Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

AAI File No. 20-1669
July 27, 2020
Revised July 28, 2020

REG Architects
120 South Olive Avenue, Suite 210
West Palm Beach, Florida 33401

Attention: Manuel Ayala

Subsurface Exploration and Geotechnical Engineering Evaluation
Royal Palm Beach Village Hall – 1050 Royal Palm Beach Boulevard
Royal Palm Beach, Florida

1.0 INTRODUCTION

In accordance with your request and authorization, Ardaman & Associates, Inc. has completed a subsurface exploration and geotechnical engineering evaluation for the above referenced project. We explored the general subsurface conditions in order to evaluate their suitability for the support of the proposed construction, to obtain a measure of pertinent engineering properties of the subsurface soils and to provide recommendations for site preparation and foundation design. Our work included soil borings, field permeability testing and engineering analyses. This report describes our explorations, reports their findings, and summarizes our conclusions and recommendations.

2.0 SITE LOCATION AND DESCRIPTION

The project site is located at 1050 Royal Palm Beach Boulevard (Section 26, Township 43 South, and Range 41 East) in Royal Palm Beach, Palm Beach County, Florida. The site is developed with several single-story municipal buildings along with the associated parking and drive areas. A site vicinity map is presented as our Figure 1.

3.0 PROJECT DESCRIPTION

It is our understanding that this project involves razing existing structures and constructing a new two-story building and associated pavement areas. Based upon the information provided to us, maximum wall loads will be 11 kips per linear foot, and maximum column loads will be 200 kips. Fill heights were estimated to be two feet or less.

If any of this information is incorrect or anticipated to change, please notify our office so that we can review the changes and make corrections as needed.

4.0 FIELD EXPLORATION

4.1 SOIL BORINGS

The subsurface conditions at the site were explored with five (5) Standard Penetration Test (SPT) borings and five (5) auger borings at the approximate locations shown on our attached Figure 2: Boring Location Plan. The SPT borings were terminated at a depth of 25 feet, and the auger borings at depths of 5 feet below the existing grades. The soil borings were performed in general accordance with the procedures outlined in ASTM D-1586 (SPT borings) and ASTM D-1452 (auger borings). The boring logs and a description of our drilling and testing procedures are attached.

Our field exploration was conducted on July 8 and July 9, 2020. The boring locations were laid out in the field in reference to the existing building and other distinguishable landmarks. We estimate that the actual boring locations are within approximately 15 feet of the locations shown in Figure 2.

4.2 FIELD PERMEABILITY TEST

In order to estimate the hydraulic conductivity of the upper soils, two (2) field permeability tests were performed at the approximate locations shown in Figure 2. The tests were conducted in general accordance with the usual open-hole exfiltration test method described in the South Florida Water Management District (SFWMD) Permit Information Manual, Volume IV. Descriptions of the soils observed in the test boreholes and the test results are presented in the attached field permeability test log. In brief, the exfiltration tests yielded hydraulic conductivity values of 4.75×10^{-4} cfs/sqf - ft head (EX-1) and 2.32×10^{-4} cfs/sqf - ft head (EX-2).

5.0 LABORATORY TESTING

Our drillers examined soils recovered from the sampler, placed the recovered soil samples in moisture proof containers, and maintained a log for each boring. The field soil boring logs and recovered soil samples were transported to our West Palm Beach soils laboratory from the project site. Each soil sample was then examined by an Engineer and visually classified in general accordance with the Unified Soil Classification System (USCS). The soil classifications and other pertinent data obtained from our explorations and laboratory examinations and tests are reported on the attached boring logs. The soil samples recovered from our explorations will be kept in our laboratory for 60 days, then discarded unless you request otherwise.

6.0 GENERAL SUBSURFACE CONDITIONS

The attached boring logs present a detailed description of the soils encountered in the explored locations throughout the explored depths. The soil stratification shown on the boring logs is based on examination of recovered soil samples and interpretation of the driller's field logs. It indicates only the approximate boundaries between soil types. The actual transitions between adjacent soil strata may be gradual and indistinct.

The borings performed throughout the existing pavements consisted of 1.5 to 3.0 inches of asphalt and 7.0 to 12.0 inches of limerock base. The soils below the pavement and in other explored locations consisted generally of very loose to loose fine sands with varying amounts of silt and clay to depths of 5 feet, followed by loose to medium dense fine sands with varying amounts of shell and limestone fragments to depths of about 8 feet, in turn followed by very loose to loose fine sands with varying amounts of silt to the termination depth of our deepest boring at 25 feet.

6.1 USDA SOIL SURVEY

Our review of the Soil Survey of Palm Beach County, Florida, which was issued by the U.S. Department of Agriculture, Soil Conservation Service in 1978, indicates that the predominant surficial soil type in the immediate vicinity of the project site is Riviera fine sand. This soil is described as very deep, poorly drained, very slowly permeable soil that formed in stratified sand and loamy marine sediments. They typically have soil with varying amounts of silt and clay between depths of about 2.5 and 4 feet under natural conditions and are underlain by fine sands with varying amounts of shell to depths of 80 inches or more. The soils encountered in our borings compared well with those described by the USDA Soil Survey.

7.0 GROUNDWATER CONDITIONS

Groundwater was encountered at depths ranging from 4.7 to 5.5 feet in our borings at the time of exploration. Under normal conditions, groundwater levels on this site should be anticipated throughout the year due to a variety of factors, the most important of which are rainfall and established drainage patterns. Groundwater levels somewhat above the present levels should be expected after major storm events and periods of heavy or prolonged rainfall.

8.0 DISCUSSIONS AND RECOMMENDATIONS

Based on the findings of our site exploration and our evaluation of the encountered subsurface conditions, we conclude that the soils underlying this site are generally satisfactory to support the proposed construction on conventional shallow foundations. The bearing capacity of the loose near-surface sands should be improved beneath the foundations in order to reduce the risk of unsatisfactory foundation performance. Following are specific recommendations for site preparation procedures and the design of foundation systems.

8.1 SITE PREPARATION RECOMENDATIONS

The foundation areas should be cleared of all landscaping, topsoil, pavements, debris, trash, etc. Underground utility lines (if any), should be removed or rerouted around the construction areas and their excavations/depressions backfilled with approved granular fill placed and compacted in thin lifts as recommended below (or be properly abandoned by grouting in place). Care should be exercised not to undermine or damage any existing structures/foundations.

Once cleared and prepared, the construction areas should be proofrolled with a heavy (10 to 12 ton) vibratory roller. Any soft, yielding soils detected during the proofrolling operations should be excavated and replaced with approved fill conforming to the specifications below. Sufficient passes should be made during the proofrolling operations to produce minimum dry densities of 98 percent of the Modified Proctor (ASTM D-1557) maximum dry density value of the compacted subgrade soils to a depth of 1 foot below the compacted surface.

After the construction areas have been proofrolled and tested to verify that the specified compaction level has been attained, the construction areas may be filled to the desired finish grades. All fill material should consist of clean sands, free of organics and other deleterious materials, with less than 8 percent of fines (particles passing the No. 200 sieve) and no particle larger than 3 inches in diameter. It should be placed in uniform layers, 6 inches or less in loose thickness, individually compacted to a minimum dry density of 98 percent of its Modified Proctor maximum dry density value. Soils with higher percentage of silts and clays may be used but may prove to be difficult to compact.

