PREPARED FOR: LAFRANCE HOSPITALITY

GEOTECHNICAL DESIGN BASIS REPORT

PROPOSED HOTEL
GOODING AVENUE PLAT 111 LOT 1
BRISTOL, RHODE ISLAND

PREPARED BY:

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PARE PROJECT NUMBER 15088.00

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PARE
CORPORATION

GEOTECHNICAL DESIGN BASIS REPORT

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1.0 BACKGROUND/SITE LOCATION

This Geotechnical Design Basis Report presents the results of the geotechnical investigations and evaluations performed by Pare Corporation (PARE) at the site of the proposed LaFrance Hospitality Hotel in Bristol, Rhode Island. The project site is depicted on Figure 1: Locus Plan. This report has been prepared in general accordance with our proposal and is subject to the Geotechnical Limitations presented in Appendix C.

1.1 Purpose and Scope

The purpose of this study was to identify the existing subsurface conditions within the area of the proposed work; evaluate potential implications the observed conditions may have upon the proposed structure; and provide geotechnical parameters and recommendations for use during the design of the foundations, buildings, and other site improvements associated with the proposed project. The scope of work was performed in general accordance with PARE's proposal.

Please note that this scope of work does not include an assessment for the presence of oil or hazardous materials at the site. This scope of work does not include the characterization of the excavated soil or groundwater that may be generated as a result of the planned construction or site work.

1.2 Background

PARE understands that the proposed project consists of the construction of a new three story hotel with associated parking and site improvements. The building is proposed to be situated at the northern end of the site along Gooding Avenue in Bristol, RI on an undeveloped, wooded site that abuts a wetlands. The scope of services has been developed based upon the understanding that the layout as shown on the Grading and Utility Plan prepared by SITEC, dated February 11, 2015 is the preferred approach for the site development.

1.3 Surface Conditions

Within the proposed building footprint, existing grades are generally gentle-sloping (3-5%) and wooded with hard wood trees and low lying brush. The land is undeveloped and generally slopes from the west to the east. Residential developments are present to the west of the site, and Gooding Avenue runs along the north side of the site. Commercial developments are present on the opposite side of Gooding Avenue. An underground sewer pipe and an abandoned-in-place Verizon conduit are understood to exist near the east side of the property. No bedrock outcrops were observed during the site operations. Wetlands are present to the east and southeast of the site.

1.4 USGS Surficial/Bedrock Geology

The 1955 United States Geological Survey (USGS) surficial geology map of the area indicates that the site is underlain by ground moraine. The deposit is described as "unstratified and poorly sorted sand, gravel, boulders and a minor amount of clay deposited by the glacial ice. Locally contains small lenses or masses of stratified sand and gravel."[1]

The 1954 USGS bedrock map of this area indicates that the surficial deposits are underlain by the Rhode Island formation. In this area, the Rhode Island formation is described as "fine grained, greenish-grey phyllite; has well-developed schistosity, but the bedding is obscure or invisible; consists chiefly of quartz, muscovite, and chlorite, with minor amounts of magnetite as octahedral crystals, rutile needles, and tourmaline."[2]

1.5 Previous Site Development

Available historical aerial imagery of the site was reviewed. A historical image dated 1938 shows a plowed field at the proposed site. Imagery from 1963 to present day shows that the field has become overgrown with vegetation.

1.6 Previous Site Investigations

The proposed site plan made available to PARE at the time of this report writing indicated test pits were performed by others across the site. The details of these test pits were not made available to PARE.

1.7 Proposed Grading

The proposed grades that were available for review at the time of writing this report appear to indicate that the grading will generally slope away from the proposed structure to the northwest and to the south. Proposed grades generally appear to be raised by approximately 10 feet at the eastern portion of the site, and approximately 1 foot at the western portion of the site. Raising the grade across the site will require the placement of fill to achieve final grade.

[1] USGS, *"Geologic Map of the Bristol Quadrangle and Vicinity, Rhode Island-Massachusetts Surficial Geology"* Compiled by Smith, J. Harim, 1955.

[2] USGS. *"Geologic Map of the Bristol Quadrangle and Vicinity, Rhode Island-Massachusetts Bedrock Geology"*. By Quinn, Alonzo W., Springer, George H. 1954.

2.0 SUBSURFACE EXPLORATIONS

A subsurface exploration program consisting of 5 soil borings was performed to determine the subsurface conditions at the site in order to provide geotechnical guidelines for the design of foundations for the proposed structure and other site features. Logs of the soil borings were completed and are included in Appendix A. Their locations are shown on Figure 3: Boring Location Plan.

The soil borings were performed by New England Boring Contractors of Brockton, Massachusetts and observed by PARE personnel on July 13, 2015 through July 18, 2015. Soil borings were performed using a track-mounted drill-rig; utilizing 4-inch casing with wash and drive techniques, as noted on the boring logs. PARE personnel provided coordination and field observation of the soil borings performed. Field personnel observed the drilling conditions, visually identified the recovered soil samples during the advancement of the explorations, and took groundwater measurements.

2.1 Sampling Methodology

The sampling methodology for the soil borings consisted of obtaining disturbed samples of the deposits continuously to a depth of approximately 10 feet, and at 5 foot intervals thereafter. The samples were obtained by advancing a 2-inch diameter, thick-walled split-spoon sampler during the performance of the Standard Penetration Test (SPT) in general accordance with ASTM D-1586. The SPT is used to obtain an indication of the characteristics, relative density, and consistency of the underlying soils. The test consists of driving a 1 3/8-inch inside diameter standard split spoon sampler 24 inches with a 140-pound hammer dropping from a height of 30 inches. The SPT value used in analysis is the number of blows (N) required to drive the sampler from 6 to 18 inches of penetration.

During the explorations, subsurface soils were visually classified utilizing the Burmister Classification System. This system describes soil composition based upon the percentage of soil particle size present by weight in the sample with the major soil particle size listed first followed by other soil components described as "trace" indicating 0-10% by weight, "little" indicating 10-20% by weight, "some" indicating 20-35% by weight, or "and" indicating 35-50% by weight.

2.2 Field Measurement and Methodology

The locations of the soil borings were recorded in the field using measurements from the staked building corners installed by others. The surface elevation at each boring was estimated from topographic information presented on the Sitec Grading and Utility Plan dated February 11, 2015 by Sitec.

2.3 Locations

The subsurface exploration program completed at the site included five soil borings (B15-1 through B15-5). Each of the borings were advanced to a depth of approximately 40 feet below the existing ground surface. Actual depths of each of the borings are noted in Table 3-1: Subsurface Exploration Summary. All borings were performed within the footprint of the proposed building.

3.0 SUBSURFACE CONDITIONS

The surface of the site generally consists of a surficial root mat, and topsoil, overlying sand, above glacial till, overlying weathered mudstone.

TABLE 3-1: SUBSURFACE EXPLORATION SUMMARY

Boring ID	General Location	Approx. Ground Surface Elevation (Feet)[1]	Approximate Depth to Top of Stratum (Feet)					
			(Stratum 1) Root Mat/Topsoil	(Stratum 2) Sand	(Stratum 3) Glacial Till	(Stratum 4) Weathered Mudstone	Depth of Exploration	Groundwater (Elevation)
B15-1	Northeast Building Corner	72	0	0.5	3.5	15	35.5	65
B15-2	Southeast Building Corner	70	0	0.5	4	14	39.5	64
B15-3	Southwest Building Corner	79	0	1	4	21	39.8	74.5
B15-4	Northwest Building Corner	80	0	0.5	4	19	39.8	74.5
B15-5	Approximate Center of Building Footprint	78	0	0.75	4	14	39.8	73.5

1. Vertical datum references the Sitec Grading and Utility Plan dated February 11, 2015.

3.1 Soil Strata

The various soil strata encountered in the borings are described as follows. It should be noted that the depths to, and thickness of the various soil and mudstone strata will vary between and away from the exploration locations. Similarly, the nature of the various deposits will also vary between and away from the exploration locations.

Stratum 1 – ROOT MAT/ TOPSOIL

ROOT MAT/ TOPSOIL was encountered at the site and within the proposed building location. The topsoil can generally be described as a tan to brown, fine SAND, with "some" silt, "trace" amounts of medium to coarse sand, "trace" amounts of fine gravel, and "trace" amounts of roots. Classifying the topsoil utilizing United States Department of Agriculture procedures, the TOPSOIL would be designated as a SANDY LOAM.

SPTs performed in Stratum 1 generally indicate a relative density of loose. *ROOT MAT/TOPSOIL is not considered a suitable bearing stratum for foundations or site improvements.*

Stratum 2 – SAND

The SAND encountered at the site underlying the ROOT MAT/TOPSOIL is generally described as brown to tan to gray, fine to coarse SAND, with "trace" to "and" amounts of silt, and "trace" amounts of fine gravel.

SPTs performed in Stratum 2 generally indicate a relative density of dense to very dense. *Stratum 2 – SAND is considered a suitable bearing stratum for foundations.*

Stratum 3 – GLACIAL TILL

The GLACIAL TILL at the site underlying the SAND is generally described as dark gray to gray to tan, fine to coarse GRAVEL, or fine to coarse SAND, with "little" to "some" amounts of silt. The relative amounts of gravel, sand, and silt vary across the borings. For additional information and detail, please refer to the boring logs in Appendix A.

SPTs performed in Stratum 3 generally indicate a relative density of medium dense to very dense. *Stratum 3 – GLACIAL TILL is considered a suitable bearing stratum for foundations.*

Stratum 4 – WEATHERED MUDSTONE (Rhode Island Formation)

The recovered samples of the WEATHERED MUDSTONE at the site underlying the GLACIAL TILL are generally described as black to gray, fine to coarse GRAVEL or fine to coarse SAND with "trace" to "and" amounts of silt. The WEATHERED MUDSTONE was observed to be highly to completely weathered.

SPTs performed in Stratum 4 generally indicate a relative density of dense to very dense. *Stratum 4 – WEATHERED MUDSTONE is considered a suitable bearing stratum for foundations.*

3.2 Groundwater

Based on observations taken during the subsurface investigation program, groundwater was encountered at approximately 4.5 feet below the existing ground surface (elevation 74.5±) in Boring B15-3, and as deep as 7 feet below existing ground surface (elevation 65±) in Boring B15-1.

