REPORT

25-0742 S

July 11, 2025

Explorations and Geotechnical Engineering Services

Proposed Maintenance Building
MTA Crosby Maintenance Facility
South Portland, Maine

Prepared For:
Harriman
Attention: Alexander R. Wheelock, P.E.
80 Exchange Street
Portland, ME 04101

Prepared By:
S. W. Cole Engineering, Inc.
286 Portland Road
Gray, ME 04039
T: 207-657-2866

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25-0742 S

July 11, 2025

Harriman
Attention: Alexander R. Wheelock, P.E.
80 Exchange Street
Portland, ME 04101

Subject: Explorations and Geotechnical Engineering Services
Proposed Maintenance Building
Maine Turnpike Authority Crosby Maintenance Facility
South Portland, Maine

Dear Alex:

In accordance with our Proposal, dated May 12, 2025, we have performed subsurface explorations for the subject project. This report summarizes our findings and geotechnical recommendations, 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 obtain subsurface information at the site in order to develop geotechnical recommendations relative to foundations and earthwork associated with the proposed construction. Our scope of services included test boring explorations, soils laboratory testing, a geotechnical analysis of the subsurface findings, and preparation of this report.

1.2 Site and Proposed Construction

The site is located at the existing Maine Turnpike Authority (MTA) Crosby Maintenance Facility, on the westerly side of the MTA mainline, in South Portland, Maine. The site includes an existing grass and gravel-surfaced area on the easterly edge of the paved yard. Existing grades slope down to the east, towards the MTA mainline, ranging from approximately elevation 84 to 71 feet (project datum).

We understand development plans include a new on-grade, single-story maintenance building measuring about 60 by 115 feet in plan dimensions. We anticipate the building will consist of high-bay, pre-engineered metal construction. We understand finish floor elevation is proposed at 84 feet, requiring tapered grade-raise fills approaching about 8 feet beneath the building. A 3H:1V fill slope about 12 feet tall is proposed on the easterly side of the building.

Proposed and existing site features are shown on the "Exploration Location Plan" attached in Appendix B.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Five test borings (B-401 through B-405) were made at the site on June 10, 2025, by Seaboard Drilling, LLC working under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). The exploration locations were selected and established in the field by S.W.COLE using measurements from existing site features. 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. The elevations shown on the logs were estimated based on topographic information shown on the "Exploration Location Plan".

2.2 Field Testing

The test borings were drilled using a combination of hollow stem auger and cased wash-boring techniques. The soils were sampled at 2-to-5-foot intervals using a split spoon sampler and Standard Penetration Testing (SPT) methods. Pocket Penetrometer Tests (PPT) were performed where stiffer cohesive soils were encountered. SPT blow counts and PPT results are shown on the logs.

2.3 Laboratory Testing

Soil samples obtained from the explorations were returned to our laboratory for further classification and testing. The results of two soil moisture content tests are shown on the boring logs. The results of two grain size analyses are attached in Appendix D.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock

The test borings encountered a subsurface profile generally consisting of uncontrolled fill overlying glaciomarine deposits of silty clay, clayey silt and sand with varying portions of silt and gravel, overlying refusal surfaces (probable bedrock). The principal soils encountered at the explorations are summarized below. Not all of the strata were encountered at each exploration; refer to the attached boring logs for more detailed subsurface information.

Uncontrolled Fill: Underlying a surficial layer of topsoil, where encountered, the borings encountered uncontrolled fill extending to depths ranging from about 2 to 15 feet below existing ground surface (bgs). The uncontrolled fill consisted of very loose to medium dense sand with varying portions of silt and gravel, and stiff silty clay with varying portions of sand and gravel. In borings B-401, B-404 and B-405, the uncontrolled fill included layers of buried asphalt pavement rubble up to about 5 feet thick.

Glaciomarine Soils: Underlying the uncontrolled fill, the borings encountered native glaciomarine deposits of very stiff to hard silty clay and clayey silt and loose to dense sand with varying portions of silt and gravel.

Refusal Surfaces: Underlying the glaciomarine soils, the borings encountered refusal surfaces (probable bedrock) at depths ranging from about 8 to 24 feet bgs.

3.2 Groundwater

The soils encountered in the test borings were moist to wet from the ground surface. Saturated soils were encountered at depths varying from 2 to 5 feet bgs. Groundwater likely becomes perched in the uncontrolled fill and on the relatively impervious silts and clays encountered in the test borings. Long term groundwater information is not available. It should be anticipated that groundwater levels will fluctuate, particularly in response to periods of snowmelt and precipitation, as well as changes in site use.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint; however, the site does present some geotechnical limitations. The principal geotechnical considerations include:

- The test borings encountered up to about 15 feet of uncontrolled fill which is unsuitable for support of the proposed building. We recommend the uncontrolled fill be removed from beneath the proposed building and base of the fill embankment to expose the underlying undisturbed, non-organic native soils, and replaced with compacted Granular Borrow.

- Alternatively, rammed aggregate pier ground improvement could be installed through the uncontrolled fill to support the proposed building foundations, floor slabs, and entrance slabs, as well as the fill embankment. However, based on the presence of thick layers of buried asphalt pavement rubble in the uncontrolled fill, ground improvement installation may be difficult and would require pre-drilling.

- In all cases, the existing pavement, topsoil, utilities and structures should be removed from beneath the proposed building and fill embankment and replaced with compacted Granular Borrow.

- Subgrades across the site will consist of uncontrolled fill overlying sensitive wet silts, clays and silty sand. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Rubber tired construction equipment should not operate directly on the native silt and clays when wet. Excavation of bearing surfaces should be completed with a smooth-edged bucket to lessen subgrade disturbance.