After completion of the general compaction and filling operations, when the excavations for the construction of foundations are made through the compacted soils, the bottom of the foundation excavations should be compacted to densify soils loosened during or after the excavation process and washed or sloughed into the excavation prior to the placement of the forms. A heavy-duty vibratory rammer should be used for this final compaction, immediately prior to the placement of reinforcing steel, with previously described minimum dry density requirements to be maintained below the foundation level.

After the foundations are cast and the forms are removed, backfill around the foundations should be placed in thin layers, six inches or less in loose thickness, individually compacted with a heavy-duty vibratory rammer to a minimum dry density of 98 percent of the Modified Proctor maximum dry density value of the backfill material.

8.2 CONSTRUCTION CONSIDERATIONS

Foundation concrete should not be cast over a foundation surface containing organic soils, trash of any kind, surfaces made muddy by improperly abandoned utility or sewer lines, or loose soils caused by excavation or other construction work. Reinforcing steel should also be clean at the time of concrete casting. If such conditions develop during construction, the reinforcing steel must be lifted out and the foundation surface reconditioned and approved by the Foundation Engineer.

The site preparation contractor should closely monitor the ground vibrations produced by the operation of the compaction equipment to minimize the risk of structural damage to any adjacent structures and avoid creating excessive nuisance. A seismograph with a suitable indicator range should be arranged along the edge of the nearest structure to ensure that ground vibrations do not reach objectionable levels. We can assist you in the planning and implementation of a suitable vibration monitoring program if deemed necessary.

8.3 FOUNDATION RECOMMENDATIONS

After the site has been prepared in accordance with the above site preparation recommendations, the soils will be suitable for supporting the proposed structure on conventional shallow foundations proportioned for a maximum allowable bearing stress of 2,500 pounds per square foot (psf). All continuous foundations should be at least 24 inches wide and individual column foundations should have minimum widths of 48 inches. All spread foundations should bear at least 18 inches below adjacent finish grades.

The floor slab can be placed directly on the compacted subgrade. In our opinion, a highly porous base material is not necessary. We recommend the use of a polyolefin film vapor barrier with a minimum thickness of 10 mils. We recommend isolating the ground floor slab from column and wall foundations. Care must be exercised in installing control joints as needed shortly after placing the concrete, and in placing and maintaining the steel reinforcement at its designated elevation within the floor slab.

Based upon our understanding of the project in conjunction with the soils encountered in the borings and the assumed loading conditions, we estimate that the recommended allowable bearing stress will provide a minimum factor of safety in excess of two against bearing capacity failure. With the site prepared and the foundations designed and constructed as recommended, we anticipate total settlements of 1 inch or less, and differential settlement between adjacent similarly loaded footings of less than one half of an inch. For design purposes, we recommend using a subgrade reaction modulus of 125 pounds per cubic inch (pci) for the well compacted shallow sands with trace amounts of silts and clays.

8.4 PAVEMENT RECOMMENDATIONS

No traffic patterns or pavement design information was provided. However, new pavements may consider using materials (limerock base, etc.) recycled from the demolition of any existing pavements to form sub-base sections. The pavements will need to be designed according to their anticipated traffic load conditions with thicker sections or rigid pavements used in more heavily loaded areas and/or dumpster pads.

New pavement areas should be proofrolled with a heavy weight (10-12 ton) vibratory roller. Any unsuitable organic or deleterious soils or soft, yielding soils observed or detected during the proofrolling operations should be excavated and replaced with approved fill conforming to the specifications below. Sufficient passes should be made during the proofrolling operations to produce minimum dry densities of 98 percent of the Modified Proctor (ASTM D-1557) maximum dry density value of the compacted subgrade soils to depths of 1 foot below the compacted surface. The proofrolled areas should receive not less than 10 overlapping passes, half of them in each of two perpendicular directions.

After the exposed surface has been proofrolled and tested to verify that the desired dry density has been obtained, the construction areas may be filled to the desired grades. All fill material should conform to the previously described specifications. It should be placed in uniform layers, not exceeding 12 inches in loose thickness, individually compacted with a heavy vibratory roller to a minimum dry density of 98 percent of the Modified Proctor maximum dry density value of the fill material.

8.4.1 FLEXIBLE PAVEMENT SECTION

We recommend a pavement section consisting of an asphaltic concrete wearing surface, resting on a calcareous base course, supported on a stabilized subgrade course.

The pavements should be designed according to the anticipated traffic conditions. The stabilized subgrade course should be at least 12 inches thick. It should have a Limerock Bearing Ratio [LBR] (FDOT FM F-515) value greater than 40 and should be compacted to a minimum dry density of 98 percent of its Modified Proctor maximum dry density value. The stabilized subgrade may be replaced by a thicker base course or eliminated (pending regulations of the governing municipal or county authorities), if the Civil Engineer determines that the anticipated traffic loads do not warrant it.

The base course should be a crushed limerock or coquina with an LBR value in excess of 100 and conforming to the gradation and other criteria specified in the FDOT Standard Specifications for Road and Bridge Construction. It should have a minimum thickness of 6 inches, and should be placed in two lifts, individually compacted to a minimum dry density of 98 percent of its Modified Proctor maximum dry density value.

We recommend a minimum of 1.5-inch thick FDOT Type S-1 or SP-9.5 asphaltic wearing surface. Care must be exercised to place the asphalt over dry, well primed base material. The asphalt can be placed in two layers, with the second layer placed after all site construction is completed.

8.4.2 HEAVY-DUTY PAVEMENT

The base course should be a crushed limerock or coquina with an LBR value in excess of 100 and conforming to the gradation and other criteria specified in the FDOT Standard Specifications for Road and Bridge Construction. It should have a minimum thickness of 8 inches, and should be placed in two lifts, individually compacted to a minimum dry density of 98 percent of its Modified Proctor maximum dry density value.

We recommend a 2-inch thick FDOT Type S-1 or SP-12.5 asphaltic wearing surface. Care must be exercised to place the asphalt over dry, well primed base material. The asphalt can be placed in two layers, with the second layer placed after all site construction is completed.

8.4.3 RIGID PAVEMENT

We recommend a minimum 5-inch thick pavement section of unreinforced Portland cement concrete, supported on a 4-inch thick stabilized subgrade course resting on well-compacted subgrade. In our experience, concrete placed directly on clean sands tends to punch into the sands when wheel loads are imposed near the control joints, causing the development of cracking possibly because the upper most sands tend to be fluffed by the traffic of humans before and during the pour.

The stabilized subgrade should have an LBR value greater than 40 and should be compacted to a minimum dry density of 98 percent of its Modified Proctor maximum dry density value. The concrete should have a minimum 28-day compressive strength of 4,000 psi. Construction control joints should be placed no more than 15 feet apart in either direction and should be at least one-quarter of the thickness of the concrete. They should be cut as soon as the concrete will support the crew and equipment (8 to 12 hours). The concrete should be cured by moist curing or by application of a liquid curing compound.

8.4.4 CURBING

The curbing around landscaped areas adjacent to pavement should be constructed with full-depth sections. Use of extruded curb sections that lie directly above the final asphalt surface, or omission of the curbing, can allow migration of irrigation water or surficial runoff from the landscaped areas. The excess water often causes separation of the asphalt wearing surface from the base and softening of the base material, resulting in early deterioration of the pavement. Landscaped areas should be provided with adequate drainage of irrigation water.

