KENNEBUNK SERVICE PLAZAS NORTHBOUND AND SOUTHBOUND PARKING EXPANSION

Kennebunk, Maine

Final Geotechnical Design Report

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PREPARED FOR

The Maine Turnpike 2360 Congress Street Portland, ME 04102

PREPARED BY

HNTB Corporation

9 Entin Road, Suite 202 Parsippany, NJ 07054 Phone: (973) 434-3100



GEOTECHNICAL DESIGN REPORT KENNEBUNK SERVICE PLAZAS – NORTHBOUND AND SOUTHBOUND PARKING EXPANSION KENNEBUNK, MAINE Contract ID: 2019.02 MM 25.5

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1.0 PROJECT DESCRIPTION AND SCOPE

1.1 Introduction

The Kennebunk Service Plaza, located at Mile 25.5 of Interstate 95 (I-95) in Kennebunk, Maine, has insufficient truck parking capacity given the plaza serves as a vital staging point for deliveries to and from Southern Maine. A project location map is provided as **Figure** 1. The service plaza consists of a Northbound (NB) Plaza located adjacent to the mainline to the east and a Southbound (SB) Plaza located adjacent to the mainline to the west. For both the NB and SB Plazas, the expansion includes separating truck and passenger car parking and expands the capacity for both.

The project involves reconfiguring the parking lot and adding more truck spaces in order to improve capacity. To do so will require widening of the existing pavement. Work will also include lengthening the NB acceleration lane and the SB deceleration lanes as well as reconfiguration of the access road. Three proposed areas require an increase in grade which will be accomplished by the placement of fill material.

1.2 Scope of Services

In completing this evaluation, HNTB has performed the following scope of services:

- Reviewed available geotechnical data for the project site.
- Implemented a subsurface investigation including a geotechnical boring and laboratory testing program.
- Analyzed the resulting data collected to identify subsurface conditions that impact the design and construction of the project.
- Established geotechnical engineering design parameters based on the available borings.
- Conducted geotechnical analyses and provided recommendations for design of plaza expansions.

1.3 Proposed Improvements Necessitating Geotechnical Assessment

The NB Plaza improvements include the expansion of the existing southern parking area by placing up to 9 feet of new fill to expand the existing parking lot embankment. The northern parking area will be expanded, and the northbound acceleration lane will be lengthened and shifted north to accommodate the parking expansion and will require approximately 3 to 4 feet of new fill to be placed adjacent to existing wetlands.

The SB Plaza improvements include the expansion of the existing southern parking area at grade, as well as the expansion of the existing northern parking area by placing approximately 2 to 4 feet of new fill. The southbound exit ramp will be lengthened and shifted north to accommodate the northern parking expansion.



1.4 Survey Control

The project vertical datum and elevations referenced are in feet and reference the North American Vertical Datum of 1988 (NAVD 88). Boring locations were field located with elevations estimated based on topographic survey data.

2.0 GEOLOGY AND SITE CONDITIONS

2.1 Site Geology

The project is located within the Kennebunk 7.5-minute quadrangle in the Seaboard Lowland physiographic province. The region has been subjected to recent glaciation within the last 25,000 years (late Wisonsinan glaciation) resulting in a physiographic surficial geology primarily composed of unconsolidated sediments such as sand and gravel of glacial and nonglacial origin. The bedrock geology is identified as the Kittery Formation which is composed of calcareous feldspathic sandstone.

Existing geologic mapping available for the project site includes bedrock and surficial geology mapping prepared by the Maine Geological Survey (MGS) for the Kennebunk Quadrangle, Maine.

MGS surficial geology mapping identifies soil overburden in the project area primarily as marine deltas, with marine regressive sand deposits located alongside the north and east of the site, as well as swamp wetland located along the northeast edge of the site. The marine deltas which cover the majority of the site are outwash consisting of sand and gravel that were deposited by glacial meltwater streams as ice retreated. These commonly occur as flat to gently sloping surfaces underlain by glacial-marine clay-silt deposits. The marine regressive sand deposits are said to consist of sand, silt, and minor gravel deposited in shallow marine waters from the late-glacial regression of the sea; they also may include a variety of nearshore and fluvial sediments. They commonly occur as flat sandy areas and are likely to be underlain by marine clay-silt deposits.

Test soil borings performed along the Maine Turnpike suggest loose interbedded marine silts and sands underlain by soft sensitive marine silts and clays typical of the Presumpscot Formation. The soft silts and clays are particularly prone to problems associated with low strength, compressibility, and stability issues. A surficial and bedrock geology map are presented in Figures 2 and 3, respectively.

3.0 Subsurface Investigation

3.1 General

A subsurface exploration was performed by Schonewald Engineering Associates, Inc. (SchonewaldEA) of Cumberland Maine, under the direction of HNTB. The boring location



plan depicting the location of the borings is presented in the data report provided by SchonewaldEA, included as **Appendix A**. The subsurface investigation borings were advanced using cased wash boring methods from a Mobile drill rig using 4.0 inch (HW-size) and 3.0 inch (NW-size) inside diameter steel casing. Standard Penetration Testing (SPT) was performed by driving a 1-3/8 inch ID split spoon sampler with a 140-lb hammer dropped 30 inches to obtain samples at approximately 5-foot intervals. The uncorrected SPT N-value is defined as the total number of blows required to advance the sampler through the second and third six-inch interval of any given 24-inch sampling interval. All SPT N-values discussed in this report have been corrected to reflect the 60 percent hammer efficiency (N_{60}) unless noted otherwise.

In-situ vane shear testing was completed in accordance with the requirements outlined in ASTM D 2573 and are outlined below. In situ vane shear testing involves using a simple rotated blade of specified dimensions to evaluate undrained shear strengths (s_u) and remolded shear strengths (s_r) in soft to stiff clays (FHWA-IF-02-034 GEC No. 5). The vane is advanced into the test soil and the blade is rotated at a maximum rate of six degrees per minute until failure of the soil occurs while the resulting torque measurement is recorded. This first test is used to approximate the peak undrained shear strength of the soil. Following the initial test, the remolded strength of the soil is measured after 10 rapid turns of the vane (FHWA-IF-02-034 GEC No. 5).

3.2 Geotechnical Subsurface Exploration

Nine borings were performed by New England Boring Contractors under supervision of HNTB's subconsultant SchonewaldEA. Borings were advanced between June 27 and July 12 in 2018. A summary of the borings performed with approximate depths of exploration are included in **Table 3-1**. In borings BB-KBUNK-106, BB-KBUNK-107, and BB-KBUNK-109, rods were pushed to refusal.

For the SB Plaza, two borings were performed near the new ramp from I-95 and one boring was performed near the northerly truck parking expansion area. For the NB Plaza, three borings were performed near the new ramp to I-95 and the northerly truck parking expansion area, and two borings were performed near the southerly truck parking expansion area.



Depth of **Bottom of Exploration** Surveyed **Ground Elevation** Boring No. **Boring** Elevation (feet) (feet) (feet) BB-KBUNK-102 $104.0^{(1)}$ 22.0 82.0 BB-KBUNK-103 102.6 27.0 75.6 BB-KBUNK-104 96.6 22.0 74.6 BB-KBUNK-105 94.5 27.0 67.5 BB-KBUNK-106 $74.0^{(2)}$ 96.2 22.2 86.5(1) 53.3⁽²⁾ BB-KBUNK-107 33.2 BB-KBUNK-108 85.2 27.0 58.2 55.2⁽³⁾ BB-KBUNK-109 86.6 31.4 BB-KBUNK-110 27.0 89.8 62.8

Table 3-1: Summary of Subsurface Exploration

- (2) Rods pushed as hydraulic probe to reach bottom depth. Sampling was discontinued at a depth of 42 feet.
- (3) Rods pushed as hydraulic probe to reach bottom depth. Sampling was discontinued at a depth of 27 feet.

4.0 LABORATORY TEST RESULTS

4.1 Soil Testing

R.W. Gillespie & Associates, Inc. of Biddeford, Maine conducted a series of laboratory tests on selected soil samples to verify classifications as well as to obtain indexes and grain size distributions to correlate with select design parameters. The testing program consisted of the following:

- 4 Sieve analysis tests (ASTM D422)
- 4 Sieve and hydrometer analysis tests (ASTM D422)
- 7 Atterberg Limits tests (ASTM D4318)

Test results are summarized below in **Table 4-1** and are also presented in the data report provided by SchonewaldEA, included as **Appendix A**.



⁽¹⁾ Estimated based upon available topographic information.

Atterberg Limits Particle Distribution (%) Water Depth Sample Boring No. Content No. (feet) PLPΙ LL Gravel Sand Fines (%) 5-7 BB-KBUNK-104 2D 19.8 2.7 91.5 5.8 BB-KBUNK-104 3D 10-12 NV NP NP 69.9 27.7 0.0 30.1 BB-KBUNK-104 5D 20-22 35.9 10.5 26.1 15.6 BB-KBUNK-106 1D 2-4 8.8 23.1 55.3 21.3 BB-KBUNK-106 4D 10-12 22.0 0.0 98.2 1.8 BB-KBUNK-106 6D 20-22 32.1 24.6 16.7 7.9 0.0 15.8 84.2 BB-KBUNK-106 8D 30-32 28.5 NVNP NP 0.0 17.7 82.3 BB-KBUNK-106 10D 40-42 41.1 36.7 23.4 13.3 BB-KBUNK-109 2D 5-7 22.2 0.1 97.3 2.6 BB-KBUNK-109 4D 15-17 40.7 27.8 17.7 10.1 0.0 3.2 96.8 BB-KBUNK-109 6D 25-27 46.3 37.5 21.3 16.2

Table 4-1: Summary of Identification Test Results

Note: NP- Non-plastic; NV- No value

5.0 Subsurface Conditions

5.1 Generalized Subsurface Stratification

Based on the data collected, the subsurface conditions at the site generally consist of the following strata as encountered from the ground surface:

- Granular Fill
- Organic Silt (original ground)
- Interbedded Sand and Silt
- Marine Silty Clay Crust
- Marine Silty Clay
- Glacial Till

Stratum 1: Granular Fill

The Granular Fill was encountered in all borings except for HB-KBUNK-108 and HB-KBUNK-110 which are located towards the north and south ends of the proposed NB ramp. The Granular Fill generally consists of Medium to Fine SAND with little to trace Silt



and was encountered in a very loose to medium dense condition with SPT N_{60} values ranging from 1 to 16 blows per foot.

Stratum 2: Organic Silt (original ground)

The Organic Silt is comprised of varying amounts of organic silt, medium to fine sand, peat and roots, typical of natural topsoil. This Organic Silt was encountered in a very loose or soft condition. The Organic Silt was encountered beneath the Granular Fill in borings HB-KBUNK-106 and HB-KBUNK-107 with thicknesses of approximately 0.7 and 2.0 feet, respectively. The borings where this was encountered are in the NB southern parking area.

Stratum 3: Interbedded Sand and Silt

The Interbedded Sand and Silt was encountered in borings HB-KBUNK-102, HB-KBUNK-104 and HB-KBUNK-106 underlying the Granular Fill or Organic Silt. In HB-KBUNK-102 and HB-KBUNK-104, located towards both the south and north ends of the proposed SB ramp, this stratum was approximately 5.0 and 9.5 feet thick, respectively. In HB-KBUNK-106, located in the NB southern parking area, this stratum was approximately 28 feet thick. The stratum is layered, with layers either composed of SILT with some to little fine Sand or Fine SAND with some to little Silt. The Interbedded Sand and Silt was encountered in a very soft or very loose to medium dense condition with SPT N_{60} values ranging from 0 to 16.

Stratum 4: Marine Silty Clay Crust

The Marine Silty Clay Crust varies in thickness from 1.0 to 5.0 feet and has a relatively stiff consistency with SPT N_{60} values ranging from weight of hammer to 8 blows per foot. This stratum was encountered in borings HB-KBUNK-103, HB-KBUNK-104, HB-KBUNK-107, HB-KBUNK-108, and HB-KBUNK-109 indicating its presence in all three areas where fill will be placed. The Marine Silty Clay Crust was not encountered in borings where the Interbedded Sand and Silt was encountered, underlying either the Granular Fill or Organic Silt and underlain by the Marine Silty Clay.

Stratum 5: Marine Silty Clay

The Marine Silty Clay was typically encountered underlying the Interbedded Sand and Silt or the Marine Silty Clay Crust, with exceptions being in borings HB-KBUNK-105 and HB-KBUNK-110 where the Marine Silty Clay was encountered directly beneath the Granular Fill. The Marine Silty Clay was encountered in all borings with a soft consistency. Vane shear testing performed indicates peak undrained shear strengths ranging from 302 to 563 psf. The Marine Silty Clay is composed of over 90 percent fines and is typically a low plasticity clay with Atterberg testing indicating liquid limits ranging from 26.1 to 37.5 and plastic limits ranging from 15.6 to 23.4. The natural water content of the Marine Silty Clay is typically above the liquid limit with natural water contents ranging from 35.9% to 46.3%, which is generally an indication of being both soft and high compressible.



Stratum 6: Glacial Till

Glacial Till was not sampled during the subsurface investigation but was sampled in past explorations by Haley and Aldrich beneath the marine silty clay from borings performed at both the northbound and southbound service facilities. Haley and Aldrich encountered thicknesses of the deposit ranging from 2.0 to 7.4 feet. The Glacial Till sampled varied significantly in composition, with major constituents of the three samples taken being Gravel & Silt, Sand & Gravel, and Silt & Sand, with minor components of gravel, sand, and silt where these were not a major component. The Glacial Till was encountered in a very loose to very dense condition.

The firm material encountered beneath the marine silty clay by probing in the borings performed under supervision of SchonewaldEA is likely Glacial Till. The probing encountered the firm material at depths ranging from approximately 53.0 and 74.0 feet.

5.2 Groundwater

Groundwater was typically encountered at shallow depths ranging from 1.7 to 6.3 feet. Depths and approximate elevations at which groundwater was encountered in borings are given in **Table 5-1**.

Depth of Approximate Groundwater Boring No. Groundwater Elevation (feet) (feet) BB-KBUNK-103 6.1 96.5 92.5 BB-KBUNK-104 4.1 BB-KBUNK-105 5.8 88.7 BB-KBUNK-106 89.9 6.3 BB-KBUNK-108 3.4 81.8 BB-KBUNK-109 1.7 84.9 BB-KBUNK-110 3.6 86.2

Table 5-1: Groundwater Depths Encountered During Drilling

Vane shears were performed within the soft marine silty clay which were used to take insitu measurements of the peak undrained shear strength, s_u , and the remolded undrained shear strength, s_r . A summary of vane shear results is provided in **Table 5-2**.



Test Test Peak Undrained Remolded Depth Elevation Shear Strength, Undrained Shear Boring No. Test No. (feet)(1) (feet) Strength, s_r (psf) s_u (psf) BB-KBUNK-104 V120.8 75.7 440 27 BB-KBUNK-105 V1 20.8 75.2 343 14 BB-KBUNK-105 V2 21.8 74.2 385 0 V3 BB-KBUNK-105 25.8 70.2 563 82 $\overline{V4}$ BB-KBUNK-105 26.8 69.2 494 0 V1 BB-KBUNK-107 65.7 27 20.8 371 V2 BB-KBUNK-107 21.8 64.7 316 14 V3 BB-KBUNK-107 25.8 60.7 302 14 <u>V4</u> BB-KBUNK-107 26.8 59.7 14 288 V5 BB-KBUNK-107 30.8 55.7 426 14 BB-KBUNK-107 V6 412 31.8 54.7 14 V7 BB-KBUNK-107 35.8 50.7 481 27 V8 385 BB-KBUNK-107 36.8 49.7 27 V9 40.8BB-KBUNK-107 45.7 481 27 BB-KBUNK-107 V10 41.8 44.7 453 14 BB-KBUNK-109 V166.2 302 20.8 14 BB-KBUNK-109 V2 21.8 65.2 302 14 BB-KBUNK-109 V3 25.8 61.2 440 27 BB-KBUNK-109 V426.8 60.2 522 27 (2) V1 BB-KBUNK-110 15.8 371 41 (2) BB-KBUNK-110 V2 16.8 398 41 (2) V3 BB-KBUNK-110 25.8 481 0 (2) BB-KBUNK-110 V3 26.8 398 14

Table 5-2: Vane Shear Test Summary

6.0 GEOTECHNICAL ANALYSIS AND DISCUSSION

6.1 Discussion of Geotechnical Challenges

The borings performed throughout the site indicate the presence of a thick marine silty clay strata which is both compressible and of relatively low shear strength. Therefor, settlement is anticipated and has been evaluated due to the additional load from the proposed fill placement. Settlement is of concern due to the potential impact it may have on the maintenance of proposed pavements. In addition to settlement, global stability of the proposed embankment has been evaluated for factors of safety against both shallow and deep seated slope shear failure due the expansion of the existing embankment.



 $^{(1) \} Estimated \ based \ upon \ available \ topographic \ information.$

⁽²⁾ Unable to estimate due to lack of topographic information.

6.2 Design Soil Properties

Soil properties for design were determined using correlations to in-situ testing including standard penetration tests and vane shear tests, as well as correlations to laboratory index tests. Parameters used as design soil properties are summarized for all soil strata in **Table 6-1**.

Strata Soil Properties Granular Organic Interbedded Marine Silty Marine Fill Silt Sand & Silt Clay Crust Silty Clay Moist unit 103 109 109 115 $\gamma_{\rm m}$ (pcf) weight Saturated unit $\gamma_{sat}\left(pcf\right)$ 115 109 109 115 112 weight Effective Angle of Internal φ', (deg) 29 29 15 22 22 Friction Undrained Su, (psf) 250 1500 390-420 Shear Strength Elastic E(ksf) 200 300 Modulus

Table 6-1: Engineering Properties of Soil for Design

Consolidation properties for settlement analysis were established from previous testing and standard correlations. Historical consolidation test data for the Marine Silty Clay, in concert with correlations to testing performed from previous projects in the vicinity were necessary to select properties for design and are presented in **Table 6-2**.

Table 6-2: Consolidation Properties for Design

Soil Proper	ties	Organic Silt	Marine Silty Clay Crust	Marine Silty Clay	
Compression Index	C_{C}	1.5	0.2	0.31	
Recompression Index	C_r	0.015	0.015	0.015	
Initial Void Ratio	e _O	2.4	0.8	1.4	
Overconsolidation Ratio ⁽¹⁾	OCR	-	-	1.1-2.8 or 1.2-1.8 ⁽²⁾	



Soil Proper	ties	Organic Silt	Marine Silty Clay Crust	Marine Silty Clay	
Preconsolidation	P _C (psf)	1100 to	1400 to	_	
Pressure ⁽¹⁾	1 ((psi)	1700	2100	_	
Coefficient of	C_{V}	0.1	0.3	0.3	
Consolidation	(ft²/day)	0.1	0.3	0.3	
Secondary					
Compression	C_{α}	0.018	0.018	0.012	
Index					

⁽¹⁾A range of values are be provided and solutions bounded where multiple correlations were utilized for assessments.

6.3 Global Stability

A global stability assessment of the proposed NB Plaza southern parking area was performed assuming both short-term undrained, and long-term drained soil conditions. Subsurface conditions for global stability analysis were selected based on review and interpretation of the available borings and laboratory testing. The analysis includes a surcharge load of 250 psf applied to the parking area to simulate the vehicular live load.

A global stability resistance factor of 0.75 is required when embankments do not support or contain structural elements. This resistance factor translates to a minimum required factor of safety of approximately 1.3. Results of the analysis indicate that the factor of safety of the NB Plaza southern parking area in the proposed condition when assessed in the short-term undrained condition is approximately 1.4. In the long-term drained condition, the factor of safety is approximately 1.7 which is considered acceptable for this embankment.

6.4 Settlement

Embankment Settlement

Given the presence of soft marine silty clay in the subgrade, settlement is anticipated under the weight of the proposed embankment fill. As such, a settlement assessment has been performed for the NB Plaza southern parking area which is to receive the largest potential fill height of approximately 12 feet.

A settlement analysis was performed using SETTLE3D by Rocscience to assess the magnitude of settlement under placement of normal weight fill. The deformation values reported herein include the immediate settlement that will occur during construction, as well as consolidation settlement after the embankment is placed.

Tables 6-3 through **6-7** are representative of conditions for the NB Plaza parking area expansion. **Table 6-3** addresses the settlement to be experienced by the new embankment



⁽²⁾OCR varies from its highest value at the top of the layer to its lowest value at the bottom of the layer.

and pavement. Because of the compressible clay soils, the settlement analysis was projected over a 20-year span, as settlement is expected to occur incrementally over the design life of the structure with settlements decreasing with time. Allowing time to pass prior to paving or installing foundations will allow a portion of the predicted settlement to occur first, thereby reducing the settlements experienced by the pavement and foundations. Given the settlement magnitudes, a 5 to 10-year paving cycle is anticipated for the first round of repaving. After the first 10 years it is anticipated the paving cycle can be extended as approximately 1 inch of settlement is anticipated between 10 and 20 years.

The table below summarizes the ranges of anticipated settlement at the crest of the embankment expansion, with the crest being defined as the top edge of the embankment expansion before the side slope at the highest depth of fill. It is recommended that the contractor allows as much time to pass following the placement of the fill as the construction schedule practically allows, preferably placing the fill prior to the winter season during which regional construction typically slows or stops for a period.

Table 6-3: Post-Construction Settlement of the Pavement Surface at the Crest Point

Time from fill placement to paving		Construc imediate		3-r	nonth w	ait	6-month wait		
Time	5 10 20		20	5	5 10 20		5	10	20
Time	years	years	years	years	years	years	years	years	years
Post-Construction	2.1-	2.7-	3.7-	1.1-	1.8-	2.8-	1.0-	1.6-	26.42
Settlement (inches)	4.8	6.3	7.4	1.9	3.5	4.5	1.6	3.2	2.6-4.2

In the NB Plaza southern parking area it is recommended that light post foundations be designed to extend beneath the organic silt soils to mitigate settlement. This will require light post foundation pier lengths on the order of 15 feet (the typical design is a 2-foot diameter extending 7 feet). The Authority's Geotechnical Representative should verify the bottom of the light pole foundations penetrates the organic silt layer during construction. It is recommended the contractor allows as much time to pass between placing the new fill and constructing the light pole foundations, preferably with the light pole foundation construction occurring at the end of the project construction. **Table 6-4** provides settlements that would be experienced by a lighting foundation pier assuming it penetrates beneath the organic silt.



Table 6-4: Post-Construction Settlement of the Organics at the Crest Point

Time from fill placement to paving		Construc		3-r	nonth w	ait	6-month wait		
Time	5	10	20	5	10	20	5	10	20
Time	years	years	years	years	years	years	years	years	years
Post-Construction	1.7-	2.3-	3.2-	1.1-	1.7-	2.6-	1.0-	1.5-	2440
Settlement (inches)	2.5	3.9	4.9	1.7	3.2	4.2	1.5	3.0	2.4-4.0

Table 6-5 provides estimates of total settlement of the existing embankment at the joint of the existing pavement and the new expansion to illustrate the influence on the parking lot pavement in the immediate vicinity of the expansion.

Table 6-5: Total Settlement of Existing Embankment at Joint of Expansion

Time	5 years	10 years	20 years	
Total Settlement (inches)	0.7-0.8	0.8-0.9	0.8-0.9	

Table 6-6 provides estimates of total settlement at an offset of 25 feet west of the joint into the existing lot to illustrate settlements at a moderate distance from the new fill embankment.

Table 6-6: Total Settlement at an Offset 25 Feet West of New Fill (Existing Parking Area)

Time	5 years	10 years	20 years
Total Settlement (inches)	0.3	0.3	0.3

Table 6-7 provides estimates of total settlement at the toe of the proposed embankment expansion. These settlement estimates are provided for consideration of impacts to pavement, nearby utilities, and proposed drainage in the vicinity of the expansion.

Table 6-7: Total Settlement at the Toe of Proposed Expansion

Time	5 years	10 years	20 years	
Total Settlement (inches)	0.2 - 0.3	0.6 – 0.9	1.5 – 1.8	

It is anticipated that the above settlement ranges are acceptable for the proposed embankment, however it should be noted that the pavements will require more frequent maintenance and resurfacing than typical, primarily during the earlier stages of the embankment's design life. Several mitigative options were explored including wick drain and surcharge, as well as lightweight fill compensation options consisting of EPS Geofoam, expanded shale aggregate, or foamed glass aggregate fill material. It is understood that minimizing initial construction costs is a priority for this project. Therefore, while all the mitigative options would effectively reduce the amount of anticipated settlement, they were not found to be preferable due to their significantly higher construction costs or potential



delays to the project schedule.

Existing Utility Settlement

At the NB Plaza southern parking area, two existing branches of a gravity sewer owned by the Kennebunk Sewer District traverse the proposed fill area and join at a manhole outside the toe of the proposed embankment expansion. The gravity sewer is understood to be 8 inches in diameter and is known to consist of Asbestos Concrete Pipe (ACP) based on existing utility information. From cross sections along the pipe runs, it is understood that up to 6 feet of new fill will be placed over the existing utility. Settlement beneath the existing utility was analyzed along the length of both segments that traverse the fill area. Results of the analysis show settlement ranging up to approximately 2.5 inches over a 20-year period may occur beneath the crest of the proposed embankment expansion if normal weight fill is used.

To preserve the functionality of the sewer it is recommended that a lightweight fill compensation be used over the sewer lines to limit undesirable settlement and avoid damage to the utility. Both an EPS Geofoam and a foamed glass aggregate solution were evaluated as fill material over the sewer. Both materials are similar in unit cost, however the foamed glass aggregate is significantly easier to install and will allow for easier removal should the utility require future servicing. Therefore, the foamed glass aggregate is the preferred option.

To minimize the risk of potential settlement, the contractor should excavate 2 feet of the existing fill material for 25 feet to either side of the centerline of the pipes. Following the removal of the existing surficial fill, foamed glass aggregate should be used to construct the embankment over the sewer line. The approximate limits of excavation and lightweight fill placement are depicted in **Figure 4**.

7.0 LIMITATIONS OF REPORT

The conclusions and recommendations contained in this report are based upon the subsurface data obtained during this investigation and on details stated in this report. The validity of the conclusions and recommendations contained in this report are necessarily limited by, among other things, the scope of field investigation and by the number of borings. Therefore, given the nature of this subsurface study, there is a possibility that actual conditions encountered will differ from those discussed in this report. Should conditions arise which differ from those described in this report, HNTB should be notified immediately and provided with all information when available regarding subsurface conditions.

As part of the geotechnical recommendations presented in this report, HNTB makes no warranty as to the absence or presence of any environmental hazard or waste present on any property evaluated hereunder and all reports generated here to are qualified as being based upon existing data reasonably available to HNTB and not subject to independent verification. HNTB is not responsible for any latent defects that could not be reasonably



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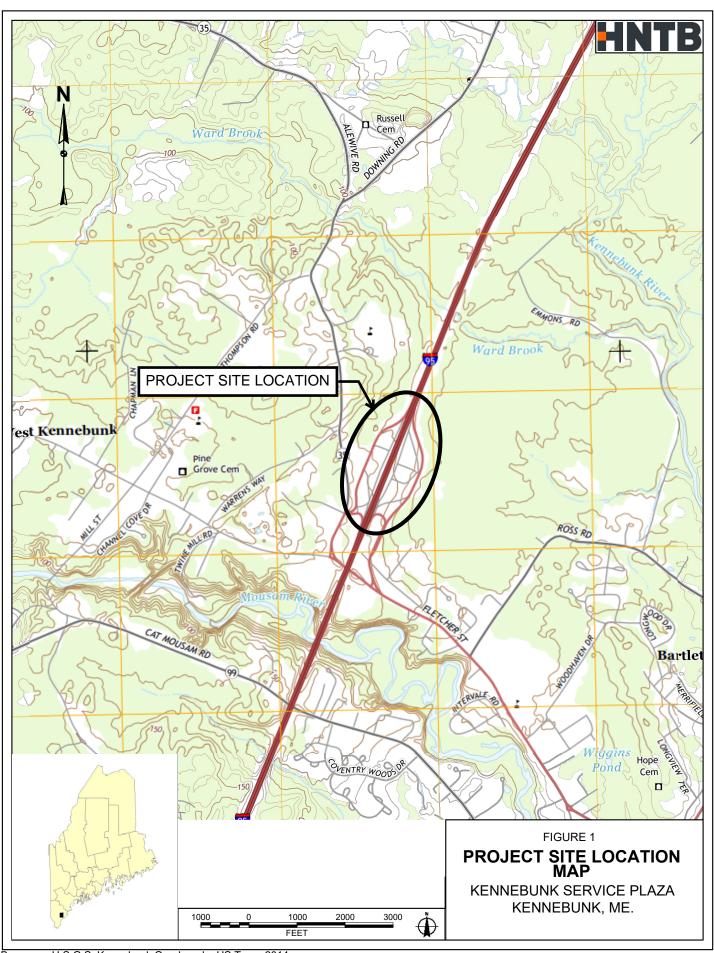
8.0 REFERENCES

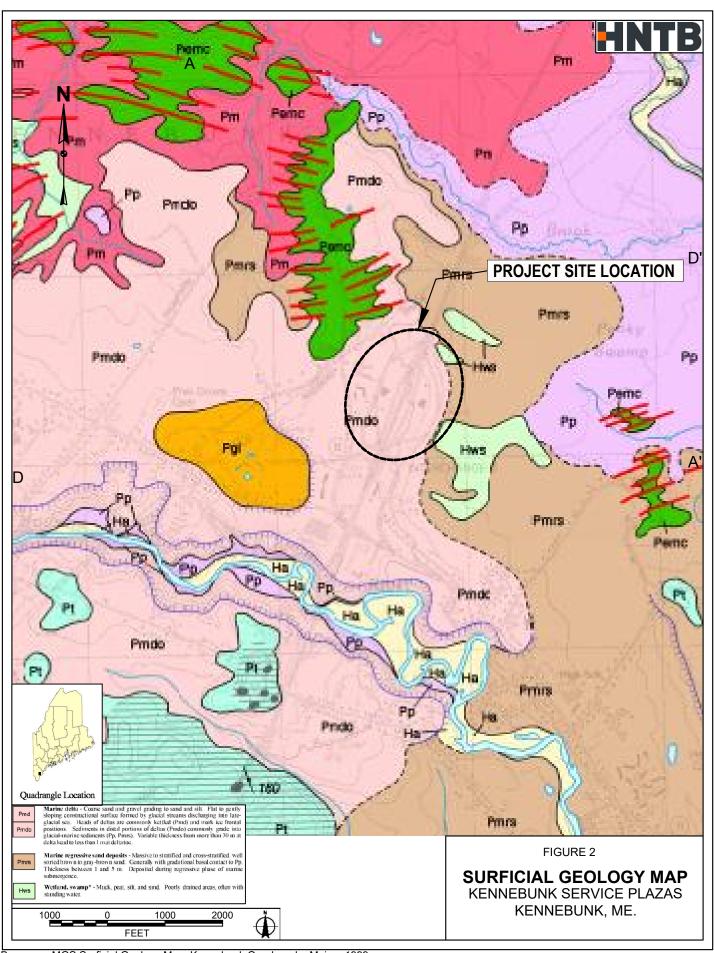
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- 2. FHWA, "Evaluation of Soil and Rock Properties," Geotechnical Engineering Circular No. 5, FHWA-IF-02-034, 2002.
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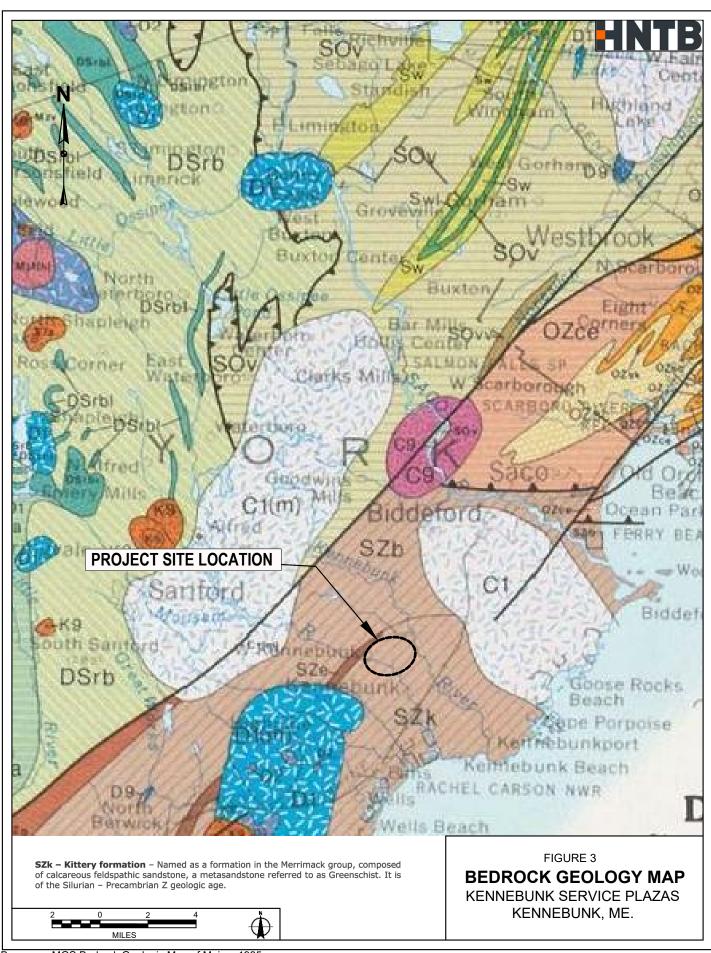


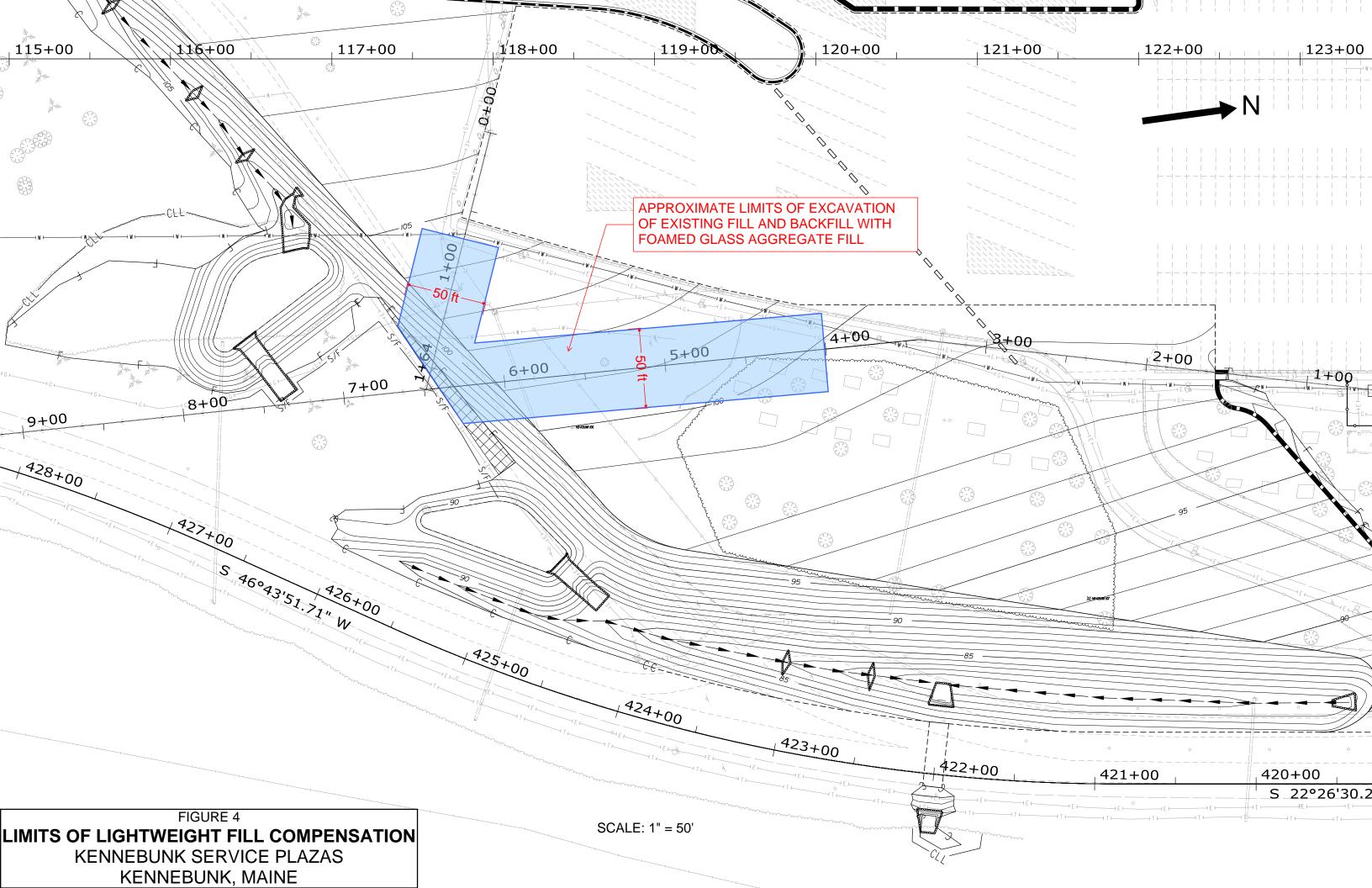
FIGURES











Appendix A: Geotechnical Data Report





FIELD AND LABORATORY DATA REPORT
GEOTECHNICAL PROGRAM
KENNEBUNK SERVICE PLAZA PARKING EXPANSION
MAINE TURNPIKE EXIT 25
KENNEBUNK, MAINE

PREPARED FOR:

HNTB Corporation Westbrook, Maine

PREPARED BY:

Isabel V. (Be) Schonewald, P.E. Schonewald Engineering Associates, Inc. (SchonewaldEA) 129 Middle Road Cumberland, Maine 04021 Be@SchonewaldEngineering.com

Just Waln

October 2018



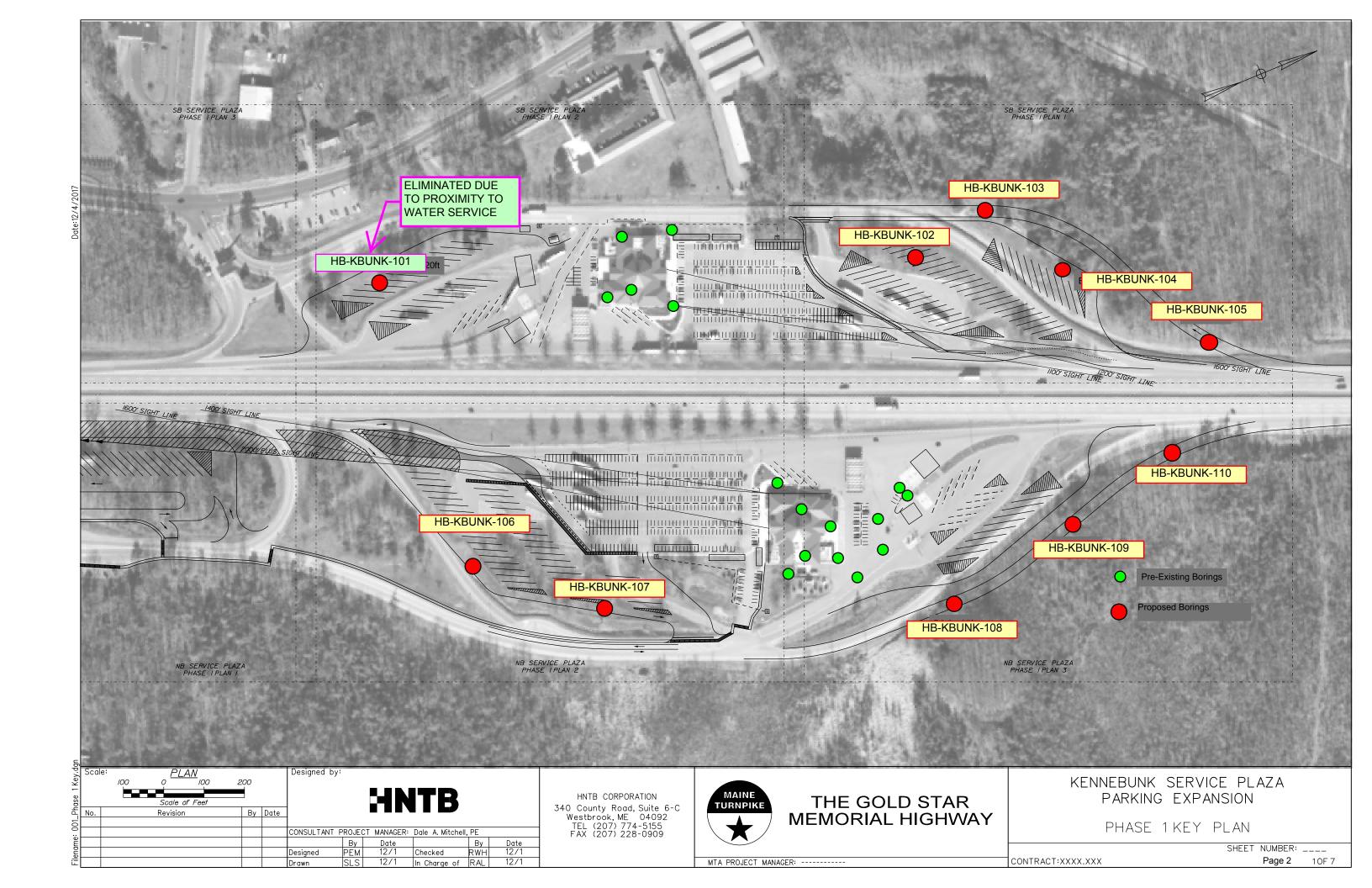
FIELD AND LABORATORY DATA REPORT GEOTECHNICAL PROGRAM KENNEBUNK SERVICE PLAZA PARKING EXPANSION MAINE TURNPIKE EXIT 25 KENNEBUNK, MAINE

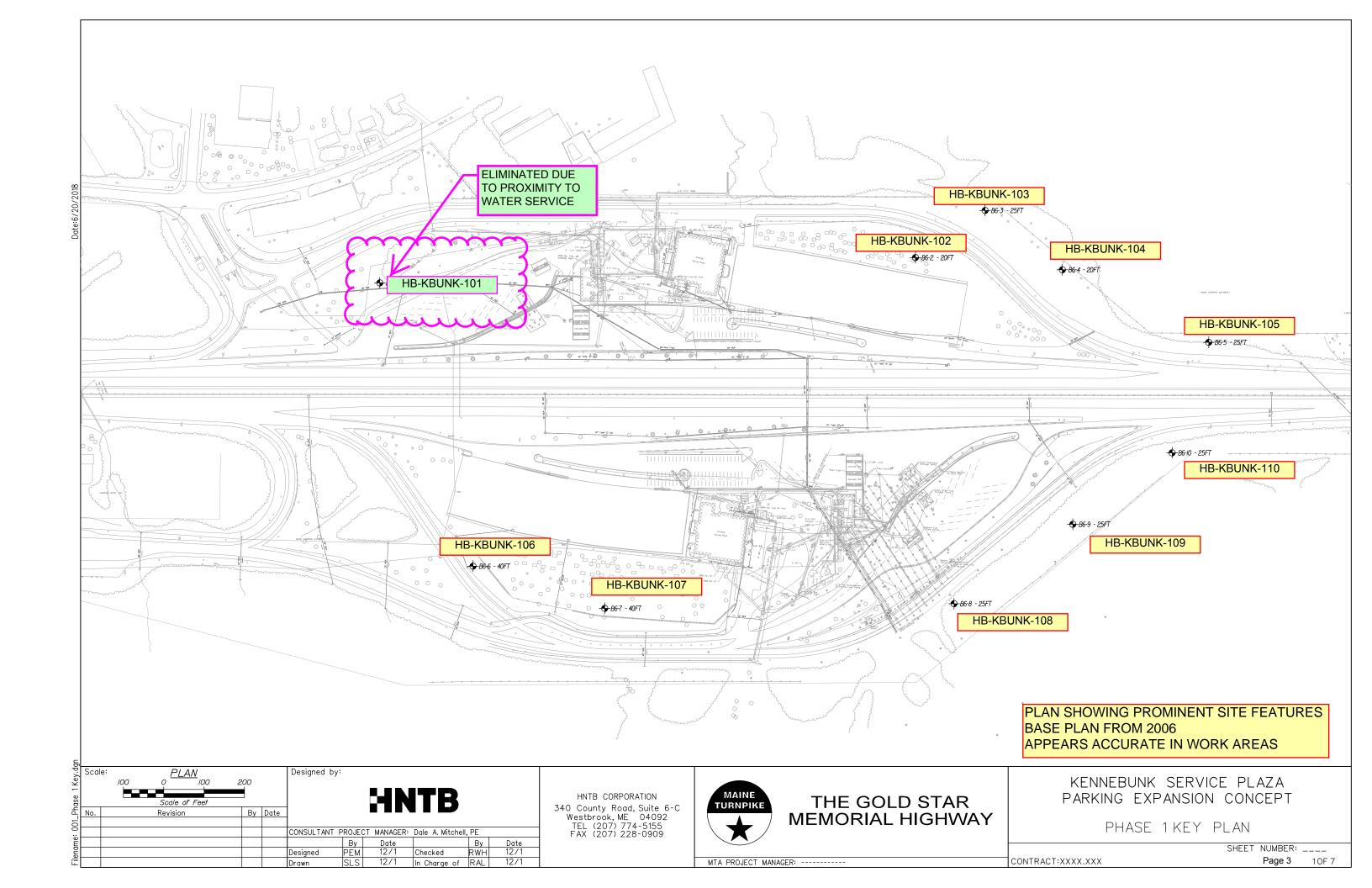
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SUBSURFACE EXPLORATION LOCATION SKETCHES	2-3
LOGS OF SUBSURFACE EXPLORATIONS	5-23
RESULTS OF SOILS LABORATORY TESTS ON SOIL SAMPLES	25-37



SUBSURFACE EXPLORATION LOCATION SKETCHES







LOGS OF SUBSURFACE EXPLORATIONS

Engineering						Main	e Tur	npike	MM	Plaza Expansion Boring No.: HB-KBUNK- Proj. No.: 18-018		
D-:!!!			Associates, I				ON: Kennebunk, ME				,	
	• •			+-	Elevation (ft.)							
			+-					Sampler: Standard Split-Spoot I B-53 Hammer Wt./Fall: 140 lbs/ 30 in)TI			
	Start/Fi	nich:	7/12/18; 0745	.0055		+-	Type:	othod:			h boring Hammer Type: rope & cathead	
	Boring Location: per plan			+	sing ID			to 20'	Hammer Efficiency: 0.60			
F	ig Loca		per piari			+	ger ID/			to 5'	Water Level*:	
			TESTING:		DDITIONAL D	EFINIT	IONS:			ADD	ITIONAL DEFINITIONS: LABORATORY TEST RESULTS:	
MD = l U = Th MU = l V = Ins	in Wall Tub Insuccessi itu Vane S	ful Split Spoe Sample ful Thin Wohear Test	/all Tube Sample at : /ane Shear Test att	pt tempt <u>empt</u>	N-uncorrected N ₆₀ = N value hammer efficie S _u = Insitu Fie R = Rock Core RQD = Rock 0	e correct ency = o eld Vane e Samp	ted for ha calculated e Shear S le	I hamme strength (r efficienc	WC y = BC SS	H= weight of 140lb. hammer R= weight of rods R= weight of rods #200 = percent fines WC = water content CONSOL= 1-D consolidation test USU-Unconsolidated undrained triaxial test USU-Unconsolidated undrained triaxial test L=Liquid Limit / PL=Plastic Limit / PI=Plastici UCT qp = peak compressive strength of rock	
				Sample Info			ı	1	1	-		
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	(psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
0								SSA				
									ĺ			
									1		1D: Tan, dry to damp, m. dense, fine to medium SAND, trace Silt.	
	1D	24/12	2.0 - 4.0	3-4-7-	-11	11	11				SAND	
								\ /	1			
- 5 -								 V	1		2D: Tan to orange-tan, moist, m. dense, fine to medium SAND,	
	2D	24/15	5.0 - 7.0	6-6-7	-7	13	13	25			trace Silt, trace coarse Sand.	
								28				
								32	1			
									1			
								48				
40								52				
- 10 -	3D	24/11	10.0 - 12.0	6-7-10	-14	17	17	19			3D: Tan, m. dense, fine to medium SAND, little to some Silt, trace coarse Sand.	
								25	1			
								25	-			
								35				
								40	90.	5		
								40	1			
- 15 -	4D	24/16	15.0 - 17.0	3-5-5	-4	10	10	25			4D: Orange tan, m. dense, interbedded, Silty fine SAND; and Clayey SILT, little very fine Sand. INTERBEDDED MARINE SILT	
								25			AND SANDS	
								26	1			
								27	85.			
								28	1			
- 20 -	5D	24/18	20.0 - 22.0	1/18"	1	0	0		1		5D: Grey with occasional black, v. soft, Silty CLAY, trace very	
	50	24/18	20.0 - 22.0	1/10	-1	U	U U		1		fine Sand, with one 1-inch seam and few partings Silty fine SAND. MARINE SILT-CLAY	
									82.0		22.0	
											Bottom of Exploration at 22.0 feet below ground surface. No refusal.	
									1			
25 Rem	arks:						<u> </u>	l				
			at approximate b	ndorico h-t	on coil torre	onsia-	an march	grader			Page 4 of 4	
١.		•	nt approximate bou				-	-			Page 1 of 1	
* Wate pres	r level readent at the t	dings hav ime meas	e been made at tim urements were ma	es and under o	conditions state	ed. Gro	oundwate	r fluctuati	ons may	occur d	Boring No.: HB-KBUNK	-102

			Schonewald)	PROJE	CT:	Kenr	nebi	unk	Serv	ice P	laza Expansion Boring No.: HB-KBUNK	-103	
			Engineering				Main	e T	urn	pike I		10-0-1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		
Associates, Inc. LOCATION									unk			•		
				+	vation	(ft.)			ft (est					
<u> </u>				+-	Datum:				88	Sampler: Standard Split-Spoo	on			
	Logged By: Schonewald				+-	Rig Type:				e Drill				
Date	Start/Fi	nish:	7/11/18; 1140-	-1410		Dril	lling M	etho	d:	cased	wash	boring Hammer Type: rope & cathead		
Borir	ng Loca	tion:	per plan			Cas	sing ID	/OD	:	HW to	25'	Hammer Efficiency: 0.60		
			_	Auger ID/OD:				:0 5'	Water Level*: 6.1 ft (open)					
D = Spi MD = U U = Thi MU = U V = Ins	U SAMPLI lit Spoon S Jnsuccessi in Wall Tut Jnsuccessi itu Vane S Jnsuccessi	N-uncorrected N ₆₀ = N value hammer efficie S _u = Insitu Fie R = Rock Corr RQD = Rock (d = N val e correct ency = c eld Vane e Sampl	llue ted for ha calculated e Shear S le	d ham Streng	mer e	efficiency	iciency = not recorded CONSOL= 1-D consolidation test						
					formation									
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing	Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results	
0								SS	SA					
		2445					 		-			1D: Orange tan, damp to moist, v. loose, fine to medium SAND,		
	1D	24/15	2.0 - 4.0	3-2	2-2-2	4	4					trace to little Silt, trace coarse Sand. SAND		
									/					
- 5 -	2D	24/17	5.0 - 7.0	5-4	i-3-3	7	7	PU	SH			2D: Orange tan, wet, loose, fine to medium SAND, little Silt, trace coarse Sand.		
									_					
								1						
								2						
- 10 -	3D	24/11	10.0 - 12.0	3-4	I-6-8	10	10	PU				3D: Orange tan, loose, fine to medium SAND, some Silt; somewhat layered by silt content.		
									_					
								2	0					
								1:	15 87.0					
- 15 -								20				Olive brown, Clayey SILT, little very fine Sand, with several		
	4D	24/24	15.0 - 17.0	1-1/	12"-1	1	1	PU	SH	84.4		partings and layers Silty fine SAND. MARINE SILT-CLAY ¬ CRUST Changing at 16.1 ft to:		
												4D: Grey, Silty CLAY, little very fine SAND with one 1-inch seam Silty fine SAND at 16.1 ft. MARINE SILT-CLAY WITH INTERBEDDED SANDS		
- 20 -	5D	24/22	20.0 - 22.0	1-2	2-2-6	4	4	PU	/ SH			5D: Grey brown, loose, interbedded, Silty fine SAND; Silty CLAY, trace very fine Sand; and fine to medium SAND, little to some		
												Silt; with one piece of gravel in bottom of sample.		
25														
Stratifi	er level rea	dings have	nt approximate boul e been made at tim	nes and under				-		ns may o	ccur due	Page 1 of 2		
prese	ent at the t	me meas	urements were made	ae.								Boring No.: HB-KBUNK	-103	

Schonewald PROJECT									k Serv		Plaza Expansion Boring No.: HB-KBUN	
			Associates, I		LOCATI	ON:				VIIVI 2	Proj. No.: <u>18-01</u>	8
						vation			ft (es	t'd) Core Barrel: N/A		
				+-	tum:		NAVD		Sampler: Standard Split-Sp	oon		
	ged By:		Schonewald			+	Type:		Mobil			
	Start/Fi		7/11/18; 1140	-1410		+	lling M				h boring Hammer Type: rope & cathead	
Borii	ng Locat	ion:	per plan			+	sing ID		HW to		Hammer Efficiency: 0.60	
	U SAMPLI		ESTING:		ADDITIONAL D	_	ger ID/0	JD:	SSA	ADDI	Water Level*: 6.1 ft (open) TIONAL DEFINITIONS: LABORATORY TEST RESULTS:	
MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessf in Wall Tub Jnsuccessf itu Vane Sl Jnsuccessf	ul Split Spo e Sample ul Thin Wa near Test	ttempt	N-uncorrected N ₆₀ = N value hammer efficient S _u = Insitu Fier R = Rock Correct RQD = Rock (e correct ency = c eld Vane e Samp	ted for ha calculated e Shear S le	l hammer strength (p	efficiency	WO = BOF SSA	H = weight of 140lb. hammer R = weight of rods not recorded CONSOL= 1-D consolidation test REHOLE ADVANCEMENT METHODS: UH-UN-CONSOlid/hollow stem auger roller cone/OPEN/PUSH=hydraulic push UCT qp = peak compressive strength of roc	ticity Index	
				·	formation				1			
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Pen./Rec. (in.) Sample Depth (ft.) Blows (/6 in.) Shear Strength (psf) or RQD (%)		N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results	
25	6D	24/24	25.0 - 27.0		8"-3	1	1				6D: Grey, v. soft, Silty CLAY, trace very fine Sand with three 1- inch seams and few partings Silty fine SAND.	
									73.5	767. V. X	—27.0 Bottom of Exploration at 27.0 feet below ground surface. No refusal.	1
- 30 -												
- 35 -												
- 40 -												
- 45 -												
_ 50 _												
	arks:	represent	approximate bou	ndarioe boh	een soil tusse:	rancition	ne may be	a graduo!			Page 2 of 2	
* Wate	er level read	lings have		nes and under			-	-	ons may o	ccur du	e to conditions other than those Boring No.: HB-KBUN	K-103

Engineering								e Turi	npike	MM 2	Boring No.: HB-KBUNK Proj. No.: 18-018	
D.::::			Associates, I		LOCAT						•	
Drille	er: ator:		New England Schaefer/ Titu		ntractors	+-	evation tum:	(ft.)	96.5 NAVI	ft (est'	d) Core Barrel: N/A Sampler: Standard Split-Spc	oon
	ged By:		Schonewald	15		+	Type:			le Drill	·	JOH
	Start/Fi	nish.	7/11/18; 0855	-1125		_	illing M				boring Hammer Type: rope & cathead	
_	ng Loca		per plan	1120		+-	sing ID			to 20'	Hammer Efficiency: 0.60	
							ger ID/		SSA		Water Level*: 4.1 ft (open)	
	U SAMPLI		TESTING:		ADDITIONAL N-uncorrecte	DEFINIT	TIONS:				TIONAL DEFINITIONS: LABORATORY TEST RESULTS: H = weight of 140lb. hammer AASHTO / USCS soil classifications	
MD = U U = Th MU = U V = Ins	Jnsuccess in Wall Tul Jnsuccess itu Vane S	ful Split Sp be Sample ful Thin Wa hear Test	oon Sample attem all Tube Sample at ane Shear Test att	ttempt	N ₆₀ = N valu hammer effic S _u = Insitu F R = Rock Co RQD = Rock	ie correctiency = ield Van ire Samp	cted for ha calculated e Shear Sole	d hammer Strength (p	efficienc	WOI y = 1 BOF SSA	R = weight of rods	icity Index
				Sample In	formation							
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
0								S\$A				
									1			
									-		1D: Tan, moist to wet, m. dense, fine to medium SAND, trace Silt,	t.
	1D	24/14	2.0 - 4.0	5-8	-8-9	16	16				trace coarse Sand. SAND	
								\ /	1			
- 5 -								$\vdash \lor$			2D: Tan, wet, v. loose, fine to coarse SAND, trace to little Silt.	A-3
	2D	24/18	5.0 - 7.0	1-1	-2-4	3	3	3				SP-SM -#200=5.8%
								6				WC=19.8%
								12				
								12	-			
								22	07 1			
								24	87.) I	9 ft: Silt-clay observed in wash water.	
- 10 -	3D	24/24	10.0 - 12.0	1.1	4.4	2	2	DUCL	-		3D: Olive brown, soft, SILT & CLAY, little very fine Sand with	A-4(0)
	3D	24/24	10.0 - 12.0	1-1	-1-1	2	2	PUSH			numerous seams, partings, and pockets of fine Sandy SILT; sandier material comprises approx. 40% of sample.	ML -#200=69.9% WC=27.7% LL=NV
											INTERBEDDED MARINE SILT AND SANDS	
												PL=NP PI=NP
											Attempted yang at 15 6 ft; unable to push yang page 15 4 ft	
- 15 -	4D	24/12	15.0 - 17.0	2-3	-2-3	5	5	PUSH	1		Attempted vane at 15.6 ft; unable to push vane past 15.4 ft. 4D: Olive brown, loose, interbedded, Silty fine SAND; CLAY &	
			1000					1 0011			SILT, trace very fine Sand; and fine to medium SAND, little Silt.	
									78.0			
									70.0		10.5	
00												
- 20 -	5D	24/24	20.0 - 22.0	(VANE/1	8")-WOR						5D: Grey with occasional black, Silty CLAY, trace very fine Sand with few seams Silty fine SAND. MARINE SILT-CLAY	CL WC=35.9%
	V1		20.6 - 21.0	Su= 44	0/ 27 psf				1		V1: Tu=16 / Tr=1 ft-lbs (65 mm x 130 mm vane)	LL=26.1 PL=15.6
	MV		21.5 - 21.5						74.	, <i>VIII</i>	MV: Unable to push past 21.5 ft.	PI=10.5
											Bottom of Exploration at 22.0 feet below ground surface. No refusal.	
									1		No Telusal.	
25												
	arks:	0.0000	topprovince	indarios hat	000 0011 4	trans ¹⁴¹	no marit	o gradu			Page 1 of 4	
Stratifi	cation line	s represen	t approximate bou	indaries betwe	een soil types;	transitio	ns may be	e gradual.			Page 1 of 1	
* Wate prese	er level rea ent at the t	dings have ime measi	been made at tim urements were ma	nes and under ide.	r conditions sta	ited. Gr	oundwate	r fluctuation	ons may	occur due	Boring No.: HB-KBUNI	K-104

	PROJE	CT:	Kenr Main											
			Associates, I		LOCATI		Kenr	nebu				- FIOJ. No.: 18-018	Proj. No.: 10-016	
Drille	er:		New England		tractors	+-	vation	(ft.)		6 ft (e		Core Barrel: N/A		
'				-	tum:			AVD8		Sampler: Standard Split-Spo	on			
					+	Type:				Drill				
	Start/Fi		7/10/18; 1340	-7/11/18; 08	805	+	Iling M					boring Hammer Type: rope & cathead		
Borii	ng Loca	tion:	per plan			+-	sing ID ger ID/			W to		Hammer Efficiency: 0.60		
IN-SIT	IN-SITU SAMPLING AND TESTING: ADDITIONAL D							JD:	5	SA to		Water Level*: 5.8 ft (open) TONAL DEFINITIONS: LABORATORY TEST RESULTS:		
MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccessi in Wall Tul Jnsuccessi itu Vane S Jnsuccessi	N-uncorrected $N_{60} = N$ value hammer efficie $S_U = Insitu$ Fie R = Rock Core RQD = Rock (l = N va correctency = o eld Vane Samp	llue ted for ha calculated e Shear S le	l hamn trength	ner effici		WOF = r BOR SSA	I = weight of 140lb. hammer R = weight of rods R = WC = water content of consolidation test EHOLE ADVANCEMENT METHODS: HSA=solid/hollow stem auger R = WC = water content of consolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=	city Index				
Sample Information							1			-				
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength	(psf) or RQD (%)	N-uncorrected	09-N	Casing	Elevation	(ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results	
0								SSA	4					
							_	\vdash	+	deli del		1D: Red tan, damp, loose, fine to medium SAND, trace Silt.		
	1D	24/19	2.0 - 4.0	3-3-	3-3	6	6					SAND		
									$\overline{/}$					
- 5 -								$\frac{V}{a}$		ala la		2D: Orange tan, moist to wet, m. dense, fine to medium SAND,		
	2D	24/17	5.0 - 7.0	5-7-	9-8	16	16	22				trace Silt, trace coarse Sand.		
								19						
								34						
								20						
								30						
- 10 -								32						
10	3D	24/11	10.0 - 12.0	2-3-	3-4	6	6	12		dida.		3D: Orange tan, loose, fine to medium SAND, trace Silt, trace coarse Sand.		
								16						
								21		i i i i i i i i i i i i i i i i i i i				
								31						
								38		32.0		— — — — — — — — — — — — — — — — — — —		
- 15 -								\vdash	-			Olive brown, slightly mottled, Clayey SILT, some fine SAND as		
	4D	24/24	15.0 - 17.0	2-1-	1-1	2	2	PUS	H 8	30.5		Partings and seams; changing at 15.5 ft to:		
												4D: Grey, soft, CLAY & SILT, trace very fine Sand with numerous		
												seams and partings of Silty fine SAND and one 1-inch seam black, fine to medium SAND, some Silt.		
								\vdash	\dashv					
									/					
- 20 -	5D	24/17	20.0 - 22.0	VANE IN	TERVAL			PUS	Н			5D: Grey, Silty CLAY, trace very fine Sand with multiple seams		
	5D V1		20.0 - 22.0 20.6 - 21.0	Su= 343	/ 14 psf			. 00	-			and partings Silty fine SAND. V1: Tu=12.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)		
	V2		21.6 - 22.0	Su= 385	5/ 0 psf							V2: Tu=14 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
								\vdash	\dashv					
25	25]													
Stratifi		-	nt approximate bou				-	-				Page 1 of 2		
* Wate	er level rea	dings have ime meas	e been made at tim urements were ma	es and under de.	conditions state	ed. Gro	oundwate	r fluctu	ations m	nay occ	cur due	Boring No.: HB-KBUN	<-105	

			Schonewali)	PROJI	ECT:	Kenr	nebunl	k Serv	ice F	Plaza Expansion Boring No.: H	B-KBUNK-10	5
	Engineering						Main	e Turr	npike I				
	ASSOCIATES, INC. LOCATION								k, ME		•		
Drille	, ,				_	evation	(ft.)		(est'd)	Core Barrel: N/A			
<u> </u>	'			_	tum:		NAVD			dard Split-Spoon			
	ged By:		Schonewald	=/4.4		+	Type:		Mobil	_			
	Start/Fi		7/10/18; 1340	-7/11/18; C	0805	_	illing M				· · · · ·	cathead	
Borii	ng Loca	tion:	per plan			_	sing ID		HW t		Hammer Efficiency: 0.60		
IN-SIT	U SAMPLI	NG AND T	ESTING:		ADDITIONAL		ger ID/	OD:	SSA		Water Level*: 5.8 ft	t (open) Ts:	
	lit Spoon S		oon Sample atter	not	N-uncorrecte N ₆₀ = N valu			ımmer effi	iciency		H = weight of 140lb. hammer AASHTO / USCS soil class: R = weight of rods -#200 = percent fines W	ifications /C = water content (%)	
U = Th	in Wall Tul	oe Sample	all Tube Sample a		hammer effic S _U = Insitu F	iency =	calculated	d hammer	efficiency	=	not recorded CONSOL= 1-D consolidation REHOLE ADVANCEMENT METHODS: UU=Unconsolidated undrain	n test	
V = Ins	itu Vane S	hear Test	ane Shear Test at	•	R = Rock Co RQD = Rock	re Samp	ole		201)	SSA	VHSA=solid/hollow stem auger LL=Liquid Limit / PL=Plastic eroller cone/OPEN/PUSH=hydraulic push UCT qp = peak compressiv	Limit / PI=Plasticity Inde	lex
IVIV – C	nsuccessi	ui irisitu va			formation	Quality	Designati	011 (76)		I RC	roller cone/OPEN/POSH=nydraulic push OCT qp = peak compressiv	3 Strength of rock	
		(in.)	t t	·		þa				1_		Ι.	
t.)	Sample No.		Det	lu 9	ر %	N-uncorrected	rect		<u> </u>	Graphic Log	Visual Description and Remarks		Lab. esting
Depth (ft.)	nple	Pen./Rec.	l ple	vs (th (C)	JCOL		ing	/atic	phic	·	Re	esults
	San	Pen	Sample Depth (ft.)	She	Strength (psf) or RQD (%)	ž	09-N	Casing Blows	Elevation (ft.)	Gra			
25	6D V3	24/24	25.0 - 27.0 25.6 - 26.0		NTERVAL 3/ 82 psf						6D: Grey, Silty CLAY with multiple seams fine SAND V3: Tu=20.5 / Tr=3 ft-lbs (65 mm x 130 mm vane)	, some Silt.	
	V4		26.6 - 27.0	Su= 49	94/ 0 psf				69.0		V4: Tu=18 / Tr=0 ft-lbs (65 mm x 130 mm vane)		
								27.0- I surface.					
									1		No refusal.		
- 30 -													
30													
									1				
- 35 -													
- 40 -													
40													
									\cdot				
									1				
									1				
- 45 -									1				
									ŀ				
									1				
									-				
_ 50 _													
Rem	arks:												
Stratifi	cation line	s represent	t approximate bou	indaries between	een soil types;	transitio	ns may be	gradual.			Page 2 of 2		
* Wate	er level rea	dings have	been made at tim	nes and under	r conditions sta	ted. Gr	oundwate	r fluctuation	ons may o	ccur du	e to conditions other than those Boring No.: H	B-KBI INK-10)5
pres	on at the t	e measu	nomento were ma	wc.							5011119 140 11	2 120141/-10	,

Driller: Nove England Borray Contractors Blavellon (RL) Borra Enterplies MM 25 Core Barrel: NA NA SANSCONTS, NA				CHONEWALE NGINEERING		PROJE	CT:					laza Expansion Boring No.: HB-KBUN	
Operation: Ope			==			LOCATI	ON:					Proj. No.:18-01	8
Depth Start	<u> </u>					ractors	+-		(ft.)		· ,		
Date StartPrivate C27716 L105 1650 Dilling Method: cased west biolog Harmer Type: ry set sinesed Berrial Location: por plays Date Dilling Method: cased west biolog Harmer Type: ry set sinesed Dilling Method: cased west biolog Harmer Type: ry set sinesed Dilling Method: cased west biolog Harmer Type: ry set sinesed Dilling Method: cased west biolog Harmer Type: ry set sinesed Dilling Method: cased west biolog Dilling Method:	⊢÷-				S		+-						oon
					1650		_		-4l d.				
Name August Aug					-1050		+						
Application	Boili	Zoring Zoodiloin Per press											
Mor Intercontact for the Search and Pages Search and Pages Search Annual Control of Normal Control				ESTING:			EFINIT	TIONS:			ADDI	TIONAL DEFINITIONS: LABORATORY TEST RESULTS:	
Table Testing Testin	MD = U U = Th MU = U V = Ins	Jnsuccessi in Wall Tub Jnsuccessi itu Vane S	ful Split Spo be Sample ful Thin Wa hear Test	Il Tube Sample at	ipt I Itempt S tempt I	N_{60} = N value hammer efficie S_u = Insitu Fie R = Rock Core RQD = Rock 0	e correct ency = c eld Vanc e Samp	cted for ha calculated e Shear S ble	trength (p	efficienc	WO y = BOF SSA	R = weight of rods -#200 = percent fines WC = water cont of recorded CONSOL= 1-D consolidation test LEHOLE ADVANCEMENT METHODS: UU=Unconsolidated undrained triaxial test LU=Liquid Limit / PL=Plastic Limit / Pl=Plastic	sticity Index
10: Brown, dry to damp, Sitly fine to medium SAND with two please gravel. Fill. 10: 24/7							N-uncorrected	N-uncorrected N-60 Casing Blows			Graphic Log	Visual Description and Remarks	Testing
10 247 23-40 96-53 11 11 11 11 12 12 13 14 12 14 14 14 14 15 15 15 15	0								HSA				
10 247 23-40 96-53 11 11 11 11 12 12 13 14 12 14 14 14 14 15 15 15 15													
20		1D	24/7	2.0 - 4.0	6-8-3-	-3	11	11		-			SM -#200=21.3%
20	_												
20		2D	24/17	5.0 - 7.0	2-1/12'	"-3	1	1					9
30 24/16 70.98 1.348 11 11 11 88.4 2D-X: Dark brown, PEAT and ORGANIC SILT. changing at 7.8 ft 10:		2D-A	/									ft to:	
10		3D	24/16	7.0 - 9.0	1-3-8-	-8	11	11			(2000)	2D-A: Dark brown PEAT and ORGANIC SILT	F
3D. Crey, fine SAND, little Sitt, grading at 7.9 ft to tan, fine to medium SAND, trace Sitt. SAND 4D. 24/20 10.0-12.0 2-6-8-7 14 14 14 14 15 15 15 15 15 15 15 15 15 15 15 15 15												\to:	<u></u>
4D 2420 10.0 - 12.0 2-6-8-7 14 14 14												3D: Grey, fine SAND, little Silt; grading at 7.9 ft to tan, fine to	
### SD: Split-spoon sampler locked in augers by blowing sand. Pull augers; continue as cased wash boring. Unable to retrieve sample. 15	- 10 -	4D	24/20	10.0 - 12.0	2-6-8-	-7	14	14					
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. 18 18 18 18 18 18 18 1										-		4450 5.11.	
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. 18 18 18 18 18 18 18 1													
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. 18 18 18 18 18 18 18 1									\ /				
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Stratification lines represent approximate boundaries between soil types; transitions may be gradual. 18 18 18 18 18 18 18 1									\mathbb{H}				
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. 18 ft. Olive brown silt-clay observed in wash water. 19.5 ft. Grey sandy silt-clay observed in wash water. 19.5 ft. Grey sandy silt-clay observed in wash water. 19.5 ft. Grey sandy silt-clay observed in wash water. 6D: Dark, grey with black, v. soft, Silty CLAY, little to some fine to medium Sand as multiple pockets and seams. INTERBEDDED MARINE SILT AND SANDS 11 12 25 Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual.	- 15 -	5D	24/0	15.0 - 17.0	7-8-11	1-7	19	19	V				
Table 1 18 ft: Olive brown silt-clay observed in wash water. 18 ft: Olive brown silt-clay observed in wash water. 19.5 ft: Grey sandy silt-clay observed in wash water. 6D: Dark, grey with black, v. soft, Silty CLAY, little to some fine to medium Sand as multiple pockets and seams. INTERBEDDED MARINE SILT AND SANDS 11 12 25 Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 3									18				
18 ft: Olive brown silt-clay observed in wash water. 19.5 ft: Grey sandy silt-clay observed in wash water. 19.5 ft: Grey sandy silt-clay observed in wash water. 6D: Dark, grey with black, v. soft, Silty CLAY, little to some fine to medium Sand as multiple pockets and seams. INTERBEDDED MARINE SILT AND SANDS 11 12 25 Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 3									16	-			
20 6D 24/24 20.0-22.0 WOR/18"-WOH 0 0 10									16	78.0			-
6D: Dark, grey with black, v. soft, Silty CLAY, little to some fine to medium Sand as multiple pockets and seams. INTERBEDDED MARINE SILT AND SANDS A-4(5) CH-2200=84.2% WC=32.1% LL=24.6 PL=16.7 Pl=7.9 Stratification lines represent approximate boundaries between soil types; transitions may be gradual.									17	1		19.5 ft: Grey sandy silt-clay observed in wash water.	
WC=32.1% LL=24.6 PL=16.7 Pl=7.9 Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 3	20 -	6D	24/24	20.0 - 22.0	WOR/18"-	-wон	0	0	10	1		6D: Dark, grey with black, v. soft, Silty CLAY, little to some fine to medium Sand as multiple pockets and seams. INTERBEDDED	CL
25 Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Pi=7.9 Pi=7.9 Page 1 of 3									11			MARINE SILT AND SANDS	WC=32.1%
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 3									13				
Remarks: Stratification lines represent approximate boundaries between soil types; transitions may be gradual. Page 1 of 3									12				
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. ***The property of the	25	25 11 25											
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made. **Boring No.: HB-KBUNK-106*			s represent	approximate bour	ndaries betwee	n soil types; tr	ransition	ns may be	gradual.			Page 1 of 3	
	* Wate	er level readent at the t	dings have	been made at tim	nes and under o	onditions state	ed. Gro	oundwate	fluctuation	ons may	occur du	e to conditions other than those Boring No.: HB-KBUN	IK-106

			Schonewali)	PROJE	CT:	Kenr	ebunk	(Ser	vic	e P	laza Expansion	Boring No.: _	HB-KBUN	<-106
			Engineering				Main	e Turr	npike	M			Proj. No.:	18-018	3
Drille			Associates, I		LOCATI						ot'd)		Core Barrel:	N/A	
	ator:		New England Schaefer/ Titu		ntractors	_	vation tum:	(π.)	NAV	<u> </u>	st'd)		Sampler:	Standard Split-Spo	on
⊢-	ged By:		Schonewald	13		+-	Type:					B-53	Hammer Wt./Fall:		JOI1
	Start/Fi		6/27/18; 1015	-1650		_	Iling M					boring	Hammer Type:	rope & cathead	
Borii	ng Locat		per plan			+	sing ID		HW			<u> </u>	Hammer Efficienc	y: 0.60	
						Au	ger ID/0	OD:	HSA	A to	15'		Water Level*:	6.3 ft (approx)	
D = Sp MD = U U = Th MU = U V = Ins	in Wall Tub Insuccessf itu Vane Sl	ample ul Split Sp e Sample ul Thin Wa hear Test	oon Sample attem all Tube Sample a	ttempt tempt	ADDITIONAL E N-uncorrected N ₆₀ = N value hammer effici S _U = Insitu Fie R = Rock Corr RQD = Rock Information	d = N va e correct ency = o eld Vano e Samp	alue sted for ha calculated e Shear S ale	I hammer strength (p	efficien		WOF WOF = r BOR SSA	"IONAL DEFINITIONS:	LL=Liquid Limit / PL	oil classifications as WC = water content solidation test d undrained triaxial test =Plastic Limit / PI=Plasti	city Index
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation	(11.)	Graphic Log	Visual D	escription and Remark	as	Lab. Testing Results
25	7D	24/23	25.0 - 27.0		2"-2-2	2	2	21				7D: Dark grey, v. loose, little very fine Sand; and			
								22							
								26		经经验					
								20							
- 30 -								24				OD, Dark gray laces inte	torboddod fino CAND	little Cilt. Cilt. fine	A-4(0)
	8D	24/20	30.0 - 32.0	2-2	2-4-2	6	6	27				8D: Dark grey, loose, int SAND; and fine to media inch seams Silty CLAY.	um SAND, little to som		ML -#200=82.3%
								24				men seams only OEXT.			WC=28.5% LL=NV PL=NP
								26							<u>PI=NP</u>
								24							
- 35 -								28				9D: Top 10 inches samp	ole: Dark grev. interbed	Ided, fine SAND.	
	9D	24/19	35.0 - 37.0	1/	24"	0	0	25	60.	.0	10	little Silt; and Silty fine S	AND. — — — — — — —	- — — — —36.0 ⁻	
								23				9D (cont'd): Bottom 9 inc MARINE SILT-CLAY	ches of sample: Dark o	grey, Silty CLAY.	
								20							
								23							
- 40 -								24				10D: Olive grey, v. soft,	Silty CLAY, with one 1	-1/2-inch seam	CL
	10D	24/18	40.0 - 42.0	wo	R/24"	0	0					Silty fine SAND.			WC=41.1% LL=36.7 PL=23.4
									54.	.0	77.P.	42.0 ft: Hydraulic push rosoil.	ods as probe to estima	42.0 ate bottom of soft	<u>PI=13.3</u>
- 45 -															
50 Rem	arks:						<u> </u>								
			approximate bou				-	_					Page 2 of 3		
* Wate pres	er level read ent at the ti	dings have me measu	been made at tim rements were ma	nes and unde ide.	r conditions stat	ed. Gro	oundwate	r fluctuatio	ns may	occi	ur due	to conditions other than those	Boring No	.: HB-KBUNI	<-106

			Schonewald		PROJE	CT:					Plaza Expansion	Boring No.: HB-KBUN	<-106
		==	Engineering Associates, ^I		LOCATION	ON:			ipike N c. MF	/M 2	25	Proj. No.: 18-018	3
Drille	<u>———</u> er:		New England				vation		96 ft (est'd)		Core Barrel: N/A	
Oper	ator:		Schaefer/ Titu			+	tum:	. ,	NAVD8	_		Sampler: Standard Split-Spo	on
Logo	ged By:		Schonewald			Rig	Type:		Mobile	e Drill	B-53	Hammer Wt./Fall: 140 lbs/ 30 in	
	Start/Fi	nish:	6/27/18; 1015-	-1650		+	lling Me				n boring	Hammer Type: rope & cathead	
	ng Locat		per plan			+	sing ID		HW to		<u> </u>	Hammer Efficiency: 0.60	
	<u> </u>		· ·			+	ger ID/0		HSA t			Water Level*: 6.3 ft (approx)	
	U SAMPLI		TESTING:		ADDITIONAL D	EFINIT	IONS:			ADDI	TIONAL DEFINITIONS:	LABORATORY TEST RESULTS:	
	lit Spoon S Jnsuccessf		oon Sample attem	pt	N-uncorrected N ₆₀ = N value			mmer effic	ciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte	nt (%)
	in Wall Tub		all Tube Sample at	temnt	hammer efficie S _{II} = Insitu Fie						not recorded REHOLE ADVANCEMENT METH	CONSOL = 1-D consolidation test IODS: UU=Unconsolidated undrained triaxial test	
V = Ins	itu Vane Sl	hear Test	•	-	R = Rock Core	Samp	le		51)	SSA	/HSA=solid/hollow stem auger	LL=Liquid Limit / PL=Plastic Limit / PI=Plasti	
MV = C	Insuccessi	ui insitu V	ane Shear Test att		RQD = Rock C	luality I	Designation	on (%)		RC=	Froiler cone/OPEN/PUSH=nydraul	lic push UCT qp = peak compressive strength of rock	ζ
		<u>-</u>		•		р							
_	9	. (in.)	Sample Depth (ft.)	.⊑	Strength (psf) or RQD (%)	N-uncorrected			_	o-	Viewel D	and Demonstra	Lab.
Depth (ft.)	Sample No.	Pen./Rec.	l e	9) :	gth C	COLLE		و <u>«</u>	Elevation (ft.)	Graphic Log	Visual D	escription and Remarks	Testing Results
epth	amb	en./	amp (:	lows	sf)	μη	N-60	Casing Blows	leva	rapt			
50	ű	ď	ÿ €	画 ある	ত ও ত	Ż	Ż	ÖΞ	⊞₩	Ō			
50													
- 55 -													
- 60 -													
- 65 -													
			+ -		+								
- 70 -													
			+ -										
									22.0		Bottom of Evaloration	74.0-	
_ 75 _	لـــا										Rod probe fetches up; p	n at 74.0 feet below ground surface. robable bottom of soft soil; no refusal.	
<u>iveiil</u>	arks <u>:</u>												
Stratifi	cation lines	s represen	t approximate bou	ndaries betw	een soil types; tra	ansition	ns may be	gradual.				Page 3 of 3	
* Wate	er level read	dings have	e been made at tim	es and unde	r conditions state	d. Gro	undwater	r fluctuatio	ns may oc	cur due	e to conditions other than those	Poring No. LID VOLINI	Z 106
pres	ent at the ti	me measi	urements were ma	de.					-			Boring No.: HB-KBUN	N-100

			SCHONEWALE Engineering				Main	e Tur	npike	MM	Plaza Expansion Boring No.: HB-KBUNK-2 Proj. No.: 18-018	107
Drille	ar.		Associates, I		LOCATI		Kenr vation			ft (es	'd) Core Barrel: N/A	
	ator:		Schaefer/ Titu		iliaciois	+	tum:	(11.)	NAVI		Sampler: Standard Split-Spoon	
<u> </u>	ged By:		Schonewald			+-	Type:				I B-53 Hammer Wt./Fall: 140 lbs/ 30 in	•
	Start/Fi	nish:	6/27/18; 1720	-6/28/18: 1	300	_	Iling M				h boring Hammer Type: rope & cathead	
	ng Loca		per plan			_	sing ID			to 40'	Hammer Efficiency: 0.60	
						+	ger ID/			to 5'	Water Level*:	
D = Sp MD = U U = Th MU = U V = Ins	lit Spoon S Jnsuccess in Wall Tul Jnsuccess itu Vane S	Sample ful Split Spoe Sample ful Thin Working Test	all Tube Sample at	npt ttempt	N-uncorrected N ₆₀ = N value hammer effici S _u = Insitu Fic R = Rock Cor RQD = Rock	d = N va e correct ency = o eld Vand e Samp	alue eted for ha calculated e Shear S ele	d hamme Strength (r efficienc	W W y B(ITIONAL DEFINITIONS: LABORATORY TEST RESULTS: ASHTO / USCS soil classifications PRE weight of rods not recorded CONSOLE 1-D consolidation test CONSOLE 1-D consolidation test UE HOLE ADVANCEMENT METHODS: AHSA-Soild/hollow stem auger LL=Liquid Limit / PL=Plastic Limit / Pl=Plasticity EFFOIEr cone/OPEN/PUSH=hydraulic push	•
				Sample In	formation				,			
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log		Lab. Testing Results
0								SSA		\otimes		
- 5 -									- 81.	\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	2.0 ft: Unable to drive spoon past 2.5 ft; spoon and augers walking; fill material, including asphalt in spoon. FILL 5.0-	
	1D	24/22	5.0 - 7.0	1-1-	2-3	3	3	PUSH	1		1D: Dark brown, damp to moist, v. loose, fine Sandy ORGANIC SILT with one tree root. ORIGINAL GROUND	
								35	79.		5	
								33	4			
								67				
								58				
- 10 -									-		2D: Olive brown, damp to moist, stiff, Clayey SILT, little to some	
	2D	24/18	10.0 - 12.0	4-6-	.5-4	11	11	32	1		fine to medium Sand as seams, partings, and pockets. MARINE SILT-CLAY CRUST Grading at 11.8 ft to:	
								28	74.	7 4		
								25	1		2D (cont'd): Grey, Silty CLAY, trace very fine Sand. MARINE SILT-CLAY	
									-	Ŋ,	SILT-CLAY	
								25		1/2		
								23				
- 15 -	3D	24/24	15.0 - 17.0	WOR/12	'-WOH-1	0	0	PUSH			3D: Dark grey with few black streaks, v. soft, Silty CLAY with numerous seams fine to medium SAND, some Silt.	
]			
								1	1			
- 20 -	4D	24/16	20.0.000	VANE IN	TED\/AI			PUSH	1		4D: Dark grey with occasional black, Silty CLAY with one seam	
	4D V1	24/16	20.0 - 22.0 20.6 - 21.0	VANE IN Su= 371	/ 27 psf			FUSF	4		fine to medium SAND, some Silt. V1: Tu=13.5 / Tr=1 ft-lbs (65 mm x 130 mm vane)	
	V2		21.6 - 22.0	Su= 316	6/ 14 psf]		V2: Tu=11.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	
									1			
									1			
							<u> </u>	\vdash	4			
25								$ \bigvee $	1			
Stratifi		•	nt approximate bou				-	-			Page 1 of 3	
* Wate	er level rea ent at the t	dings hav ime meas	e been made at tim urements were ma	nes and under de.	conditions stat	ed. Gro	oundwate	r fluctuat	ions may	occur o	Boring No.: HB-KBUNK-	107

			Schonewald)	PROJE	CT:	Kenr	ebunl	Sen	/ice F	Plaza Expansion Boring No.: HB-KBUNK	(-107
		==	Engineering					e Turr				
			Associates, I		LOCATI						•	
Drille			New England		ntractors	+	vation	(ft.)		ft (est'		
⊢-	rator:		Schaefer/ Titu	s		+	tum:		NAVI	ile Drill	Sampler: Standard Split-Spc B-53 Hammer Wt./Fall: 140 lbs/ 30 in	on
— <u> </u>	ged By: Start/Fi		Schonewald 6/27/18; 1720	6/29/19: 1	300	_	Type:					
_	ng Loca		per plan	-0/20/10, 1	300	+	sing ID			to 40'	h boring Hammer Type: rope & cathead Hammer Efficiency: 0.60	
- Bo	ng Loca		per plan			+	ger ID/		SSA		Water Level*:	
	U SAMPLI		ESTING:		ADDITIONAL I	DEFINIT	IONS:			ADDI	TIONAL DEFINITIONS: LABORATORY TEST RESULTS:	
MD = I U = Th MU = I V = Ins	in Wall Tul Jnsuccessi situ Vane S	ful Split Sp be Sample ful Thin Wa hear Test	all Tube Sample at ane Shear Test att	tempt empt	N-uncorrected N ₆₀ = N value hammer effici S _u = Insitu Fic R = Rock Cor RQD = Rock	e correct ency = c eld Vanc e Samp	ted for ha calculated e Shear S le	d hammer Strength (p	efficienc	WO y = BOI SSA	H = weight of 140lb. hammer AASHTO / USCS soil classifications #200 = percent fines WC = water contex CONSOL=1-D consolidation test REHOLE ADVANCEMENT METHODS: UH=Unconsolidated undrained triaxial test VHSA=solid/hollow stem auger UH=Liquid Limit / PL=Plastic Limit / Pl=Plastic FOIler cone/OPEN/PUSH=hydraulic push UCT qp = peak compressive strength of rock	city Index
		·		•	formation	70				1		
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
25	5D V3	24/24	25.0 - 27.0 25.6 - 26.0	VANE IN	NTERVAL 2/ 14 psf			PUSH			5D: Dark grey, Silty CLAY, trace very fine Sand grading to olive grey, Silty CLAY.	
	V4		26.6 - 27.0		8/ 14 psf						V3: Tu=11 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) V4: Tu=10.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	
								\/				
- 30 -											6D: Olive grey, Silty CLAY.	
	6D V5	24/22	30.0 - 32.0 30.6 - 31.0	VANE IN Su= 42	NTERVAL 6/ 14 psf			PUSH			V5: Tu=15.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	
	V6		31.6 - 32.0	Su= 41	2/ 14 psf						V6: Tu=15 / Tr=0.5 ft-lbs (65 mm x 130 mm vane)	
- 35 -	7D V7 V8	24/0	35.0 - 37.0 35.6 - 36.0 36.6 - 37.0	Su= 48	ITERVAL 1/27 psf 5/27 psf			PUSH			7D: No recovery. V7: Tu=17.5 / Tr=1 ft-lbs (65 mm x 130 mm vane) V8: Tu=14 / Tr=1 ft-lbs (65 mm x 130 mm vane) 8D: Dark grey, Silty CLAY.	
	8D V9	24/22	40.0 - 42.0 40.6 - 41.0	VANE IN Su= 48	NTERVAL 1/27 psf						V9: Tu=17.5 / Tr=1 ft-lbs (65 mm x 130 mm vane)	
- 45 -	V10		41.6 - 42.0	Su= 45:	3/ 14 psf				44.5		V10: Tu=16.5 / Tr=0.5 ft-lbs (65 mm x 130 mm vane) 42.0 42.0 ft: Hydraulic push rods as probe to estimate bottom of soft soil.	
50												
	arks:	1	1									
Chu-1'	ination !:-	0.0000	t opprovimets b	ndarias hat	oon gell beer	ron olai-	00 ma:k	gradu-1			Page 2 of 2	
١.			t approximate bou				-	-			Page 2 of 3	
^ Wate pres	er level rea ent at the t	dings have ime meast	been made at tim urements were ma	es and under de.	r conditions stat	ed. Gro	oundwate	r fluctuatio	ons may	occur du	e to conditions other than those Boring No.: HB-KBUNH	<-107

			Schonewale)	PROJE	CT:	Kenn	ebunk	(Servi	ce P	laza Expansion	Boring No.: _	HB-KBUN	<-107
			Engineering				Main	e Turr	npike N			Proj. No.:	18-018	3
			Associates, ^I	NC.	LOCAT	ON:	Kenr	ebunk	k, ME					
Drille	er:		New England	Boring Co			vation		86.5 f	t (est'c	d)	Core Barrel:	N/A	
Oper	rator:		Schaefer/ Titu	ıs		Dat	tum:		NAVD8	38		Sampler:	Standard Split-Spo	oon
Logg	ged By:		Schonewald			Rig	ј Туре:		Mobile	e Drill	B-53	Hammer Wt./Fall:	140 lbs/ 30 in	
Date	Start/Fi	nish:	6/27/18; 1720	-6/28/18; <i>1</i>	1300	Dri	lling Me	ethod:	cased	wash	boring	Hammer Type:	rope & cathead	
Borii	ng Locat	tion:	per plan			Ca	sing ID	OD:	HW to	40'		Hammer Efficienc	y: 0.60	
						Au	ger ID/0	DD:	SSA t	o 5'		Water Level*:		
D = Sp MD = U U = Th MU = U V = Ins	iin Wall Tub Jnsuccessf situ Vane Sl	ample ful Split Sp se Sample ful Thin Wa hear Test	ooon Sample attem all Tube Sample at ane Shear Test att	ttempt tempt	ADDITIONAL N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu Fi R = Rock Col RQD = Rock	d = N va e correctiency = o eld Vanore Samp	alue sted for ha calculated e Shear S ale	hammer trength (p	efficiency	WOF = r BOR SSA	TIONAL DEFINITIONS: 1 = weight of 140lb. hammer 2 = weight of rods not recorded KEHOLE ADVANCEMENT METH H/SA-Solid/hollow stem auger roller cone/OPEN/PUSH=hydraul	LL=Liquid Limit / P	oil classifications es WC = water conte asolidation test d undrained triaxial test L=Plastic Limit / PI=Plasti	city Index
					nformation									
S Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear	Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual D	escription and Remar	ks	Lab. Testing Results
50									33.2				 53.3-	
- 55 -									55.2		Bottom of Exploratio Rod probe fetches up; p	n at 53.3 feet below g robable bottom of soft	round surface.	
- 60 -														
- 65 -														
- 70 - - 75 _ Rem	arks:													
Stratifi	ication lines	dings have	it approximate bou e been made at tim urements were ma	nes and unde					ns may oo	ccur due	e to conditions other than those	Page 3 of 3 Boring No	o.: HB-KBUNI	K-107

			Schonewale	,			1,				Plaza Expansion Boring No.: HB-KBUNK-10	<u> </u>
			Engineering		PROJE							0
			Associates, I		LOCATION			e Turi			²⁵ Proj. No. : <u>18-018</u>	
Drille			New England				vation			(est'd) Core Barrel: N/A	
Oper			Schaefer/ Titu		tractors	+	um:	(11.)	NAV	•	Sampler: Standard Split-Spoon	
⊢÷-	ed By:		Schonewald	<u> </u>		+ -	Type:			ile Dril		
	Start/Fi	inich:	7/9/18; 1005-1	1255		-		ethod:			h boring Hammer Type: rope & cathead	
_	ng Loca		per plan	1233		-	sing ID			to 25'	Hammer Efficiency: 0.60	
Born	ig Loca	uon.	per piari			+	ger ID/			to 5'	Water Level*: 3.4 ft (open)	
IN-SIT	U SAMPL	ING AND	TESTING:	A	DDITIONAL D			JD.	007		ITIONAL DEFINITIONS: LABORATORY TEST RESULTS:	
MD = U U = Thi MU = U V = Ins	in Wall Tul Insuccess itu Vane S	ful Split Split Split Split Split Sample ful Thin William Test	all Tube Sample at ane Shear Test att	ipt itempt iempt	N-uncorrected $N_{60} = N$ value hammer efficie $S_U = Insitu$ Fiel $R = Rock$ Core $RQD = Rock$ Q	correct ency = could ld Vane Sampl	ted for ha calculated Shear S le	l hammer strength (p	efficiend	wc sy = BO SS	DH = weight of 140lb. hammer AASHTO / USCS soil classifications PR = weight of rods RE + weight of rods REHOLE ADVANCEMENT METHODS: A/HSA=solid/hollow stem auger Froller cone/OPEN/PUSH=hydraulic push AASHTO / USCS soil classifications WC = water content (%) CONSOL= 1-D consolidation test UU=Unconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plasticity Independent of the content of	lex
				Sample Inf		_ 1		1		+		
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strenath	(psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks Te	Lab. esting esults
0								S\$A				
											축	
	1D	24/15	2.0 - 4.0	1-3-5	5-5	8	8		-		1D: Red brown, damp to moist, loose, fine to medium SAND, little	
- 5 -	2D	24/13	5.0 - 7.0	1-1-7	-10	8	8	PUSH	-		Red brown, wet, loose, interbedded, fine to medium SAND, trace to little Silt; and ORGANIC SILT. Changing at 6.5 ft to:	
									82.	5	2D: Grey tan, wet, fine SAND, trace Silt. Strong petroleum odor. SAND	
								26				
								20	-			
40								28				
- 10 -	3D	24/14	10.0 - 12.0	3-6-5	5-8	11	11	15			Grey tan, fine to medium SAND, little Silt, trace coarse Sand; changing at 11. 6 ft to:	
								21	77.	4 997		
								25			3D: Olive brown, mottled, Clayey SILT, little to some fine to medium Sand as seams and partings. MARINE SILT-CLAY	
								23			CRUST	
								26	1			
- 15 -	4D	24/24	15.0 - 17.0	1/12"-	-1-1	1	1	PUSH			4D: Grey, v. soft, CLAY & SILT, little fine Sand as pockets, partings, and seams.	
									73.			
									-			
- 20 -	5D	24/24	20.0 - 22.0	WOR	/24"	0	0	PUSH	-		5D: Grey with occasional black, v. soft, Silty CLAY with occasional partings of very fine SAND, some Silt. MARINE SILT-CLAY	
25												
Loc	ated dov		ent from former			ansition	ns may be	e gradual.		VI/ F.	Page 1 of 2	
* Wate	r level rea	dings hav	e been made at tim	nes and under	conditions state	d. Gro	undwate	r fluctuation	ons may	occur dı	Boring No.: HB-KBUNK-10	18
prese	ent at the t	urne meas	urements were ma	ue.							Dolling No TID-NDUNN-10	,0

			Schonewali	n	DD 0 15		17		_			Boring No.:	HB-KBUN	<_1∩8
			Engineering		PROJE	:C1:			k Serv npike ľ		Plaza Expansion	_		
			Associates, I		LOCATI	ON-				VIIVI 2	20	Proj. No.:	18-018	<u> </u>
Drille			New England				vation			(est'd)		Core Barrel:	N/A	
-					niliaciois	_		(11.)		, ,				
H	ator:		Schaefer/ Titu	ıs		+-	tum:		NAVD		D. 50	Sampler:	Standard Split-Spo	oon
	ged By:		Schonewald			+	Type:			e Drill		Hammer Wt./Fall:		
_	Start/Fi		7/9/18; 1005-	1255		+	lling M				n boring	Hammer Type:	rope & cathead	
Borii	ng Loca	tion:	per plan			+	sing ID		HW to			Hammer Efficience	:y: 0.60	
			FOTILIO		ADDITIONAL		ger ID/	OD:	SSA		TIGHT DEFINITIONS	Water Level*:	3.4 ft (open)	
	lit Spoon S	ING AND T Sample	ESTING:		N-uncorrected						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST AASHTO / USCS s		
		ful Split Spo be Sample	oon Sample atten	npt	N ₆₀ = N value hammer effici						R = weight of rods not recorded	-#200 = percent fin CONSOL= 1-D cor		nt (%)
MU = U	Jnsuccess ¹	ful Thin Wa	II Tube Sample a	ttempt	S _u = Insitu Fi	eld Van	e Shear S			BO	REHOLE ADVANCEMENT METH	ODS: UU=Unconsolidate	d undrained triaxial test	
	itu Vane S Insuccessi		ne Shear Test at	tempt	R = Rock Cor RQD = Rock	e Samp Quality	ile Designati	on (%)		SS/ RC:	NHSA=solid/hollow stem auger -roller cone/OPEN/PUSH=hydraul		L=Plastic Limit / PI=Plasti mpressive strength of rock	
					nformation								· •	
		(in.)	£	· ·		þ				_				
$\widehat{}$	Sample No.	 	Sample Depth (ft.)	i.e	Strength (psf) or RQD (%)	N-uncorrected			_	Graphic Log	Visual D	escription and Remar	ks	Lab. Testing
Depth (ft.)	<u>əl</u> e	Pen./Rec.	<u>e</u>	% :	gth DD (соп		gu s	Elevation (ft.)	ы	Viodai B	cooription and remai		Results
ept	am	en.	: a m	l ow	trer SSf)	ş	09-N	Casing Blows	: <u>e</u>	lap				
25	S		o €	<u>a</u> o	<u>ა ი ი</u>	z	z	ОВ	ш€	722	6D: Grey with occasiona	al blook v. coft. Ciltur	OLAY with multiple	
20	6D	24/24	25.0 - 27.0	wo)R/24"	0	0				partings and seams fine	to medium SAND, litt	le Silt.	
									1		' ĭ	,		
									62.0	142			27.0-	
											Bottom of Exploratio No refusal.	n at 27.0 feet below o	ground surface.	
											No reiusai.			
- 30 -									1					
- 35 -														
33														
									-					
									-					
- 40 -														
									1					
									1					
- 45 -									1					
									1					
50														
	arks:													
Loc	ated dov	vngradie	nt from forme	r remediati	ion system.									
		-			•									
Stratifi	cation line	s represent	approximate bou	undaries betw	veen soil types; t	ransitio	ns may be	gradual.				Page 2 of 2		
* Wate	er level rea	dings have	been made at tin	nes and unde	er conditions stat	ed. Gro	oundwate	r fluctuatio	ons may o	ccur du	e to conditions other than those	Boring No	. HB KDIIVII	√ 109
pres	ent at the t	time measu	rements were ma	ade.					-			Dorning No	.: HB-KBUNI	X-100

			CHONEWALE NGINEERING		PROJ	ECT:		nebunl e Turr			Plaza Expansion	Boring No.: _ Proj. No.:	HB-KBUNI 18-018	
			Associates, I		LOCAT	$\overline{}$	Kenr	nebun	к, МЕ					
Drille			New England		ntractors	+	evation	(ft.)		(est'd)		Core Barrel:	N/A	
⊢÷-	ator:		Schaefer/ Titu Schonewald	IS		_	tum:		NAVI	le Drill	D 52	Sampler: Hammer Wt./Fall:	Standard Split-Spo	oon
	ged By: Start/Fi		7/9/18; 1330 -	7/10/18: (1825	+-	g Type: illing M			_	n boring	Hammer Type:	rope & cathead	
	ng Loca		per plan	7710/10, 0	0020	+	sing ID			to 25'	1 borning	Hammer Efficienc		
	. <u>.</u>					+	ger ID/		SSA			Water Level*:	1.7 ft (open)	
	U SAMPLI	NG AND TI	ESTING:		ADDITIONAL N-uncorrecte						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST AASHTO / USCS s		
MD = l U = Th MU = l V = Ins	Jnsuccess in Wall Tul Jnsuccess itu Vane S	ful Split Spo be Sample ful Thin Wal hear Test	oon Sample attem Il Tube Sample at	ttempt tempt	N ₆₀ = N val hammer effi S _u = Insitu F R = Rock Co RQD = Rock	ue correc ciency = Field Van ore Samp	cted for ha calculated e Shear Sole	d hammer Strength (p	efficienc	WO y = BOF SSA	R = weight of rods not recorded REHOLE ADVANCEMENT METHO VHSA=solid/hollow stem auger roller cone/OPEN/PUSH=hydraulii	-#200 = percent fin CONSOL= 1-D cor ODS: UU=Unconsolidate LL=Liquid Limit / PI	es WC = water conte isolidation test d undrained triaxial test L=Plastic Limit / PI=Plasti	icity Index
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)		Strength (psf) or RQD (%)	N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual De	escription and Remarl	ks	Lab. Testing Results
0								SSA						
	1D	24/14	2.0 - 4.0	3-7	7-6-9	13	13				1D: Orange tan, wet, m. SAND	dense, fine to coarse	SAND, trace Silt.	
- 5 -	2D	24/19	5.0 - 7.0	2-5	5-4-6	9	9	3			2D: Orange tan, wet, loo Silt, trace coarse Sand.	se, fine to medium SA	AND, trace to little	A-3 SP -#200=2.6%
								5						WC=22.2%
								7						
								8						
								8	77.5				9.5-	
- 10 -	3D	24/24	10.0 - 12.0	wo	H/24"	0	0	PUSH	76.5		_ 3D: Olive grey, v. soft, C	LAY & SILT. MARINE	SILT-CLAY	
											CRUST Grading at 10.5 3D (cont'd): Grey with oc CLAY, trace to little fine to	casional black pocket	— — — —10.5- ts, v. soft, Silty artings and seams.	
											WANINE SILT-CLAT			
- 15 -								\vee			15.0 ft: Attempted vane s	shear test at 15.6 feet	; unable to push	
10	4D	24/17	15.0 - 17.0	(VANE	Ε)-1/18"	1	1	PUSH			past 15.4 ft. 4D: Grey, v. soft, Silty Cl CLAY and one 2-inch se			A-4(9) CL -#200=96.8% WC=40.7% LL=27.8
														PL=17.7 PI=10.1
- 20 -								$ \lor\downarrow$			5D: Grey, Silty CLAY wit	h occasional partires	fine SAND little	
	5D	24/24	20.0 - 22.0	VANE IN Su= 30	NTERVAL 12/ 14 psf			PUSH			Silt.	, ,		
					2/ 14 psf						V1: Tu=11 / Tr=0.5 ft-lbs V2: Tu=11 / Tr=0.5 ft-lbs	•	,	
25 Rem	arks:							$\square \bigvee$		VIII.	1			
Keiii	airs.													
Stratifi	cation line	s represent	approximate bou	indaries hetwo	een soil tynes:	transitio	ns mav he	e gradual				Page 1 of 3		
* Wate	er level rea	dings have	been made at tim	nes and unde			-	_	ons may	occur du	e to conditions other than those		ייאווס ואסוואיי	V 100
pres	ent at the t	ime measu	rements were ma	de.	22.30.10 00	31					The state of the s	Boring No	.: HB-KBUNI	K-109

			CHONEWALI		PROJE	CT:					Plaza Expansion	Boring No.: _		
		$\Box \Box A$	ngineering Associates, ⁱ	Inc.	LOCAT	ON:		e Turr nebunl		MM 2	<u> </u>	Proj. No.:	18-018	3
Drille	er:	1	New England	Boring Co	ntractors	Ele	evation	(ft.)	87 ft	(est'd)		Core Barrel:	N/A	
Oper	ator:		Schaefer/ Titu	ıs		Da	tum:		NAVD	88		Sampler:	Standard Split-Spo	on
Logg	jed By:	(Schonewald			Rig	g Type:		Mobil	e Drill	B-53	Hammer Wt./Fall:	140 lbs/ 30 in	
Date	Start/Fi	nish:	7/9/18; 1330 -	- 7/10/18; 0	0825	Dri	illing M	ethod:	case	d wash	n boring	Hammer Type:	rope & cathead	
Borir	ng Loca	tion: p	per plan			Ca	sing ID	/OD:	HW t	o 25'		Hammer Efficienc	y: 0.60	
						Au	ger ID/	OD:	SSA	to 5'		Water Level*:	1.7 ft (open)	
	U SAMPLI	NG AND T	ESTING:		ADDITIONAL I						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST		
MD = U U = Thi MU = U V = Insi	Jnsuccessi in Wall Tub Jnsuccessi itu Vane S	ful Split Spo be Sample ful Thin Wal hear Test	oon Sample atten Il Tube Sample a ne Shear Test at	ttempt	N-uncorrecte N ₆₀ = N valu hammer effic S _u = Insitu Fi R = Rock Col RQD = Rock	e correctiency = eld Van re Samp	cted for ha calculated e Shear Sole	d hammer Strength (p	efficiency	WO = BOI SSA	H = weight of 1401b. nammer R = weight of rods not recorded REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger eroller cone/OPEN/PUSH=hydrau	LL=Liquid Limit / P	es WC = water conte solidation test d undrained triaxial test =Plastic Limit / PI=Plasti	icity Index
IVIV - C	JIISUCCESSI	ui iiisitu va			nformation	Quality	Designati	OII (76)		KC-	-loller colle/OFEN/FOSH=Hydrau	iic pusii OC i qp – peak coi	ipressive strength of foci	
		(in.)				ō				1				
Depth (ft.)	Sample No.	Pen./Rec. (ir	Sample Depth (ft.)	Blows (/6 in. Shear	Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows	Elevation (ft.)	Graphic Log		escription and Remar	(S	Lab. Testing Results
25	6D	24/24	25.0 - 27.0	VANE IN	NTERVAL 0/ 27 psf						6D: Olive grey, Silty CL	AY.	,	CL WC=46.3%
											V3: Tu=16 / Tr=1 ft-lbs (65 mm x 130 mm van	e)	LL=37.5
				Su= 52	2/ 27 psf				60.0		V4: Tu=19 / Tr=1 ft-lbs (65 mm x 130 mm van		PL=21.3 <u>PI=16.2</u>
									00.0		27.0 ft: Hydraulic push r	ods as probe to estima	27.0 ate bottom of soft	
									1		soil.	p		
- 30 -									1					
									1					
- 35 -														
									1					
									1					
- 40 -									1					
									1					
									1					
- 45 -														
50								<u> </u>	<u> </u>					
Rema	arks:													
Stratific	cation lines	s represent	approximate bou	undaries between	een soil types: 1	ransitio	ns may be	e gradual.				Page 2 of 3		
			•				-	-		ccur du	e to conditions other than those		LIB IZELIU	
prese	ent at the t	ime measu	rements were ma	ade.	. Jonalions sta	.cu. Ul	Junuwale	i iiucidall(ono mdy 0	ooui üü	C to continuous outer than those	Boring No	.: HB-KBUNI	K-109

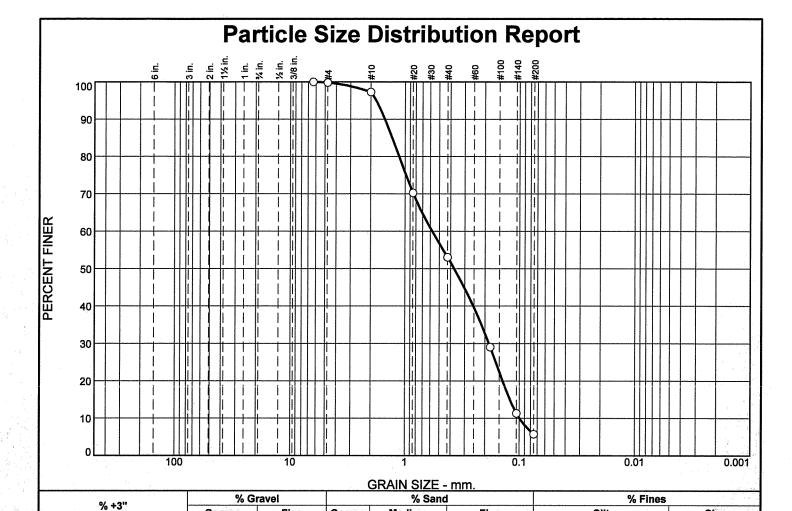
			Schonewald		PROJE	CT:	Kenr	ebunl	(Servi	ce P	Plaza Expansion	Boring No.:HB-KBUN	K-109
			Engineering				Main	e Turr	npike N			Proj. No. : 18-018	3
			Associates, I		LOCATI							-	
Drille			New England		ntractors	+	vation	(ft.)	87 ft (Core Barrel: N/A	
·	rator:		Schaefer/ Titu	S		+	tum:		NAVD		D. 50	Sampler: Standard Split-Spo	oon
	ged By:		Schonewald	7/10/10: (102E	+-	Type:	othod:	Mobile			Hammer Wt./Fall: 140 lbs/ 30 in Hammer Type: rope & cathead	
	Start/Fi		7/9/18; 1330 - per plan	7/10/16, 0	0020	+	Iling Mo		HW to		boring	Hammer Type: rope & cathead Hammer Efficiency: 0.60	
БОП	ng Locat	uon.	pei pian			+	ger ID/0		SSA t			Water Level*: 1.7 ft (open)	
	U SAMPLI		TESTING:		ADDITIONAL D	EFINIT	IONS:	JD.	30A t	ADDI	TIONAL DEFINITIONS:	LABORATORY TEST RESULTS:	
MD = L	lit Spoon S Jnsuccessf	ul Split Sp	oon Sample attem	pt	N-uncorrected N ₆₀ = N value			mmer effi	ciency		H = weight of 140lb. hammer R = weight of rods	AASHTO / USCS soil classifications -#200 = percent fines WC = water conte	nt (%)
	in Wall Tub		all Tube Sample at	tempt	hammer efficie S _U = Insitu Fie						not recorded REHOLE ADVANCEMENT METH	CONSOL= 1-D consolidation test IODS: UU=Unconsolidated undrained triaxial test	
	situ Vane SI		ane Shear Test att	temnt	R = Rock Core	e Samp	le		•	SSA	/HSA=solid/hollow stem auger	LL=Liquid Limit / PL=Plastic Limit / Pl=Plasti lic push UCT qp = peak compressive strength of rock	
					nformation	,							
		(in.)	pth	(:)		eq							Lab.
f.)	Sample No.		Sample Depth (ft.)	/6 in	Strength (psf) or RQD (%)	N-uncorrected			u.	Graphic Log	Visual D	escription and Remarks	Testing
Depth (ft.)	nple	Pen./Rec.	l pldn	ws (SQD (S	nco	0	Casing Blows	Elevation (ft.)	phic			Results
Dep	Sar	Per	San (ft.)	Blo	Stre (psf or F	Ž	09-N	Cas	(ft.)	Gra			
50													
- 55 -									31.8		Bottom of Exploration	55.2- n at 55.2 feet below ground surface.	
											Rod probe fetches up; p	robable bottom of soft soil; no refusal.	
- 60 -													
00													
- 65 -													
- 70 -							-						
			+ -										
75													
	arks:						•	•					
Cture 11.00	iontion !!-	roper	t approximat- b	ndarias tt	oon neil ter	oneili -	00 100 - 1	ared:				Page 3 of 3	
		•	t approximate bou				-	-			o to condition		
Wate	er level read ent at the ti	gings have ime measi	been made at tim urements were ma	ies and unde de.	r conditions state	ed. Gro	oundwate	r fluctuatio	ons may o	cur due	e to conditions other than those	Boring No.: HB-KBUN	K-109

			Schonewald Engineering)	PROJE	CT:			k Serv		Plaza Expansion Boring No.: HB-KBUNK-	
		==	Associates, I	NC.	OCATIO	ON:				IVIIVI 2	Proj. No.: 18-018	
Drille	er:		New England		actors	Ele	vation	(ft.)	no to	po-una	able to estimate Core Barrel: N/A	
Oper			Schaefer/ Titu	S		_	um:		NAVE		Sampler: Standard Split-Spoo	n
	ed By:		Schonewald	4005		-	Type:			le Drill		
	Start/Fi		7/10/18; 0910-	-1225		_	ling Mo		HW 1		h boring Hammer Type: rope & cathead Hammer Efficiency: 0.60	
ВОП	ig Loca	uon.	per plan			_	ing ID/ ger ID/0		SSA		Water Level*: 3.6 ft (open)	
			TESTING:		DITIONAL DI	EFINIT	IONS:		00/1	ADDI	TIONAL DEFINITIONS: LABORATORY TEST RESULTS:	
MD = U U = Th MU = U V = Ins	in Wall Tub Insuccesst itu Vane S	ful Split Sp be Sample ful Thin W hear Test	all Tube Sample at ane Shear Test att	pt N ₆ ha tempt S ₁ R empt R	uncorrected 60 = N value mmer efficie J = Insitu Fiel Rock Core DD = Rock Q	correct ncy = c d Vane Sampl	ed for ha alculated Shear S le	hamme trength (r efficienc	WO / = BOI SSA	H = weight of 140lb. hammer AASHTO / USCS soil classifications Reveight of rods #200 = percent fines WC = water content CONSOL = 1-D consolidation test WHSA=solid/hollow stem auger U=Uconsolidated undrained triaxial test LL=Liquid Limit / PL=Plastic Limit / Pl=Plasticit UCT qp = peak compressive strength of rock	
Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength		N-uncorrected	09-N	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
0								SSA		7777		
									1			
	1D	24/9	2.0 - 4.0	1/12"-1-4	1	1	1				1D: Dark brown, moist, v. loose, ORGANIC SILT AND PEAT, little fine Sand; sand content increases with depth. TOPSOIL/ SUBSOIL	
								\ /	1			
- 5 -	2D	24/19	5.0 - 7.0	4-7-8-11		15	15	5	1		2D: Grey tan grading to orange tan, wet, m. dense, fine to coarse SAND, trace to little Silt. SAND	
								13				
								22				
								28				
- 10 -								28			3D: No recovery.	
	3D	24/0	10.0 - 12.0	3-4-5-6		9	9	19			SD. No recovery.	
								19	-		12.0 ft: sample wash - Orange tan, fine to medium SAND, trace	
								16			Silt. 13.0 ft: Olive brown silt-clay observed in wash water.	
								17	1			
- 15 -	4D	24/24	15.0 - 17.0	VANE INTER	RVAI			18 PUSH			14.5 FT: Grey silt-clay observed in wash water. 4D: Grey, Silty CLAY, trace very fine Sand with occasional layers	
	V1 V2	24/24	15.6 - 16.0 16.6 - 17.0	Su= 371/41 Su= 398/41	psf			1 001	1		and pockets black, Silty fine to medium SAND. MARINE SILT-	
	VZ		10.0 - 17.0	3u- 390/ 41	ры				1		V1: Tu=13.5 / Tr=1.5 ft-lbs (65 mm x 130 mm vane) V2: Tu=14.5 / Tr=1.5 ft-lbs (65 mm x 130 mm vane)	
									1			
								1/	1		20.0 ft. Attempted vano absentest at 20.0 ft. at vanishing to	
- 20 -	5D	24/10	20.0 - 22.0	(VANE)-1/	18"	1	1	PUSH	1		20.0 ft: Attempted vane shear test at 20.6 feet; unable to push past 20.4 ft. 5D: Grey, Silty CLAY, trace very fine Sand with one 1-inch seam	
											fine Sandy SILT in tip of spoon.	
									1			
_ 25 _								$ \bigvee$				
	cation lines	s represer	nt approximate bou	ndaries between	soil types; tra	ansition	is may be	gradual			Page 1 of 2	
* Wate	er level rea	dings have	e been made at tim	es and under cor			•	_		occur du		110
pres	ent at the t	ime meas	urements were ma	de.	51010	5.0					Boring No.: HB-KBUNK	-110

			Schonewald		PROJE	CT:					Plaza Expansion	Boring No.: HB-KBUNK	< <u>-110</u>
			Engineering Associates, In		LOCATI	ON.			pike N	ЛМ 2	25	Proj. No.: 18-018	3
Drille	er:		New England I		LOCATION INTRACTORS		vation			o-una	able to estimate	Core Barrel: N/A	
	ator:		Schaefer/ Titus			+	tum:	(,	NAVD			Sampler: Standard Split-Spo	oon
Logg	ged By:		Schonewald			Rig	Type:		Mobile	e Drill	B-53	Hammer Wt./Fall: 140 lbs/ 30 in	
Date	Start/Fi	nish:	7/10/18; 0910-	-1225		Dri	lling Mo	ethod:	cased	l wash	n boring	Hammer Type: rope & cathead	
Bori	ng Locat	ion:	per plan			Cas	sing ID	OD:	HW to	25'		Hammer Efficiency: 0.60	
							ger ID/0	OD:	SSA t			Water Level*: 3.6 ft (open)	
	U SAMPLII lit Spoon S		ESTING:		ADDITIONAL D N-uncorrected						TIONAL DEFINITIONS: H = weight of 140lb. hammer	LABORATORY TEST RESULTS: AASHTO / USCS soil classifications	
	Jnsuccessfin Wall Tub		oon Sample attem	pt	N ₆₀ = N value hammer efficie						R = weight of rods not recorded	-#200 = percent fines WC = water content CONSOL= 1-D consolidation test	nt (%)
MU = U		ul Thin Wa	all Tube Sample at	tempt	S _u = Insitu Fie R = Rock Core	ld Vane	e Shear S			BOF	REHOLE ADVANCEMENT METH VHSA=solid/hollow stem auger		city Index
			ane Shear Test atte		RQD = Rock C			on (%)		RC=	roller cone/OPEN/PUSH=hydraul	lic push UCT qp = peak compressive strength of rock	(
				•	formation								
_	<u>.</u>	. (in.)	Sample Depth (ft.)	i.	Strength (psf) or RQD (%)	N-uncorrected				go			Lab.
(ft.	le N	Rec		9) ;	gth	юте		g "	ıtion	ji L	Visual D	escription and Remarks	Testing Results
Depth (ft.)	Sample No.	Pen./Rec.	amp t.)	lows	rren Ssf)	-nnc	N-60	Casing Blows	Elevation (ft.)	Graphic Log			
25						Z	Z	ОМ	E (f	17.7%	6D: Grev. Silty CLAY. tra	ace very fine Sand with seams and	
	6D V3	24/24	25.0 - 27.0 25.6 - 26.0	VANE IN Su= 48	NTERVAL 31/ 0 psf							ILT throughout and one pocket black,	
	V4		26.6 - 27.0	Su= 39	8/ 14 psf						V3: Tu=17.5 / Tr=0 ft-lbs	s (65 mm x 130 mm vane) bs (65 mm x 130 mm vane)	
											<u> </u>	n at 27.0 feet below ground surface.	
											No refusal.		
- 30 -													
0.5													
- 35 -													
40 -													
- 40 -													
_ AF													
- 45 -													
50 _													
	arks:												
Stratifi	cation lines	represen	t approximate bour	ndaries betw	een soil types; tr	ansitior	ns may be	gradual.				Page 2 of 2	
* Wate	er level read ent at the ti	dings have me measu	been made at time urements were made	es and unde de.	r conditions state	ed. Gro	oundwater	fluctuation	ns may o	ccur due	e to conditions other than those	Boring No.: HB-KBUN	<-110



RESULTS OF SOILS LABORATORY TESTS ON SOIL SAMPLES



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1/4"	100.0	: .	
#4	99.8		
#10	97.3		
#20	70.2		
#40	53.0		
#80	29.1		
#140	11.3		
#200	5.8		-
	'		
	ľ		

Coarse

0.0

Fine

0.2

Coarse

2.5

Medium

44.3

Poorly graded san	Soil Description	
roony graded san	u wiiii siit	
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 1.5071 D ₅₀ = 0.3728 D ₁₀ = 0.0997	Coefficients D ₈₅ = 1.2983 D ₃₀ = 0.1849 C _u = 5.80	D ₆₀ = 0.5787 D ₁₅ = 0.1210 C _c = 0.59
USCS= SP-SM	Classification AASHTC)= A-3
Moisture Content:	<u>Remarks</u> 19.8%	1

Silt

5.8

0.0

Location: HB-KBNK-104 **Sample Number:** 2D Depth: 5'-7'

> R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK Kennebunk Service Plaza (#18-018)

Fine

47.2

Kennebunk, ME

Project No: 1368-014

Lab No.

15225a

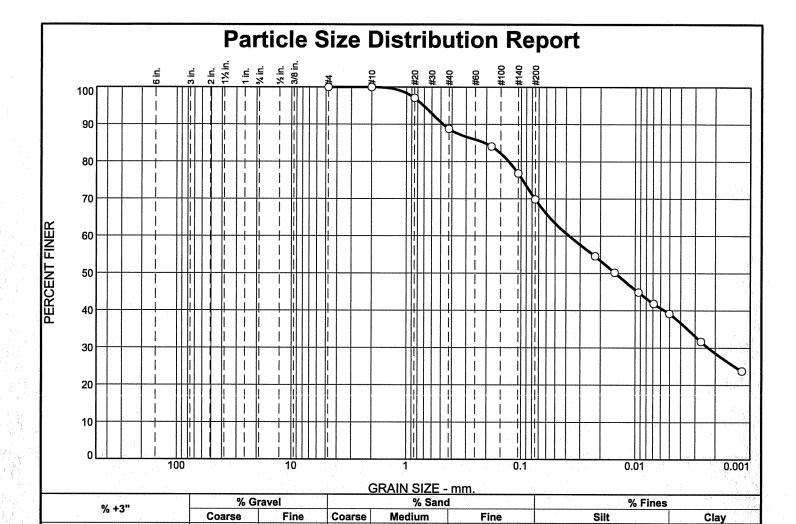
Clay

Tested By: JJB Checked By: MTG



Date: 9/14/2018

⁽no specification provided)



11.2

18.9

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#4	100.0		
#10	100.0		
#20	97.1		
#40	88.8	'	
#80	84.1		
#140	76.8		
#200	69.9		
0.0223 mm.	54.6		
0.0151 mm.	50.2		
0.0094 mm.	44.9		
0.0069 mm.	41.9		
0.0050 mm.	39.2		
0.0027 mm.	31.7		
0.0012 mm.	23.8		

0.0

0.0

0.0

	Soil Description	13 (1)
Sandy silt		
		in and the second se Second second second second second se
PL= NP	Atterberg Limits LL= NV	PI= NP
D ₉₀ = 0.4770 D ₅₀ = 0.0148 D ₁₀ =	Coefficients D ₈₅ = 0.2062 D ₃₀ = 0.0023 C _u =	D ₆₀ = 0.0374 D ₁₅ = C _c =
USCS= ML	<u>Classification</u> AASHTO	= A-4(0)
Moisture Conte	Remarks ent: 27.7%	

30.8

39.1

Location: HB-KBNK-104 **Sample Number:** 3D

0.0

Depth: 10'-12'

R.W. Gillespie & Associates, Inc. Saco, Maine

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK Kennebunk Service Plaza (#18-018)

Kennebunk, ME

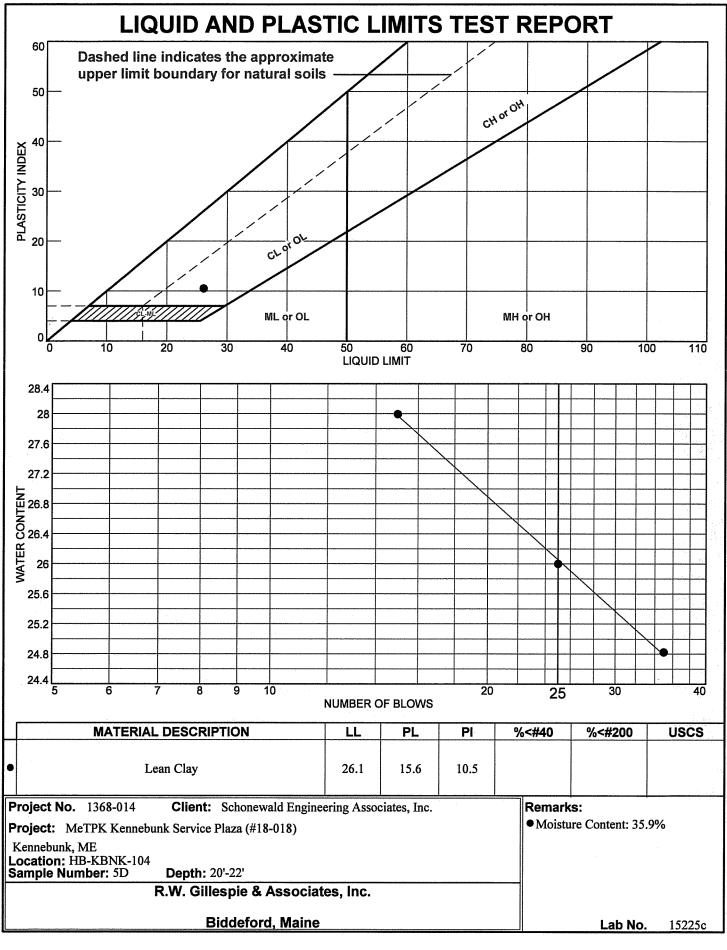
Project No: 1368-014

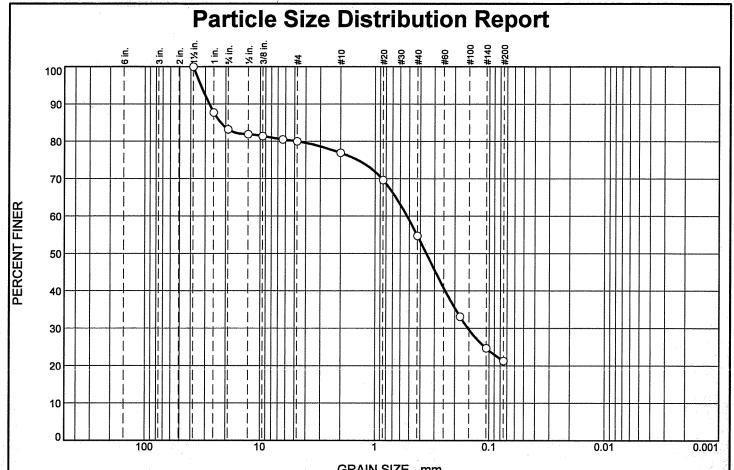
Figure 15225b

Date: 9/14/2018

Tested By: AGS

⁽no specification provided)





	GRAIN SIZE - IIIIII.								
% +3"			% Grave	el		% Sand		% Fines	100
	76 T3		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0		16.8	3.2	3.1	22.2	33.4	21.3	2 7 4 3 4 3 4 4 4 4 3
				1					1,500,000,000
	SIEVE	PERCENT	SPEC.*	PASS	3?		Soil I	<u>Description</u>	
					<u> </u>				

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	1 1/2"	100.0		
	1"	87.7		
	3/4"	83.2		
	1/2"	81.9	-	
	3/8"	81.4		
	1/4"	80.5		
	#4	80.0		
. 1	#10	76.9		
	#20	69.6		
	#40	54.7		
	#80	33.1		
	#140	24.7		
	#200	21.3		
			*	

	Soil Description	
Silty sand with gra	avel	
PL=	Atterberg Limits LL=	PI=
D ₉₀ = 27.8021 D ₅₀ = 0.3553 D ₁₀ =	Coefficients D85= 22.0793 D30= 0.1532 Cu=	D ₆₀ = 0.5252 D ₁₅ = C _c =
USCS= SM	Classification AASHT	O= A-2-4(0)
Moisture Content:	Remarks	

Location: HB-KBNK-106

Sample Number: 1D

Tested By: JJB

Depth: 2'-4'

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK Kennebunk Service Plaza (#18-018)

Kennebunk, ME

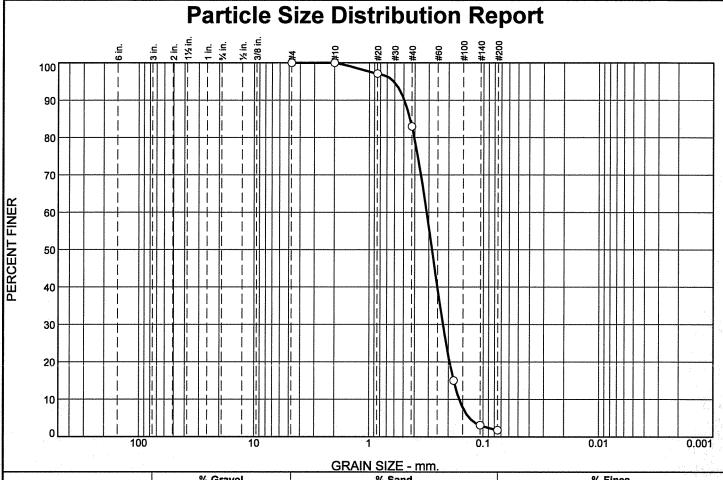
Project No: 1368-014

Lab No. 15226a

Date: 9/14/2018

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Checked By: MTG MTC



GRAIN SIZE - MM.							500 East 1200
0/ ±3"	% Gravel % Sand			% Fines			
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	17.0	81.2	1.8	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#4	100.0		
#10	100.0		
#20	97.1		
#40	83.0		
#80	15.0		
#140	3.1	•	
#200	1.8		
* /			

	Soil Description		
Poorly graded sa	and		
	Atterberg Limits		
PL=	LL=	PI=	
D ₉₀ = 0.4958 D ₅₀ = 0.2808 D ₁₀ = 0.1608	Coefficients D85= 0.4412 D30= 0.2236 Cu= 1.95	D ₆₀ = 0.3138 D ₁₅ = 0.1799 C _c = 0.99	
USCS= SP	Classification AASHT	O= A-3	
Moisture Conten	Remarks at: 22.0%		

Location: HB-KBNK-106

Sample Number: 4D

R.W. Gillespie

& Associates, Inc.

Biddeford, Maine

Depth: 10'-12'

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK Kennebunk Service Plaza (#18-018)

Kennebunk, ME

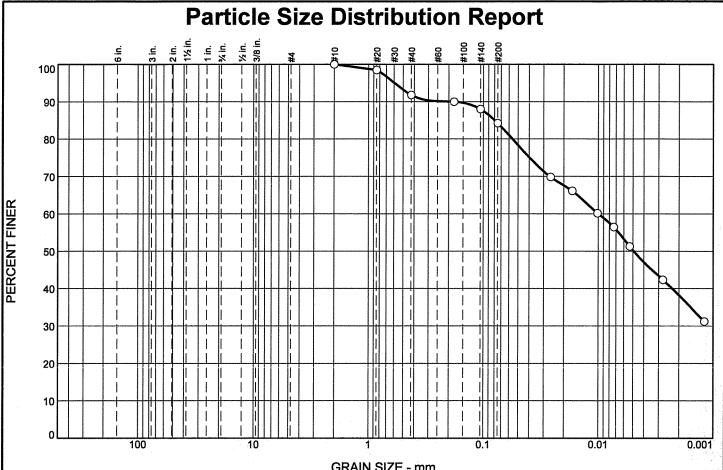
Project No: 1368-014

15226b Lab No.

Date: 9/14/2018

Tested By: JJB

Checked By: MTG MTG



GRAIN SIZE - MM.							
% +3" <u></u>	% Gr	% Gravel % Sand			% Fines		
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	8.2	7.6	34.0	50.2

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#10	100.0		
#20	98.5		
#40	91.8		
#80	90.0		
#140	88.0		
#200	84.2		
0.0261 mm.	69.8		
0.0169 mm.	66.1		
0.0101 mm.	60.2		
0.0073 mm.	56.5		
0.0053 mm.	51.3		
0.0028 mm.	42.3		
0.0012 mm.	31.2		

	Soil Description		
Lean clay with sa	and		
PL= 16.7	Atterberg Limits LL= 24.6	PI= 7.9	
D ₉₀ = 0.1856 D ₅₀ = 0.0049 D ₁₀ =	<u>Coefficients</u> D ₈₅ = 0.0797 D ₃₀ = C _u =	D ₆₀ = 0.0100 D ₁₅ = C _c =	
USCS= CL	Classification AASHT	O= A-4(5)	
Moisutre Content	Remarks t: 32.1%		

Location: HB-KBNK-106 **Sample Number:** 6D

Tested By: AGS

Depth: 20'-22'

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK Kennebunk Service Plaza (#18-018)

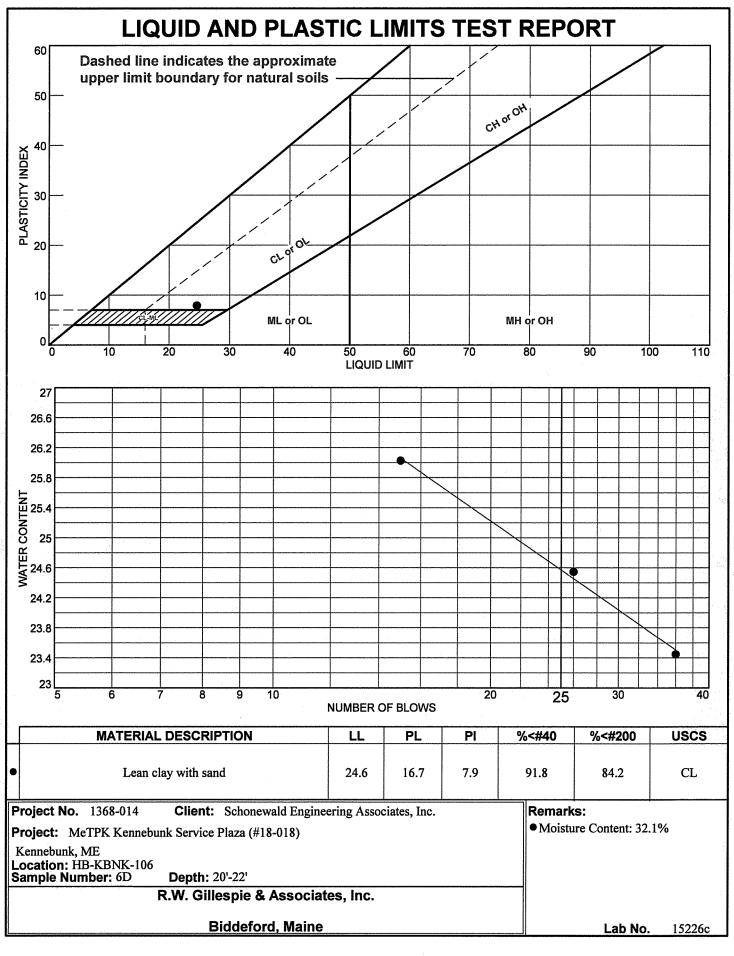
Kennebunk, ME

Project No: 1368-014

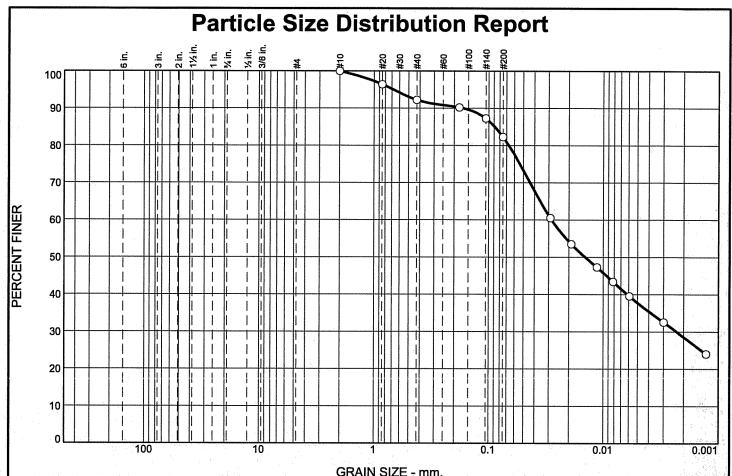
15226c Lab No.

Date: 9/14

R.W. Gillespie & Associates, Inc. Biddeford, Maine



Tested By: AGS



				71 V III T OILL	1111111		and the state of t
% +3"	% Gr	avel	1 11 1	% Sand	7. 1 11 11 11	% Fine	s
/6 +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	7.8	9.9	44.5	37.8
1	1 1			,			- Ann. 1 (2004) Ann. 1 (2004) Ann. 1 (2004)

	SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
	#10	100.0		. (5.5. 5 7
	#20	96.4		
	#40	92.2		
	#80	90.2		
	#140	87.3		
	#200	82.3		
	0.0290 mm.	60.5		
	0.0190 mm.	53.5		
- 1	0.0113 mm.	47.3		
- 1	0.0082 mm.	43.5		
١	0.0059 mm.	39.6		
١	0.0030 mm.	32.6		
١	0.0013 mm.	24.1		
-				

	Soil Description	
Silt with sand		
PL= NP	Atterberg Limits LL= NV	PI= NP
D ₉₀ = 0.1660 D ₅₀ = 0.0143 D ₁₀ =	Coefficients D85= 0.0882 D30= 0.0023 Cu=	D ₆₀ = 0.0282 D ₁₅ = C _c =
USCS= ML	Classification AASHTO	= A-4(0)
Moisture Content	Remarks : 28.5%	•

Location: HB-KBNK-106

Sample Number: 8D

Depth: 30'-32'

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK Kennebunk Service Plaza (#18-018)

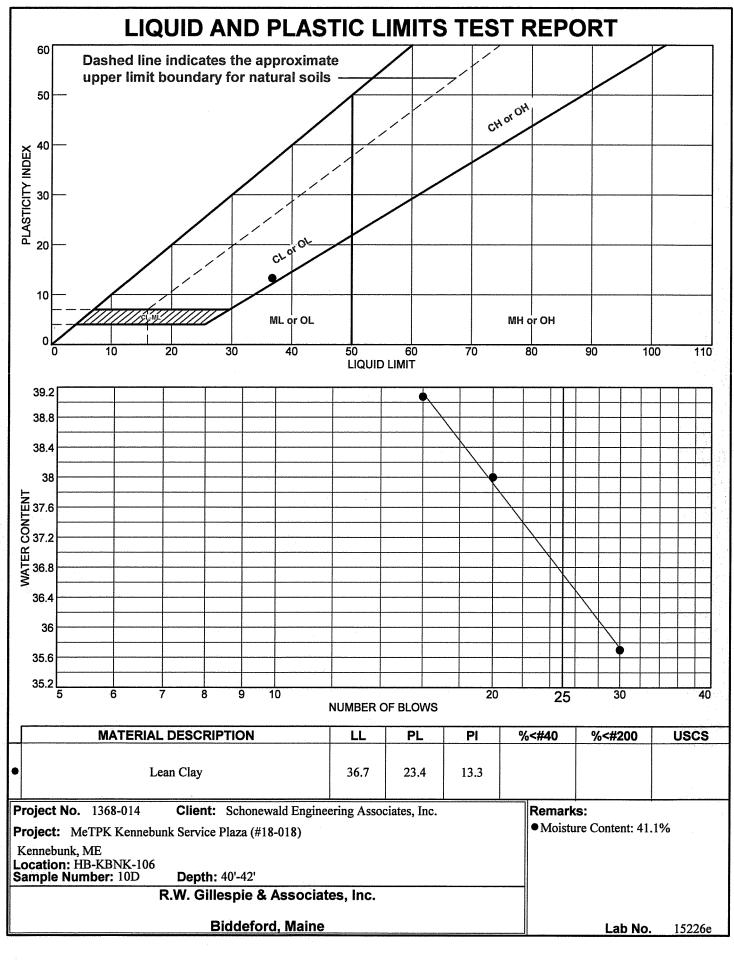
Kennebunk, ME

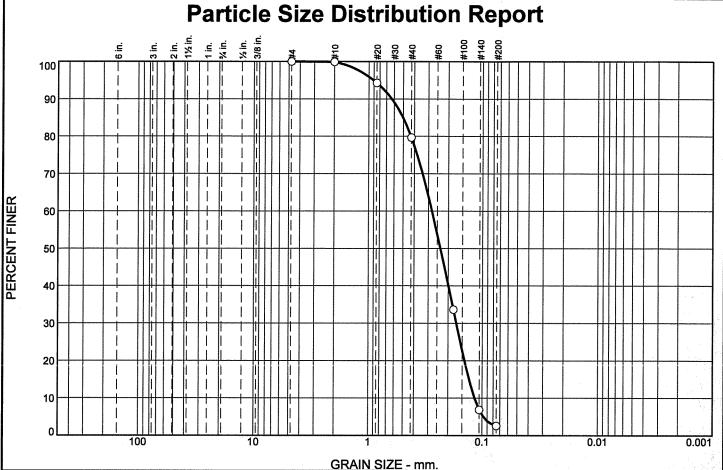
15226d **Figure**

Date: 9/14/2018

R.W. Gillespie & Associates, Inc. Saco, Maine

Project No: 1368-014





					INAIN SIZE -	[1]]]		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	+3"	% Grave	el .		% Sand		% Fines	
76	173	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
. (0.0	0.0	0.0	0.1	20.2	77.1	2.6	
SIEV		SPEC.*	PAS	·		Soil Des	scription	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#4	100.0		
#10	99.9		
#20	94.3		
#40	79.7		
#80	33.6		
#140	6.9		
#200	2.6		

	Soil Description		
Poorly graded sar	nd		
PL=	Atterberg Limits LL=	PI=	
D ₉₀ = 0.6292 D ₅₀ = 0.2351 D ₁₀ = 0.1164	Coefficients D ₈₅ = 0.5031 D ₃₀ = 0.1697 C _u = 2.40	D ₆₀ = 0.2795 D ₁₅ = 0.1303 C _c = 0.89	
USCS= SP	Classification AASHT	O= A-3	
Moisture Content	Remarks		

Location: HB-KBNK-109 Sample Number: 2D

Tested By: AGS

Depth: 5'-7'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK Kennebunk Service Plaza (#18-018)

Kennebunk, ME

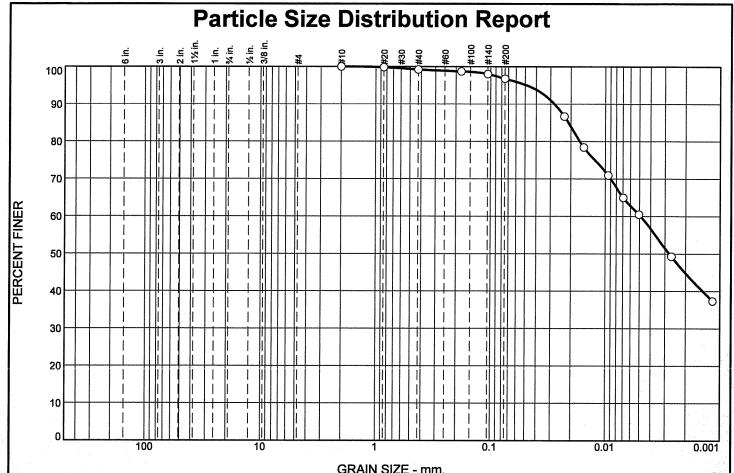
Project No: 1368-014

15227a Lab No.

Date: 9/14/2018



⁽no specification provided)



					111111.		
% +3"	% Gr	% Gravel		% Sand		% Fin	es
/a +3	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.8	2.4	36.5	60.3

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	#10	100.0		
	#20	99.8		
	#40	99.2		
	#80	98.7		
	#140	98.0		
	#200	96.8		
	0.0228 mm.	86.7		
ı	0.0155 mm.	78.4		
	0.0094 mm.	71.0		
	0.0070 mm.	65.0		
	0.0051 mm.	60.5		
١	0.0026 mm.	49.3		
	0.0012 mm.	37.4		

Lean Clay	Soil Description	
PL= 17.7	Atterberg Limits LL= 27.8	Pl= 10.1
D ₉₀ = 0.0278 D ₅₀ = 0.0028 D ₁₀ =	Coefficients D ₈₅ = 0.0211 D ₃₀ = C _u =	D ₆₀ = 0.0049 D ₁₅ = C _c =
USCS= CL	<u>Classification</u> AASHT	O= A-4(9)
Moisture Content	Remarks : 40.7%	

Location: HB-KBNK-109

Sample Number: 4D Depth: 15'-17'

R.W. Gillespie & Associates, Inc. Biddeford, Maine

Client: Schonewald Engineering Associates, Inc.

Project: MeTPK Kennebunk Service Plaza (#18-018)

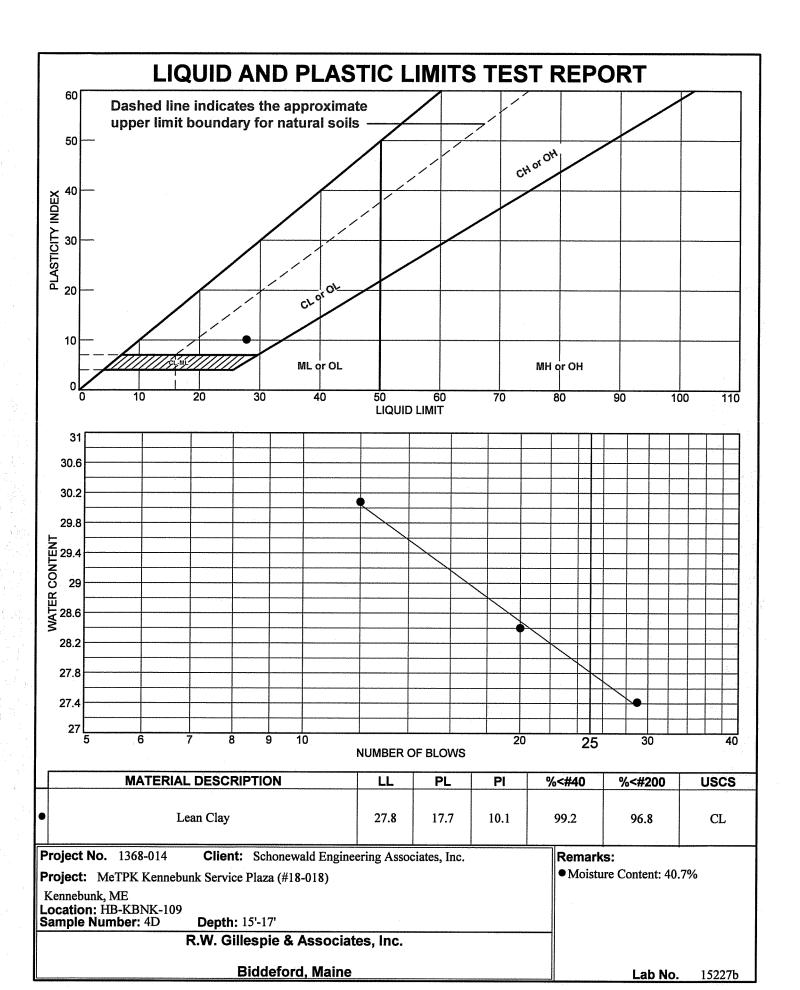
Kennebunk, ME

Project No: 1368-014

Lab No. 15227b

Date: 9/14/2018

Tested By: AGS Checked By: MTG MTG



Tested By: AGS