- Imported Granular Borrow, Structural Fill, and Crushed Stone will be required for construction. Portions of the existing granular fills, free of organics, deleterious materials, asphalt pavement rubble, and debris, may be suitable for reuse as Granular Borrow to backfill over-excavations provided they are at a compactable moisture content at the time of reuse.

4.2 Site and Subgrade Preparation

We recommend that site preparation begin with the construction of an erosion control system to protect adjacent drainage ways and areas outside the construction limits. Surficial organics, roots and topsoil should be completely removed from areas of proposed fill and construction. As much vegetation and pavement as possible should remain outside the construction areas to lessen the potential for erosion and site disturbance.

As discussed, the borings encountered a variable thickness of uncontrolled fill which is unsuitable for support of the proposed building and fill embankment. We recommend the uncontrolled fill, as well as existing pavement, organics, structures, and utilities, be removed from beneath the proposed building footprint (including foundations, floor slabs, and entrance slabs) and the base of proposed the fill embankment to expose the underlying undisturbed, non-organic, native soils. The extent of removal should extend 1 foot laterally outward from outside edge of perimeter footings and toe of the fill embankment for every 1-foot of excavation depth (1H:1V bearing splay). The over-excavated area should be backfilled with compacted Granular Borrow. Initial lifts of Granular Borrow for Underwater Backfill will be required over wet subgrades.

Alternatively, rammed aggregate pier ground improvement could be installed through the uncontrolled fill to support the proposed building foundations, floor slabs, and entrance slabs, as well as the fill embankment.

We recommend that footings be excavated using a smooth-edged bucket and that footings be underlain by at least 6 inches of Crushed Stone overlying properly prepared subgrades. A thicker layer of Crushed Stone may be needed for load distribution of foundations supported by soils with ground improvement.

4.3 Excavation and Dewatering

Excavation work will generally encounter uncontrolled fills with asphalt pavement rubble and debris, silty sand, silt, and clay soils. Care must be exercised during construction to limit disturbance of the bearing soils. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Rubber tired construction equipment should not operate directly on the native soils when wet. Final cuts to subgrade should be performed with a smooth-edged bucket to help reduce strength loss from soil disturbance.

Vibrations from construction should be controlled below threshold limits of 0.5 in/sec for structures, water supply wells and infrastructure within 500 feet of the project site. More restrictive vibration limits may be warranted in specific cases with sensitive equipment, historic structures or artifacts on-site or within close proximity.

Relatively shallow groundwater was encountered in the test borings. The contractor should anticipate the need to dewater and stabilize excavations, particularly deep over-excavations to remove the unsuitable soils which will extend below groundwater. Controlling the water levels to at least one foot below planned excavation depths will help stabilize subgrades during construction. Excavations must be properly shored or sloped in accordance with OSHA Regulations to prevent sloughing and caving of the sidewalls during construction. Care must be taken to preclude undermining adjacent structures, utilities and roadways. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor.

4.4 Foundations

We recommend the proposed building be supported on spread footings founded on at least 6 inches of compacted Crushed Stone overlying undisturbed, non-organic native soils, or overlying compacted Granular Borrow used to backfill over-excavations down to undisturbed, non-organic, native soils. For foundations bearing on properly prepared subgrades, we recommend the following geotechnical parameters for design consideration:

Geotechnical Parameters for Spread Footings and Foundation Walls	
Design Frost Depth (100-year AFI)	4.5 feet
Net Allowable Soil Bearing Pressure	3.0 ksf
Base Friction Factor	0.35
Total Unit Weight of Backfill	125 pcf
At-Rest Lateral Earth Pressure Coefficient	0.5
Internal Friction Angle of Backfill	30°
Seismic Soil Site Class	D (IBC 2021)
Estimated Total Settlement	1-inch
Differential Settlement	½-inch

4.4.1 Ground Improvement

As an alternate to removing and replacing the unsuitable soils, rammed aggregate pier ground improvement could be installed through the uncontrolled fill and into the underlying non-organic native soils or bedrock to support the proposed building foundations, floor slabs, entrance slabs, as well as the fill embankment. In this case, proposed building footings should be underlain with at least 6 inches of compacted Crushed Stone, bearing on improved ground. It should be noted that a thicker layer of Crushed Stone may be needed for load distribution of foundations supported by ground improvement. For foundations bearing on properly prepared subgrades, we recommend the following geotechnical parameters for design consideration:

Geotechnical Parameters for Spread Footings on Improved Ground	
Design Frost Depth (100-year AFI)	4.5 feet
Net Allowable Soil Bearing Pressure (Improved Ground)	4.0 ksf
Base Friction Factor	0.4
Total Unit Weight of Backfill	125 pcf
At-Rest Lateral Earth Pressure Coefficient	0.5
Internal Friction Angle of Backfill	30°
Seismic Soil Site Class	D (IBC 2015)
Total Settlement (Improved Ground)	1-inch
Differential Settlement (Improved Ground)	½-inch

We recommend the contract documents require an engineered submittal for aggregate piers to improve ground conditions to meet or exceed the geotechnical parameters for bearing capacity and settlement as recommended herein. The aggregate pier submittal must include QC and modulus testing procedures. We recommend load testing be completed prior to installing production elements. The aggregate submittal must be prepared and sealed by a Professional Engineer licensed in the State of Maine and endorsed by the Installer.

4.5 Foundation Drainage

We recommend an underdrain system be installed on the outside edge of perimeter building footings. The underdrain pipe should consist of 4-inch diameter, perforated SDR-35 foundation drainpipe bedded in Crushed Stone and wrapped in non-woven geotextile fabric. The underdrain pipe must have a positive gravity outlet protected from freezing, clogging and backflow. Surface grades should be sloped away from the building for

positive surface water drainage. General underdrain details are illustrated on the "Foundation Detail Sketch" attached in Appendix B.