A groundwater monitoring well was installed within Boring B15-1. The well consists of 25 feet of 2-inch diameter PVC screen pipe starting near 35.5 feet below existing ground, and 13 feet of riser pipe. A bentonite seal was installed at the depth of 3 to 8 feet. A steel standpipe and cap was installed over the well to prevent unwanted access. The well readings are summarized in Table 3-2 below.

It is important to note that as part of the boring activities, water was introduced to each borehole and may not have dissipated at the time that the initial or subsequent measurements were taken. Please see the boring logs within Appendix A of this report for details on groundwater depths and stabilization times.

It should be noted that groundwater levels are known to fluctuate due to local and regional factors including, but not limited to, precipitation events, seasonal changes, and periods of wet or dry weather. It was noted by the field engineer that it rained at the site overnight from July 15, 2015 to July 16, 2015.

TABLE 3-2: WELL READINGS

Date	Time	Depth to Water	Elevation (ft.)	Stabilization Time
7/14/15	AM	6'	66	1 DAY
7/15/15	AM	7'	65	2 DAY
7/16/15	AM	6'	66	3 DAY
7/17/15	AM	5'	67	4 DAY

4.0 LABORATORY TESTING

The laboratory testing program included mechanical grain size determinations performed upon samples from the strata encountered during the investigation. The results of the laboratory testing are summarized below. The data sheets are included in Appendix B.

4.1 Procedures

Grain Size Analysis

Two (2) grain size analyses were completed by PARE on materials recovered during the subsurface investigation with descriptions and results presented as follows:

TEST No. 1 (SAND strata) – SILT and fine to medium SAND, little fine gravel, trace coarse sand

- Sample S-2 taken from a depth of 2 to 4 feet at soil boring B15-3.
- Wet and dry mechanical sieve method.

TEST No. 2 (GLACIAL TILL strata) – SILT and fine to coarse SAND, some fine gravel, trace coarse gravel

- Sample S-4 taken from a depth of 6 to 8 feet at soil boring B15-5.
- Wet and dry mechanical sieve method.

4.2 Grain Size Analysis

Two grain size determinations by combined wet and dry methods were performed on materials recovered during the subsurface investigation with descriptions and results presented as follows:

Table 4-1: Results of Grain Size Analyses

Test No.	Boring No.	Sample No.	Depth (Ft.)	Representative Soil Strata	% Gravel	% Sand	% Fines
1	B15-3	S-2	2-4	SAND	16	46	38
2	B15-5	S-4	6-8	GLACIAL TILL	28	37	35

5.0 IMPLICATIONS OF SUBSURFACE CONDITIONS

5.1 General

Based on the subsurface investigation program and observations made during the explorations, the following are the geotechnical issues identified that could potentially impact the development of the site as proposed:

- ROOT MAT/TOPSOIL (Stratum 1) was observed across the site, and is not a suitable bearing stratum for foundations or for reuse as backfill materials in the building areas. This stratum should be removed and replaced with suitable material as stated herein.

- It may be possible to reuse the SAND (Stratum 2) material as fill. The high silt content will make the material susceptible to frost heave and sensitive to moisture content control during compaction, hence difficult to work with if the material becomes wet.

  It is noted that not all on-site materials will be suitable for reuse, nor will all required material gradations be present on-site. *Imported materials or blending of on-site material with imported material is anticipated for this project.*

- Due to the high fine sand and silt makeup present below the site, crushed stone used on-site under foundations, slabs, or around utilities should be wrapped with geotextile filter fabric to prevent the migration of the fine sand particles into the voids within the crushed stone.

- Due to the high fine sand and silt makeup present below the site, stormwater infiltration rates could be low. Construction activities may be impacted by flooding from storm events that occur if proper precautions are not made to manage runoff.

- Groundwater was encountered between 4.5 and 7 feet below the existing site grade. At these depths, groundwater is not likely to impact the construction due to the proposed grading. *Temporary dewatering to control stormwater runoff is anticipated.*

5.2 Seismic Design Category and Liquefaction Evaluations

SITE CRITERIA

In general accordance with the 2012 International Building Code and the 11th Edition of the Rhode Island Building Code, based on the boring information the soil profile of the project site is characterized as Site Class Profile C, "Very Dense Soil and Soil Rock" (i.e. Nbar>50)[3]

Based on the Rhode Island State building code, Table 1608.1, the maximum considered earthquake spectral response acceleration at short periods, S_s, and at 1-second periods, S_1, are 0.174 g and 0.06 g respectively.

[3] "Nbar" denotes the average Standard Penetration Test N-value for the first 100 feet of soil.

Correcting the accelerations for the observed site profile based upon average Standard Penetrations Test N values, the following parameters are recommended by the general procedure:

- Adjusted maximum considered earthquake spectral response acceleration parameters:
  - $S_{MS} = 0.208$
  - $S_{M1} = 0.102$
- For calculating the design spectral response accelerations, utilize:
  - $S_{DS} = 0.139$
  - $S_{D1} = 0.068$

LIQUEFACTION EVALUATION

Liquefaction is the tendency for a soil type, particularly fine sands, to lose a significant amount of strength and behave similar to a liquid in the event of an earthquake, or sufficient vibrations. Liquefaction analyses generally relate SPT N values, corrected for overburden, fines content, and measured groundwater levels to the liquefaction potential of the materials in question. In general, in order for liquefaction to occur three conditions have to be met simultaneously. These are: 1.) loose sandy soils susceptible to liquefaction, 2.) saturated soil conditions, and 3.) vibration.

The liquefaction analyses completed during the preparation of this report takes into account the soil and groundwater conditions encountered during the subsurface exploration program. It should be noted that fluctuations in groundwater levels can have a significant effect in the liquefaction potential of soils. If the groundwater is observed to change during the construction process or future explorations, PARE should be contacted as it may be necessary to re-analyze the soil for liquefaction potential.

Based upon the observed relative densities, groundwater elevation and material composition, it appears that the in-situ soils are NOT susceptible to liquefaction at this time.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Foundations and Slabs

Prior to the placement of fill to support foundations and ground bearing slabs, the ROOT MAT/TOPSOIL (Stratum 1) should be removed from the influence zone[4] of the proposed building footprint and replaced with compacted materials as discussed herein in Sections 6.2 and 6.7. The SAND (Stratum 2) should be improved as discussed within Section 6.2. If the SAND is not improved, this stratum should also be removed from the influence zone of the proposed building footprint and replaced with compacted materials as discussed in Sections 6.2 and 6.7.

It should be noted that the recommendations presented herein are based upon an anticipated finished floor elevation near 80.5 feet. Changes within the finished floor elevation should be reviewed with the geotechnical engineer for potential impacts to these recommendations.

6.1.1 Shallow Foundations

A shallow foundation system composed of column (i.e., square) and wall (i.e., continuous) footings bearing on a minimum 12-inch thick layer of compacted "Sand Gravel Fill" or 6-inches of crushed stone (in wet areas) wrapped in a layer of geotextile filter fabric placed on compacted structural "Granular Fill", improved on-site SAND, or undisturbed GLACIAL TILL appears suitable for effectively transferring building loads to the ground. ***A maximum net allowable soil bearing pressure[5] of 4,000 pounds per square foot for exterior footings and interior footings is recommended in the design of footings bearing on this material.***

A maximum total settlement of 1 inch, and a maximum differential settlement of ½ inch between foundation elements was also determined. In no case should a continuous footing be less than 18 inches wide or should a column footing be less than 2 feet wide.

SLABS

A modulus of vertical subgrade reaction (K_v) of 150 pounds per cubic inch is recommended for design of a slab on grade placed over 12 inches of compacted "Sand Gravel Fill". The structural engineer will need to design the floor slab for anticipated live and dead loads in accordance with applicable building codes. Should any of the building, mechanical, electrical, or other equipment require independent foundations, additional foundations and/or modifications to the floor slab may be required depending upon the actual load requirements.

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[4] "Influence Zone" is defined as the area below foundations and slabs bound by a plane extending from 2 feet outside of their outer edges, down 1 vertical, and out 1 horizontal as shown on Figure 6-1.

[5] Net allowable bearing pressure is the pressure in excess of the existing overburden pressure that can be safely carried at the footing depth, D (based on presumptive bearing capacities).

6.2 Ground Modifications

Based upon the observed subsurface conditions, ground modifications should be used to improve the in-situ SAND (Stratum 2) within the influence zone of the proposed building and pavement areas.

The design of the ground modification program should be coordinated with the structural engineer in discussion with the geotechnical engineer and the site/civil engineer. Given our current understanding of the project, PARE recommends the ground modification program to consist of Proof Compaction, and excavation and replacement of high silt content soils in areas where high silt content soils would exist within the proposed frost zone. The ground improvement program should be designed to provide a uniform bearing stratum meeting the capacity presented in Section 6.1, in addition to considering the effects of differential settlement across the building.

The following summarizes the ground improvement approach to provide suitable bearing for spread footings/foundations.

1. Unsuitable in-situ soils and materials (e.g. organic soil, roots) shall be over excavated within the influence zone of the proposed shallow foundation and slabs-on-grade to the top of the soil determined to be an acceptable bearing stratum as determined by a geotechnical engineer.
2. SAND and GLACIAL TILL material exposed during excavations shall be proof compacted in accordance with Section 6.11 prior to the placement of backfill.
3. The excavation shall then be backfilled with approved material, compacted in lifts, to the bearing elevation of the proposed footing or slabs-on-grade.
4. Site elevations shall be raised as required using approved material and compacted in lifts.
5. All fill shall be compacted under the observation of the geotechnical engineer to the minimum compaction requirements as presented in Table 6-3.

This approach, which is the recommended approach in the building area, will address the potential for excessive differential settlement. The reuse of the in-situ SAND material as backfill may be permissible with confirmatory grain size distribution analyses as discussed in Section 6.9. All organic material encountered should be stripped from within the influence zone of the proposed building, and pavement areas and stockpiled for potential on-site reuse. If on-site reuse in not feasible, the organic material should be properly disposed of off-site. The reuse of any organic material as fill material within the influence zone of the proposed building and pavements areas should not be permitted.

6.3 Lateral Earth Pressures and Retaining Wall Design

For the design of retaining walls with level backfill, recommended lateral earth pressure coefficients are indicated in Table 6-1. A unit weight of 125 pounds per cubic foot (pcf) and a minimum internal friction angle (ϕ) of 35° for imported free draining "Granular Fill" is recommended. The lateral earth pressure coefficient should be increased where the ground surface slopes up behind the wall. The retaining walls should be designed to withstand surcharge loading which may be present over the life of the structure. These would include traffic loads, as well as loads from storage, fill or construction equipment which may be placed adjacent to the wall. The influence zone behind the wall can be defined by a 1.5 horizontal to 1 vertical line extending upward from the bottom outside edge of the wall footing.