8.5 QUALITY CONTROL

We recommend establishing a comprehensive quality assurance and control program to verify that all site preparation and foundation construction is conducted in accordance with the appropriate plans and specifications. Materials testing and inspection services should be provided by Ardaman & Associates, Inc.

At a minimum, an on-site engineering technician should monitor all stripping and grubbing to verify that all deleterious materials have been removed and should observe the proofrolling operation to verify that the appropriate numbers of passes are applied to the subgrade. In-situ density tests should be conducted during filling activities and below all footings and floor slabs to verify that the required densities have been achieved. In-situ density values should be compared to laboratory Proctor moisture-density results for each of the different natural and fill soils encountered. Finally, we recommend inspecting and testing the construction materials for the foundations and other structural components.

8.5.1 IN-PLACE DENSITY TESTING FREQUENCY

In Southeast Florida, earthwork testing is typically performed on an on-call basis when the contractor has completed a portion of the work. The test result from a specific location is only representative of a larger area if the contractor has used consistent means and methods and the soils are practically uniform throughout. The frequency of testing can be increased and full-time construction inspection can be provided to account for variations. We recommend that the following minimum testing frequencies be utilized.

In proposed structural areas, the minimum frequency of in-place density testing should be one test for each 2,500 square feet of structural area (minimum of five test locations). In-place density testing should be performed at this minimum frequency for a depth of 1 foot below natural ground and for every 1-foot lift of fill placed in the structural areas. In addition, density tests should be performed in each column footing for a depth of 2 feet below the bearing surface. For continuous or wall footings, density tests should be performed at a minimum frequency of one test for every 50 lineal feet of footing, and for a depth of 2 feet below the bearing surface.

Utility backfill should be tested at a minimum frequency of one in-place density test for each 12-inch lift for each 200 lineal feet of pipe. Additional tests should be performed in backfill for manholes, inlets, etc.

Representative samples of the various natural ground and fill soils should be obtained and transported to our laboratory for Proctor compaction tests. These tests will determine the maximum dry density and optimum moisture content for the materials tested and will be used in conjunction with the results of the in-place density tests to determine the degree of compaction achieved.

Please note that the reliance on Ardaman' s recommendations presented herein is predicated on an Ardaman representative being onsite to verify that the all subgrade soils have been prepared and the foundations are installed in compliance with our report recommendations.

9.0 CLOSURE

This report has been prepared specifically for subject project. It is intended for the exclusive use of REG Architects and their representatives. Our work has used methods and procedures consistent with local foundation engineering practices. No other warranty, expressed or implied, is made. We do not guarantee project performance in any respect, only that our work meets normal standards of professional care. Environmental concerns, including (but not limited to) the possibility that hazardous materials or petroleum-contaminated soils or groundwater may be present on the subject site, were not included in the scope of work. The recommendations submitted in this report are based on the data obtained from our exploration program and our understanding of the proposed construction and loading conditions as described herein. This report may not account for any variations that may exist between conditions observed in the borings and conditions at locations that were not explored. The nature and extent of any such variations may not become evident until construction is underway. If variations are then observed, we should be requested to review the conclusions and recommendations in this report.

In the event any changes occur in the design, nature or location of any project facilities, we should be requested to review the conclusions and recommendations in this report. We also recommend that we be requested to review the final foundation drawings and earthwork specifications so that our recommendations may be properly interpreted and implemented in the contract documents.

It has been a pleasure to assist you on this phase of your project. Please contact us whenever we may be of service to you, and please call if you have any questions concerning this report.

ARDAMAN & ASSOCIATES, INC.
FL. Certificate of Authorization No. 5950

7-29-2020.

Kevin Ferguson, P.E.
Senior Geotechnical Engineer
Florida License No. 60712

Mark Zrallack, P.E.
Construction Services Manager
Florida License No. 86546

MARK C. ZRALLACK
No. 86546

Attachments: Site Vicinity Map - Figure 1
Boring Location Plan - Figure 2
Subsurface Exploration Information
Boring Logs (10)
Field Permeability Test (2)

Mark
Zrallack

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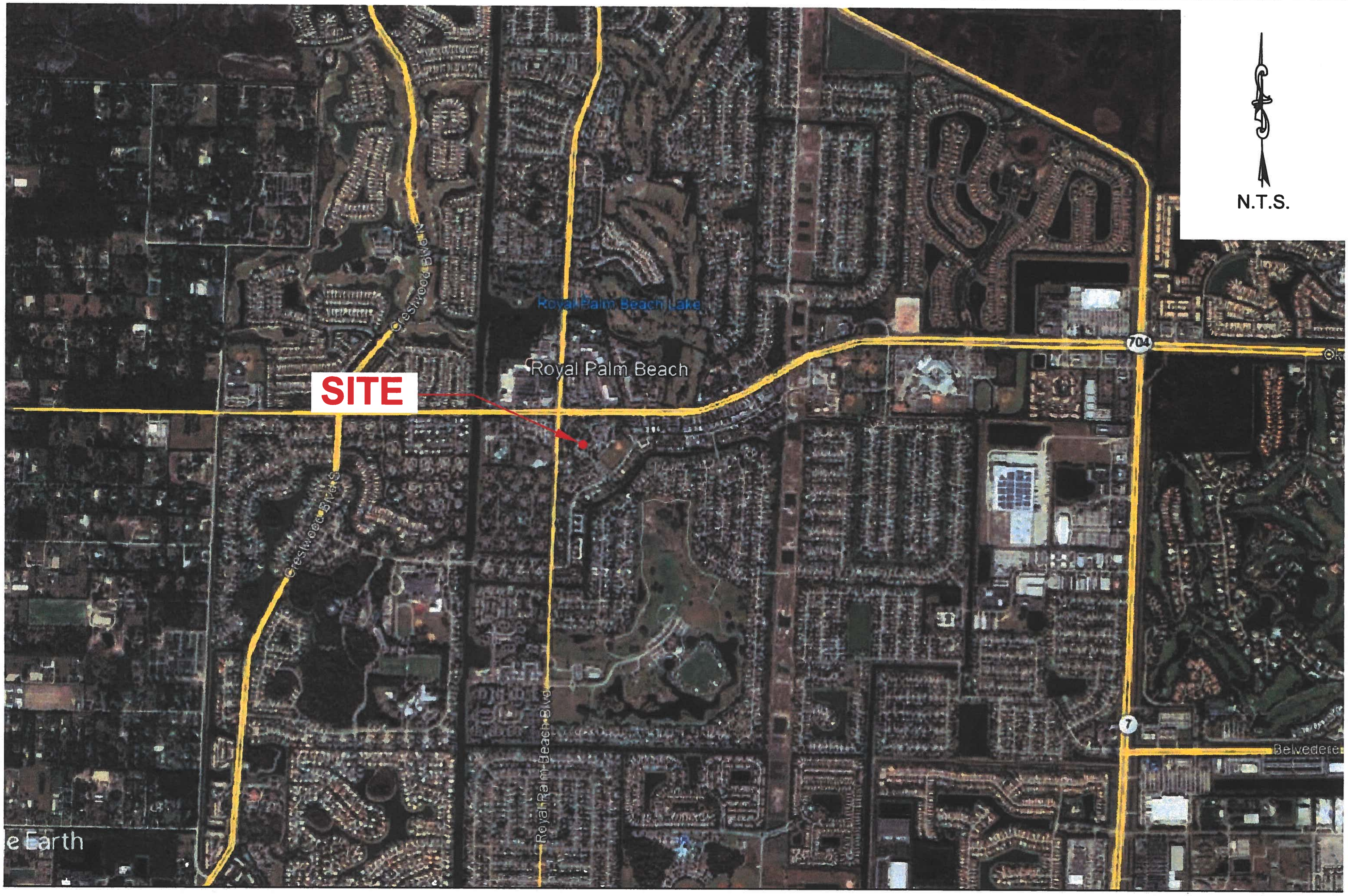