4.6 Slab-On-Grade

On-grade floor slabs in heated areas may be designed using a subgrade reaction modulus of 100 pci (pounds per cubic inch) provided the slab is underlain by at least 12 inches of compacted Structural Fill placed over properly prepared subgrades, as discussed herein. The structural engineer or concrete consultant must design steel reinforcing and joint spacing appropriate to slab thickness and function, as well as cracking and curling.

We recommend a sub-slab vapor retarder particularly in areas of the building where the concrete slab will be covered with an impermeable surface treatment or floor covering that may be sensitive to moisture vapors. The vapor retarder must have a permeance that is less than the floor cover or surface treatment that is applied to the slab. The vapor retarder must have sufficient durability to withstand direct contact with the sub-slab base material and construction activity. The vapor retarder material should be placed according to the manufacturer's recommended method, including the taping and lapping of all joints and wall connections. The architect and/or flooring consultant should select the vapor retarder products compatible with flooring and adhesive materials.

The floor slab should be appropriately cured using moisture retention methods after casting. Typical floor slab curing methods should be used for at least 7 days. The architect or flooring consultant should assign curing methods consistent with current applicable American Concrete Institute (ACI) procedures with consideration of curing method compatibility to proposed surface treatments, flooring and adhesive materials.

4.7 Entrance Slabs and Sidewalks

Entrance slabs and sidewalks adjacent to the building must be designed to reduce the effects of differential frost action between adjacent pavement, doorways, and entrances. We recommend that non-frost susceptible Structural Fill be provided to a depth of at least 4.5 feet below the top of entrance slabs. This thickness of Structural Fill should extend the full footprint of the entrance slab, thereafter, transitioning up to the bottom of the adjacent sidewalk or pavement gravels at a 3H:1V or flatter slope. General details

of this frost transition zone are shown on the "Foundation Detail Sketch" attached in Appendix B.

4.8 Fill, Backfill and Compaction

We recommend the following fill and backfill materials: recycled products must also be tested in accordance with applicable environmental regulations and approved by a qualified environmental consultant.

Common Borrow: Fill to raise grades in landscape areas, outside of the building foundation zone-of-influence, may be non-organic compactable earth meeting the requirements of 2020 MaineDOT Standard Specification 703.18 Common Borrow.

Granular Borrow: Backfill for over-excavations and fill to raise grades in building and paved areas should be sand meeting the requirements of 2020 MaineDOT Standard Specification 703.19 Granular Borrow. Granular Borrow for Underwater Backfill will be required over wet subgrades.

Structural Fill: Backfill for foundations, slab base material, and material below exterior entrances slabs should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

Structural Fill	
Sieve Size	**Percent Finer by Weight**
4 inch	100
3 inch	90 to 100
¼ inch	25 to 90
No. 40	0 to 30
No. 200	0 to 6

Crushed Stone: Crushed Stone, used beneath foundations and for underdrain aggregate, should be washed ¾-inch crushed stone meeting the requirements of 2020 MaineDOT Standard Specification 703.13 Crushed Stone ¾-Inch.

Reuse of Site Soils: Portions of the existing granular fill, free of organics, deleterious materials, asphalt pavement rubble, and debris, may be suitable for reuse as Granular Borrow provided they are at a compactable moisture content at the time of reuse. The

existing clays, silts, and miscellaneous fill and rubble are unsuitable for reuse in proposed building and embankment areas.

Placement and Compaction: Fill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses for grading, fill and backfill activities should not exceed 12 inches. We recommend that fill and backfill in building and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted with 3 to 5 passes of a vibratory plate compactor having a static weight of at least 500 pounds.

4.9 Weather Considerations

Construction activity should be limited during wet and freezing weather and the site soils may require drying or thawing before construction activities may continue. The contractor should anticipate the need for water to temper fills in order to facilitate compaction during dry weather. If construction takes place during cold weather, subgrades, foundations and floor slabs must be protected during freezing conditions. Concrete and fill must not be placed on frozen soil; and once placed, the concrete and soil beneath the structure must be protected from freezing.

4.10 Design Review and Construction Testing

S.W.COLE should be retained to review the construction documents prior to bidding to determine that our earthwork, foundation and pavement recommendations have been properly interpreted and implemented.

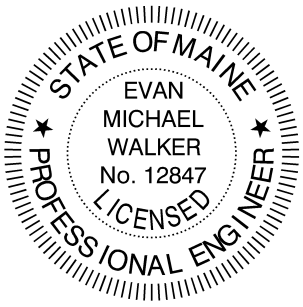
A construction materials testing and quality assurance program should be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to observe earthwork activities, the preparation of foundation bearing surfaces and pavement subgrades, as well as to provide testing and IBC Special Inspection services for soils, concrete, steel, spray-applied fireproofing, fire-stopping, structural masonry and asphalt construction materials.

5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during the construction phase of the project.

