Section J

Stormwater Management Report

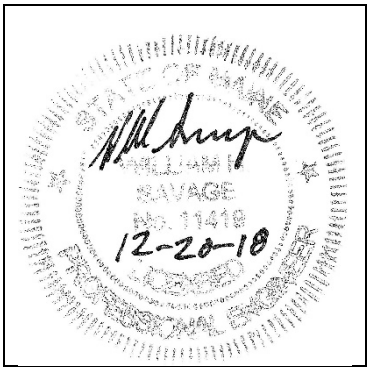
J. STORMWATER MANAGEMENT REPORT

Prepared For:

Project Management, Inc.
225 Commercial Street, Suite 502
Portland, Maine 04101

Prepared By:

Acorn Engineering, Inc.
65 Hanover Street
Portland, Maine 04101



January 2019

INTRODUCTION

Acorn Engineering, Inc. has been retained by Project Management, Inc. to provide civil engineering services for the proposed redevelopment of 121 Cassidy Point Drive. The project proposes to demolish the existing, 2-story wood-framed building and construct a new, 4-story building designed as "maker space" in which crafters and tradespeople can rent within a low impact industrial conditional use, as specified in Sec. 14-319 of the City of Portland Chapter 14 – Land Use.

A stormwater analysis has been prepared to demonstrate that the project will meet the following requirements of the City of Portland (the City):

- City of Portland Land Use Ordinance Chapter 14, Article V. Site Plan Section 14-523. Required Approvals and Applicability (E) Level II Site Plan Review.
- City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards and Maine DEP Chapter 500 Stormwater Management.

The proposed project is expected to decrease the impervious area by approximately 682 square feet. The increased landscaping will help retain and filter stormwater on site, reducing the demand on the City's storm system.

EXISTING CONDITIONS

The proposed project is located at 121 Cassidy Point Drive. A boundary plan has been prepared by Owen Haskell, Inc. of Falmouth, Maine dated October 29, 2018.

The site and its abutters reside within the Waterfront Port Development Zone. The majority (approximately 83.4%) of the site is impervious in the form of gravel, pavement or roof cover.

The project team is not aware of the presence of any existing significant natural features located on the site. Given the urban setting, and existing impervious surfaces, a field inventory of significant natural feature was not undertaken. The project is not located within a watershed classified as an Urban Impaired Stream.

PROPOSED DEVELOPMENT

The proposed project is a four-story building with a small industrial/light manufacturing designation. Pedestrian access to the site will be provided via concrete walkways on the northern side of Cassidy Point Drive. The development will be served by Portland Water District, Department of Public Works (sewer and storm), Unitil (natural gas), CMP (electric), Charter (cable), and Consolidated (telephone). Sewer, storm and natural gas utilities will be routed underground. Telephone, cable and electric will be routed on overhead lines.

Due to the creation of less than 1,000 square feet of impervious area, stormwater management features for quality control that meet Maine DEP's Chapter 500 General Standards are not required and have not been designed. However, the proposed vegetation will provide quality and quantity control where none existed previously.

Furthermore, the total impervious area proposed is expected to decrease the impervious area by approximately 682 square feet, which is well under the 5,000 square-foot increase threshold. Please refer to the attached exhibits that display the existing and proposed impervious covers.

In addition to the vegetation, stormwater will be managed by implementing a series of foundation drains, catch basins, and storm drains. Please refer to Sheet C-30 for more information.

SOILS

Onsite soil information has been gathered from the following resources:

- United States Department of Agriculture (USDA) Web Soil Survey (WSS)
- Explorations and Geotechnical Engineering Services Report prepared by S.W. Cole Engineering, Inc.

As a Level II, Site Plan Application, the proposed project isn't required to submit soil surveys, per "Section 7 Soil Survey" of the City of Portland Technical Manual. However, a geotechnical investigation was performed at the site on 10/3/18 by S.W. Cole Engineering, Inc.

The area within and surrounding the project includes soil types listed in Table 1 below. The susceptibility of soils to erosion is indicated on a relative "Kf" scale of values over a range of 0.02 to 0.69. Higher "Kf" values indicate more erodible soils. The Kf value listed was derived from the Revised Universal Soil Loss Equation Version 2 (RUSLE2), identified in the USDA's WSS (Attachment 3). The Soil Types were derived from the Explorations and Geotechnical Engineering Services Report (Attachment 4).

Table 1

Soils Type	Depth (feet)	Kf Value
Fill	1 - 5	0.2
Marine Sands	20 – 30	-

The "Kf" value for the soil, listed above, shows a low susceptibility to erosion; however, the implementation of the proposed Erosion & Sedimentation Measures by the contractor will be of the utmost importance given the steep slopes on site.

Conclusion

The proposed redevelopment was designed to meet the requirements set forth in "Section 5 -Portland Stormwater Management Standards" in the City of Portland Technical Manual. The proposed project as designed is anticipated to largely maintain existing drainage patterns while decreasing the overall volume and flowrate of stormwater runoff through the addition of foundation drains, vegetation, etc. The project will not cause flooding or erosion problems within the subject site, abutters' sites, nor within the right-of-way.