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SUBSURFACE EXPLORATION
1050 ROYAL PALM BEACH BOULEVARD
ROYAL PALM BEACH, FLORIDA

SITE VICINITY MAP

Figure No. 1

File No.:	20-1669
Prepared By:	MZ
Date:	7/24/2020

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SUBSURFACE EXPLORATION
1050 ROYAL PALM BEACH BOULEVARD
ROYAL PALM BEACH, FLORIDA

BORING LOCATION PLAN

Figure No. 2

File No.:	20-1669
Prepared By:	MZ
Date:	7/24/2020

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

SUBSURFACE EXPLORATION INFORMATION

GENERAL

Our borings describe subsurface conditions only at the locations drilled and at the time drilled. They provide no information about subsurface conditions below the bottom of the boreholes. At locations not explored, surface conditions that differ from those observed in the borings may exist and should be anticipated.

The information reported on our boring logs is based on our drillers' logs and on visual examination in our laboratory of disturbed soil samples recovered from the borings. The distinction shown on the logs between soil types is approximate only. The actual transition from one soil to another may be gradual and indistinct.

The groundwater depth shown on our boring logs is the water level the driller observed in the borehole when it was drilled. These water levels may have been influenced by the drilling procedures, especially in borings made by rotary drilling with bentonitic drilling mud. An accurate determination of groundwater level requires long-term observation of suitable monitoring wells. Fluctuations in groundwater levels throughout the year should be anticipated.

The absence of a groundwater level on certain logs indicates that no groundwater data is available. It does not mean that no groundwater will be encountered at that boring location.

STANDARD PENETRATION TEST BORINGS

The Standard Penetration Test is a widely accepted method of testing foundation soils in place. The N-Value obtained from the test has been correlated empirically with various soil properties. These empirical correlations allow satisfactory estimates to be made of how the soil is likely to behave when subjected to foundation loads. Tests are usually performed in the boreholes at intervals of five feet. In addition, our Firm performs tests continuously in the interval directly below the expected foundation bearing grade where the soil will be most highly stressed.

Boreholes where Standard Penetration Tests will be performed are drilled with a truck-mounted drilling rig. The boreholes are advanced by rotary drilling with a winged bit that makes a hole about three inches in diameter. A bentonitic drilling mud is recirculated in order to remove the cuttings and support the walls of the borehole. The drag bit is specially modified to direct the mud upward and reduce disturbance of the soil ahead of the bit. If access is not available for our truck-mounted drilling equipment, portable tripod drilling equipment can be used instead.

Occasionally, running or squeezing ground is encountered that cannot be stabilized by the drilling mud alone. In addition, drilling mud may be lost into the soil or rock strata that are unusually pervious. In such cases, flush-joint steel casing with an outside diameter of about 3.5 inches is driven as a liner for the borehole.

After the borehole has been advanced to the depth where a Standard Penetration Test will be performed, the soil sampler used to run the test is attached to the end of the drill rods and lowered to the bottom of the borehole. The testing procedure used conforms closely to the methods recommended in ASTM D-1586. The sampler used has a split-barrel 24 inches long and an outside diameter of 2.0 inches. It is driven into the ground below the bottom of the borehole using a hammer that weighs 140 pounds and falls 30 inches. The driller records the number of hammer blows needed to advance the sampler in successive increments of six inches. The total number of blows required to advance the sampler the second and third six-inch increments constitutes the test result; that is, the N-value at the depth. The test is completed after the sampler has been driven not more than 24 inches or when refusal is encountered, whichever occurs first. Refusal occurs when 50 hammer blows advance the sampler less than 6 inches. After the test is completed, the sampler is removed from the borehole and opened.

The drillers examines and classifies the soil recovered by the sampler, place representative soil specimens from each test in glass jars or plastic bags and take them to our laboratory. In the laboratory, additional evaluations and tests are performed, if needed. The driller's classifications may be adjusted, if necessary, to conform more closely with the Unified Soil Classification System (USCS). Jar samples are retained in our laboratory for sixty days, then discarded unless our clients request otherwise.

The following tables relate N-values to a qualitative description of the relative soil density.

	Description	**SPT N Value**
Cohesionless Soils	Very loose	0-4
	Loose	5-9
	Medium dense	10-29
	Dense	30-49
	Very dense	50+

	Description	**SPT N Value**
Cohesive Soils	Very soft	0-2
	Soft	3-4
	Medium stiff	5-8
	Stiff	9-15
	Very stiff	16-30
	Hard	31+

SOLID-STEM AUGER BORINGS

Solid-stem auger borings are used when a relatively large, continuous sampling of soil strata close to the ground surface is desired. A 4-inch diameter, continuous flight, helical auger with a cutting head at its end is screwed into the ground in 5 foot sections. It is powered by the rotary drill rig. The samples are recovered by withdrawing the auger out of the ground without rotating it. The soil samples so obtained are visually classified by our drillers and representative samples put in jars or bags and returned to our laboratory for further classification and testing, if necessary.

LEGEND FOR BORING LOGS

The following abbreviations are often used in our boring logs:

MC: Moisture content (percent of dry weight)
OC: Organic content (percent of dry weight)
PL: Moisture content at the plastic limit
LL: Moisture content at the liquid limit
PI: Plasticity index (LL-PL)
Qu: Unconfined compressive strength (tons per square foot, unless otherwise noted)
-200: Percent passing a No. 200 sieve (200 wash)

Ardaman & Associates, Inc.