Sincerely,

S. W. Cole Engineering, Inc.



Evan M. Walker, P.E.
Senior Geotechnical Engineer

EMW:mas

APPENDIX A

Limitations

This report has been prepared for the exclusive use of Harriman for specific application to the proposed Maintenance Building at the Maine Turnpike Authority Crosby Maintenance Facility in South Portland, Maine. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

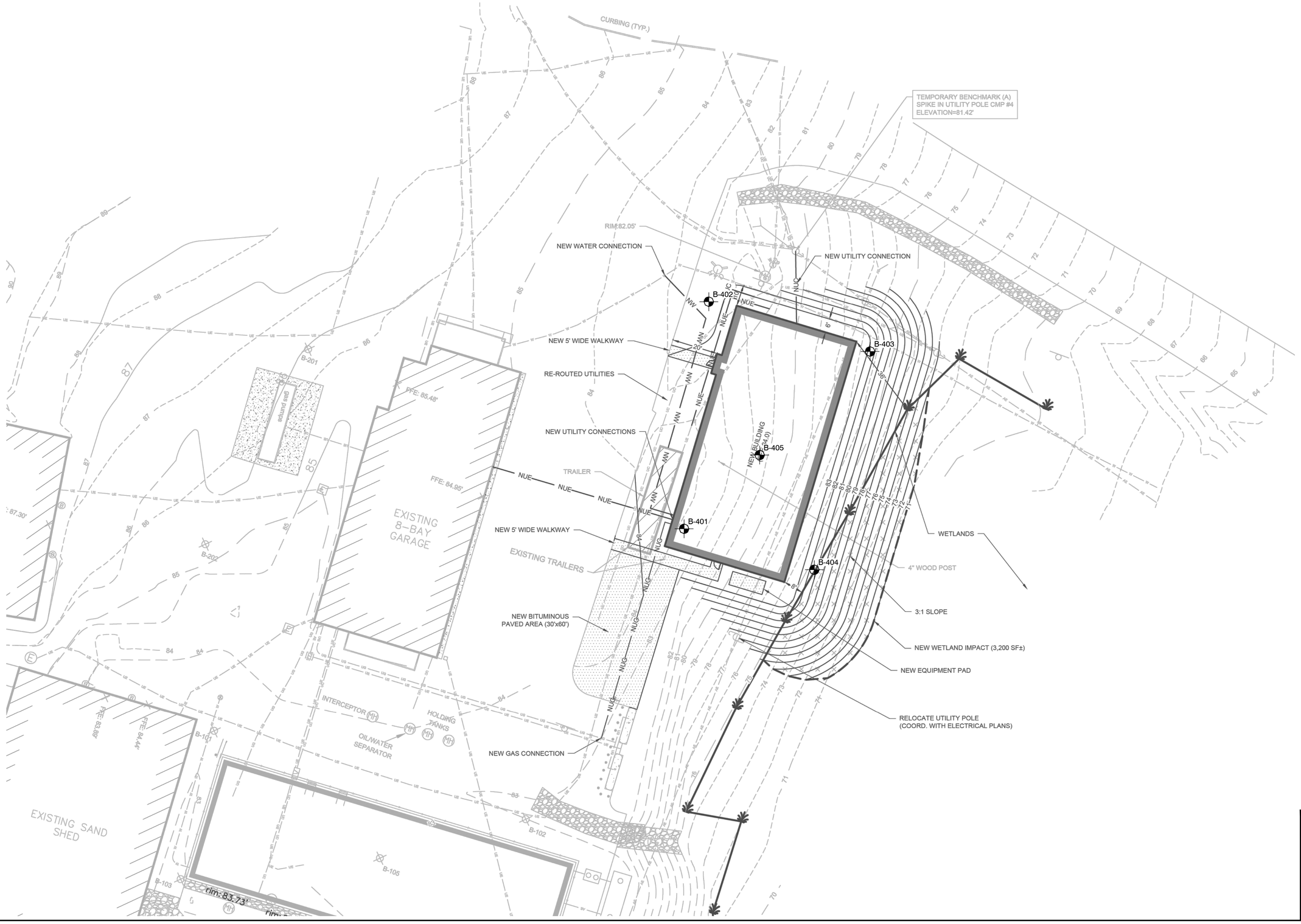
Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.

APPENDIX B

Figures



LEGEND:

APPROXIMATE BORING LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A 1"=20' SCALE PLAN OF THE SITE TITLED "CONCEPT SITE PLAN," PREPARED BY HARRIMAN, DATED 04/18/2025.
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 20 40 Feet

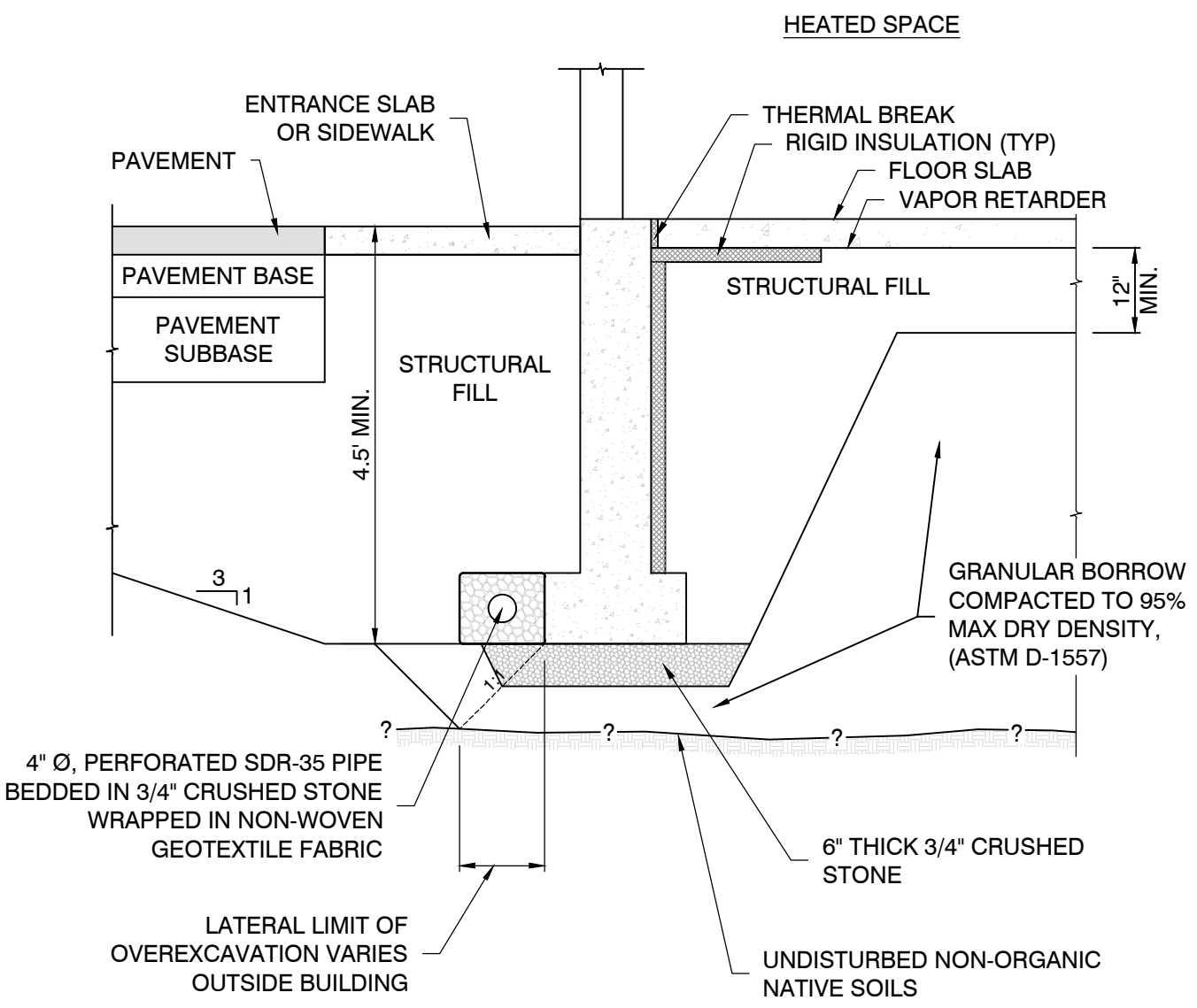
S.W.COLE ENGINEERING, INC.

