. 100	5	
75 μm	No. 200	2.6	
75 μm	No. 200*	5.7	0 - 12

* OF THE FRACTION PASSING THE NO. 4 SIEVE

SAMPLE MEETS SPECIFICATION



Comments

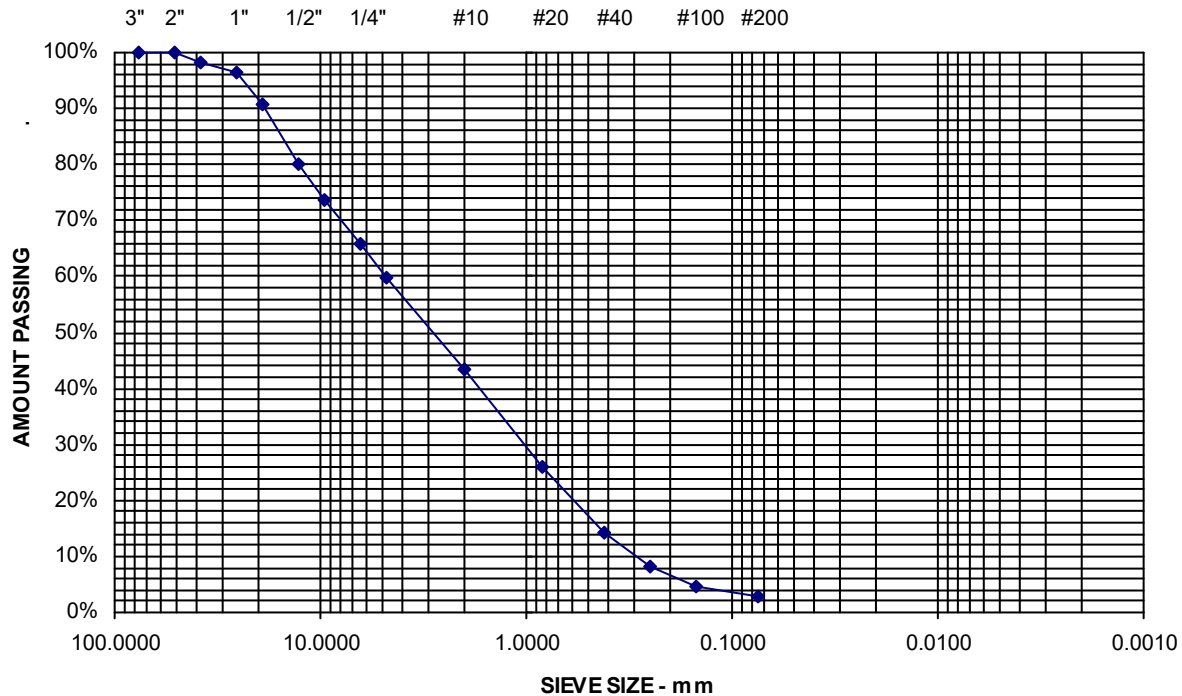
Project Name BARRINGTON NH - OVERLOOK CIRCLE - PAVEMENT
 EXPLORATIONS - GEOTECHNICAL ENGINEERING SERVICES
 Client HOYLE TANNER & ASSOCIATES, INC.
 Material Type 1.5" MINUS SCREENED BANK RUN GRAVEL
 Material Source B-7, 3.5-10"

Project Number 20-0662
 Lab ID 21059S
 Date Received 8/13/2021
 Date Completed 8/20/2021
 Tested By BRADLEY GERSCHWILER

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	<u>NHDOT 304.3 CR. GRAVEL</u> <u>SPECIFICATIONS (%)</u>
75 mm	3"	100	100
50 mm	2"	100	95 - 100
38.1 mm	1-1/2"	98	
25.0 mm	1"	96	55 - 85 †
19.0 mm	3/4"	91	
12.5 mm	1/2"	80	
9.5 mm	3/8"	74	
6.3 mm	1/4"	66	
4.75 mm	No. 4	60	27 - 52 †
2.00 mm	No. 10	44	
850 μm	No. 20	26	
425 μm	No. 40	14	
250 μm	No. 60	8	
150 μm	No. 100	5	
75 μm	No. 200	2.8	
75 μm	No. 200*	4.6	0 - 12