STANDARD PENETRATION TEST BORING LOG

BORING B-1

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

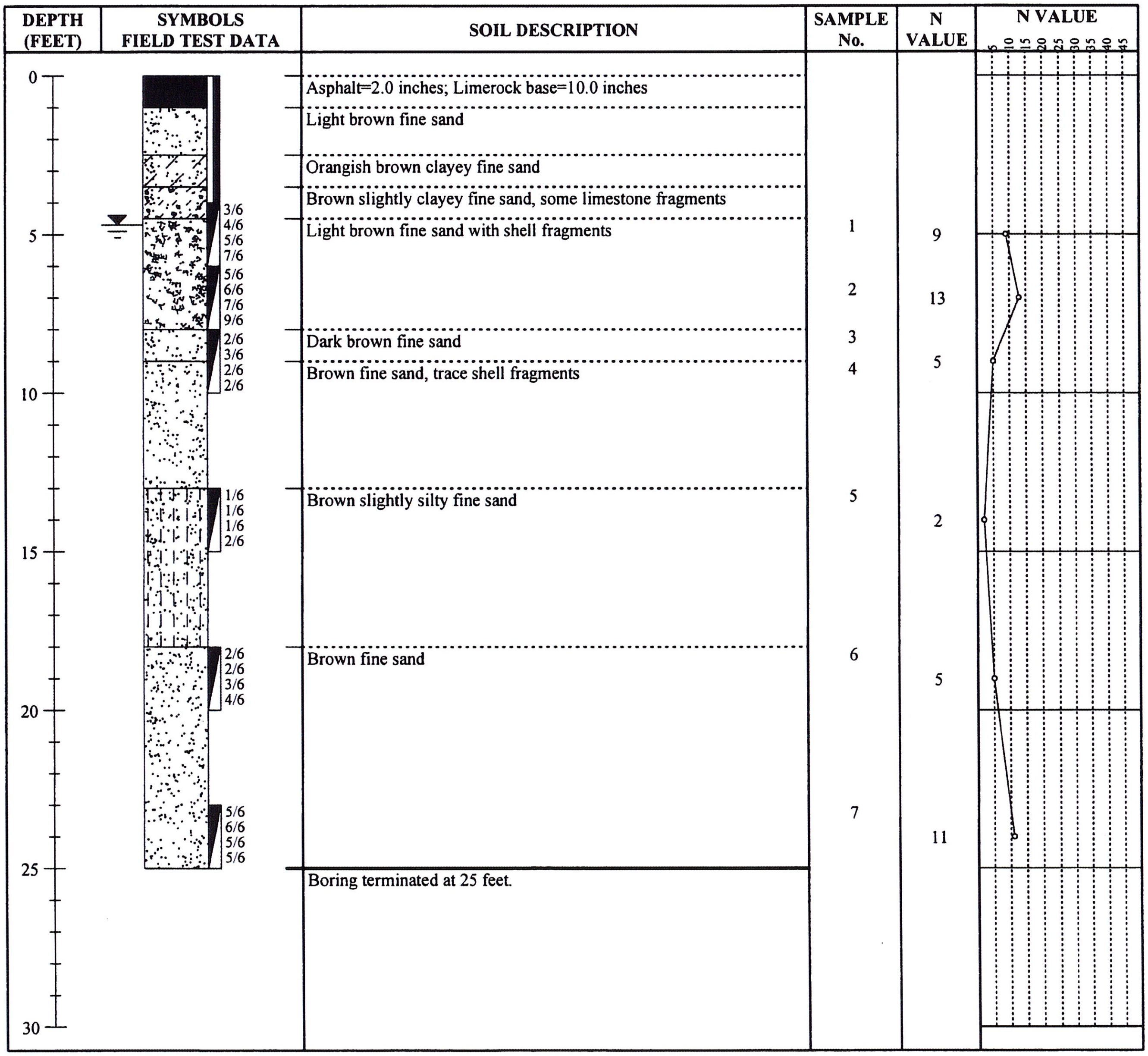
FILE No.: 20-1669

BORING LOCATION: As per plan

DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH 4.7 feet

DATE DRILLED: 7/8/2020



SYMBOLS FIELD TEST DATA	SOIL DESCRIPTION	SAMPLE No.	N VALUE
	Asphalt=2.0 inches; Limerock base=10.0 inches		
	Light brown fine sand		
	Orangish brown clayey fine sand		
	Brown slightly clayey fine sand, some limestone fragments		
3/6 4/6 5/6 7/6	Light brown fine sand with shell fragments	1	9
5/6 6/6 7/6 9/6		2	13
2/6 3/6	Dark brown fine sand	3	
2/6 2/6	Brown fine sand, trace shell fragments	4	5
1/6 1/6 1/6 2/6	Brown slightly silty fine sand	5	2
2/6 2/6 3/6 4/6	Brown fine sand	6	5
5/6 6/6 5/6 5/6		7	11
	Boring terminated at 25 feet.		

NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

Ardaman & Associates, Inc.

STANDARD PENETRATION TEST BORING LOG

BORING B-2

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

FILE No.: 20-1669

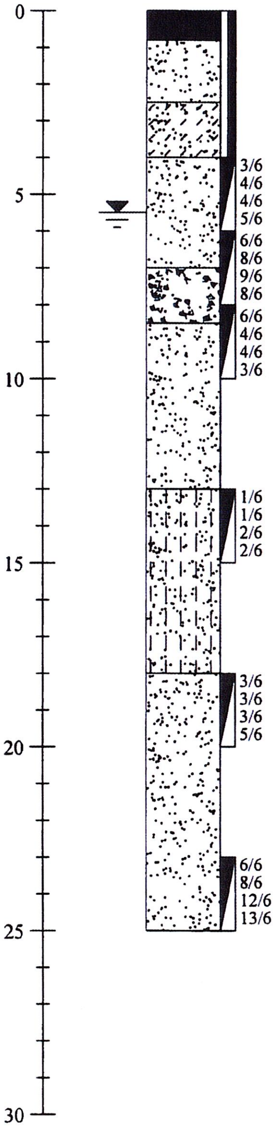
BORING LOCATION: As per plan

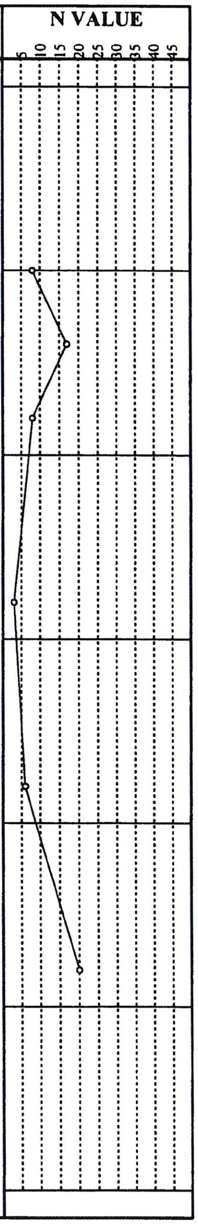
DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH 5.5 feet

DATE DRILLED: 7/8/2020

DEPTH (FEET)	SYMBOLS FIELD TEST DATA	SOIL DESCRIPTION	SAMPLE No.	N VALUE
		Asphalt=2.0 inches; Limerock base=8.0 inches		
		Brown fine sand, trace clay		
		Orangish brown slightly clayey fine sand		
	3/6 4/6 4/6 5/6	Brown to orangish brown fine sand, trace clay	1	8
	6/6 8/6 9/6 8/6	Brown fine sand, some shell and limestone fragments	2	17
	6/6 4/6 4/6 3/6	Gray fine sand, trace shell fragments	3	8
	1/6 1/6 2/6 2/6	Brown slightly silty fine sand, trace organics	4	3
	3/6 3/6 3/6 5/6	Brown fine sand	5	6
	6/6 8/6 12/6 13/6		6	20
		Boring terminated at 25 feet.		





NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

Ardaman & Associates, Inc.