The magnitude of lateral earth pressure against retaining walls is dependent upon the type of backfill, method of fill placement, drainage provisions, and the amount of displacement the wall is permitted to undergo after the placement of the backfill. PARE recommends that the retaining walls be backfilled with a free draining compacted "Granular Fill", as defined herein.

The lateral earth pressure distribution against the retaining wall should be computed using the appropriate value of K, the coefficient of lateral earth pressure. Recommended values of K are presented in the table below. Friction factors are also presented for use in checking resistance to unbalanced forces on the walls.

TABLE 6-1: RECOMMENDED EARTH PRESSURE AND FRICTION COEFFICIENTS

Material	At-Rest Coefficient (K_o)	Active Coefficient (K_a)	Passive Coefficient (K_p)
Compacted Granular Fill	0.43	0.27	3.69
Sand	0.47	0.31	3.25
Glacial Till	0.38	.24	4.0
FRICTION COEFFICIENTS			
Concrete Poured on Imported Sand Gravel Fill			$\tan \delta = 0.45$
Precast Concrete on Imported Sand Gravel Fill			$\tan \delta = 0.30$

In order to attain either the active or passive condition, displacement of the wall is necessary. To attain the active condition in a sand material, the horizontal movement required ranges from 0.001H to 0.004H depending on the density of the material. The horizontal movement required to attain the passive condition in a sand material ranges from 0.02H to 0.06H, where H is the wall height.

Traffic loads and other anticipated loadings that could occur behind the walls should be considered. In addition, the effect of adjacent footings on lateral walls should be accounted for during design. A minimum of 250 psf should be used to account for compaction equipment with 5 feet of the wall.

6.4 Frost Depth Recommendations

In conformance with Rhode Island State Building Code, exterior footings founded over soils should be placed at a minimum depth of 40 inches below the finished grade in order to provide for frost protection. Preparation for slabs and paved areas should consider the frost heave susceptibility of subgrade soils.

6.5 Drainage

Based on observations taken during the subsurface investigation, groundwater was encountered at the site at depths ranging from 4.5 to 7 feet below the existing ground surface which is expected to be below the bottom of footing in some areas. Also note that as part of the boring activities, water was introduced to the noted boreholes and may not have dissipated at the time that the measurement was taken.

In accordance with IBC (2012), given the level of the groundwater observed during the boring activities, and the understanding of the proposed building geometry (i.e. no basement) perimeter drains to control groundwater are not required.

Note that shallow foundations should be prepared in the dry. Roof drainage and surface water runoff should be directed away from the structures. As water levels are anticipated to fluctuate with the seasons and precipitation events, positive drainage is also recommended in order to carry water away from the building foundation.

6.6 Underground Utilities

Underground pipes and utilities should be placed on bedding in accordance with the manufacturer's specifications and recommendations. "Granular Fill" should be placed in lifts on the sides and above the utilities. The lift thickness should be sized appropriately for the hand operated compaction equipment used; vibratory plate compactor, 6-inch lift; vibratory drum roller or sheepsfoot trench roller, 12-inch lift.

6.7 Construction Materials

Fill materials should be friable soil, free from trash, ice, snow, frozen soils, tree stumps, roots, and other organic matter and deleterious materials. PARE recommends the following soil gradations for imported fill, conforming to the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction Amended 2013 (State Standards).

- Gravel Borrow utilized as “Sand Gravel Fill” below structures and under pavement should conform to M.01.01.1 of the State Standards.
- All other Gravel Borrow material utilized as “Granular Fill” below structures and for material utilized in regrading areas, trench backfill, backfill against below-grade walls as “Granular Fill” should conform to M.01.01 of the State Standards.
- Crushed Stone Bedding Material should be imported material conforming to M.01.09 of the State Standards.

6.8 Flexible and Rigid Pavement Recommendations

All topsoil, including the root mat, should be stripped prior to filling. The subgrade should be proof rolled with a minimum 4-6 passes of a vibratory roller with a static weight of 10,000 pounds and a dynamic weight of 20,000 pounds. Caution should be used when compacting the subgrade, if wet, to avoid weaving and disturbance from vibrations.

Table 6-2 presents recommended pavement layer thickness based upon standard AASHTO design procedures for both "Standard Duty" and "Heavy Duty" pavement. "Standard Duty" pavement is applicable for up to 50,000 Equivalent Single 18-kip Axle Loads (ESAL's) while "Heavy Duty" pavement is applicable up to 350,000 EAL's. The recommended base and subbase courses for both "Standard Duty" and "Heavy Duty" areas are as listed below:

TABLE 6-2: RECOMMENDED STANDARD AND HEAVY DUTY FLEXIBLE PAVEMENT LAYER THICKNESS

Pavement Section	STD. DUTY	HEAVY DUTY
Finish Course	1-1/2 inches	1-1/2 inches
Binder Course	1-1/2 inches	2 inches
Base Course	6 inches	6 inches
Subbase Course	8 inches	12 inches

Should the actual loading conditions be greater than those assumed, the pavement sections will need to be re-analyzed for the actual conditions. This may result in a thicker pavement section being required.

In areas where concrete and asphalt paving meet, it would be advantageous to provide a strip of free draining soil below the concrete and bituminous interface. The free draining strip should consist of a twenty-four (24) inch thick layer of "Sand Gravel Fill" extending a minimum of 3 feet laterally below the concrete apron. This should control any minor frost heaving that may occur if water enters the subgrade through this joint.

Base and Subbase course materials should meet the criteria for "Sand Gravel Fill" and "Granular Fill", respectively, as listed above. Subbase and base courses should be compacted in 1-foot (maximum loose lift thickness) lifts to 95% of the maximum dry density as determined in accordance with ASTM D1557 (modified Proctor test). Fill below the subbase should be compacted to at least 92% of the maximum dry density as determined in accordance with ASTM D1557 (modified Proctor test).

PARE understands that fill is to be placed on the site up to a thickness of about 10 feet, and the thickest fill will be on the eastern part of the site. Heave of silty material is possible unless all silty material is removed from the pavement footprint for the full-recommended frost depth. To reduce the risk of pavement damage due to potential frost heaving, subgrade soils founded below the pavement section to frost depth (i.e., 40 inches) should ideally be free draining and free of organics. However, in lieu of removing and replacing the existing subgrade soils with free-draining and organic free material, the client may choose to accept a reduced pavement service life. Laboratory testing on selected samples of onsite soils indicated silt and clay contents ranging from 35 to 38 percent. The contractor shall not assume that all onsite fill material is free draining. Free draining material is considered to have less than 10% silt and clay content.

For areas to be paved with Portland cement-based concrete, a 6-inch thick slab on grade is recommended. The concrete should have a minimum unconfined compressive strength of 4,000 pounds per square inch, with air entrainment of 4 to 6 percent. The thickness is based upon the AASHTO Low Volume Road Design procedure and a modulus of subgrade reaction of 150 pounds per cubic inch. Welded wire fabric reinforcement (6x6W2.0xW2.0) is recommended to minimize crack opening.

The concrete paving should be graded to induce runoff. All joints and cracks should be sealed and/or filled on a regular basis as part of a routine maintenance item. If the joints and cracks are not kept sealed, significant frost heaving can be expected during the winter months.

Concrete pavement should have expansion joints at a spacing of 80 feet with a joint filler thickness based on the thermal expansion. All expansion joints should be sealed with an AASHTO-approved elastomeric joint sealer. Contraction (crack control) joints should be constructed at a spacing of 15 feet. Load transfer between slabs should be provided by epoxy coated #6 dowels, 18-inches long at a spacing of 12-inches. Concrete pavement base and subbase courses should consist of 6-inches of "Sand Gravel Fill", each.

6.9 Reuse of On-Site Soils

Based on the visual classifications and limited laboratory testing, the reuse of all of the onsite ROOT MAT/TOPSOIL (Stratum 1) and SAND (Stratum 2) as backfill below pavement or under the buildings is not anticipated at this site. Removal of boulders and cobbles will likely be required during excavation and/or screening. Fill materials shall not contain oil and/or hazardous materials.

Due to the high silt content, the reuse of excavated SAND is not anticipated without modification. It may be possible to reuse the on-site SAND if it is blended with coarser materials; however, confirmatory grain size analyses will need to be completed after blending to confirm that the blending methodology achieves the desired results and can be reproduced onsite.

It should be noted that not all required soil gradations will be available on-site. Imported materials or blending with on-site materials is anticipated for this project.

6.10 Soils Prone to Disturbance from Rain and Frost

Silty or fine sandy soils are prone to disturbance when saturated from rainfall events, will be easily disturbed by construction equipment traversing the site, are difficult to compact, and prone to frost heaves during freeze thaw cycles. If the construction is performed during the late fall, winter, or spring months, wet conditions and freeze thaw cycles should be expected to prevail. Soils becoming saturated or allowed to freeze will require re-compaction and retesting prior to placing additional fill material or structural components. Delays caused by wet/freezing soil conditions may be a factor that affects the construction schedule. Should the subgrade become disturbed, the disturbed material should be over-excavated and replaced with compacted "Granular Fill" as recommended in Section 7.

Soils with a silt content of greater than about 8% have the potential to heave when subjected to freezing conditions. The risk of heaving increases with increasing silt content, although soils with a silt content of less than about 15% silt is considered within the construction industry to be an acceptable risk. High silt content soils are not recommended for use in frost zones below structures, pavements, or within the influence zone of foundation walls due to their susceptibility to frost heave. Prior to reusing these materials, confirmatory sieve analyses for each type of on-site material proposed for reuse should be completed by the Contractor and submitted to the Engineer for approval.

6.11 Compaction

The approved subgrade to accept backfill, footings, slabs, and foundations, should be compacted by proof compaction with at least six (6) passes of a 10-ton vibratory roller performed in perpendicular directions.

Lift thicknesses of placed material should be limited to 12 inches thick (loose lift thickness). Compaction of this material should be performed with adequately-sized equipment to yield the recommended amount of relative compaction.

A schematic drawing presenting influence zones beneath interior and exterior footings, recommended base and sub-base materials, and recommended fill materials for varying areas of the site development is included as Figure 6-1 on the following page.

The fill materials should be compacted as outlined below.