HARRIMAN

EXPLORATION LOCATION PLAN

PROPOSED MAINTENANCE BUILDING
MAINE TURNPIKE AUTHORITY CROSBY MAINTENANCE FACILITY
SOUTH PORTLAND, MAINE

Job No.:	25-0742	Scale:	1" = 20'
Date :	06/13/2025	Sheet:	1



OVER-EXCAVATION & REPLACEMENT OPTION

NOTE:

1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.
2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.

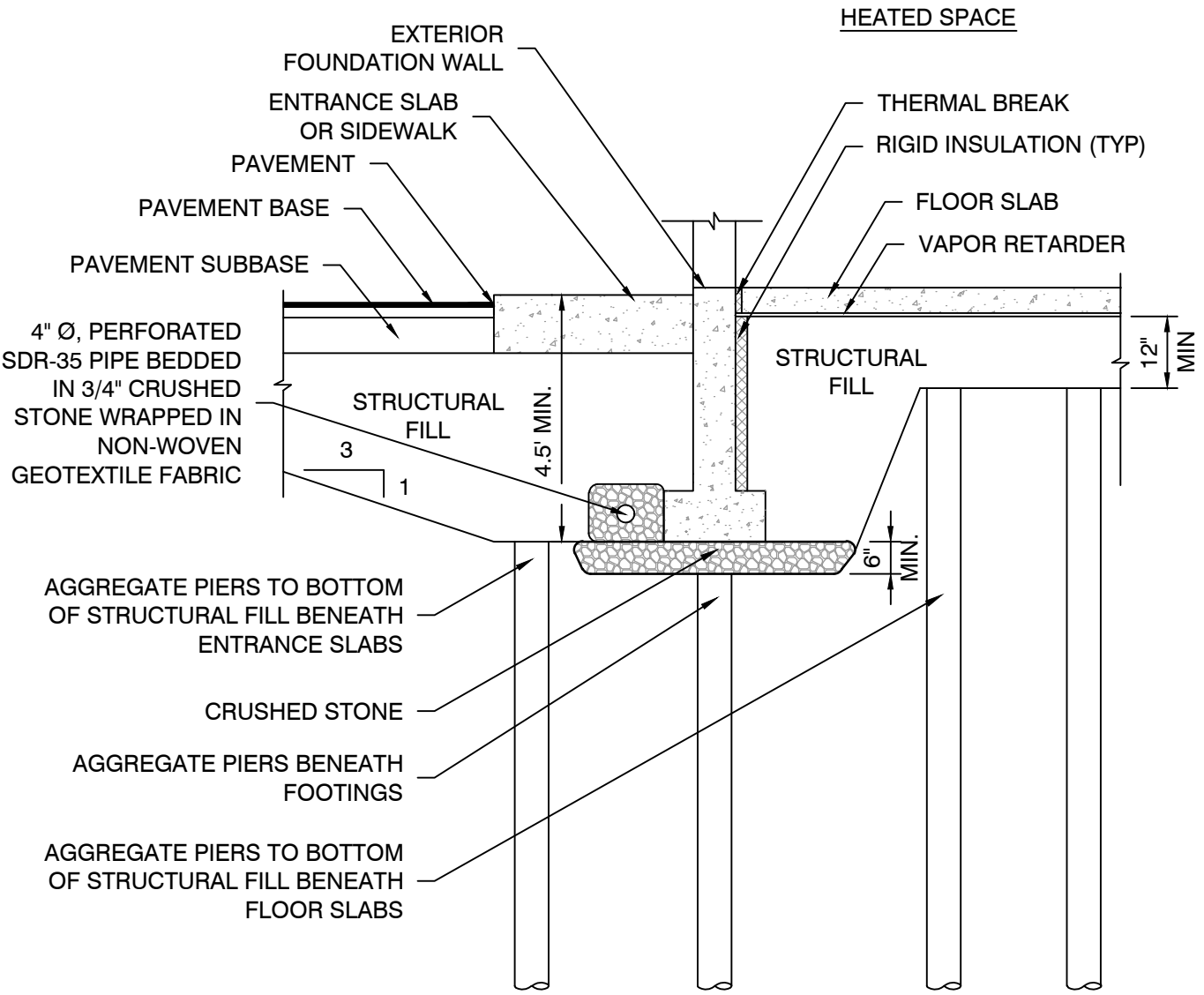
S.W.COLE ENGINEERING, INC.

HARRIMAN

FOUNDATION DETAIL SKETCH

PROPOSED MAINTENANCE BUILDING
MAINE TURNPIKE AUTHORITY CROSBY MAINTENANCE FACILITY
SOUTH PORTLAND, MAINE

Job No.:	25-0742	Scale:	Not to Scale
Date :	07/11/2025	Sheet:	2



GROUND IMPROVEMENT OPTION

NOTE:

1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.
2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.

S.W.COLE ENGINEERING, INC.

HARRIMAN

FOUNDATION DETAIL SKETCH

PROPOSED MAINTENANCE BUILDING
MAINE TURNPIKE AUTHORITY CROSBY MAINTENANCE FACILITY
SOUTH PORTLAND, MAINE

Job No.:	25-0742	Scale:	Not to Scale
Date :	07/11/2025	Sheet:	3

APPENDIX C

Exploration Logs and Key

BORING LOG

BORING NO.:	**B-401**
SHEET:	1 of 1
PROJECT NO.	25-0742
DATE START:	6/10/2025
DATE FINISH:	6/10/2025

CLIENT: Harriman
PROJECT: Proposed Maintenance Building
LOCATION: Maine Turnpike Authority Crosby Maintenance Facility, South Portland, Maine

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 83' +/- **TOTAL DEPTH (FT):** 24.0 **LOGGED BY:** Kyle Kaserman
DRILLING CO.: Seaboard Drilling **DRILLER:** Jeremy Adams **DRILLING METHOD:** Hollow Stem Augers
RIG TYPE: Track Mounted Diedrich D-50 **AUGER ID/OD:** 4 1/4 in / 7 5/8 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:**
HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 5 ft Soils saturated belwo 5' +/-
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 No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/20	3-12-31-25			0.4 Grass / Topsoil (FILL)		
										Dense, ASPHALT PAVEMENT RUBBLE (FILL)		
80												
	5		2D		5-7	24/15	2-2-1-2	q_P=2-4.5 ksf			▽	
										5.4 Stiff to hard, gray-brown, silty CLAY, some gravel, with occasional sand seams (FILL)		
										7.0 Very dense, light brown, silty SAND, some gravel		
75												
	10		3D		10-12	24/18	14-32-21-20					
70												
	15		4D		15-17	24/18	15-13-12-9	ID 33142G w =11 %		15.0 Medium dense, light brown, silty SAND, some gravel		
65												
	20		5D		20-22	24/24	7-13-14-11					
										21.0 Medium dense, gray, SILT AND SAND, some gravel, with weathered rock		
60												
										23.5 Probable Weathered BEDROCK		
										Refusal at 24.0 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 LOG

BORING NO.:	**B-402**
SHEET:	1 of 1
PROJECT NO.	25-0742
DATE START:	6/10/2025
DATE FINISH:	6/10/2025

CLIENT: Harriman
PROJECT: Proposed Maintenance Building
LOCATION: Maine Turnpike Authority Crosby Maintenance Facility, South Portland, Maine

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 82' +/- **TOTAL DEPTH (FT):** 18.0 **LOGGED BY:** Kyle Kaserman
DRILLING CO.: Seaboard Drilling **DRILLER:** Jeremy Adams **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Diedrich D-50 **AUGER ID/OD:** N/A / N/A **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic **HAMMER WEIGHT (lbs):** 140 / 140 **CASING ID/OD:** 3 in / 3 1/2 in **CORE BARREL:**
HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30 / 30
WATER LEVEL DEPTHS (ft): ▽ 5 ft Soils saturated below 5' +/-
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: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/7	5-7-7-6			Medium dense to loose, light brown, gravelly SAND, trace silt (FILL)		
80			2D		2-4	24/0	5-4-3-3					
	5		3D		5-7	24/3	5-3-2-1				▽	
										5.0 Loose, brown, SAND AND GRAVEL, some silt (FILL)		
75			4D		7-9	24/3	2-2-2-1			7.0 Very loose, brown, gravelly SAND, some silt (FILL)		
	10		5D		10-12	24/14	WOH-2-1-1			10.0 Very loose, light brown to gray, gravelly medium to coarse SAND (FILL)		
70												
	15		6D		15-17	24/16	4-6-5-5	ID 33141G w =13.6 %		15.0 Geotextile Fabric in Wash		
										Medium dense, gray-brown, silty SAND, some gravel		
65												
										17.8 Probable Weathered BEDROCK		
										Refusal at 18.0 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 LOG

BORING NO.:	**B-403**
SHEET:	1 of 1
PROJECT NO.	25-0742
DATE START:	6/10/2025
DATE FINISH:	6/10/2025

CLIENT: Harriman
PROJECT: Proposed Maintenance Building
LOCATION: Maine Turnpike Authority Crosby Maintenance Facility, South Portland, Maine

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 76' +/- **TOTAL DEPTH (FT):** 17.3 **LOGGED BY:** Kyle Kaserman
DRILLING CO.: Seaboard Drilling **DRILLER:** Jeremy Adams **DRILLING METHOD:** Hollow Stem Augers
RIG TYPE: Track Mounted Diedrich D-50 **AUGER ID/OD:** 4 1/4 in / 7 5/8 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:**
HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 5 ft Soils saturated below 5' +/-
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: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/3	1-2-5-6			0.1 Grass / Topsoil (FILL)		
75										Loose, brown, SAND, some gravel, some silt, with asphalt pavement rubble (FILL)		
			2D		2-4	24/12	4-3-3-3			2.0 Loose, dark brown, silty SAND, some gravel (FILL)		
										2.7 Medium dense to dense, light brown, silty SAND, some gravel		
	5		3D		5-7	24/13	7-13-20-22				▽	
70												
	10		4D		10-12	24/10	16-17-13-14					
65												
	15		5D		15-17	24/9	9-7-3-1			15.0 Loose, light brown, fine SAND, some silt, trace gravel		
60										17.0 Probable Weathered BEDROCK		
										Refusal at 17.3 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 LOG

BORING NO.:	**B-404**
SHEET:	1 of 1
PROJECT NO.	25-0742
DATE START:	6/10/2025
DATE FINISH:	6/10/2025

CLIENT: Harriman
PROJECT: Proposed Maintenance Building
LOCATION: Maine Turnpike Authority Crosby Maintenance Facility, South Portland, Maine

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 74' +/- **TOTAL DEPTH (FT):** 8.2 **LOGGED BY:** Kyle Kaserman
DRILLING CO.: Seaboard Drilling **DRILLER:** Jeremy Adams **DRILLING METHOD:** Hollow Stem Auger
RIG TYPE: Track Mounted Diedrich D-50 **AUGER ID/OD:** 3 1/4 in / 6 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:**
HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 2 ft Soils saturated below 2' +/-
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: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/12	2-7-10-5			0.3 Vegetation / Topsoil (FILL)		
										Medium dense, ASPHALT PAVEMENT RUBBLE (FILL)		
			2D		2-4	24/8	1-1-1-3			2.0 Very loose, dark brown, silty SAND, trace gravel, with roots and organics	▽	
70										4.0 Very stiff to hard, gray, silty CLAY, with frequent sand seams		
	5		3D		5-7	24/24	4-5-6-8	q_P=3.5-8.5 ksf				
										7.5 Probable Weathered BEDROCK		

Refusal at 8.2 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 LOG

BORING NO.:	**B-405**
SHEET:	1 of 1
PROJECT NO.	25-0742
DATE START:	6/10/2025
DATE FINISH:	6/10/2025

CLIENT: Harriman
PROJECT: Proposed Maintenance Building
LOCATION: Maine Turnpike Authority Crosby Maintenance Facility, South Portland, Maine

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 81' +/- **TOTAL DEPTH (FT):** 22.7 **LOGGED BY:** Kyle Kaserman
DRILLING CO.: Seaboard Drilling **DRILLER:** Jeremy Adams **DRILLING METHOD:** Hollow Stem Auger
RIG TYPE: Track Mounted Diedrich D-50 **AUGER ID/OD:** 3 1/4 in / 6 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:**
HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 5 ft Soils saturated below 5' +/-
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: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/14	5-12-11-11			0.3 Grass / Topsoil (FILL)		
80										Medium dense to dense, ASPHALT PAVEMENT RUBBLE (FILL)		
			2D		2-4	24/12	21-40-8-3					
	5		3D		5-7	24/18	1-4-2-1			5.0 Loose, gray, silty CLAY, some sand, some gravel (FILL)	▽	
75										6.0 Loose, gray, SAND & GRAVEL, trace silt (FILL)		
										6.5 Loose, gray, sandy SILT, with root hairs		
	10		4D		10-12	24/24	4-5-8-11	q_P=4-9 ksf		10.0 Very stiff to hard, gray, clayey SILT, with frequent sand seams		
70												
	15		5D		15-17	24/24	5-6-5-3			15.3 Medium dense, light brown, silty SAND, some gravel, with occasional sandy silt layers		
65												
	20		6D		20-22	24/24	7-5-6-9					
60										22.3 Probable Weathered BEDROCK		
										Refusal at 22.7 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.

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:	½" 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

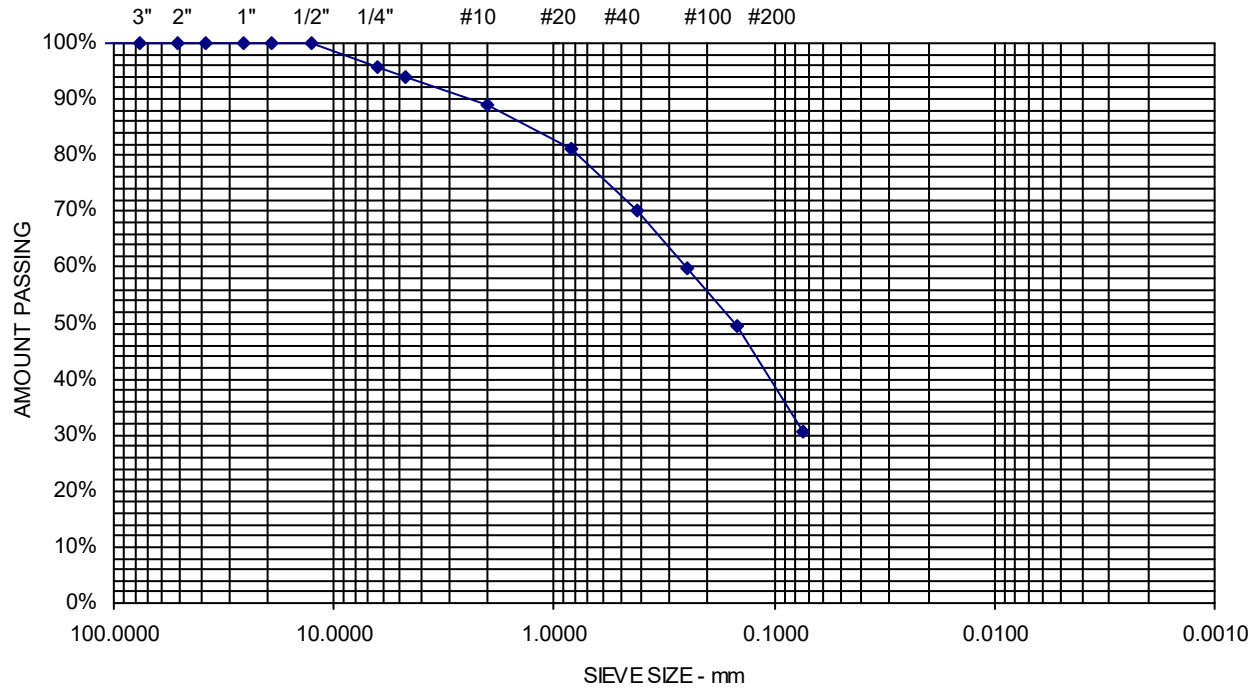
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	SOUTH PORTLAND ME - PROPOSED MTA CROSBY MAINTENANCE BUILDING - GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-0742
Client	HARRIMAN ASSOCIATES	Lab ID	33142G
		Date Received	6/12/2025
		Date Completed	6/17/2025
Material Source	**B-401, 4D, 15-17**	Tested By	LEAH YOUNGE

STANDARD DESIGNATION (mm/μm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
6.3 mm	**1/4"**	**96**	
4.75 mm	**No. 4**	**94**	5.9% Gravel
2.00 mm	**No. 10**	**89**	
850 um	**No. 20**	**81**	
425 um	**No. 40**	**70**	63.4% Sand
250 um	**No. 60**	**60**	
150 um	**No. 100**	**49**	
75 um	**No. 200**	**30.7**	30.7% Fines



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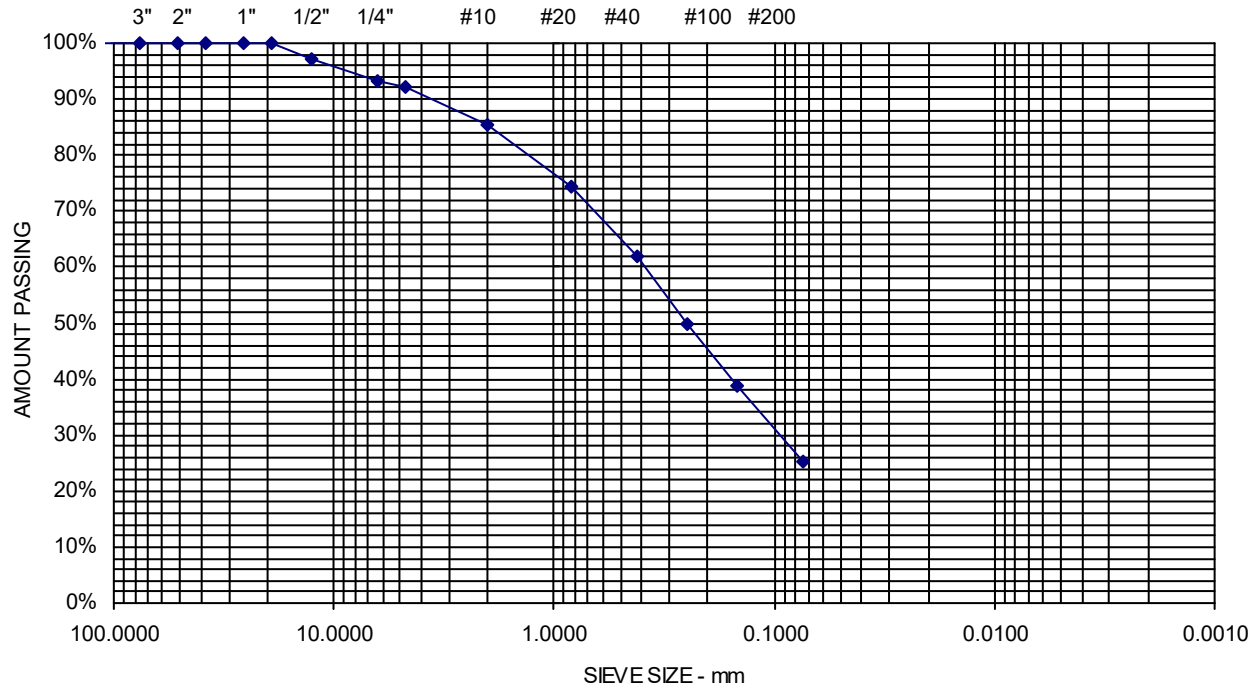
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	SOUTH PORTLAND ME - PROPOSED MTA CROSBY MAINTENANCE BUILDING - GEOTECHNICAL ENGINEERING SERVICES	Project Number	25-0742
Client	HARRIMAN ASSOCIATES	Lab ID	33141G
		Date Received	6/12/2025
		Date Completed	6/17/2025
Material Source	**B-402, 6D, 15-17**	Tested By	LEAH YOUNGE

STANDARD DESIGNATION (mm/μm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**97**	
6.3 mm	**1/4"**	**93**	
4.75 mm	**No. 4**	**92**	7.8% Gravel
2.00 mm	**No. 10**	**85**	
850 um	**No. 20**	**74**	
425 um	**No. 40**	**62**	66.9% Sand
250 um	**No. 60**	**50**	
150 um	**No. 100**	**39**	
75 um	**No. 200**	**25.2**	25.2% Fines



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