STANDARD PENETRATION TEST BORING LOG

BORING B-3

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

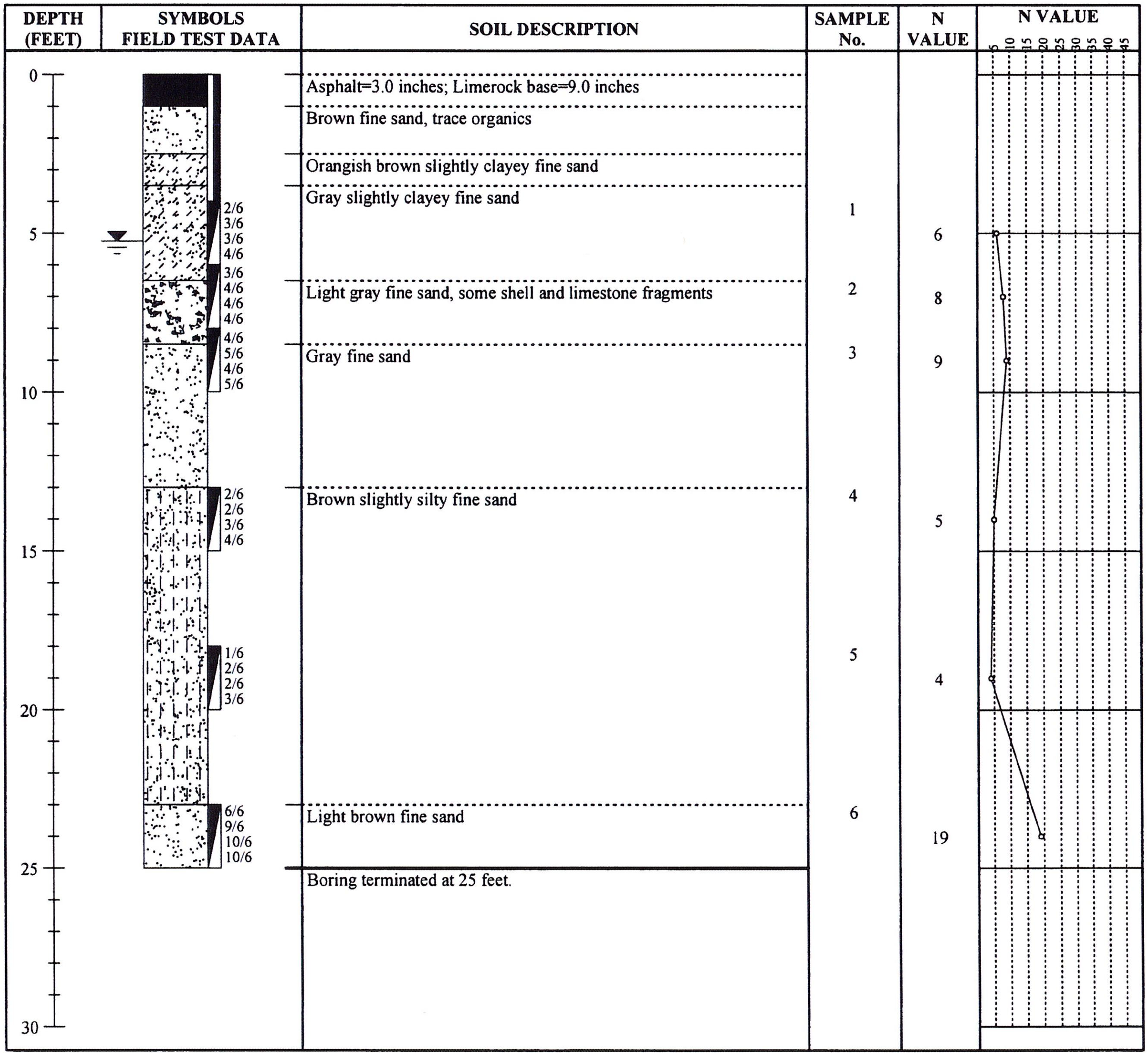
FILE No.: 20-1669

BORING LOCATION: As per plan

DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH 5.25 feet

DATE DRILLED: 7/8/2020



SYMBOLS FIELD TEST DATA	SOIL DESCRIPTION	SAMPLE No.	N VALUE
	Asphalt=3.0 inches; Limerock base=9.0 inches		
	Brown fine sand, trace organics		
	Orangish brown slightly clayey fine sand		
2/6 3/6 3/6 4/6	Gray slightly clayey fine sand	1	6
3/6 4/6 4/6 4/6	Light gray fine sand, some shell and limestone fragments	2	8
4/6 5/6 4/6 5/6	Gray fine sand	3	9
2/6 2/6 3/6 4/6	Brown slightly silty fine sand	4	5
1/6 2/6 2/6 3/6		5	4
6/6 9/6 10/6 10/6	Light brown fine sand	6	19
	Boring terminated at 25 feet.		

NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

Ardaman & Associates, Inc.