* OF THE FRACTION PASSING THE NO. 4 SIEVE

† SAMPLE DOES NOT MEET SPECIFICATION



Comments

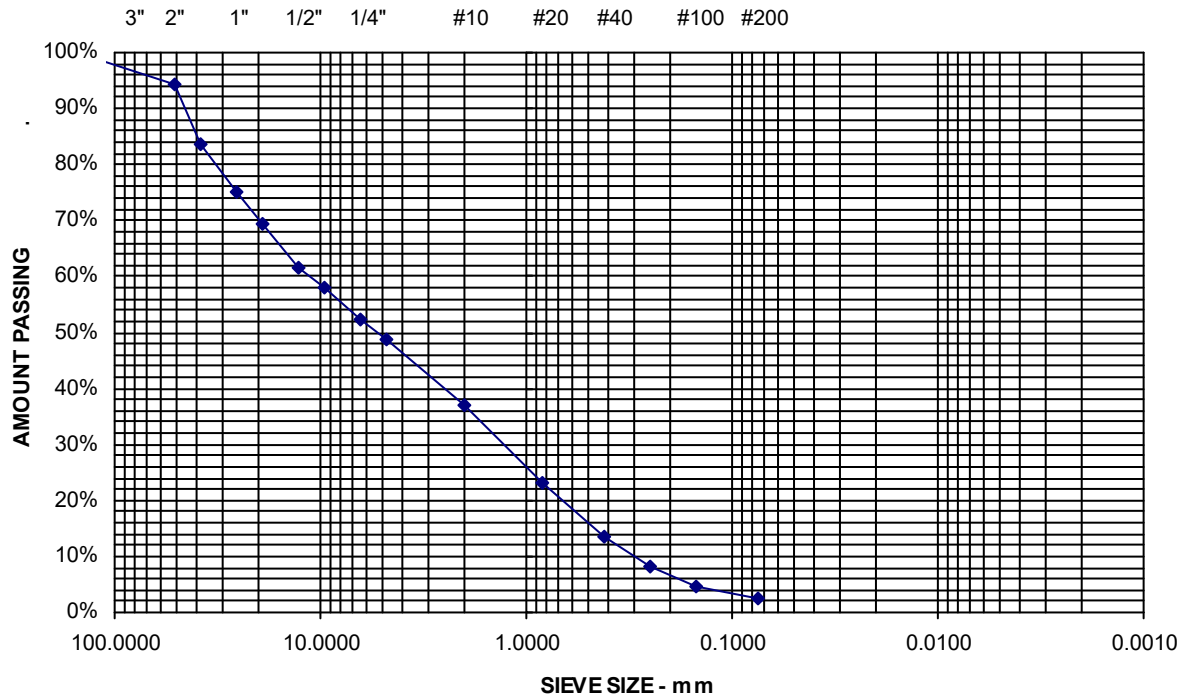
Project Name BARRINGTON NH - OVERLOOK CIRCLE - PAVEMENT
 EXPLORATIONS - GEOTECHNICAL ENGINEERING SERVICES
 Client HOYLE TANNER & ASSOCIATES, INC.
 Material Type 5" MINUS SCREENED BANK RUN GRAVEL
 Material Source B-7, 10-21"

Project Number 20-0662
 Lab ID 21060S
 Date Received 8/13/2021
 Date Completed 8/20/2021
 Tested By BRADLEY GERSCHWILER

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	<u>NHDOT 304.2 GRAVEL</u> <u>SPECIFICATIONS (%)</u>
150 mm	6"	100	100
50 mm	2"	94	
38.1 mm	1-1/2"	84	
25.0 mm	1"	75	
19.0 mm	3/4"	69	
12.5 mm	1/2"	62	
9.5 mm	3/8"	58	
6.3 mm	1/4"	52	
4.75 mm	No. 4	49	25 - 70
2.00 mm	No. 10	37	
850 μm	No. 20	23	
425 μm	No. 40	14	
250 μm	No. 60	8	
150 μm	No. 100	5	
75 μm	No. 200	2.5	
75 μm	No. 200*	5.1	0 - 12

* OF THE FRACTION PASSING THE NO. 4 SIEVE

SAMPLE MEETS SPECIFICATION



Comments



Report of Density of Compacted HMA Cores

ASTM D2726-11, AASHTO T 166

Project Name: Overlook Circle - Pavement Explorations
Project Location: Barrington, NH
Client: Hoyle Tanner & Associates
Material Supplier:
Mix Type / Design ID: Wearing
Course Description:
Placement Contractor:

Project Number: 20-0662
Lab ID: Multiple
Date Received: 08/13/21
Date Completed: 08/27/21
Tested By: Z. Kirlin

Core Location	Lab ID	Core No.	Thickness		Specific Gravity		Compaction	
			Measured (in)	Required (in)	Bulk	Theoretical Maximum	Measured (%)	Required (%)
	21061S	B-2 wearing	1 1/8		2.165	2.469	87.7%	
	21062S	B-4 wearing	1 3/4 - 2		2.245	2.469	90.9%	
	21063S	B-6 wearing	1		2.247	2.469	91.0%	
	21064S	B-8 wearing	1 1/4		2.297	2.469	93.0%	

The TMD(s) used to calculate % Compaction are from Core Samples

Comments:

Reviewed By: _____

10 Centre Road, Somersworth, NH 03878-2926 • P: (603) 692.0088 • F: (603) 692.0044 • E: infosomersworth@swcole.com

Geotechnical Engineering

Construction Materials Testing

Special Inspections



Report of Density of Compacted HMA Cores

ASTM D2726-11, AASHTO T 166

Project Name: Overlook Circle - Pavement Explorations
Project Location: Barrington, NH
Client: Hoyle Tanner & Associates
Material Supplier:
Mix Type / Design ID: Binder
Course Description:
Placement Contractor:

Project Number: 20-0662
Lab ID: Multiple
Date Received: 08/13/21
Date Completed: 08/27/21
Tested By: Z. Kirlin

Core Location	Lab ID	Core No.	Thickness		Specific Gravity		Compaction	
			Measured (in)	Required (in)	Bulk	Theoretical Maximum	Measured (%)	Required (%)
	21065S	B-2 Binder	1 1/2		2.366	2.564	92.3%	
	21066S	B-4 Binder	2		2.326	2.564	90.7%	
	21067S	B-6 Binder	1 1/2 - 2		2.324	2.564	90.6%	
	21068S	B-8 Binder	2		2.396	2.564	93.4%	

The TMD(s) used to calculate % Compaction are from Core Samples

Comments:

Reviewed By: _____

10 Centre Road, Somersworth, NH 03878-2926 • P: (603) 692.0088 • F: (603) 692.0044 • E: infosomersworth@swcole.com

Geotechnical Engineering

Construction Materials Testing

Special Inspections