TABLE 6-3: RECOMMENDED MINIMUM COMPACTION REQUIREMENTS

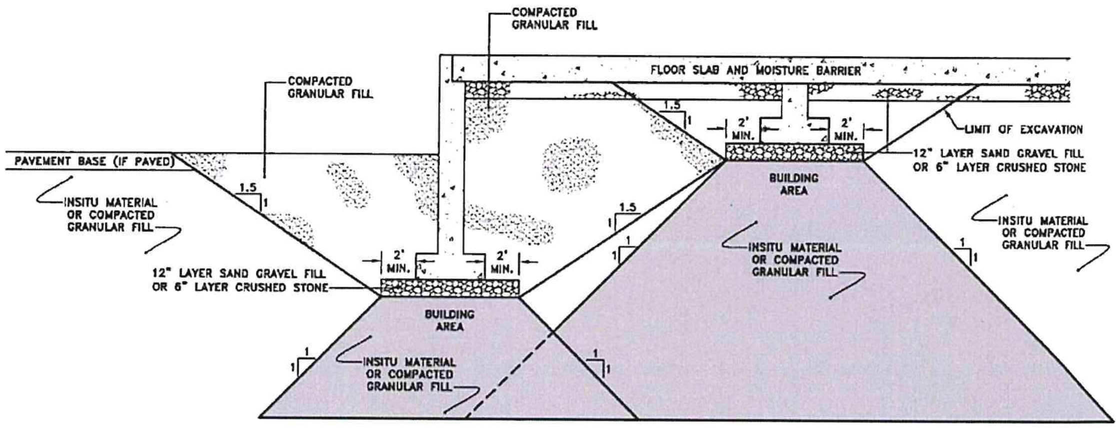
Location	Percent of Maximum Dry Density [1]
Backfill below footings, within the building area and below slabs [2]	95
Backfill for foundation walls	95
Backfill within pavement base and sub base layers	95
Backfill below pavement sub base layers	92
Around and above utilities within the building area	95
Around and above utilities in paved areas	92
Backfill behind retaining walls	95 [3]
Backfill within landscaped areas	85

[1] Maximum dry density as determined by the Modified Proctor test (ASTM D 1557)

[2] Building area is described as an area extending downward and outward from 2 feet outside of the outside edge of the footing at a 1H:1V slope.

[3] During compaction of fill placed behind retaining walls, care shall be taken so as to maintain uniform elevation along both sides within the embedded areas, and to not overstress the wall by applying excessive compactive energy at the top of the wall.

Figure 6-1: Typical Profile Below Footings



7.0 CONSTRUCTION CONSIDERATIONS

This section presents construction considerations and recommendations including excavation, backfilling, utility installation, dewatering, lateral earth support, protection of adjacent structures, and construction monitoring.

7.1 Excavation

SITE PREPARATION

Building Areas: After rough grades have been established, but before placement of compacted "Granular Fill", exposed surfaces should be visually inspected and probed. Frozen, wet, or loose soils and other undesirable materials should be removed. The exposed subgrade should be further tested by proof rolling with a minimum 10,000-pound static weight roller to identify loose or soft pockets that may be present.

The area of the proposed structures will need to be stripped of all trees and grubbed of all stumps, vegetation, topsoil, and root mat. Debris from grubbing and stripping activities should be removed and properly disposed of in accordance with current regulations. Should the material contain solid wastes, such material should be segregated and disposed of in a manner consistent with local, state, and federal regulations.

Should the subgrade become disturbed during excavation and/or construction, all disturbed material should be over-excavated to firm or native soil and replaced with a minimum of one foot of compacted "Granular Fill" or "Crushed Stone" wrapped in a Geotextile Fabric.

Parking and Paved Roadway Surfaces: All topsoil including the root mat should be stripped prior to filling. The subgrade should be proof rolled with a minimum 4-6 passes of a vibratory roller with a static weight of 10,000 pounds and a dynamic weight of 20,000 pounds. Caution should be used when compacting the subgrade, if wet, to avoid weaving and disturbance from vibrations.

7.2 Backfilling

GRAVEL BORROW

PARE recommends that footings, foundation walls, and areas requiring fill below the floor slab be backfilled to within 12 inches of the footings and slabs with compacted "Granular Fill". Compacted "Granular Fill" should be free draining friable soil free from trash, ice, snow, tree stumps, roots, other organic matter, deleterious materials, and conform to the specified requirements.

In general, compaction should be accomplished by placing fill in 8 to 12 inch loose horizontal lifts and mechanically compacting each lift to the specified dry density. Thinner lifts may be required in certain instances depending on the type of mechanical compaction equipment utilized. Recommended minimum compaction requirements are described in Section 6.10.

SAND GRAVEL FILL / CRUSHED STONE

"Sand Gravel Fill" should be placed for the final 12 inches below footings, slabs and as pavement base course layers. This material should be placed in 8 to 12 inch loose horizontal lifts and mechanically compacted to the specified dry density. In areas where wet conditions are encountered, "Crushed Stone" (wrapped in Geotextile Fabric) could be used under footings instead of the "Sand Gravel Fill". The "Crushed Stone" should be proof compacted with 1 pass in each direction with a vibratory compactor.

7.3 Utility Installation

Excavations for installation of underground utilities should be made to comply with all OSHA, federal, state, and local regulations. At a minimum, excavations should be wide enough to accommodate the utility to be installed with clearance on each side of the utility to provide space for operating compaction equipment for backfilling of the utility in lifts without damaging the utility. The base of the excavation and bedding layer should be formed to properly support all components of the utility, including pipe bells, and manholes to prevent damage during installation. During backfilling operations, care should be taken to provide properly compacted fill along the length of the utility being installed. All fill material (cobbles and boulders within the native deposits) in excess of 3 inches should be removed from the fill within 12 inches of the utility to prevent damage to the utility during compaction.

7.4 Dewatering

During construction, temporary dewatering may be required to control ponded water resulting from rain and surface runoff. Based on measurements taken during the subsurface investigation, groundwater is anticipated to be encountered within the proposed excavation depths. The Contractor should provide for proper drainage of surface water away from any excavations. All excavations should be conducted in the dry.

It should be noted that groundwater levels may fluctuate over time due to variations in rainfall and other factors different from those prevailing at the time the explorations were performed.

7.5 Lateral Support

Excavation support is solely the Contractor's responsibility. Several excavations are expected within the footprint of the proposed structure for installation of footings, utilities and below-grade walls. Temporary support systems may be required at some locations to retain the surrounding soil and maintain a near-vertical excavation face where it will be necessary to protect the adjacent building walls, pavement, or underground utilities. Design of cantilever and braced support systems is beyond the scope of this report, and should be performed for the Contractor through the services of a registered professional engineer licensed in the State of Rhode Island.

In areas where an open cut is possible without a temporary support system, the final side slopes should conform to local, state, and federal safety requirements.

7.6 Construction Monitoring

The site preparation, excavation and backfill, compaction, and foundation installations should be observed by our geotechnical field engineer(s) under the direction of one of our registered professional engineers experienced in geotechnical engineering. While onsite, our engineer(s) could provide field density testing, verification of bearing layers, and assistance in general interpretation of the geotechnical requirements during construction. This would provide an accurate record of construction, alert the designer to changed conditions, and make useful data available for upcoming construction.

Foundation excavations should be observed to confirm that all loose, soft, and undesirable material (i.e. organic matter, roots, and other deleterious materials) is removed and that the foundations will bear on a satisfactory material. Excavation subgrade observations should include hand auger borings or hand probing.

As mentioned, compaction criteria for the various imported materials should be developed and included in the specifications. Field density testing should be performed using a nuclear density gauge to confirm that adequate compaction is being achieved. During construction, representative samples of all materials to be used as backfill should also be tested for conformance with the specified material properties.

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15. *Foundation Design Principles and Practices*, Coduto, second edition.

FIGURES

USGS TOPOGRAPHIC MAP FROM THE RHODE ISLAND GEOGRAPHIC INFORMATION SYSTEM (RIGIS)