STANDARD PENETRATION TEST BORING LOG

BORING B-4

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

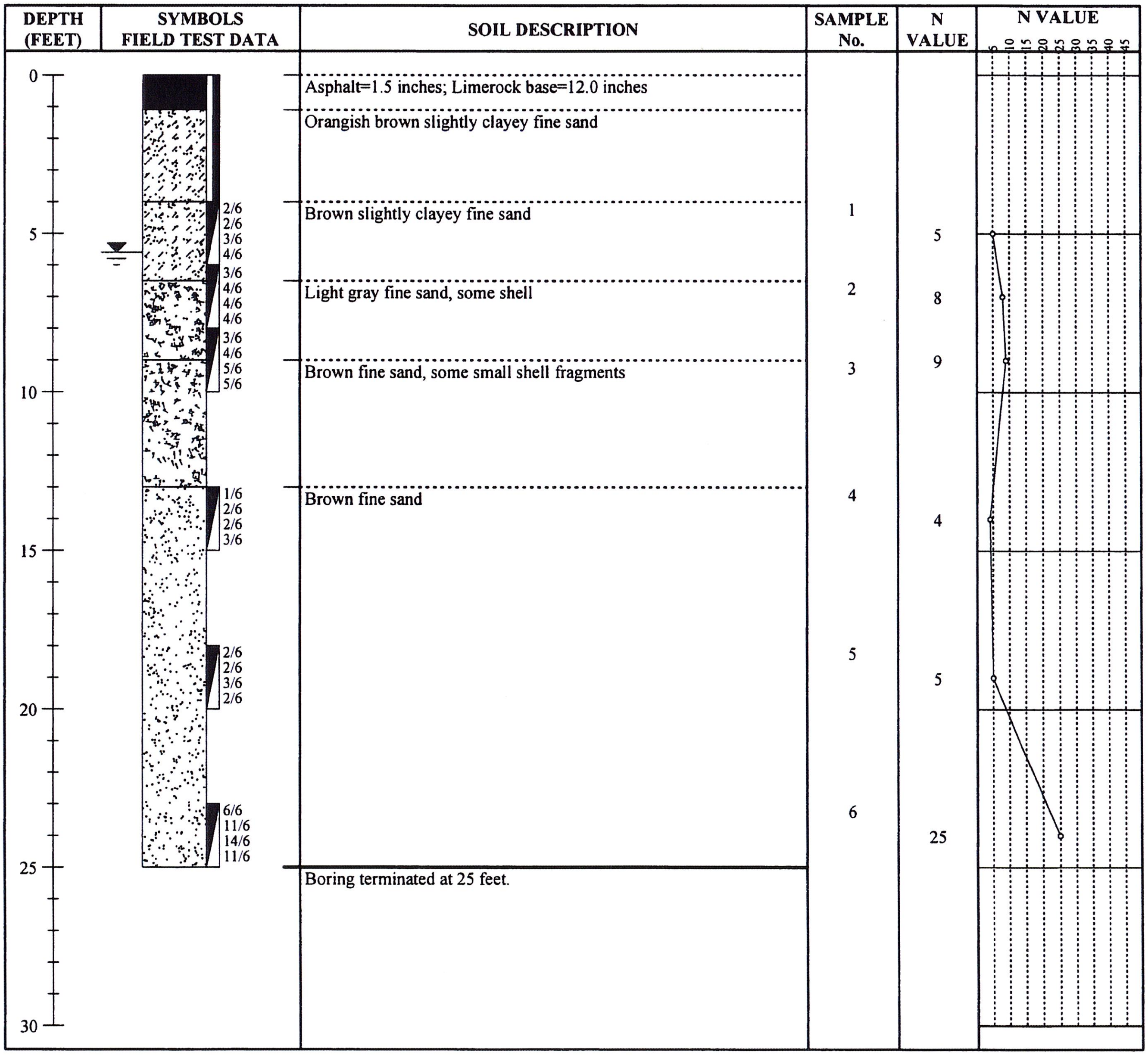
FILE No.: 20-1669

BORING LOCATION: As per plan

DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH 5.6 feet

DATE DRILLED: 7/9/2020



DEPTH (FEET)	SYMBOLS FIELD TEST DATA	SOIL DESCRIPTION	SAMPLE No.	N VALUE
		Asphalt=1.5 inches; Limerock base=12.0 inches		
		Orangish brown slightly clayey fine sand		
	2/6 2/6 3/6 4/6	Brown slightly clayey fine sand	1	5
	3/6 4/6 4/6 4/6	Light gray fine sand, some shell	2	8
	3/6 4/6 5/6 5/6	Brown fine sand, some small shell fragments	3	9
	1/6 2/6 2/6 3/6	Brown fine sand	4	4
	2/6 2/6 3/6 2/6		5	5
	6/6 11/6 14/6 11/6		6	25
		Boring terminated at 25 feet.		

NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" **140-LB HAMMER, 30-INCH FALL.** **(ASTM D-1586)**

STANDARD PENETRATION TEST BORING LOG

BORING B-5

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

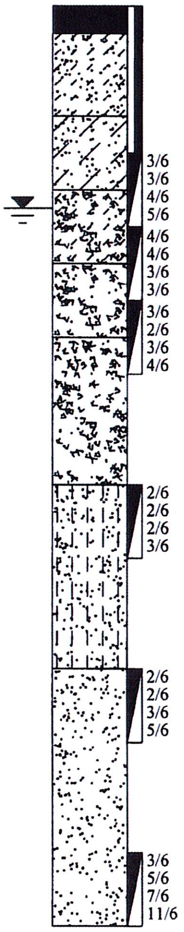
FILE No.: 20-1669

BORING LOCATION: As per plan

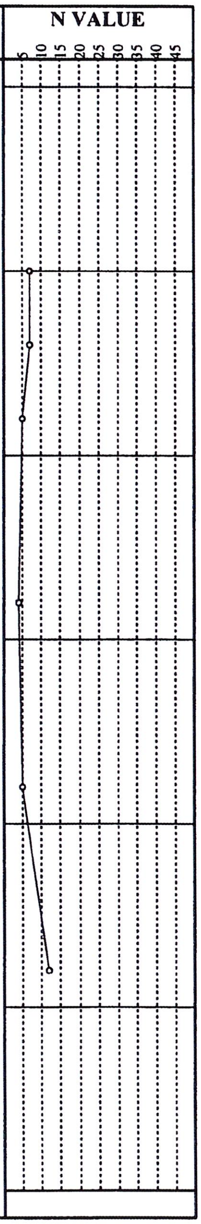
DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH 5.5 feet

DATE DRILLED: 7/9/2020



DEPTH (FEET)	SYMBOLS FIELD TEST DATA	SOIL DESCRIPTION	SAMPLE No.	N VALUE
		Asphalt=2.0 inches; Limerock base=7.0 inches		
		Orangish brown slightly clayey fine sand		
		Brown slightly clayey to clayey fine sand		
	3/6 3/6 4/6 5/6	Brown slightly clayey fine sand, some shell	1	7
	4/6 4/6 3/6 3/6	Light brown fine sand with shell, trace clay	2	7
	3/6 2/6 3/6 4/6	Light gray fine sand, few shell fragments	3	5
	2/6 2/6 2/6 3/6	Brown slightly silty fine sand	4	4
	2/6 2/6 3/6 5/6	Brown to gray fine sand	5	5
	3/6 5/6 7/6 11/6		6	12
		Borign terminated at 25 feet.		



NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

Ardaman & Associates, Inc.

HAND AUGER BORING LOG

BORING HA-1

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

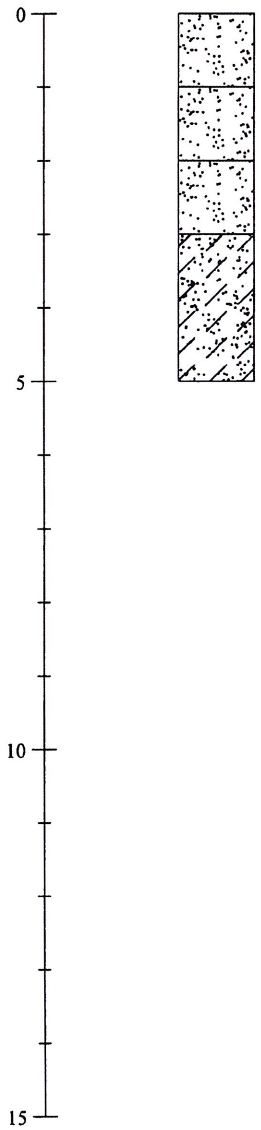
FILE No.: 20-1669

BORING LOCATION: As per plan

DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH Water table greater than 5 feet.

DATE DRILLED: 7/9/2020



DEPTH	SYMBOL	SOIL DESCRIPTION	SAMPLE No.
		Gray to brown fine sand	
		Brown fine sand, trace clay	
		Light brown fine sand	
		Brown clayey fine sand	
		Boring terminated at 5 feet.	

NOTES:

Ardaman & Associates, Inc.

HAND AUGER BORING LOG

BORING HA-2

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

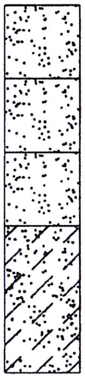
FILE No.: 20-1669

BORING LOCATION: As per plan

DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH Water table greater than 5 feet.

DATE DRILLED: 7/9/2020



DEPTH	SYMBOL	SOIL DESCRIPTION	SAMPLE No.
0		Gray to brown fine sand	
		Brown fine sand, trace clay	
		Light brown fine sand	
		Brown clayey fine sand	
5		Boring terminated at 5 feet.	
10			
15			

NOTES:

Ardaman & Associates, Inc.

HAND AUGER BORING LOG

BORING HA-3

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

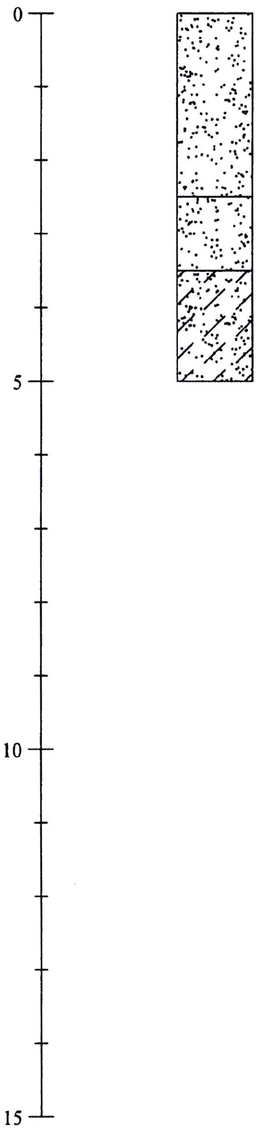
FILE No.: 20-1669

BORING LOCATION: As per plan

DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH Water table greater than 5 feet.