Attachments

Exhibit 1: Existing Impervious Cover
Exhibit 2: Proposed Impervious Cover
Exhibit 3: United States Department of Agriculture Web Soil Survey
Exhibit 4: Explorations and Geotechnical Engineering Services Report

Exhibit 1

Existing Impervious Cover

IMPERVIOUS COVER WITHIN PROPERTY

STYLE	LOCATION	EXISTING (SF)
	GRAVEL	2,291
	ROOF	7,320
	BRICK WALKWAY	63
	PAVEMENT	10,082
	CONCRETE	1,128
	TOTAL COVER	20,885
	% IMPERVIOUS	**83.4%**

20 0 20 40

SCALE: 1" = 40'

PERMIT LEVEL
NOT FOR CONSTRUCTION

DRAWING NO.
EX–1

FILE:	1113_CIVIL
DATE:	12/5/18
JN:	1113
SCALE:	AS NOTED
DESIGN BY:	FRT
DRAWN BY:	FRT
CHECKED BY:	WHS

ACORN ENGINEERING, INC
ACORN ENGINEERING, INC. P.O. BOX 3372
PORTLAND, MAINE 04104 (207) 775–2655

DRAWING NAME:
EXISTING IMPERVIOUS COVER

PROJECT NAME:
121 CASSIDY POINT DRIVE

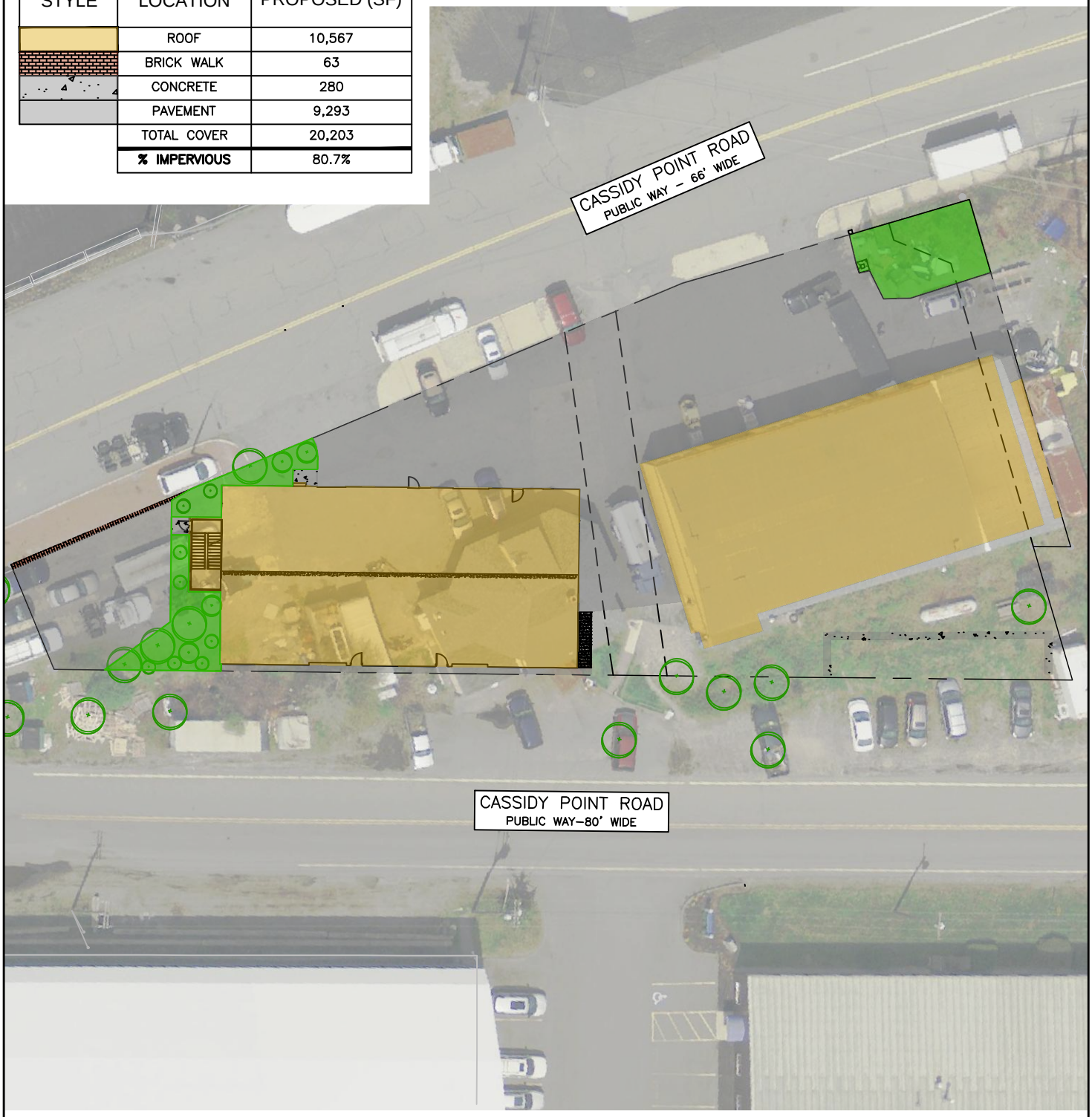
CLIENT:
PROJECT MANAGEMENT, INC.

ISSUED FOR	BY / DATE
LEVEL II SITE PLAN	WHS 12/13/18
LEVEL II SITE PLAN	WHS 1/2/19

Exhibit 2

Proposed Impervious Cover

IMPERVIOUS COVER WITHIN PROPERTY		
STYLE	LOCATION	PROPOSED (SF)
	ROOF	10,567
	BRICK WALK	63
	CONCRETE	280
	PAVEMENT	9,293
	TOTAL COVER	20,203
	% IMPERVIOUS	80.7%



20 0 20 40

SCALE: 1" = 40'

PERMIT LEVEL
NOT FOR CONSTRUCTION

DRAWING NO.
EX–2

FILE:	1113_CIVIL
DATE:	12/5/18
JN:	1113
SCALE:	AS NOTED
DESIGN BY:	FRT
DRAWN BY:	FRT
CHECKED BY:	WHS

ACORN ENGINEERING, INC
ACORN ENGINEERING, INC. P.O. BOX 3372
PORTLAND, MAINE 04104 (207) 775–2655

DRAWING NAME:
PROPOSED IMPERVIOUS COVER

PROJECT NAME:
121 CASSIDY POINT DRIVE

CLIENT:
PROJECT MANAGEMENT, INC.

ISSUED FOR	BY / DATE
LEVEL II SITE PLAN	WHS 12/13/18
LEVEL II SITE PLAN	WHS 1/2/19

Exhibit 3

United States Department of Agriculture Web Soil Survey

Map Scale: 1:1,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 15, Sep 6, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cu	Cut and fill land	2.3	100.0%
Totals for Area of Interest		**2.3**	**100.0%**

Cumberland County and Part of Oxford County, Maine

Cu—Cut and fill land

Map Unit Composition

Cut and fill land: 90 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cut And Fill Land

Typical profile

H1 - 0 to 65 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 35 percent

Natural drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)

Depth to water table: About 24 to 42 inches

Available water storage in profile: Moderate (about 6.6 inches)

Data Source Information

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 15, Sep 6, 2018

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic surface layer. .

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed. Organic surface horizons are not displayed.

RUSLE2 Related Attributes–Cumberland County and Part of Oxford County, Maine

Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
Cu—Cut and fill land								
Cut and fill land	90	—	—	.20	—	68.2	23.8	8.0

Data Source Information

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 15, Sep 6, 2018

Exhibit 4

Explorations and Geotechnical Engineering Services Report

REPORT

18-0851 S

October 3, 2018

Explorations and Geotechnical Engineering Services

Proposed Pre-Engineered Metal Building
121 Cassidy Point Road
Portland, Maine

Prepared For:
Project Management, Inc.
Attention: Cyrus Y. Hagge
225 Commercial Street, Suite 502
Portland, Maine 04101

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

S.W.COLE ENGINEERING, INC.

- *Geotechnical Engineering*
- *Construction Materials Testing and Special Inspections*
- *GeoEnvironmental Services*
- *Test Boring Explorations*

www.swcole.com

TABLE OF CONTENTS

18-0851 S

October 3, 2018

Project Management, Inc.
Attention: Cyrus Y. Hagge
225 Commercial Street, Suite 502
Portland, Maine 04101

Subject: Explorations and Geotechnical Engineering Services
Proposed Pre-Engineered Metal Building
121 Cassidy Point Road
Portland, Maine

Dear Cyrus:

In accordance with our Proposal, dated July 2, 2018, 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 one day of 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 121 Cassidy Point Road in Portland, Maine and is currently occupied by a wood-framed commercial building and paved and unpaved parking and vehicle storage areas. The existing building has a walk-out basement on the south side. The majority of the site to the north is relatively flat, but slopes down steeply about 9 feet in elevation towards the road to the south. An underground electric utility

easement bounds the eastern side of the proposed redevelopment area. We understand past site uses included a gas filling station with underground tanks and an on-site septic and leachfield system.

We understand development plans call for razing the existing commercial building and constructing a new pre-engineered metal building. We understand the building will occupy a plan area of 8,000 square feet and will have a walk-out basement level cut into the existing slope on the southern half. We anticipate an upper finish floor elevation of approximately 25 feet (project datum) and finish basement elevation of approximately 17 feet, requiring tapered cuts approaching 9 feet. Proposed structural loads are not available at this time. We understand the building will be utilized for artist studios and light commercial space.

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-101 through B-105) were made at the site on August 21, 2018 by S. W. Cole Explorations, LLC. The exploration locations were selected and established in the field by S. W. Cole Engineering, Inc. (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 Testing

The test borings were drilled using hollow-stem auger boring methods. 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.

Soil samples obtained from the explorations were returned to our laboratory for further classification and testing. Moisture content test results are noted on the logs. Grain size analysis results are attached in Appendix D.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock

The borings encountered a subsurface profile generally consisting of fill overlying marine sands, overlying glaciomarine silts and clays and relic bay mud. The principal soils encountered at the explorations are summarized below. Not all the strata were encountered at each exploration; refer to the attached logs for more detailed subsurface information.

Fill: The borings encountered about 1.5 to 5 feet of fill consisting of loose to medium dense, brown, gray and black sand with varying portions of silt and gravel.

Marine Sands: Underlying the fill, the borings encountered a marine deposit of loose to medium dense, brown and gray-brown sand with varying portions of silt and gravel to depths of 20 to 30 feet.

Glaciomarine Silts and Clays: Underlying the marine sands, the borings encountered stiff to medium, gray, silty clay and clayey silt at depths varying from approximately 20 to 30 feet below the ground surface (approximate elevations 5 to -5 feet). Borings B-102 through B-105 were terminated in this deposit at depths of 22 to 32 feet.

Relic Bay Mud: Boring B-101 encountered relic bay mud consisting of stiff to medium, gray and black, clay and silt and clayey silt with sand layers at a depth of approximately 25 feet. The boring was terminated in the relic bay mud at a depth of 27 feet.

3.2 Groundwater

Saturated soils were encountered at depths varying from 4 to 15 feet (approximate elevation 10 to 12 feet) at the borings, being shallower on the lower (south) side of the site. Groundwater is likely tidally influenced and likely becomes perched on the relatively impervious silts and clays encountered at 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. The principle geotechnical considerations include:

- Spread footing foundations, an upper level slab-on-grade, and a basement floor slab bearing on properly prepared subgrades, as recommended herein, appear suitable for the proposed building.

- The existing fills, organics, pavement, utilities, foundations, and structures are unsuitable for support of the proposed building foundations and floor slabs and should be removed and replaced beneath the entire building footprint. Backfilled prior tank graves and septic systems should also be removed and replaced beneath the entire building footprint.

- Groundwater will be encountered during construction, particularly for excavation of the basement level foundations. We recommend the basement level footings bear on a layer of Crushed Stone wrapped in geotexilte fabric to improve bearing conditions, as well as to provide a working mat for foundation construction and construction dewatering. The contractor should be prepared to sump and pump to dewater excavations.

- The contractor should be prepared to shore excavations and underpin as needed to support and preclude undermining the adjacent road, structures, underground electric duct bank and other utilities.

- Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Excavation of bearing surfaces should be completed with a smooth-edged bucket to lessen subgrade disturbance.

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 pavement, organics, roots and topsoil should be completely removed from areas of proposed 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 site has prior and current development. We understand past site uses included a gas filling station with underground tanks and a septic and leachfield system. Fills were encountered at the borings extending to depths varying from about 1.5 to 5 feet. Existing fills, tank backfill, septic system backfill, organics, pavement, utilities, foundations, structures and tanks must be completely removed from beneath the proposed building. The extent of removal should extend 1 foot laterally outward from outside edge of perimeter footings for every 1-foot of excavation depth (1H:1V bearing splay) below perimeter footing bearing elevation.

We recommend that final cut to foundation and slab subgrades be made using a smooth-edged bucket. Footings should be underlain by at least 12 inches of Crushed Stone wrapped in non-woven geotextile filter fabric, such as Mirafi 180N or equivalent. The upper (northern) slab-on-grade should be underlain with at least 12 inches of compacted Structural Fill. The lower (southern) basement floor slab should be underlain with at least 8 inches of compacted Crushed Stone

Overexcavations above ground water should be backfilled with compacted Structural Fill. Overexcavations below ground water should be backfilled with Compacted Crushed Stone wrapped in geotextile filter fabric, such as Mirafi 180N, or Underdrain Sand.

4.3 Excavation and Dewatering

Excavation work will generally encounter existing fills and marine sands. Care must be exercised during construction to limit disturbance of the bearing soils. Earthwork and grading activities should ideally occur during drier, non-freezing weather of Spring, Summer and Fall. Rubber tired construction equipment should not operate directly on saturated subgrade soils. Final cuts to subgrade should be performed with a smooth-edged bucket to help reduce strength loss from soil disturbance.

Groundwater will be encountered during construction, particularly for excavation of the basement level and southern perimeter foundations. Sumping and pumping dewatering techniques should be adequate to control groundwater in excavations. The fabric wrapped Crushed Stone layer recommended below footings will provide a media from which to sump and pump for construction dewatering. 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 roads, structures, underground electric duct bank and other utilities. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor.

4.4 Foundations

We recommend the proposed buildings be supported on spread footings founded on at least 12-inches of Crushed Stone fully wrapped in non-woven geotextile fabric, such as Mirafi 180N, bearing on properly prepared subgrades as recommended herein. 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	2.0 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	E (IBC 2015)
Estimated Total Settlement	1-inch
Differential Settlement	½-inch

4.5 Foundation Drainage

We recommend an underdrain system be installed on the outside edge of the geotextile fabric wrapped Crushed Stone layer recommended below the southern perimeter wall footing of the basement level, where footings are expected to be deepest. The underdrain pipe should consist of 4-inch diameter, perforated SDR-35 foundation drain pipe 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 and Basement Slab

On-grade floor slabs in heated areas may be designed using a subgrade reaction modulus of 100 pci (pounds per cubic inch). The upper (northern) on-grade floor slab should be underlain by at least 12-inches of compacted Structural Fill placed over properly prepared subgrades. The lower (southern) basement floor slab should be underlain with at least 8-inches of Crushed Stone. The structural engineer or concrete consultant must design steel reinforcing and joint spacing appropriate to slab thickness and function.

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 width of the entrance slab and outward at least 4.5 feet, 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:

Structural Fill: Fill to raise grades beneath the building, backfill for overexcavations above groundwater, backfill for foundations, slab-on-grade base material and material below exterior entrance 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 footings, as backfill for overexcavations below groundwater, and base material beneath the basement floor slab and for underdrain aggregate should be washed ¾-inch crushed stone meeting the requirements of 2014 MaineDOT Standard Specification 703.22 Underdrain Backfill Material Type C.

Underdrain Sand: As an alternative to geotextile wrapped Crushed Stone, backfill for overexcavations beneath the groundwater table may consist clean, free-draining sand meeting the requirements of 2014 MaineDOT Standard Specification 703.22 Underdrain Backfill Material Type B.

Reuse of Site Soils: The on-site soils are unsuitable for reuse in building areas, but may be suitable for reuse as Common Borrow in paved and landscape areas, provided they are at a compactable moisture content at the time of reuse.

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 and foundation recommendations have been properly interpreted and implemented.

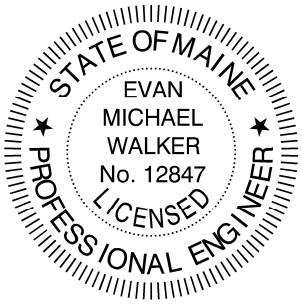
A soils and concrete testing program should be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to observe earthwork activities, the preparation of foundation bearing surfaces and pavement subgrades, as well as to provide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

EMW:tjb

APPENDIX A
Limitations

This report has been prepared for the exclusive use of Project Management, Inc. for specific application to the proposed Pre-Engineered Metal Building at 121 Cassidy Point Road in 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.

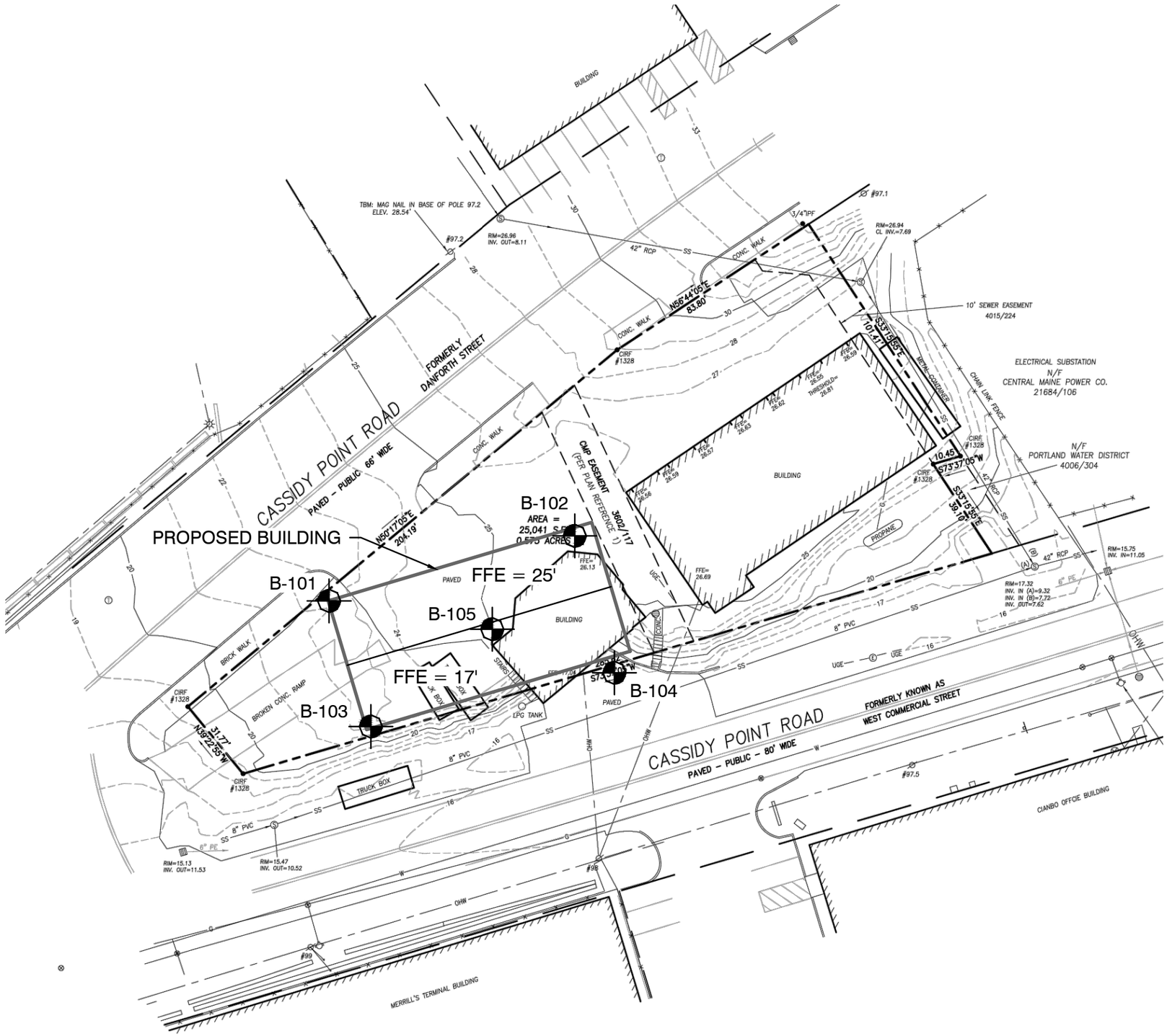
Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

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"=30' SCALE PLAN OF THE SITE ENTITLED "TOPOGRAPHIC SURVEY," PREPARED BY OWEN HASKELL, INC., DATED 5/17/2018 AND PROVIDED AS A PORTABLE DOCUMENT FORMAT (PDF) FILE.
2. PROPOSED BUILDING OVERLAID FROM A PROPOSED SITE PLAN PROVIDED BY PROJECT MANAGEMENT, INC.
3. THE BORINGS WERE LOCATED IN THE FIELD BY TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
4. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
5. 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 40 80 Feet

S.W.COLE ENGINEERING, INC.

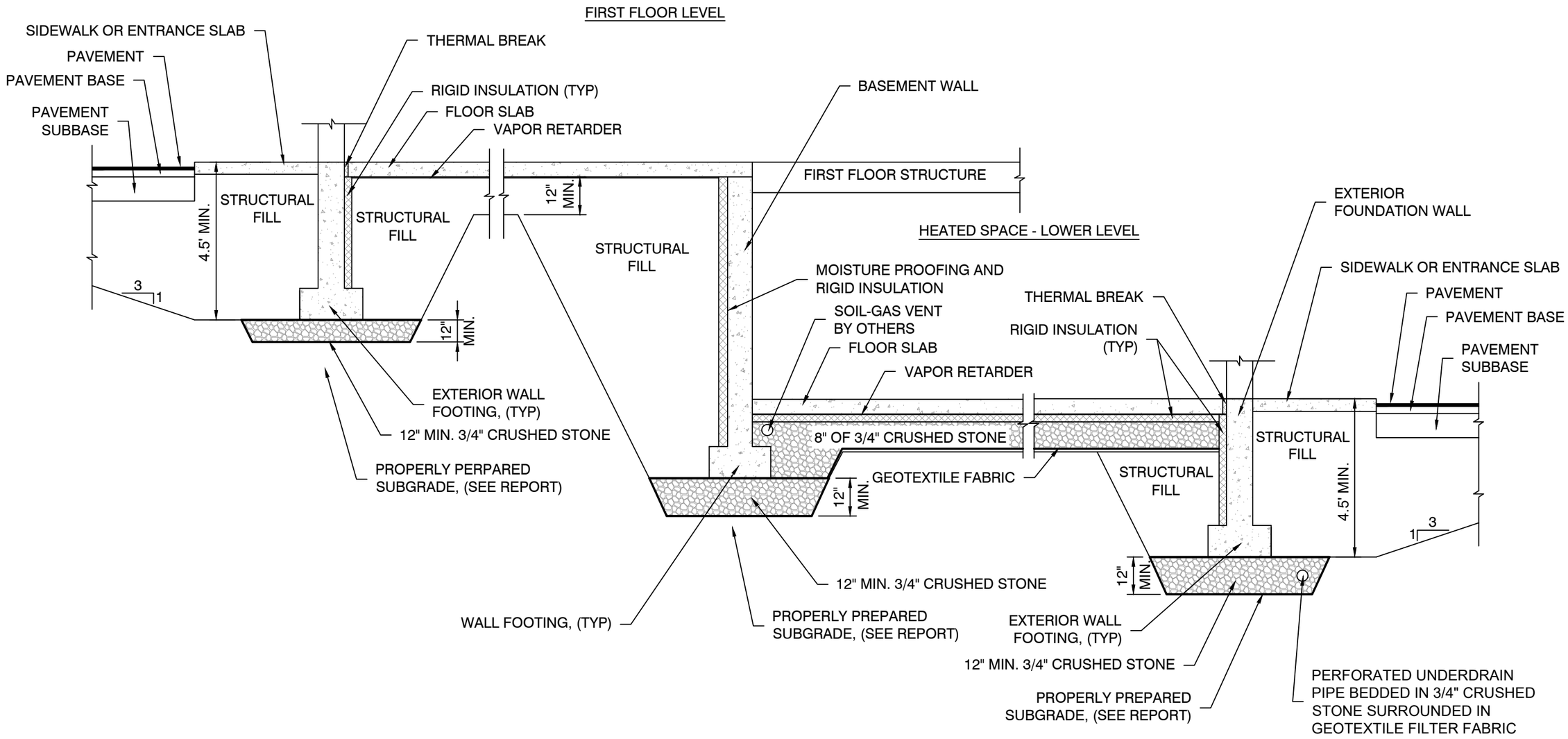
PROJECT MANAGEMENT, INC.

EXPLORATION LOCATION PLAN

PROPOSED PRE-ENGINEERED METAL BUILDING
121 CASSIDY POINT ROAD
PORTLAND, MAINE

Job No.:	18-0851	Scale:	1" = 40'
Date :	10/01/2018	Sheet:	1

R:\2018\18-0851\CAD\Drawings\18-0851 ELP.dwg, 10/1/2018 12:04:26 PM, 1:1, CEM, S. W. Cole Engineering, Inc.



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.

PROJECT MANAGEMENT, INC.

FOUNDATION DETAIL SKETCH

PROPOSED PRE-ENGINEERED METAL BUILDING
121 CASSIDY POINT ROAD
PORTLAND, MAINE

Job No.:	18-0851	Scale:	Not to Scale
Date :	10/01/2018	Sheet:	2

APPENDIX C

Exploration Logs and Key

BORING LOG

CLIENT: Project Management, Inc.
PROJECT: Proposed Pre-Engineered Metal Building
LOCATION: 121 Cassidy Point Drive, Portland, Maine

BORING NO.: B-101
SHEET: 1 of 1
PROJECT NO. 18-0851
DATE START: 8/21/2018
DATE FINISH: 8/21/2018

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 22' +/-
TOTAL DEPTH (FT): 27.0
LOGGED BY: Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Jeff Lee
DRILLING METHOD: Hollow Stem Auger
RIG TYPE: Track Mounted CME 850
AUGER ID/OD: 2 1/4 in / 5 5/8 in
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic
HAMMER WEIGHT (lbs): 140
CASING ID/OD: N/A /N/A
CORE BARREL:
HAMMER EFFICIENCY FACTOR: 0.75
HAMMER DROP (inch): 30
WATER LEVEL DEPTHS (ft): ▽ 10 ft Soils Damp Below 5', Saturated Below 10' +/-
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.; 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_2O Depth	Remarks
20			1D		0-2	24/5	6-6-6-6			Medium dense, dark brown and black, silty gravelly SAND, trace rootlets (Fill)		
			2D		2-4	24/4	6-5-5-5					
	5									3.5 Loose to medium dense, brown, fine to medium SAND, trace silt		
			3D		5-7	24/20	3-4-4-6					
15										Cobble/Gravel Layer at 8' +/-		
	10		4D		10-12	24/18	4-4-5-7			10.0 Loose to medium dense, gray-brown with orange staining, silty fine to medium SAND	▽	
10												
	15		5D		15-17	24/20	4-4-3-4			15.0 Loose, brown with orange staining, silty fine to medium SAND, with occasional clayey silt layers		
5												
	20		6D		20-22	24/22	WOH-1-2-2			20.0 Stiff to medium, gray silty CLAY, some fine sand, with frequent sand seams and layers		
0												
	25		7D		25-27	24/24	WOH-3			25.0 Stiff to medium gray with black layering, CLAY and SILT to clayey SILT, with frequent sand layers (Relic Bay Mud)		
-5										Bottom of Exploration at 27.0 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

CLIENT:	Project Management, Inc.
PROJECT:	Proposed Pre-Engineered Metal Building
LOCATION:	121 Cassidy Point Drive, Portland, Maine

BORING NO.:	**B-102**
SHEET:	1 of 1
PROJECT NO.	18-0851
DATE START:	8/21/2018
DATE FINISH:	8/21/2018

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 25.5' +/- **TOTAL DEPTH (FT):** 22.0 **LOGGED BY:** Evan Walker

DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Jeff Lee **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Track Mounted CME 850 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:**

HAMMER EFFICIENCY FACTOR: 0.75 **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 13 ft Soils Damp to Moist Below 6', Saturated Below 13' +/-

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.; 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
25			1D		0.5-2.5	24/10	8-4-3-3			0.2 Asphalt Pavement Loose, brown, gravelly SAND, some silt (Fill)		
			2D		2.5-4.5	24/8	3-4-6-6			2.5 Loose to medium dense, brown and orange-brown, silty fine to medium SAND (Possible Fill)		
20	5		3D		5-7	24/18	11-21-17-14			4.0 Dense, brown, SAND and GRAVEL, some silt		
15	10		4D		10-12	24/18	5-7-8-8			10.0 Medium dense to loose, brown, fine to medium SAND, some silt Some gravel 11.5' to 12'	▽	
10	15		5D		15-17	24/18	3-7-8-6					
5	20		6D		20-22	24/18	3-4-2-2	q_P=1 to 1.5 ksf		21.0 Stiff, gray, silty CLAY		

Bottom of Exploration at 22.0 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

CLIENT: Project Management, Inc.
PROJECT: Proposed Pre-Engineered Metal Building
LOCATION: 121 Cassidy Point Drive, Portland, Maine

BORING NO.: B-103
SHEET: 1 of 1
PROJECT NO. 18-0851
DATE START: 8/21/2018
DATE FINISH: 8/21/2018

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 22' +/-
TOTAL DEPTH (FT): 27.0
LOGGED BY: Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Jeff Lee
DRILLING METHOD: Hollow Stem Auger
RIG TYPE: Track Mounted CME 850
AUGER ID/OD: 2 1/4 in / 5 5/8 in
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic
HAMMER WEIGHT (lbs): 140
CASING ID/OD: N/A /N/A
CORE BARREL:
HAMMER EFFICIENCY FACTOR: 0.75
HAMMER DROP (inch): 30
WATER LEVEL DEPTHS (ft): ▽ 10 ft Soils Moist Below 5', Saturated Below 10' +/-
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.; 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_2O Depth	Remarks
			1D		0-2	24/16	2-2-3-7			Vegetation / Loose dark brown and black silty SAND (Fill)		
20			2D		2-4	24/18	8-10-10-10			1.5 Medium dense, light brown with orange staining, silty fine to medium SAND		
	5		3D		5-7	24/14	4-7-10-10			5.0 Medium dense, rust-brown, fine to medium SAND, some silt, trace gravel		
15												
	10		4D		10-12	24/15	5-7-10-10			10.0 Medium dense, brown, fine to medium SAND, trace silt	▽	
10												
	15		5D		15-17	24/20	4-4-3-2			15.0 Loose, gray-brown, silty fine to medium SAND, with frequent clayey silt seams and layers		
5												
	20		6D		20-22	24/24	WOH-1	q_P=0.5 to 1 ksf		20.0 Loose, layered, gray clayey SILT, silty CLAY, and silty SAND		
0												
	25		7D		25-27	24/20	WOH-1-2					
-5										Bottom of Exploration at 27.0 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

CLIENT:	Project Management, Inc.
PROJECT:	Proposed Pre-Engineered Metal Building
LOCATION:	121 Cassidy Point Drive, Portland, Maine

BORING NO.:	**B-104**
SHEET:	1 of 1
PROJECT NO.	18-0851
DATE START:	8/21/2018
DATE FINISH:	8/21/2018

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 16.5' +/- **TOTAL DEPTH (FT):** 27.0 **LOGGED BY:** Evan Walker

DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Jeff Lee **DRILLING METHOD:** Hollow Stem Auger

RIG TYPE: Track Mounted CME 850 **AUGER ID/OD:** 2 1/4 in / 5 5/8 in **SAMPLER:** Standard Split-Spoon

HAMMER TYPE: Automatic **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:**

HAMMER EFFICIENCY FACTOR: 0.75 **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▽ 4.5 ft Soils Moist to Wet Below 2.5', Saturated Below 4.5' +/-

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.; 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
15			1D		0.5-2.5	24/4	4-3-3-2			0.2 Asphalt Pavement Loose, gray-brown, silty gravelly SAND (Fill)		
			2D		2.5-4.5	24/4	4-5-5-5			2.0 Loose to medium dense, dark gray and black, silty SAND, some gravel (Fill)	▽	
10	5		3D		5-7	24/14	2-3-3-5			5.0 Loose, gray-brown, fine to medium SAND, some silt		
5	10		4D		10-12	24/18	2-3-3-4			10.0 Loose, gray-brown SAND, trace silt, trace gravel		
0	15		5D		15-17	24/18	6-6-5-6			15.0 Medium dense, brown, SAND, trace silt, trace gravel, with occasional clayey silt seams Gravelly Layer at 18		
-5	20		6D		20-22	24/20	3-2-2-3			20.0 Loose, brown, fine to medium SAND, trace silt		
-10	25		7D		25-27	24/22	4-5-5-5			24.0 Stiff, gray, silty CLAY, with occasional sand seams		

Bottom of Exploration at 27.0 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

S.W.COLE ENGINEERING, INC.

CLIENT: Project Management, Inc.
PROJECT: Proposed Pre-Engineered Metal Building
LOCATION: 121 Cassidy Point Drive, Portland, Maine

BORING NO.: B-105
SHEET: 1 of 1
PROJECT NO. 18-0851
DATE START: 8/21/2018
DATE FINISH: 8/21/2018

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 25' +/- | **TOTAL DEPTH (FT):** 32.0 | **LOGGED BY:** Evan Walker
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Jeff Lee | **DRILLING METHOD:** Hollow Stem Auger
RIG TYPE: Track Mounted CME 850 | **AUGER ID/OD:** 2 1/4 in / 5 5/8 in | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 | **CASING ID/OD:** N/A /N/A | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: 0.75 | **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▽ 15 ft Soils Damp Below 5', Saturated Below 15' +/-
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.; 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_2O Depth	Remarks
			1D		0.5-2.5	24/4	5-3-2-1			0.1 Asphalt Pavement Loose, black and brown, silty SAND, some gravel (Fill)		
			2D		2.5-4.5	24/4	1-2-2-4					
20	5		3D		5-7	24/16	5-6-11-19			4.0 Medium dense, brown, silty fine SAND Cobble/Gravel Layer at 8' +/-		
15	10		4D		10-12	24/2	8-12-12-11			10.0 Medium dense, gray-brown, silty SAND		
10	15		5D		15-17	24/16	5-7-6-9			15.0 Medium dense, brown, fine to medium SAND, some silt	▽	
5	20		6D		20-22	24/16	4-4-5-6			20.0 Loose, gray, silty fine to medium SAND, with silt and silty clay layers		
0	25		7D		25-27	24/20	1-2-2-1	q_P=0.5 to 1 ksf				
-5	30		8D		30-32	24/24	WOH-2-3	q_P=0.5 ksf		30.0 Stiff to medium, gray, silty CLAY with frequent sand seams and layers		

Bottom of Exploration at 32.0 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.

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

KEY TO THE NOTES & SYMBOLS
Test Boring and Test Pit Explorations

All 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+%

Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to ½" 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

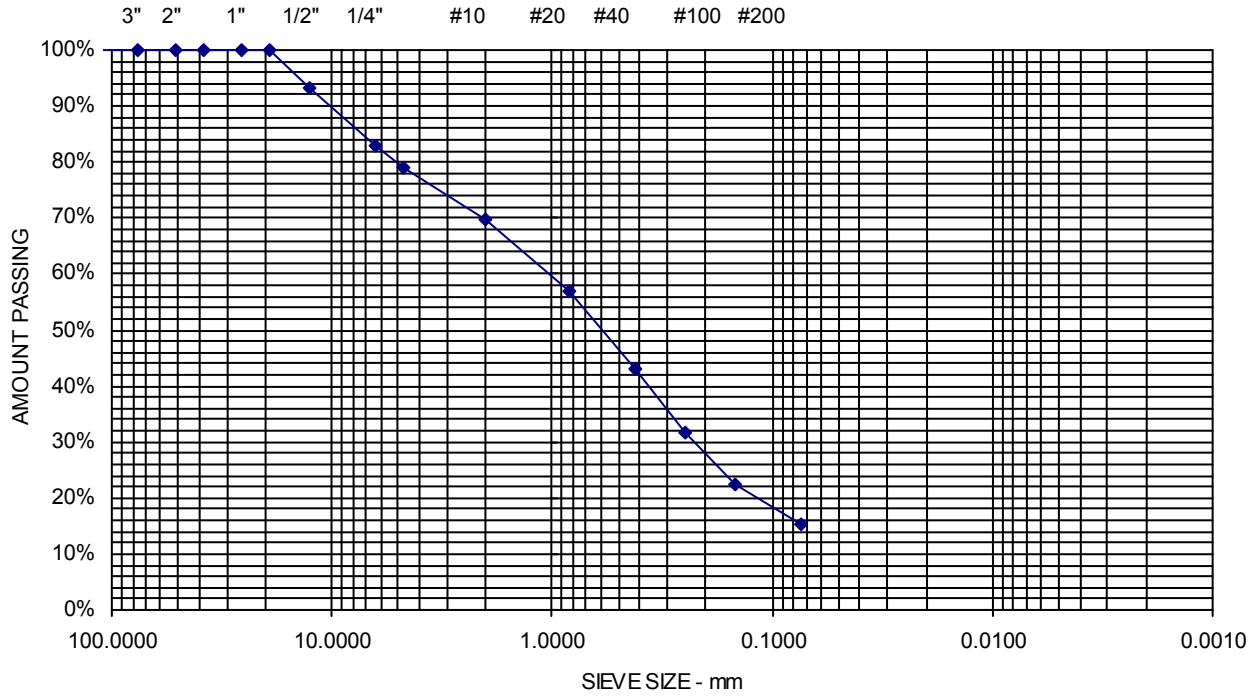
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND ME - PROPOSED PRE-ENGINEERED METAL BUILDING - GEOTECHNICAL ENGINEERING SERVICES	Project Number	18-0851
Client	PROJECT MANAGEMENT, INC.	Lab ID	24433G
		Date Received	9/28/2018
		Date Completed	10/2/2018
Material Source	**B102 1D .5-2.5'**	Tested By	PAUL SHAFFER

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"**	**93**	
6.3 mm	**1/4"**	**83**	
4.75 mm	**No. 4**	**79**	20.9% Gravel
2.00 mm	**No. 10**	**70**	
850 um	**No. 20**	**57**	
425 um	**No. 40**	**43**	63.9% Sand
250 um	**No. 60**	**32**	
150 um	**No. 100**	**23**	
75 um	**No. 200**	**15.1**	15.1% Fines



Comments:

Sheet