PARE CORPORATION

PROPOSED HOTEL

GOODING AVENUE / PLAT 111 LOT 1

BRISTOL, RHODE ISLAND

LAFRANCE HOSPITALITY

LOCUS PLAN

August, 2015

FIGURE 1

PARE CORPORATION

PROPOSED HOTEL

GOODING AVENUE / PLAT 111 LOT 1

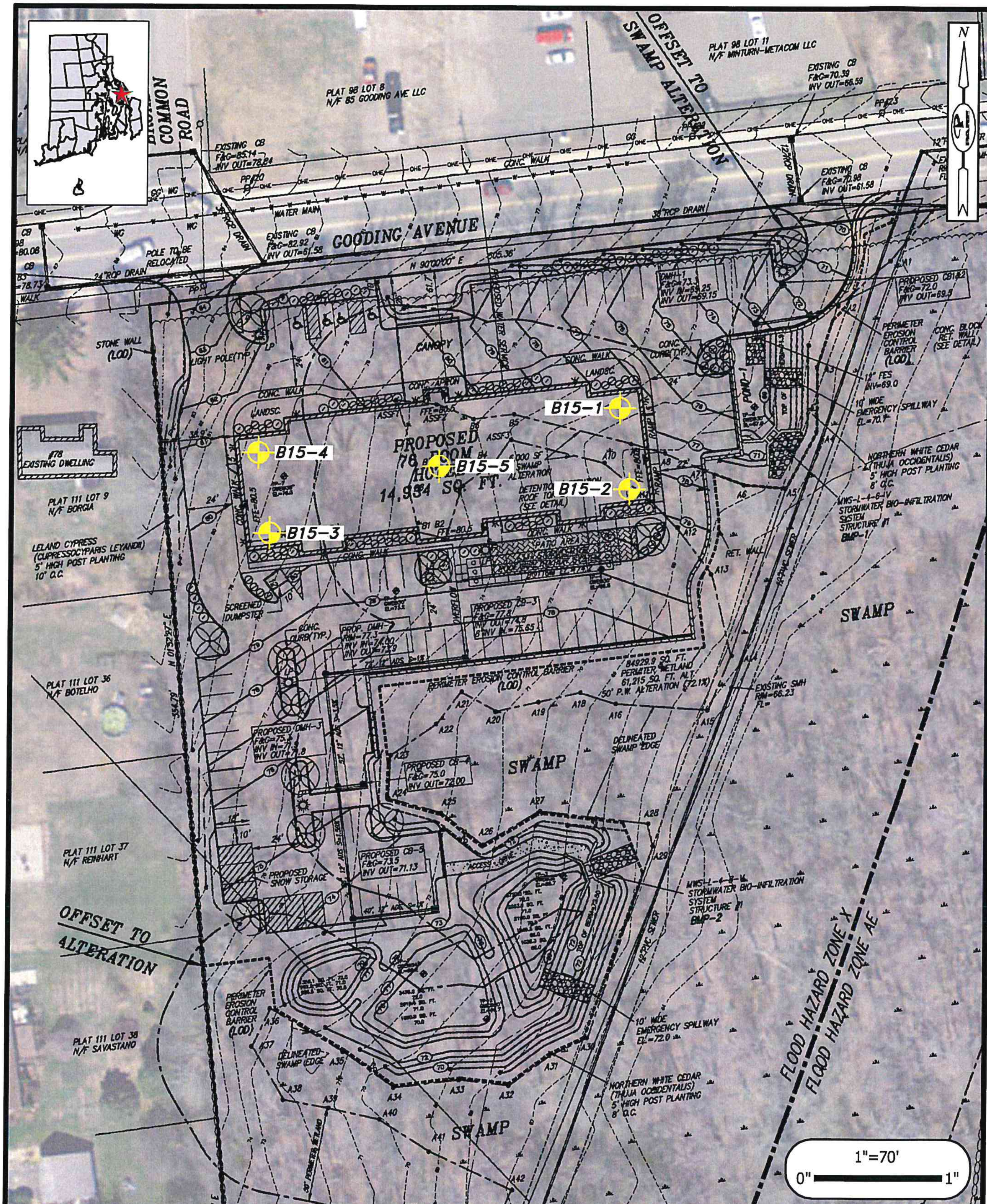
BRISTOL, RHODE ISLAND

LAFRANCE HOSPITALITY

AERIAL PLAN

August, 2015

FIGURE 2



PARE CORPORATION

PROPOSED HOTEL

GOODING AVENUE / PLAT 111 LOT 1

BRISTOL, RHODE ISLAND

LAFRANCE HOSPITALITY

BORING LOCATION PLAN

August, 2015

FIGURE 3

APPENDIX A
Boring Logs

PARE CORPORATION

10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS

ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. B15-1

SHEET 1 OF 2

PROJECT: LaFrance Hospitality, Bristol, Rhode Island

PROJECT NO. 15088.00

CHKD. BY SJM

BORING CO. New England Boring Contractors

FOREMAN John Galvin

INSPECTOR J. Costa

BORING LOCATION SEE EXPLORATION LOCATION PLAN

GROUND SURFACE ELEVATION 72 feet ± DATUM Unknown

DATE START 7/13/2015 DATE END 7/13/2015

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. SAFETY HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300 lb. HAMMER FALLING 24 IN.

CASING SIZE: 4" OTHER: Wash and Drive

GROUNDWATER READINGS[2]

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
7-14-15	AM	6'	0	1 Day
7-15-15	AM	7'	0	2 Days
7-16-15	AM	6'**	0	3 Days

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT[2] OR KG/CM[2]	SAMPLE DESCRIPTION (Burmister CLASSIFICATION)	REMARKS	STRATUM DESCRIPTION[1]
		S-1	24/16	0-2	3 5		Moist, loose, tan to brown, fine SAND some silt, trace medium to coarse sand, trace fine gravel, trace roots.	1	6" TOPSOIL
					4 5				SAND & SILT
	22/6"	S-2A	20/14	2-3.5	4 9 22		2A: Moist, dense, tan to brown, fine SAND and SILT, trace medium to coarse sand, trace fine gravel, trace roots.*	2	
	66	S-2B	4/3	3.5-4	47				
5	32	S-3	24/12	4-6	26 27		Wet, very dense, blue to gray, fine to coarse SAND, some silt, some fine to coarse gravel.		GLACIAL TILL
	70				67 15				
	78	S-4	24/14	6-8	20 24		Wet, dense, tan to gray, fine to medium SAND, some silt, trace fine to medium gravel, trace clay, trace organics.		
	42				22 34				
	30	S-5	24/16	8-10	16 15		Wet, dense, tan to light gray, fine to medium SAND, some silt, trace fine to coarse gravel, trace clay.		
10					16 19				
15		S-6A	12/9	14-15	33 42		6A: Wet, very dense, blue to light gray, fine to medium SAND and SILT, trace clay.	3	
		S-6B	11/9	15-16	85 101/5"		6B: Wet, very dense, black to dark gray, WEATHERED MUDSTONE recovered as fine to medium sand and silt, some fine gravel, little coarse sand, trace clay.		WEATHERED MUDSTONE
20		S-7	18/17	19-20.5	33 92		Wet, very dense, black to dark gray, WEATHERED MUDSTONE recovered as fine to medium sand and silt, little fine gravel, trace clay.	3	
					100/5"				
25		S-8	24/19	24-26	24 33		Wet, very dense, black to dark gray, WEATHERED MUDSTONE recovered as fine to coarse gravel and fine to coarse sand, some silt, trace clay.	3	
					32 45				
30		S-9	24/24	29-31	23 28		Wet, very dense, black to dark gray, WEATHERED MUDSTONE recovered as silt and fine to medium sand, little clay, little fine gravel.		
					16 71				

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:
1. Topsoil incldued in description.
2. Soil mottling observed in sample
3. Took sample with open hole, casing @ 8'.

** Rained overnight from 7-15-15 to 7-16-15.

*S-2B: Moist, dense, blue to gray, fine SAND and SILT, little medium to coarse sand, trace fine gravel.

BURMISTER CLASSIFICATION

TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%

PERCENT BY WEIGHT

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

PARE CORPORATION

10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS

ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. **B15-1**

SHEET 2 OF 2

PROJECT: LaFrance Hospitality, Bristol, Rhode Island

PROJECT NO. 15088.00

CHKD. BY SJM

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION (Burmister CLASSIFICATION)	REMARKS	STRATUM DESCRIPTION
35		S-10	17/17	34-35.5	56 100 100/5"		Wet, very dense, dark gray to black, WEATHERED MUDSTONE recovered as fine to coarse sand, some fine gravel, little silt, trace clay		WEATHERED MUDSTONE
							BOTTOM OF EXPLORATION 35.5 ± FEET		
40									
45									
50									
55									
60									
65									
70									

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:

6. Well 25' screen, 13' riser, backfill with 3, 50 lb. bags of sand, 25 lbs. of bentonite chips. Benotnite chips are from 3'-8'.

BURMISTER CLASSIFICATION	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%
PERCENT BY WEIGHT	

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING NO. B15-1

PARE CORPORATION

10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS

ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. **B15-2**

SHEET(S) 1 of 2

PROJECT: LaFrance Hospitality, Bristol, Rhode Island

PROJECT NO. 15088.00

CHKD. BY SJM

BORING CO. New England Boring Contractors

FOREMAN John Galvin

INSPECTOR M. Georgian

BORING LOCATION SEE EXPLORATION LOCATION PLAN

GROUND SURFACE ELEVATION 70 feet ± DATUM Unknown

DATE START 7/13/2015 DATE END 7/14/2015

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300 lb. HAMMER FALLING 24 IN.

CASING SIZE: 4"

OTHER: Safety Hammer

GROUNDWATER READINGS[2]

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
7-14-15	7:30	6'	0	18 Minutes

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION (Burmister CLASSIFICATION)	REMARKS	STRATUM DESCRIPTION[1]
		S-1	24/14	0-2	3 7		Moist, dense, tan to gray to orange, fine to medium SAND, little silt, little coarse sand, trace fine gravel.	1.	2" ROOTMAT, 4" TOPSOIL
	27				10 22			2.	
	50	S-2	24/21	2-4	25 29		Wet, very dense, tan to gray, fine to medium SAND, little medium to coarse SAND, trace fine gravel, trace silt.		SAND
	78				30 29				
5	32	S-3	24/17	4-6	25 29		Wet, very dense, gray, fine to coarse GRAVEL and fine to coarse SAND, little silt, trace clay.		
	40				30 24				
	41	S-4	24/16	6-8	24 39		Wet, very dense, gray to tan, fine to coarse GRAVEL and fine to coarse SAND, little silt, trace clay.	3.	
	50				40 31				
		S-5	24/16	8-10	13 12		Wet, medium dense, gray to tan, fine to coarse SAND, some silt, little fine to coarse gravel, trace clay.		GLACIAL TILL
10					15 14				
15		S-6	24/18	14-16	28 33		Wet, very dense, black, WEATHERED MUDSTONE recovered as fine to coarse sand, some fine to coarse gravel, some silt, trace clay.	4.	
					32 41				
20		S-7	24/18	19-21	34 22		Wet, dense, black, WEATHERED MUDSTONE recovered as medium to coarse sand, trace silt, trace sand.		
					25 52				
									WEATHERED MUDSTONE
25		S-8	24/17	24-26	38 53		Wet, very dense, black WEATHERED MUDSTONE recovered as fine to coarse gravel, little fine to medium sand, little silt, trace coarse sand.		
					68 92				
30		S-9	9/7	29-29.75	81 105/3"		Wet, very dense, black WEATHERED MUDSTONE recovered as fine to coarse gravel, little fine to medium sand, little silt, trace coarse sand.		

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:
1. Soil mottling in sample.
2. Top soil not included in description.
3. Sampled with open hole, casing @ 8'.
4. Sampled with open hole, casing @ 8'.

BURMISTER CLASSIFICATION	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%
PERCENT BY WEIGHT	

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING NO. B15-2

PARE CORPORATION

10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS

ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. B15-2

SHEET 2 OF 2

PROJECT: LaFrance Hospitality, Bristol, Rhode Island

PROJECT NO. 15088.00

CHKD. BY SJM

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION (Burmister CLASSIFICATION)	REMARKS	STRATUM DESCRIPTION
35		S-10	8/4	34-34.7	100 100		Wet, very dense, black WEATHERED MUDSTONE recovered as fine to coarse sand, some silt.	5.	WEATHERED MUDSTONE
40		S-11	5/5	39-39.5	100		Wet, very dense, black WEATHERED MUDSTONE recovered as fine to coarse sand, some silt.		
							BOTTOM OF EXPLORATION ± 39.5 FEET		
45									
50									
55									
60									
65									
70									

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:

5. Occassional brown patches in sample.

BURMISTER CLASSIFICATION	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%

PERCENT BY WEIGHT

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

PARE CORPORATION

10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS
ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. B15-3

SHEET(S) 1 of 2

PROJECT: LaFrance Hospitality, Bristol, Rhode Island

PROJECT NO. 15088.00

CHKD. BY SJM

BORING CO. New England Boring Contractors

FOREMAN John Galvin

INSPECTOR M. Georgian

BORING LOCATION SEE EXPLORATION LOCATION PLAN

GROUND SURFACE ELEVATION 79 feet ± DATUM Unknown

DATE START 7/15/2015 DATE END 7/16/2015

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300 lb. HAMMER FALLING 24 IN.

CASING SIZE: 4" OTHER: Safety Hammer

GROUNDWATER READINGS[2]

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
7/16/15	1:30	6'	0	8 Hours
7/17/15	12:00	4.5'	0	1 Day

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION (Burmister CLASSIFICATION)	REMARKS	STRATUM DESCRIPTION[1]
		S-1A	10/18	0-1	3 9		1A: Wet, dense, brown fine to medium SAND and SILT.		TOPSOIL
		S-1B	14/14	1-2	22 29		1B: Moist, dense, gray, fine SAND and SILT.		SAND
		S-2	24/18	2-4	12 40		Moist, dense, gray and tan and orange, SILT and fine to medium SAND, little fine gravel, trace coarse sand.		
					21 20				
5		S-3	24/14	4-6	20 63		Wet, very dense, gray to tan, fine to coarse GRAVEL, trace fine sand, trace silt.		GLACIAL TILL
					49 30				
		S-4	24/15	6-8	18 14		Wet, dense, gray to tan, fine to coarse GRAVEL, trace fine to coarse sand, trace silt.		
					22 24				
		S-5	24/13	8-10	18 31		Wet, very dense, gray to brown, fine to coarse GRAVEL, fine to coarse sand, little silt.		
10					40 33				
15		S-6	24/1	14-16	33 87		Wet, very dense, gray, coarse GRAVEL, trace fine to coarse sand, trace silt, trace clay.	1.	
					80 60				
20		S-7	24/15	19-21	23 27		Wet, very dense, gray, fine SAND, trace silt.	2.	
					35 32				
25		S-8	24/12	24-26	86 56		Wet, very dense, dark gray WEATHERED MUDSTONE recovered as fine to coarse sand and fine gravel, trace silt.	3.	WEATHERED MUDSTONE
					82 30				
30		S-9	21/20	29-30.3	33 77		Wet, very dense, black WEATHERED MUDSTONE recovered as silt, trace fine to coarse sand, trace gravel.	4.	
					78 106/5"				

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:
1. Coarse gravel appeared to plug the tip of the spoon.
2. The top half of the spoon recovered gradual fades from brown to gray.
3. Hole collapsed, installed casing.
4. Black is specked with occassional white.

BURMISTER CLASSIFICATION

TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%

PERCENT BY WEIGHT

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING NO. B15-3

PARE CORPORATION

10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS
ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. B15-3

SHEET 2 OF 2

PROJECT: LaFrance Hospitality, Bristol, Rhode Island
PROJECT NO.: 15088.00
CHKD. BY: SJM

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION (Burmister CLASSIFICATION)	REMARKS	STRATUM DESCRIPTION
35		S-10	17/14	34-35.5	57 60 100/3"		Wet, very dense, black WEATHERED MUDSTONE recovered as fine to coarse sand and silt.		WEATHERED MUDSTONE
40		S-11	9/9	39-39.75	98 100/3"		Wet, very dense, gray, fine SAND, some silt.	5.	
							BOTTOM OF EXPLORATION ± 39.75 FEET		
45									
50									
55									
60									
65									
70									

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:
5. Contains white streaks.

BURMISTER CLASSIFICATION	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%
PERCENT BY WEIGHT	

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING NO. B15-3

PARE CORPORATION

10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS
ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. B15-4
SHEET(S) 1 of 2

PROJECT: LaFrance Hospitality
PROJECT NO.: 15088.00
CHKD. BY: SJM

BORING CO.: New England Boring Contractors
FOREMAN: John Galvin
INSPECTOR: M. Georgian
BORING LOCATION: SEE EXPLORATION LOCATION PLAN
GROUND SURFACE ELEVATION: 80 feet ± DATUM: Unknown
DATE START: 7/15/2015 DATE END: 7/16/2015

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300 lb. HAMMER FALLING 24 IN.

CASING SIZE: 4" OTHER: Safety Hammer

GROUNDWATER READINGS[2]

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
7-16-15	AM	5.5'	0	1 Day

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION[1]
		S-1A	6/3	0-2	2 5		1A: Moist, medium dense, brown, fine SAND and SILT.		6" TOPSOIL
		S-1B	18/15		6 11		1B: Moist, medium dense, gray to orange, fine SAND and SILT.		
		S-2	24/24	2-4	16 26		Moist, very dense, brown and orange, fine to coarse SAND, trace silt, trace gravel.		SAND
					32 19				
5	30	S-3	24/18	4-6	18 22		Wet, dense, gray, fine to coarse SAND and GRAVEL, trace silt.		
	41				25 39				
	33	S-4	24/21	6-8	35 24		Wet, dense, dark gray, fine to coarse SAND, little silt.		
	30				18 20				
	27	S-5	24/13	8-10	14 15		Wet, dense, gray, fine to coarse SAND and SILT, trace fine gravel.		
10					21 16				
									GLACIAL TILL
15		S-6	24/17	14-16	18 29		Wet, very dense, dark gray, fine to coarse GRAVEL, little fine to coarse sand, little silt.		
					34 33				
20		S-7	24/20	19-21	23 33		Wet, very dense, dark gray, WEATHERED MUDSTONE, recovered as fine sand, little silt, trace medium to coarse sand, trace fine gravel.	1.	
					41 50				
25		S-8	24/9	24-24.75	88 100/4"		Wet, very dense, gray, WEATHERED MUDSTONE, recovered as fine to coarse sand, some silt.		WEATHERED MUDSTONE
30		S-9	24/22	29-31	21 22		Wet, very dense, WEATHERED MUDSTONE, recovered as dark gray, fine to coarse sand, some silt, trace gravel.		
					83 75				

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:
1. 0.5 inch thick brown to orange streaks.

BURMISTER CLASSIFICATION	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%
PERCENT BY WEIGHT	

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

PARE CORPORATION
10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS
ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. B15-4

SHEET 2 OF 2

PROJECT: LaFrance Hospitality
0

PROJECT NO.: 15088.00
CHKD. BY: SJM

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
35		S-10	20/16	34-35.8	20 17		Wet, very dense, WEATHERED MUDSTONE, recovered as black, fine to coarse sand, trace silt, trace gravel.		WEATHERED MUDSTONE
					87 100/2"				
40		S-11	4/9	39-39.75	83 100/3"		Wet, very dense, WEATHERED MUDSTONE, recovered as black, fine to coarse SAND, some silt.		
							BOTTOM OF EXPLORATION ± 39.75 FEET		
45									
50									
55									
60									
65									
70									

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:

BURMISTER CLASSIFICATION	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%
PERCENT BY WEIGHT	

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING NO. B15-4

PARE CORPORATION
10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS
ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. B15-5
SHEET(S) 1 of 2

PROJECT	LaFrance Hospitality Bristol, Rhode Island	PROJECT NO.	15088.00
		CHKD. BY	SJM

BORING CO.	New England Boring Contractors	BORING LOCATION	SEE EXPLORATION LOCATION PLAN
FOREMAN	John Galvin	GROUND SURFACE ELEVATION	78 feet ± DATUM Unknown
INSPECTOR	M. Georgian	DATE START	7/17/2015 DATE END 7/17/2015

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300 lb. HAMMER FALLING 24 IN.

CASING SIZE: 4" OTHER: Safety Hammer

GROUNDWATER READINGS[2]

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
7/17/15	11:00	4.5'	0	30 Minutes

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION[1]
	4	S-1A	9/6	0-.75	2 4		1A: Moist, dense, brown SILT, little fine sand.		9" TOPSOIL
	10	S-1B	15/10	.75-2	17 19		1B: Moist, dense, brown/tan, fine SAND, trace silt.		SAND
	33	S-2	24/10	2-4	14 20		Moist, dense, orange and tan, coarse GRAVEL, some fine to medium sand, little silt, trace coarse sand.		
	42				25 23				
5	18	S-3	24/12	4-6	13 13		Wet, medium dense, gray, fine to coarse GRAVEL, some silt, little fine to coarse sand.		GLACIAL TILL
	39				19 25				
	21	S-4	24/9	6-8	21 21		Wet, dense, gray, SILT and fine to coarse SAND, some fine gravel, trace coarse gravel.		
	32				24 47				
	30	S-5	24/10	8-10	19 17		Wet, dense, gray, fine GRAVEL, some fine to coarse sand, trace silt.		
10					21 19				
15		S-6	24/13	14-16	8 9		Wet, medium dense, dark gray, fine SAND and SILT, some gravel, little coarse sand.		WEATHERED MUDSTONE
					10 13				
20		S-7	24/16	19-21	14 18		Wet, dense, dark gray WEATHERED MUDSTONE, recovered as fine to coarse sand, trace gravel, trace silt.		
					25 25				
25		S-8	24/21	24-26	17 30		Wet, very dense, dark gray, WEATHERED MUDSTONE, recovered as fine to coarse sand, trace silt.		
					31 37				
30		S-9	20/14	29-30.3	40 70		Wet, very dense, gray, WEATHERED MUDSTONE, recovered as fine to coarse sand, little gravel, trace silt.		
					100/4"				

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:

BURMISTER CLASSIFICATION	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%
PERCENT BY WEIGHT	

NOTES:
1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING NO. B15-5

PARE CORPORATION

10 LINCOLN ROAD, SUITE 103, FOXBORO, MASSACHUSETTS
ENGINEERS *** PLANNERS *** CONSULTANTS

BORING NO. B15-5

SHEET 2 OF 2

PROJECT: LaFrance Hospitality, Bristol, Rhode Island

PROJECT NO. 15088.00

CHKD. BY SJM

DEPTH (ft)	CASING (bl/ft)	SAMPLE NO.	PEN. (in.)/ REC.	DEPTH (FT)	BLOWS/6"	TONS/FT² OR KG/CM²	SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
35		S-10	10/10	34-34.8	91 100/4"		Wet, very dense, dark gray, WEATHERED MUDSTONE, recovered as fine to coarse sand, trace silt, trace gravel.		WEATHERED MUDSTONE
40		S-11	10/10	39-39.8	43 100/4"		Wet, very dense, dark gray, WEATHERED MUDSTONE, recovered as fine to coarse sand, some silt, trace medium to coarse sand.		
							BOTTOM OF EXPLORATION ± 39.8 FEET		
45									
50									
55									
60									
65									
70									

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0 - 4	V. LOOSE	<2	V.SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M.DENSE	4 - 8	M.STIFF
30 - 50	DENSE	8 - 15	STIFF
>50	V.DENSE	15 - 30	V.STIFF
		>30	HARD

REMARKS:

BURMISTER CLASSIFICATION	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%
PERCENT BY WEIGHT	

NOTES: 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

BORING NO. B15-5

APPENDIX B
Laboratory Testing Data

SIEVE ANALYSIS

SOIL SAMPLE

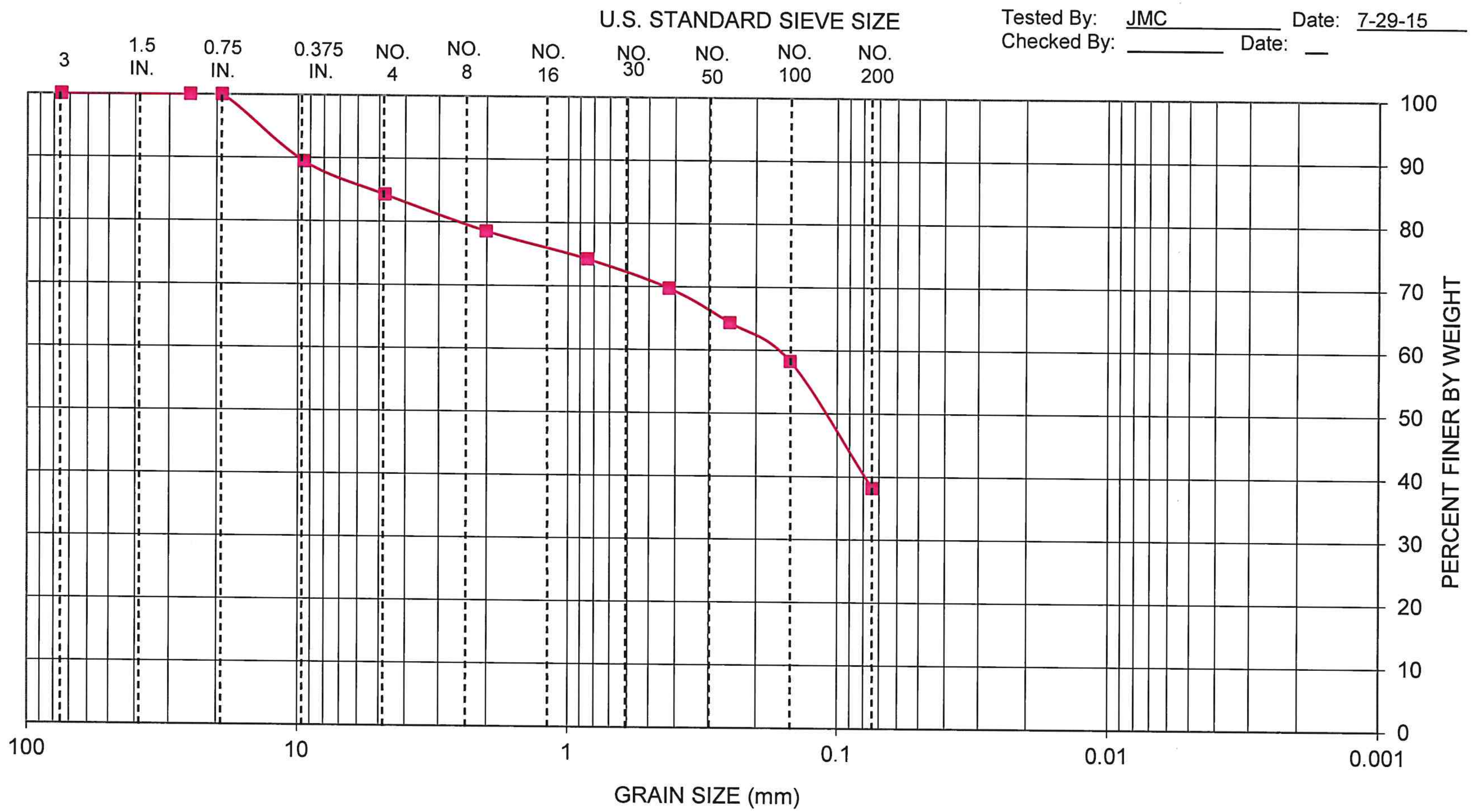
WATER CONTENT

Location:	Bristol,RI	Container No.	3	File No.	15088.00
Boring No.:	B15-3	Wt. Container (g)	189.4	Test No.	1
Depth:	2'-4'	Wt. Container, Wet Soil (g)	353.6	Date	7/29/2015
Sample No.:	S-2	Wt. Container, Dry Soil (g)	335.2	Tested By:	JMC
		Wt. Water (g)	18.4	Checked By	SJM
Specific		Wt. Dry Soil (g)	145.8		
Gravity, Gs:	2.65	Natural Water Content (%)	12.62%	Dry Sieve	
		Wt. Con, Washed Dry Soil (g)		Wash Sieve	
		Wt. Washed Dry Soil (g)		Combined	X

TOTAL SAMPLE

U.S. Standard Sieve No.	Sieve Opening (mm)	Sieve Wt. (g)	Sieve + Soil Wt. (g)	Wt. of Soil Retained (g)	Cumulative Percent Retained	Total Sample Percent Finer By Wt.
3"	75	546.4	546.4	0.0	0.00	100.00
1"	25	546.4	546.4	0.0	0.00	100.00
0.75"	19.1	553.9	553.9	0.0	0.00	100.00
0.375"	9.5	537.4	552.7	15.3	10.53	89.47
4	4.76	498.6	506.1	7.5	15.69	84.31
10	2	482.3	490.6	8.3	21.40	78.60
20	0.841	434.2	440.5	6.3	25.74	74.26
40	0.420	378.2	384.8	6.6	30.28	69.72
60	0.250	349.3	357.1	7.8	35.65	64.35
100	0.149	361.5	370.4	8.9	41.78	58.22
200	0.074	332.5	361.6	29.1	61.80	38.20
Pan		371	426.5	55.5	100.00	0.00
Total				145.3	100.00	

Tested By: JMC Date: 7-29-15
Checked By: ______ Date: —



GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

TEST	MATERIAL SOURCE	REMARKS
1	LaFrance Hospitality Bristol, RI B15-3 S-2 2'-4' SAND	Burmister - (SILT and fine to medium SAND, little fine gravel, trace coarse sand) Unified Soil Classification System - (SM Silty sand with gravel)

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SIEVE ANALYSIS

SOIL SAMPLE

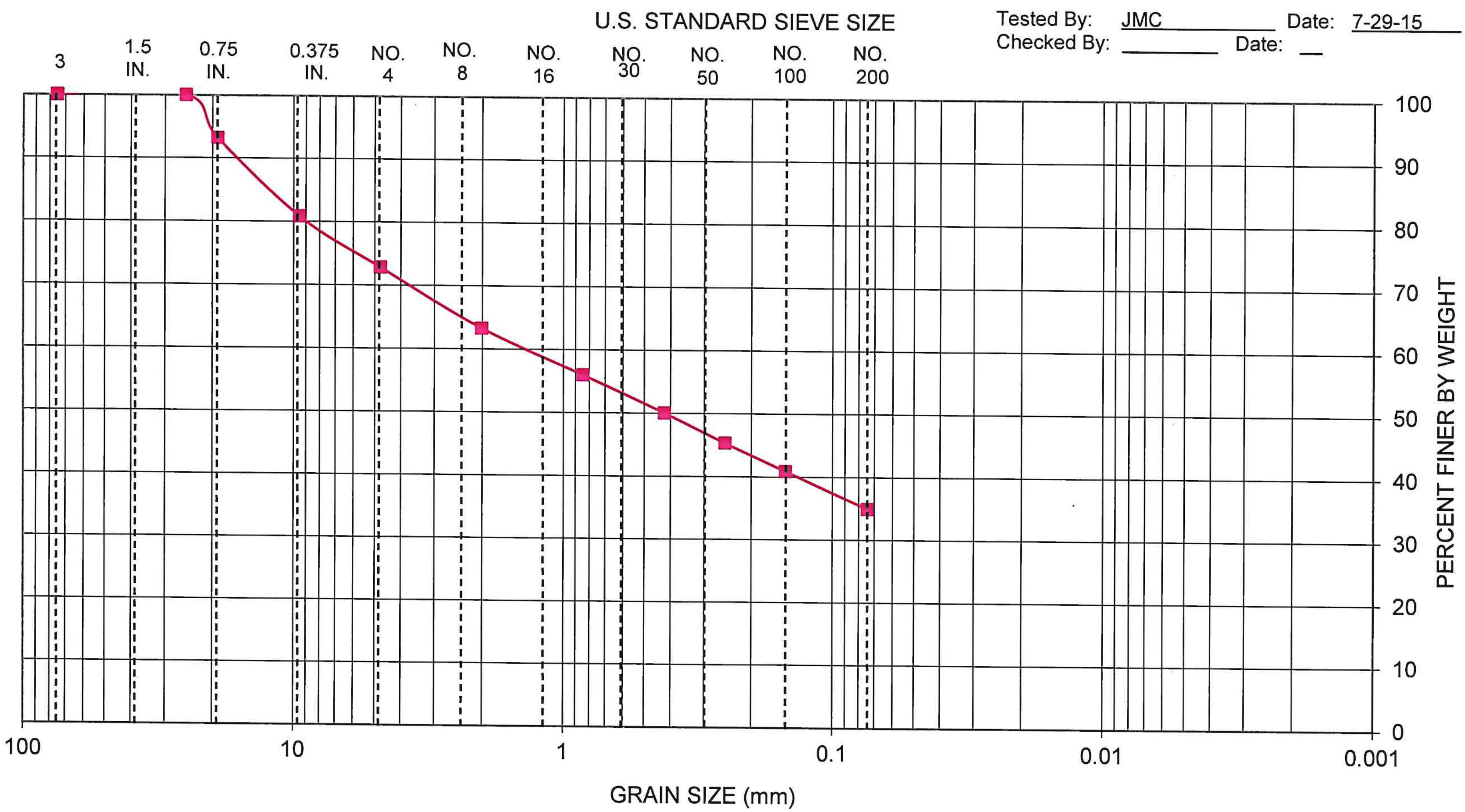
WATER CONTENT

Location:	Bristol,RI	Container No.	4	File No.	15088.00
Boring No.:	B15-5	Wt. Container (g)	185.2	Test No.	2
Depth:	6'-8'	Wt. Container, Wet Soil (g)	396.2	Date	7/29/2015
Sample No.:	S-4	Wt. Container, Dry Soil (g)	374.3	Tested By:	JMC
		Wt. Water (g)	21.9	Checked By	SJM
Specific		Wt. Dry Soil (g)	189.1		
Gravity, Gs:	2.65	Natural Water Content (%)	11.58%	Dry Sieve	
		Wt. Con, Washed Dry Soil (g)		Wash Sieve	
		Wt. Washed Dry Soil (g)		Combined	X

TOTAL SAMPLE

U.S. Standard Sieve No.	Sieve Opening (mm)	Sieve Wt. (g)	Sieve + Soil Wt. (g)	Wt. of Soil Retained (g)	Cumulative Percent Retained	Total Sample Percent Finer By Wt.
3"	75	546.4	546.4	0.0	0.00	100.00
1"	25	546.4	546.4	0.0	0.00	100.00
0.75"	19.1	553.9	566.9	13.0	6.78	93.22
0.375"	9.5	537.4	561	23.6	19.10	80.90
4	4.76	498.6	514	15.4	27.14	72.86
10	2	482.3	500.6	18.3	36.69	63.31
20	0.841	434.2	448.2	14.0	44.00	56.00
40	0.420	378.2	389.6	11.4	49.95	50.05
60	0.250	349.3	358.4	9.1	54.70	45.30
100	0.149	361.5	370	8.5	59.13	40.87
200	0.074	332.5	343.9	11.4	65.08	34.92
Pan		371	437.9	66.9	100.00	0.00
Total				191.6	100.00	

Tested By: JMC Date: 7-29-15
Checked By: ______ Date: —



GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

TEST	MATERIAL SOURCE	REMARKS
2	LaFrance Hospitality Bristol, RI B15-5 S-4 6'-8' GLACIAL TILL	Burmister - (SILT and fine to coarse SAND, some fine gravel, trace coarse gravel) Unified Soil Classification System - (SM Silty sand with gravel)

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APPENDIX C
Geotechnical Limitations

GEOTECHNICAL LIMITATIONS

Explorations

1. The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, Pare Corporation (PARE) should be asked to reevaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in the subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.

3. Water level readings have been made in the drill holes at the times and under the conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, fluctuations in the level of groundwater may occur due to variations in rainfall, temperature, and other factors occurring since the time the measurements were made.

Review

4. In the event that any changes in the nature or location of the proposed structure are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are verified in writing by PARE. PARE should also be provided with the opportunity for a general review of the final design and specifications in order that the earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Construction

5. PARE should be retained to provide soil engineering services during construction of the excavation and foundation phases of work in order to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those indicated prior to the start of construction.

Use of Report

6. This report has been prepared for the exclusive use of Sean LaFrance, LaFrance Hospitality for specific application to the proposed hotel in Bristol, RI in accordance with generally accepted engineering practices. No other warranty, expressed or implied, is made.

7. This engineering report has been prepared for this project by PARE. This report is for design purposes only and is not necessarily sufficient to prepare an accurate bid. Contractors wishing a copy of this report may secure it with the understanding that its scope is limited to design considerations only.

APPENDIX D
General Investigation Notes

GENERAL INVESTIGATION NOTES

GENERAL

1. All depths are given in feet measured from the ground surface unless otherwise noted. Depth of angled borings is measured along the axis of the boring.
2. The identification and description of soils is based on visual inspection of the retrieved samples using the Burmister Classification System. Descriptions of boring logs apply only at the specific boring locations and at the time the borings were made. They are not warranted to be representative of subsurface conditions at other locations or times.
3. Water levels are observed at the end of boring (E.O.B.) or/and on a long-term basis through the use of strategically placed observation wells. The indicated levels may not reflect the actual groundwater levels. Fluctuations in groundwater levels can occur due to variations in precipitation, season, tidal fluctuation, adjacent construction activity and construction dewatering systems, and other factors.

SOIL DESCRIPTION

1. The Standard Penetration (SPT) test is performed in general accordance with ASTM D-1586. The standard penetration resistance (N) is defined as the number of blows required to drive a 2-inch O.D., 1 3/8-inch I.D. split-spoon sampler by 12 inches by dropping a 140-lb hammer through a vertical distance of 30 inches. The sampler is normally driven 3 (for 18-inch long sampler) or 4 (for 24-inch long sampler) successive 6-inch increments. The first 6-inch is considered to be a seating drive, therefore the sum of the second and third increments are used in determining the N value.

2. Consistency/Condition

Coarse-Grained Soils	Relative Density (%)	N (blows per foot)
Very loose	0-15	0-4
Loose	15-35	4-10
Medium dense	35-65	10-30
Dense	65-85	30-50
Very dense	85-100	>50

Fine-Grained Soils	Unconfined Compressive Strength, q_u (tsf)	N (blows per foot)	Field Identification
Very Soft	<0.25	0-2	Exudes between fingers when squeezed in hand
Soft	0.25-0.50	2-4	Molded by light finger pressure
Medium	0.50-1.00	4-8	Molded by strong finger pressure
Stiff	1.00-2.00	8-15	Indented by thumb
Very Stiff	2.00-4.00	15-30	Indented by thumbnail
Hard	>4.00	>30	Difficult to indent by thumbnail

Grain Size

Boulders – >12 in.
Cobbles – 3 in. - 12 in.
Gravel – Coarse, ¾ in. - 3 in.
– Fine, 0.19 in. (#4) to ¾ in.
Sand – Coarse, 0.079 in. (#10) to 0.19 in. (#4)
– Medium, 0.017 in. (#40) to 0.079 in. (#10)
– Fine, 0.0029 in. (#200) to 0.017 in. (#40)
Silt – 0.0002 in. to 0.0029 in. (#200)
Clay - <0.0002 in.

Descriptive Adjective	
Trace	0-10%
Little	10-20%
Some	20-35%
And	35-50%

Percent by Weight

ROCK DESCRIPTION

1. Core recovery is the total length of rock core recovered from a core run divided by the length of the run, expressed as a percentage.
2. Rock Quality Designation (RQD) is the total length of hard, sound pieces of rock core greater than 4-inches from a core run divided by the length of the run, expressed as a percentage.

RQD (%)	Description	Approximate Equivalent Fracture Spacing (feet)	
0-25	Very Poor	Very close	(<0.2)
25-50	Poor	Close	(0.2-1)
50-75	Fair	Moderately wide	(1-3)
75-90	Good	Wide	(3-10)
90-100	Excellent	Very wide	(>10)

3. "Weathering" refers to the degree of alteration observed in the rock core, which is produced by chemical and/or mechanical processes.

Grade	Symbol	Recognition
Fresh	F	No visible sign of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	WS	Slight discoloration inwards from open fractures, otherwise similar to F.
Moderately Weathered	WM	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat

		less than fresh rock but cores cannot be broken by hand or scraped by knife. Texture preserved.
Highly Weathered	WH	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	WC	Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	RS	Advance state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

4. "Hardness" is an estimate of the rock strength that is a function of lithology and the degree of weathering.

Class	Hardness	Field Test	Approximate Range of Uniaxial Compression Strength kg/cm^2 (tons/ft^2)
I	Extremely Hard	Many blows with geologic hammer required to break intact specimen.	>2,000
II	Very Hard	Hand held specimen breaks with hammer end of pick under more than one blow.	2,000 – 1,000
III	Hard	Cannot be scraped or peeled with knife, hand held specimen can be broken with single moderate blow with pick.	1,000 – 500
IV	Soft	Can just be scraped or peeled with knife. Indentation 1 mm to 3 mm show in specimen with moderate blow with pick.	500 – 250
V	Very Soft	Material crumbles under moderate blow with sharp end of pick and can be peeled with a knife, but is too hard to hand-trim for triaxial test specimen.	250 – 10

5. Discontinuity Descriptions

Rock Continuity: Any break in a rock whether or not it has undergone relative displacement.

Extremely Fractured – Drill core stem less than 1 in.
Moderately Fractured – Drill core stem 1 in. to 4 in.
Slightly Fractured – Drill core stem 4 in. to 8 in.
Sound – Drill core stem greater than 8 in.

Texture: Terminology used to identify size, shape and arrangement of constituent elements.

Amorphous – Too small to be seen with naked eye.
Fine Grained – Barely seen with naked eye.
Medium Grained – Barely seen with naked eye to 1/8 in.
Coarse Grained – $^1/_8$ in to ¼ in.
Very Coarse Grained > ¼ in.

Discontinuities: Surface representing breaks or fractures separating the rock moss into discrete units.

Crack – A partial or incomplete fracture.
Joint – A simple fracture along which no shear displacement has occurred. May form joint sets.
Shear – A fracture along which differential movement has taken place parallel to the surface sufficient to produce slickendsides or polishing. May be accompanied by a zone of fractured rock up to a few inches wide.
Fault – A major fracture along which there has been appreciable displacement and accompanied by gouge and/or a severely fractured adjacent zone.
Shear or Fault Zone – A band or zone of parallel, closely spaced shears or faults.

Fractures, Bedding, and Foliation, Spacing and Attitude:

Fractures	Bedding and Foliation	Spacing	Attitude	Dip Angle
Very Close	Very Thin	Less than 2 in.	Horizontal	0 – 5
Close	Thin	2 in. – 1 ft.	Shallow or low angle	5 – 35
Moderate	Medium	1 ft. – 3 ft.	Moderately dipping	35 – 55
Wide	Thick	3 ft. – 10 ft.	Steep or high angle	55 – 85
Very Wide	Very Thick	More than 10 ft.	Vertical	85 – 90

DRILLING CODES

HSA	Hollow Stem Auger	SS	Split Spoon Sample
C/A	Casing Advancement	AS	Auger Sample
BX	Rock Cored with BX Core Barrel (Produces 1 $^5/_8$"-diameter core)	ST	Shelby Tube Sample
		WS	Washed Sample
NX	Rock Cored with NX Core Barrel (Produces 2 $^1/_8$"-diameter core)	NR	No Recovery