DATE DRILLED: 7/9/2020



DEPTH	SYMBOL	SOIL DESCRIPTION	SAMPLE No.
0		Light to dark brown fine sand	
		Brown fine sand	
		Brown clayey fine sand	
5		Boring terminated at 5 feet.	

NOTES:

Ardaman & Associates, Inc.

HAND AUGER BORING LOG

BORING HA-4

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

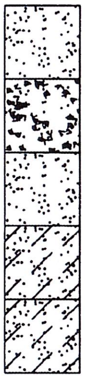
FILE No.: 20-1669

BORING LOCATION: As per plan

DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH Water table greater than 5 feet.

DATE DRILLED: 7/9/2020

DEPTH	SYMBOL	SOIL DESCRIPTION	SAMPLE No.
0		Dark brown fine sand	
		Brown fine sand with shell and limestone fragments	
		Brown fine sand	
		Brown clayey fine sand	
		Gray clayey fine sand	
5		Boring terminated at 5 feet	
10			
15			

NOTES:

Ardaman & Associates, Inc.

HAND AUGER BORING LOG

BORING HA-5

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

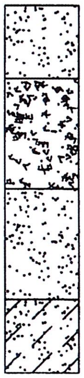
FILE No.: 20-1669

BORING LOCATION: As per plan

DRILL CREW: DG/ET

WATER OBSERVED AT DEPTH Water table greater than 5 feet.

DATE DRILLED: 7/9/2020



DEPTH	SYMBOL	SOIL DESCRIPTION	SAMPLE No.
0		Dark brown fine sand	
		Brown fine sand with shell fragments	
		Brown fine sand	
		Brown clayey fine sand	
5		Boring terminated at 5 feet	
10			
15			

NOTES:

Ardaman & Associates, Inc.

FIELD PERMEABILITY TEST LOG
SFWMD USUAL OPEN-HOLE TEST
EX-1

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

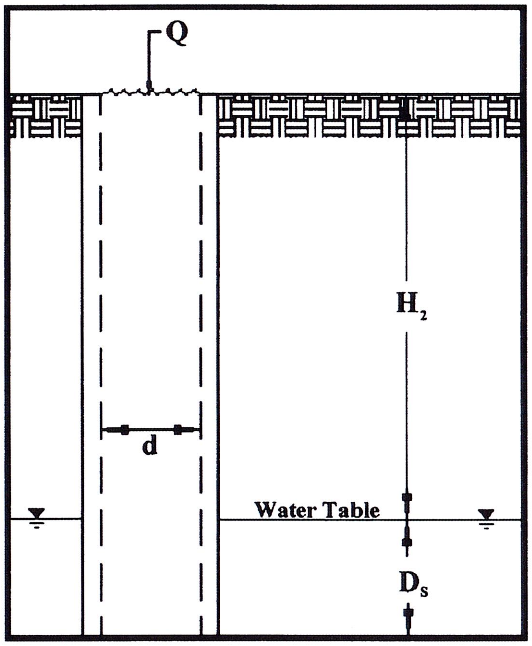
FILE No.: 20-1669

TEST LOCATION: As per plan

DRILL CREW: DG/ET

GROUNDWATER OBSERVED AT DEPTH 5.2 feet

TEST DATE: 7/9/2020



$$K = \frac{4Q}{\pi d(2H_2^2 + 4H_2 D_s + H_2 d)}$$

Q ["Stabilized" Flow Rate (cfs)] = 1.02×10^{-2}

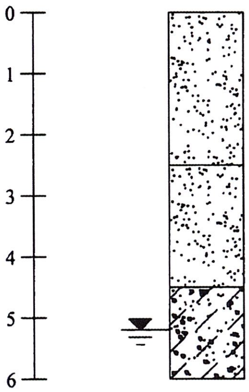
K [Hydraulic Conductivity (cfs/sqf - ft head)] = 4.75×10^{-4}

d [Diameter of Test Hole (ft)] = 0.375

H_2 [Depth to Water Table (ft)] = 5.2

* D_s [Saturated Hole Depth (ft)] = 0.8

* By Groundwater

DEPTH	SYMBOLS	SOIL DESCRIPTION	SAMPLE No.
0		Dark brown fine sand	
		Light brown fine sand	
6		Orangish brown clayey fine sand with limestone fragments	

NOTES:

Ardaman & Associates, Inc.

FIELD PERMEABILITY TEST LOG
SFWMD USUAL OPEN-HOLE TEST
EX-2

PROJECT: Royal Palm Beach Village Hall
1050 Royal Palm Beach Boulevard, Royal Palm Beach, Florida

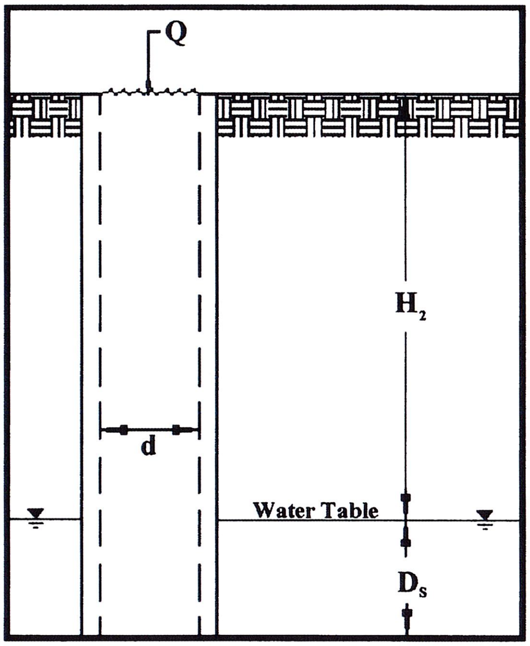
FILE No.: 20-1669

TEST LOCATION: As per plan

DRILL CREW: DG/ET

GROUNDWATER OBSERVED AT DEPTH 5.5 feet

TEST DATE: 7/9/2020



$$K = \frac{4Q}{\pi d(2H_2^2 + 4H_2 D_s + H_2 d)}$$

Q ["Stabilized" Flow Rate (cfs)] = 5.04×10^{-3}

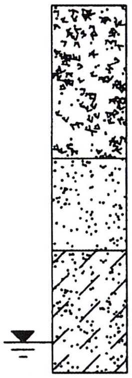
K [Hydraulic Conductivity (cfs/sqf - ft head)] = 2.32×10^{-4}

d [Diameter of Test Hole (ft)] = 0.375

H_2 [Depth to Water Table (ft)] = 5.5

* D_s [Saturated Hole Depth (ft)] = 0.5

* By Groundwater

DEPTH	SYMBOLS	SOIL DESCRIPTION	SAMPLE No.
0 1 2 3 4 5 6		Dark brown fine sand, some shell Brown fine sand Gray to brown clayey fine sand	

NOTES: