ITB #23-015
Cemetery Road WWTP Ponds Expansion

Addendum #5

Q & A

Question:

Please provide the soil borings for the above project. I am looking for the desired screen length, ground water monitoring plan, and the confining layer for the soil bentonite layer.

Answer:

Please see the attached Geotechnical report for this project.

A licensed well driller is required to install the monitoring wells. The contractor/driller is responsible for the state required well drilling permits. Well depths are estimated to be between 30 and 45 feet depending on location. The well driller will have to make final determination on required depth to keep the well screen in the water table during drought conditions. Well completion reports are also required to be provided to the City.

ACKNOWLEDGEMENT

It is the vendor's responsibility to ensure their receipt of all addenda, and to clearly acknowledge all addenda within their initial bid or proposal response in the space provided on the Submittal Checklist included in the original solicitation document. Failure to do so may subject the bidder to disqualification.

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GEOTECHNICAL EXPLORATION

Proposed WWTP Pond
4005 Cemetery Road
Sebring, Highlands County, Florida

UES Project No. 0530.2100348.0000

PREPARED FOR:

Polston Engineering
2925 Kenilworth Boulevard
Sebring, FL 33871-0588

PREPARED BY:

Universal Engineering Sciences
201 Waldo Avenue North
Lehigh Acres, Florida 33971
(239) 489-2443

July 21, 2022
October 13, 2022 - Revised

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- West Palm Beach

July 21, 2022
October 13, 2022 - Revised

Polston Engineering
2925 Kenilworth Boulevard
Sebring, FL 33871-0588

Attention: Mr. Dale Polston, P.E.

Reference: **Geotechnical Exploration**
Proposed WWTP Pond
4005 Cemetery Road
Sebring, Highlands County, Florida
UES Project No. 0530.2100348.0000

Dear Mr. Polston:

Universal Engineering Sciences (UES) has completed a geotechnical exploration on the above-referenced site in Sebring, Highlands County, Florida. Our scope of services was in general accordance with UES Proposal dated September 17, 2021.

This report contains the results of our study, an engineering interpretation of the subsurface data obtained with respect to the project characteristics described to us, geotechnical recommendations for stormwater management design.

We appreciate the opportunity to have worked with you on this project and look forward to a continued association with your firm. Please contact us if you have any questions, or if we may further assist you as your plans proceed.

Respectfully Submitted,
UNIVERSAL ENGINEERING SCIENCES
Certificate of Authorization No. 4930

ADAM JAMES DORNACKER
LICENSE
No. 85319
★
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Ashok Neela
Staff Engineer

Adam J. Dornacker, P.E. No.85319
State of Florida
Geotechnical Department Manager

This document has been digitally signed and sealed by Adam J. Dornacker, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

TABLE OF CONTENTS

LIST OF APPENDICES

EXECUTIVE SUMMARY

We prepared this summary to provide a quick overview of our findings. Please review, and rely on, the full report for recommendations and other considerations.

Project Description

We understand you are designing new effluent treatment pond for the Cemetery Road WWTP in Sebring, Florida. The new pond will be located on an approximately 7-acre parcel of land between Nelson Street and Muriel Street in Sebring, Highlands County, Florida. We understand information regarding the soil and groundwater conditions in the proposed pond area is required to facilitate the effluent modeling and pond design. Specifically, data concerning the soil type, depth to less permeable strata, groundwater gradient, lateral transmissivity, and saturated and unsaturated vertical and horizontal permeability will be required.

Soil and Groundwater Conditions

The subsurface soil conditions encountered at this site generally consists of very loose to very dense sands (SP), loose to dense slightly clayey sands (SP-SC), and medium dense clayey sands (SC) to the boring termination depths. Please refer to "Appendix B: Record of Test Borings" for a detailed account of each boring.

The groundwater was encountered at a depth of approximately 23 feet below the ground surface at the boring locations at the time of our exploration.

1.0 INTRODUCTION

1.1 GENERAL

In this report we present the results of our geotechnical exploration on the site of the proposed WWTP Pond located at 4005 Cemetery Road in Sebring, Highlands County, Florida. This report contains the results of our study, an engineering interpretation of the subsurface data obtained with respect to the project characteristics described to us, and our geotechnical recommendations for stormwater management design. Our scope of services was in general accordance with UES Proposal dated September 17, 2021.

1.2 PROJECT DESCRIPTION

We understand you are designing new effluent treatment pond for the Cemetery Road WWTP in Sebring, Florida. The new pond will be located on an approximately 7-acre parcel of land between Nelson Street and Muriel Street in Sebring, Highlands County, Florida. We understand information regarding the soil and groundwater conditions in the proposed pond area is required to facilitate the effluent modeling and pond design. Specifically, data concerning the soil type, depth to less permeable strata, groundwater gradient, lateral transmissivity, and saturated and unsaturated vertical and horizontal permeability will be required.

We were provided with an aerial plan depicting the locations of the proposed pond. We used this information to perform our exploration.

Our geotechnical recommendations are based upon the above provided information, assumptions and considerations. ***If UES is not informed of changes to final design information, the recommendations contained herein are not considered valid as we cannot be responsible for the consequences of changes of which we were not informed.***

A general location map of the project area appears in Appendix A: Site Location Map.

2.0 PURPOSE AND METHODOLOGIES

2.1 PURPOSE

The purpose of our services was:

- to generally characterize the shallow subsurface conditions at the site using a limited amount of Standard Penetration Test (SPT) borings;
- to evaluate the soil/structure relationships using subsurface information interpreted from the borings and project information described to us or assumed by us; and
- to provide geotechnical engineering recommendations for the design of stormwater management area.

This report presents an evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. The recovered samples were not examined, either visually or analytically, for chemical composition or environmental hazards.

2.2 FIELD EXPLORATION

Between April 25th and May 6th, 2022, the following testing were completed for this study:

- The subsurface conditions in the proposed WWTP Pond area was explored with nine (9) borings advanced to depths of approximately 40 to 75 feet below the existing ground surface.
- Installed PVC Casings at seven boring locations (B-3, B-4, B-5, B-6, B-7, B-8 and B-9) to measure stabilized groundwater level.
- Installed PVC 10-Slot, pre-packed screened monitoring wells at two boring locations (B-1 and B-2).

On September 8, 2022, UES performed slug tests at monitoring wells B-1 and B-2.

The borings were advanced using the rotary wash method, and samples were collected while performing the Standard Penetration Test (SPT) at regular intervals.

We performed the SPT test in general accordance with ASTM D-1586 guidelines. However, at depths of 10 feet or less we sampled continuously in order to note variations in the upper soil profile. In general, the SPT test consists of a standard split-barrel sampler (split-spoon) driven into the soil using a 140-pound hammer free-falling 30 inches. The number of hammer blows required to drive the sampler 12 inches, after first seating it 6 inches, is designated the penetration resistance, or SPT-N value. This value is used as an index to soil strength and consistency.

Seven (7) bags of samples of the upper 2 feet of soil were extracted from test holes (test boring locations) excavated within the proposed stormwater management areas. The bulk samples were returned to our laboratory where the sample was remolded in loose to medium dense consistency and placed in a permeameter and a constant head permeability test was performed on a sample generally according to the procedures of ASTM D2434.

Consider the indicated locations, elevations and depths to be approximate. Our drilling crew located the borings based upon estimated distances and taped measurements from existing site features. If more precise location and elevation data are desired, a registered professional land surveyor should be retained to locate the borings and determine their ground surface elevations. The Boring Location Plan is presented in Appendix B.

Soil, rock, water, and/or other samples obtained from the project site are the property of the client. Unless other arrangements are agreed upon in writing, UES will store such samples for no more than 30 calendar days from the date UES issued the first document that includes the data obtained from these samples. After that date, UES will dispose of all samples.

2.3 LABORATORY TESTING

The soil samples recovered from the test borings were returned to our laboratory and visually classified in general accordance with ASTM D 2487 “Standard Classification of Soils for Engineering Purposes” (Unified Soil Classification System). We selected representative soil samples from the borings for laboratory testing to aid in classifying the soils and to help to evaluate the general engineering characteristics of the site soils. A summary of the tests performed is shown in Table II. The results of the Wash #200 tests are shown on the boring logs in Appendix B and laboratory test results in Appendix C. The detailed laboratory permeability test results are presented in Appendix C. A summary of the tests performed is shown in Table I.

TABLE I
LABORATORY METHODOLOGIES

Test Performed	Number Performed	Reference
Grain Size Analysis (#200 wash only)	4	ASTM D 1140 “Amount of Material in Soils Finer than the No. 200 (75 - µm) sieve”
Permeability Tests	7	ASTM D 2434 “Standard Test Method for Permeability of Granular Soils (Constant Head)"

3.0 FINDINGS

3.1 SURFACE CONDITIONS

The subject site is located within Sections S-21, Township 34 South, Range 29, Area 030, Block 4010 and Lot 0010 in Sebring, Highlands County, Florida. It is relatively level. We did not note any debris or rock outcrops on site at the time of our field exploration. Nelson Street and Muriel Street borders the site to the North and South respectively. At the start of our geotechnical exploration, we reviewed aerial photographs available from the Highlands County Property Appraiser's office and USGS topographic quadrangle maps. According to the conceptual site plan provided to us, the elevation across the proposed stormwater management area is on the order of +122 to +126 feet NGVD.

3.2 SUBSURFACE CONDITIONS

3.2.1 SOIL SURVEY

We also reviewed current USDA Soil Conservation Service (SCS) data for Highlands County. According to SCS, the following surficial soil groups underlies this site. A summary of selected properties for the identified soil groups on the site are included below in Table II

TABLE II
SUMMARY OF SOIL INFORMATION

Soil Map Unit & Name	Hydrologic Soil Group	Indications of Shallow Rock	Water Table Type	SHWT Depth	Location
9 – Astatula sand, 0 to 5 percent slopes	A	More than 80 inches	Apparent	More than 80 inches	Entire Proposed Pond Area

3.2.2 SOIL BORINGS

The boring locations and detailed subsurface conditions are illustrated in Appendix B: Boring Location Plan and Boring Logs. The classifications and descriptions shown on the logs are based upon visual characterizations of the recovered soil samples. Refer to Appendix B: Soils Classification Chart, for further explanation of the symbols and placement of data on the Boring Logs. The general subsurface soil profile on the site, based on the soil boring information, is described below. For more detailed information, please refer to the boring logs.

The subsurface soil conditions encountered at this site generally consists of very loose to very dense sands (SP), loose to dense slightly clayey sands (SP-SC), and medium dense clayey sands (SC) to the boring termination depths. Please refer to “Appendix B: Record of Test Borings” for a detailed account of each boring.

The groundwater was encountered at a depth of approximately 23.0 feet below the ground surface at the boring locations at the time of our exploration.

The boring logs and related information included in this report are indicators of subsurface conditions only at the specific locations and times noted. Our field exploration did not find unsuitable or unexpected materials at the time of occurrence. However, borings for a typical geotechnical report are widely spaced and generally not sufficient for reliably detecting the presence of isolated, anomalous surface or subsurface conditions, or reliably estimating unsuitable or suitable material quantities. Accordingly, UES does not recommend relying on our boring information to negate presence of anomalous materials or for estimation of material quantities unless our contracted services ***specifically*** include sufficient exploration for such purpose(s) and within the report we so state that the level of exploration provided should be sufficient to detect such anomalous conditions or estimate such quantities. Therefore, UES will not be responsible for any extrapolation or use of our data by others beyond the purpose(s) for which it is applicable or intended.

4.0 GROUNDWATER CONDITIONS

4.1 EXISTING GROUNDWATER LEVEL

UES installed piezometers at each boring location to approximately 15 feet below the ground surface (bgs), as per the scope of work. However, at the time of our exploration the groundwater was encountered at a depth of approximately 23.0 BGS feet at the boring locations.

UES returned to the project site on September 8, 2022. On that day, the groundwater was measured to be 20.60’ below the top of casing (TOC) of monitoring well B-1 (elevation 106.1’), and 21.60 feet below TOC at monitoring well B-2 (elevation 106.2’). The data indicates water movement to the west, with an approximate gradient of 0.0004, however, a third water level data point is required to accurately interpret the groundwater movement.

4.2 SEASONAL HIGH GROUNDWATER LEVEL

Based upon our visual review of the recovered soil samples, review of information obtained from SWFWMD and the USDA Soil Survey of Highlands County, and our general knowledge of local and regional hydrogeology, our estimated seasonal high groundwater level could be approximately 18 feet below the existing grade at the test boring locations, on average.

Several factors influence the determination of the seasonal high water table (SHWT). Over time natural, undisturbed soils are subjected to alternating cycles of saturation and drying, resulting in discoloration or staining that is not part of the dominant soil color occurs. This is called mottling, and manifests itself in various shades of gray, brown, red or yellow. There are numerous processes that lead to this discoloration, including mineral accretions, oxidation, and bacteria growth within the soil. The presence of this discoloration indicates that groundwater has repetitively reached that elevation and remained there long enough to cause any or all of these processes to occur. The SHWT elevation is assumed to be the highest level at which mottling is observed in the natural soil profile, regardless of whether water is present at the time of observation.

This estimate is independent of the actual location of the groundwater table. Because the mottling process takes time and repetitive episodes, man-made soil fills do not exhibit such mottling and seasonal high estimates cannot be made in this manner.

It should be noted that the estimated SHWT does not provide any assurance that groundwater levels will not exceed this level in the future. Should impediments to surface water drainage exist on the site, or should rainfall intensity and duration exceed the normally anticipated amounts, groundwater levels may exceed our seasonal high estimate. Also, future development around the site could alter surface runoff and drainage characteristics, and cause our seasonal high estimate to be exceeded.

We therefore recommend positive drainage be established and maintained on the site during construction. Further, we recommend permanent measures be constructed to maintain positive drainage from the site throughout the life of the project. Finally, we recommend all foundation and pavement grades account for the seasonal high groundwater conditions**.**

4.3 SLUG TESTING

On September 8, 2022, UES conducted in-situ slug tests on monitoring wells B-1 and B-2. The groundwater depth was measured prior to each slug test. The pressure transducer was set at a depth of approximately 27.5 feet bgs and 37.0 feet bgs at B-1 and B-2, respectively. The slug-in test was performed by lowering a plastic rod measuring 1.54 inches in diameter and 2.72 feet in length ("slug") into the monitoring well, displacing ¼ gallon of water. The displacement of water by the slug caused the water level to rise inside the well for the falling head test. The water level within the well was monitored in real time by using a pressure transducer connected to a laptop computer (Level TROLL 500 pressure transducer and In Situ 5™ data logging computer software), which rapidly recorded the water level until it returned to the static level (recovery). The slug-out test was subsequently completed by rapidly removing the slug from the well, which caused the water level within the well to drop, while the transducer rapidly recorded the water level until recovery. The slug-in and slug-out tests were performed a total of three times for each monitoring well. Water level and well recovery data were analyzed using calculations provided by the USGS (Bouwer and Rice Straight Line Method of Equation (1976)). The output from the slug-in and slug-out tests documented consistent results for each set of tests. Based on this analysis, the average calculated hydraulic conductivity (k) is 4.1 feet per day. The Bouwer and Rice Output spreadsheets are presented in **Appendix D.** A summary of slug testing results provided below in **Table III.**

TABLE III
SUMMARY OF SLUG TESTING DATA

Location	TOC Elevation (Feet)	Groud Elevation (Feet)	Screened Interval (Feet)	Date	Depth to Water (Feet)	Ground Water Elevation (Feet)	Slug IN/OUT	K (ft/day)	K ave (ft/day)		K t ave (ft/day)
B-1	126.7	124.2	96.66' - 86.66'	9/8/22	20.60	106.1	IN	2.4	1.3	2.0	4.1
							IN	0.75			
							IN	0.78			
							OUT	1.2	2.6		
							OUT	2.6			
							OUT	4.0			
B-2	127.8	125.9	107.77' - 97.77"	9/8/22	21.60	106.2	IN	3.1	4.5	6.2	
							IN	5.2			
							IN	5.2			
							OUT	8.9	7.9		
							OUT	8.1			
							OUT	6.6			

Notes:
TOC = Top of Casing
Elevation of TOC and Ground provided by Client.
K = Hydraulic Conductivity
K ave = Average Hydraulic Conductivity
Kt ave = Total Average Hydraulic Conductivity

5.0 STORM WATER MANAGEMENT DESIGN

We understand that you are designing a new effluent pond for the Cemetery Road WWTP in Sebring, Florida.

Review of the encountered soil and groundwater conditions indicates that deep, dry ponds may be feasible at this site. For these reasons, this report will present pond design parameters based on the laboratory test results for the near surface fine sands encountered from the ground surface to depths of approximately 20 feet below existing grade.

5.1 STORMWATER POND DESIGN PARAMETERS

In general, the soils encountered at the borings performed at the site can be described as moderately free-draining, fine sands to the maximum depth explored of 75 feet below the ground surface (BGS). Some restrictive layers of less permeable slightly clayey sand [SP-SC] and clayey sand [SC] were encountered at our test boring locations to the boring termination depths. In addition, dense to very dense were encountered below a depth of approximately 50 feet BGS, which will exhibit significant lower permeability rates than similar strata with very loose to medium dense consistency. Recommendations for the design coefficient of permeability values are presented below in Table III.

TABLE III
RECOMMENDED DESIGN COEFFICIENT OF PERMEABILITY VALUES

Depth (Feet)	Soil Type	Saturated Coefficient of Vertical Permeability
0 – 15	Very loose to Loose Sand	30 feet/day
15 - 23	Loose to Medium Dense Sand	20 feet/day
23 - 50	Medium Dense Sand	15 feet/day
50 – 75	Dense to Very Dense Sand	< 1 feet/day
13 - 18	Loose Slightly Clayey Sand	10 feet/day
38 – 75	Medium Dense to Dense Slightly Clayey Sand	5 feet/day
38 – 40	Medium Dense Clayey Sand	< 1 feet/day

The laboratory permeability test results indicate saturated vertical coefficient of permeability (K_V) of approximately 39.3 to 46.5 inches per hour for the surficial fine sand soils at the proposed stormwater pond area. The saturated horizontal coefficient of permeability (K_h) may be estimated as 1.3 times the K_v value. Unsaturated vertical permeability is generally less than saturated values due to the lack of laminar flow through the soil. SFWMD's 1989 publication titled "Stormwater Retention Pond Infiltration Analyses in Confined Aquifers" suggests that the unsaturated vertical permeability may be estimated as about 2/3 of the saturated values. Appropriate safety factors should be used with any permeability data.

It should be noted that the coefficients of permeability provided are not an infiltration rate. The actual infiltration rate is influenced by the coefficient of permeability as well as several factors including the elevation of the facility bottom, water level in the facility, the elevation of the wet season water table and the confining layer. These factors must be accounted for in an appropriate groundwater model to determine the infiltration rate of a given stratum.

Based upon our visual-manual review of the site soils, the results of our laboratory testing and observation of the existing site conditions, we recommend that you consider the surficial sands [SP & SP-SC] to have a gross porosity of 25 percent. The fillable porosity is the available porosity after accounting for the natural moisture content. We recommend that you use an average fillable porosity of 20 percent for the sandy material [SP] above the water table. For consecutive storm events, the fillable porosity for the second storm event should be assumed to be zero. Presented below in Table IV is a summary of our stormwater retention design parameters. **A factor of safety (F.O.S.) has not been applied to the values presented.**

TABLE IV
SHALLOW STORMWATER MANAGEMENT POND DESIGN PARAMETERS

Input Parameters							
Relevant Borings	B-1	B-2	B-3	B-5	B-6	B-8	B-9
Estimated Base of Surficial Aquifer Depth (ft)	40	40	40	40	40	40	40
Estimated Seasonal High Groundwater Level Depth (ft)	20	20	20	20	20	20	20
Estimated Fillable Porosity of Fine Sand Overburden (%)	20	20	20	20	20	20	20
Estimated Average Horizontal Saturated Hydraulic Conductivity K_{hsat} (feet/day) for Fine Sand Overburden**	107	112	114	108	121	102	114
Estimated Average Vertical Unsaturated Hydraulic Conductivity K_{vunsat} (feet/day) for Fine Sand Overburden**	72	75	76	72	81	68	76

** Values are unfactored.

UES performs hydraulic conductivity tests using generally accepted practices of the local stormwater management system design. However, the user of this information is cautioned that the potential variability of results and reproducibility associated with these influencing the permeability of a soil. These factors include, but are not limited to, soil grain size, soil particle arrangement and structure, dispersion of soil fines, density, and degree of saturation, soil heterogeneity, and soil anisotropy. Also, the permeability measured by such tests may not be representative of that of the total effective aquifer thickness. Factors of safety can compensate for part of the inherent test limitations but the designer must exercise judgment regarding final selection and applicability of provided soil design input parameters.

In stormwater management pond locations where poorly drained excessively clayey soils [SC, CL, and CH] are found within or near the pond bottom excavation, the excessively clayey soils can be over-excavated and replaced with free draining granular material to improve infiltration performance. A surficial blanket of permeable sand plays an important role in preventing localized wetness and ponding within the pond bottom. The blanket of sand also provides storage and allows relatively rapid lateral movement of ground water which may otherwise perch above the clayey soils. Horizontal movement of water is important to allow the water to access areas of locally higher vertical leakage.

5.2 STORMWATER POND FILL SUITABILITY

The subsurface soil conditions encountered at this site generally consists of the following stratums:

- **Sand (SP):** Very loose to very dense, gray, orange, and tan. Where encountered, this material is suitable for use as structural fill.
- **Slightly Clayey Sand (SP-SC):** Loose to dense**,** orange and tan. Where encountered, this material is suitable for use as structural fill so long as the overall fines content remains below 12% (further lab testing may be needed to confirm this).
- **Clayey Sand (SC):** Medium dense, tan. This material is not recommended for use as structural fill, it may be possible for use as embankment fill. If the material can be mixed with clean sands to lower fines contents to below 12% fines, then this material may be used as structural fill.

6.0 CONSTRUCTION RELATED SERVICES

The geotechnical engineering design does not end with the advertisement of the construction documents. The design is an on-going process throughout construction. Because of our familiarity with the site conditions and the intent of the engineering design, we are most qualified to address problems that might arise during construction in a timely and cost-effective manner.

7.0 LIMITATIONS

Our services were rendered in general accordance with generally accepted principles and practices of the geotechnical community and our proposal contract agreement. It is not uncommon for project plans to change or for more specific project information to become known after completion of our geotechnical services. We strongly recommend that UES be contacted to review final design plans and modify or amend the recommendations contained herein as appropriate. ***If UES is not informed of changes to the final design information, the recommendations contained herein are not considered valid as we cannot be responsible for the consequences of changes of which we were not informed.***

Our field exploration did not find unsuitable or unexpected materials at the time of occurrence. However, borings for a typical geotechnical report are widely spaced and generally not sufficient for reliably detecting the presence of isolated, anomalous surface or subsurface conditions, or reliably estimating unsuitable or suitable material quantities. Accordingly, UES does not recommend relying on our boring information to negate presence of anomalous materials or for estimation of material quantities unless our contracted services ***specifically*** include sufficient exploration for such purpose(s) and within the report we so state that the level of exploration provided should be sufficient to detect such anomalous conditions or estimate such quantities.
Therefore, UES will not be responsible for any claims, damages, or liability associated with any extrapolation, interpretation, or use of our data by others beyond the purpose(s) for which it is applicable or intended.

During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible subsurface variations. A Geotechnical Business Council (GBC) publication, "Important Information About Your Geotechnical Engineering Report" appears in Appendix D, and will help explain the nature of geotechnical issues. Further, we present documents in Appendix D: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

APPENDIX A

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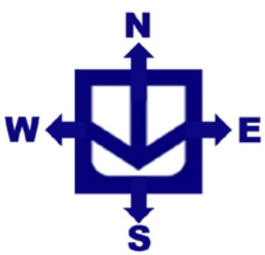

VICINITY MAP

SOURCE: GOOGLE EARTH PRO©

UNIVERSAL ENGINEERING SCIENCES

Proposed WWTP Pond
4005 Cemetery Road
Sebring, Highlands County, FL

Drawn By:	Checked By:	Date:
Ashok Neela	AJD	07/21/2022

Project No.:	Approved By:
0530.2100348.0000	Adam Dornacker, P.E.

APPENDIX B

UNIVERSAL
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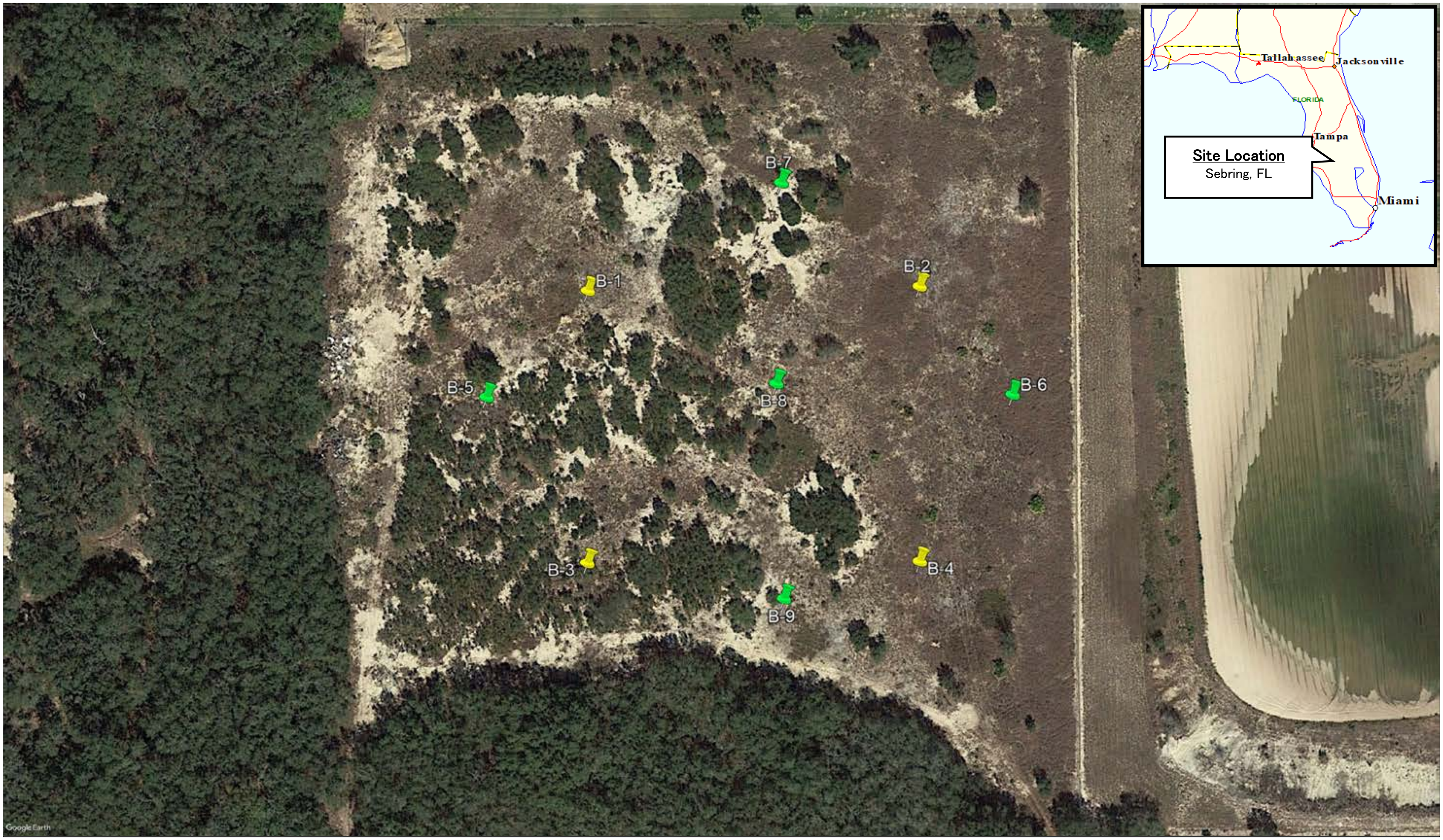
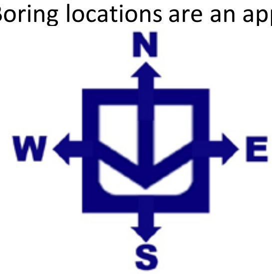


Boring locations are an approximation.



TEST LOCATION PLAN

SOURCE: GOOGLE EARTH PRO©

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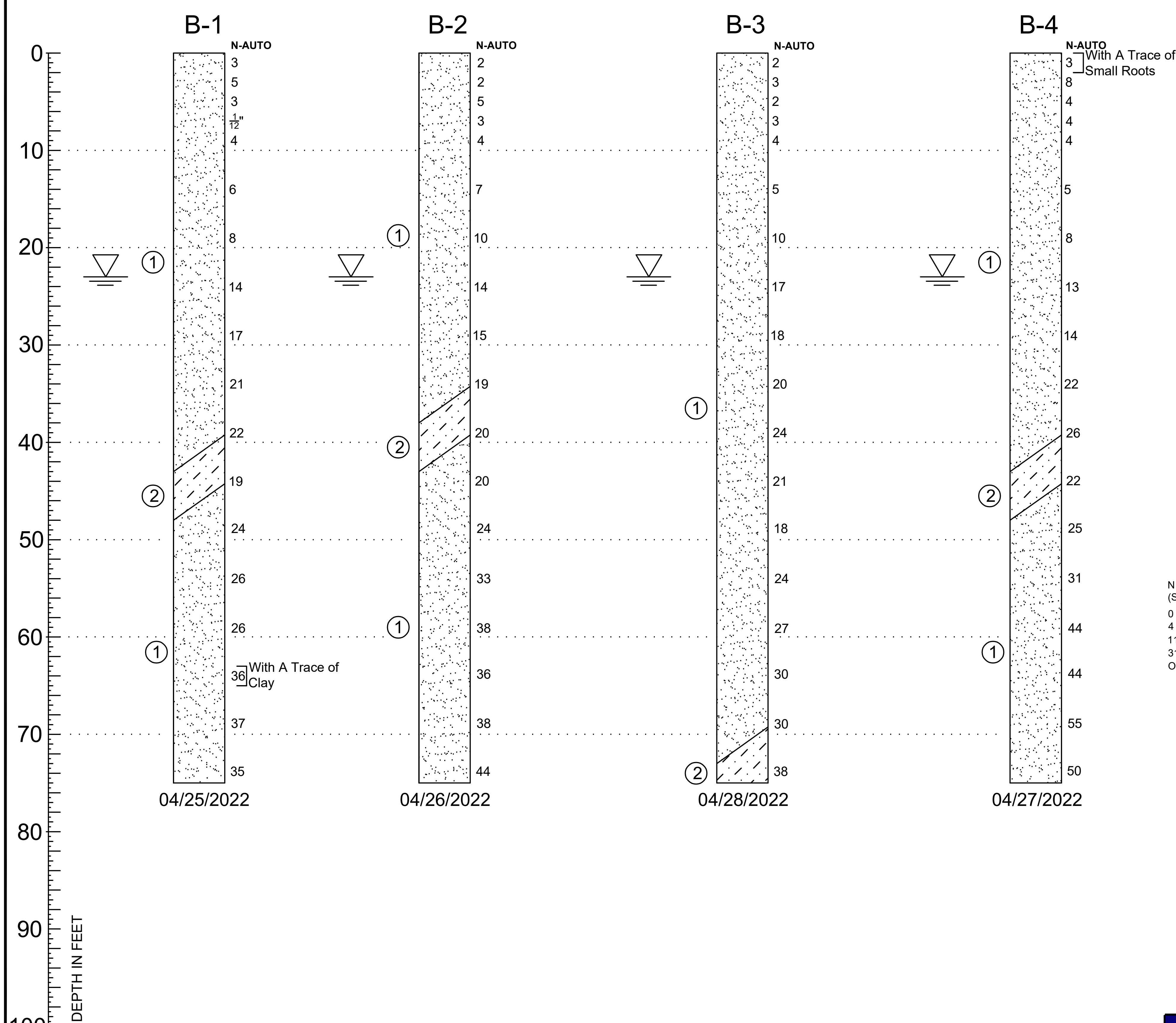
Proposed WWTP Pond
4005 Cemetery Road
Sebring, Highlands County, FL

Drawn By: Ashok Neela	Checked By: AJD	Date: 07/21/2022
Project No.: 0530.2100348.0000	Approved By: Adam Dornacker, P.E.	

SOIL PROFILES



SOIL PROFILE LEGEND

B-X = BORING NUMBER

SOIL TYPE (X)

N = SPT TEST VALUE

SOIL SYMBOL

GROUND WATER LEVEL

INDICATES PRACTICAL REFUSAL TO BORING EQUIPMENT

= INDICATES GRADUAL TRANSITION IN SOIL TYPES

SOIL LEGEND

(1) Gray, Orange, Tan, SAND (SP) Very Loose to Very Dense

(2) Orange, Tan, Slightly Clayey SAND (SP-SC) Loose to Dense

(3) Tan, Clayey SAND (SC) Medium Dense

NOTES:

N - STANDARD PENETRATION RESISTANCE TEST (SPT) VALUE. NUMBERS TO THE RIGHT OF BORINGS INDICATE SPT VALUE FOR 12-INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).

WOH - BORING INTERVAL ADVANCED UNDER WEIGHT OF HAMMER.

WOR - BORING INTERVAL ADVANCED UNDER WEIGHT OF ROD.

LFC - LOSS OF DRILLING FLUID CIRCULATION.

WLS - WEATHERED LIMESTONE

SOIL CLASSIFICATION

CORRELATION OF N - VALUES WITH RELATIVE DENSITY AND CONSISTENCY

COHESIONLESS SOIL			SILTS AND CLAYS		
N - VALUE (SAFETY)	N - VALUE (AUTO)	RELATIVE DENSITY	N - VALUE (SAFETY)	N - VALUE (AUTO)	CONSISTENCY
0 - 3	0 - 3	VERY LOOSE	0 - 1	0 - 1	VERY SOFT
4 - 10	4 - 8	LOOSE	2 - 4	2 - 4	SOFT
11 - 30	9 - 24	MEDIUM DENSE	5 - 8	5 - 6	FIRM
31 - 50	25 - 40	DENSE	9 - 15	7 - 12	STIFF
OVER 50	OVER 40	VERY DENSE	16 - 30	13 - 24	VERY STIFF
			OVER 30	OVER 24	HARD

CORRELATION OF N - VALUES WITH HARDNESS DESCRIPTION

LIMEROCK	
N - VALUE	RELATIVE DENSITY
0 - 50	SOFT
51 - 50 FOR 0"	HARD

APPROXIMATE FINES CONTENT	MODIFIERS
5% TO 12%	SLIGHTLY SILTY OR SLIGHTLY CLAYEY
12% TO 25%	SILTY OR CLAYEY
26% TO 49%	VERY SILTY OR VERY CLAYEY

APPROXIMATE SHELL CONTENT	MODIFIERS
0% TO 5%	WITH A TRACE OF SHELL
5% TO 12%	SLIGHTLY SHELLY
13% TO 30%	SHELLY
31% TO 50%	VERY SHELLY

APPROXIMATE ORGANIC CONTENT	MODIFIERS
2.5% TO 5%	WITH A TRACE
5% TO 20%	WITH ORGANICS
20% TO 75%	HIGHLY ORGANIC
75% TO 100%	PEAT

DEFINITION OF DESCRIPTIVE TERMS OF MODIFIERS FOR SILTS/CLAYS/SHELLS/GRAVELS ARE DESCRIBED AS FOLLOWS:

PERCENTAGE OF MODIFIER MATERIAL	FIRST QUALIFIER	SECOND QUALIFIER
5 - 12	SLIGHTLY + MODIFIER + Y	WITH A LITTLE
12 - 30	MODIFIER + Y	WITH SOME
30 - 50	VERY + MODIFIER + Y	AND

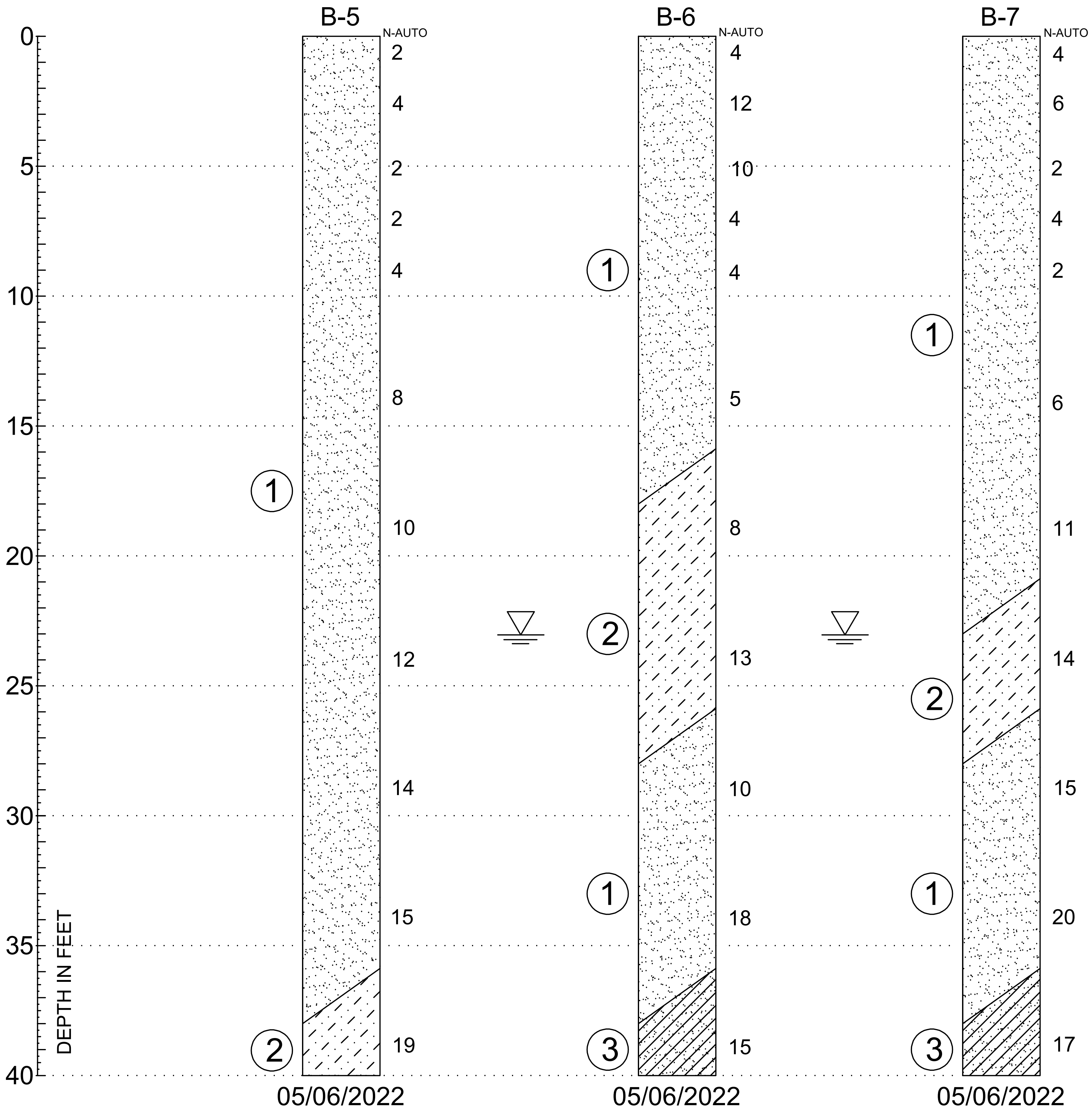
RECORD OF TEST BORINGS

Universal Engineering Sciences
201 Waldo Ave. N.
Lehigh Acres, Florida 33971
239-489-2443
www.universalengineering.com

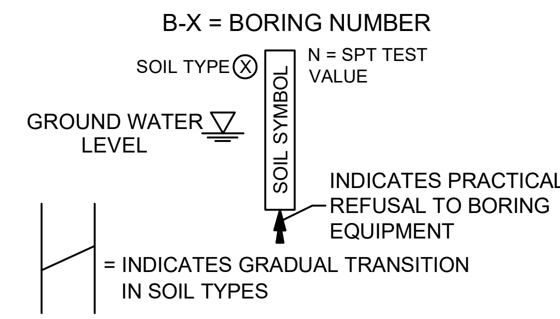
Client: Polston Engineering
Project No: 0530.2100348.0000
Project:
Cemetery Road WWTP
4005 Cemetery Road
Sebring, Highlands County, FL

Date: 05/24/2022
Drilled By: DB
Rig: GP-3230
Drawn By: TJW
Approved by: AJD

SOIL PROFILES



SOIL PROFILE LEGEND



SOIL LEGEND

1. Gray, Orange, Tan, SAND (SP) Very Loose to Very Dense
2. Orange, Tan, Slightly Clayey SAND (SP-SC) Loose to Dense
3. Tan, Clayey SAND (SC) Medium Dense

NOTES:

N - STANDARD PENETRATION RESISTANCE TEST (SPT) VALUE. NUMBERS TO THE RIGHT OF BORINGS INDICATE SPT VALUE FOR 12-INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).

WOH - BORING INTERVAL ADVANCED UNDER WEIGHT OF HAMMER.

WOR - BORING INTERVAL ADVANCED UNDER WEIGHT OF ROD.

LFC - LOSS OF DRILLING FLUID CIRCULATION.

WLS - WEATHERED LIMESTONE

CS - CEMENTED SANDS

HA - HAND AUGERED

SOIL CLASSIFICATION

CORRELATION OF N - VALUES WITH RELATIVE DENSITY AND CONSISTENCY

COHESIONLESS SOIL

N - VALUE (SAFETY)	N - VALUE (AUTO)	RELATIVE DENSITY
0 - 3	0 - 3	VERY LOOSE
4 - 10	4 - 8	LOOSE
11 - 30	9 - 24	MEDIUM DENSE
31 - 50	25 - 40	DENSE
OVER 50	OVER 40	VERY DENSE

SILTS AND CLAYS

N - VALUE (SAFETY)	N - VALUE (AUTO)	CONSISTENCY
0 - 1	0 - 1	VERY SOFT
2 - 4	2 - 4	SOFT
5 - 8	5 - 6	FIRM
9 - 15	7 - 12	STIFF
16 - 30	13 - 24	VERY STIFF
OVER 30	OVER 24	HARD

CORRELATION OF N - VALUES WITH HARDNESS DESCRIPTION

LIMEROCK

N - VALUE	RELATIVE DENSITY
0 - 50	SOFT
51 - 50 FOR 0"	HARD

APPROXIMATE FINES CONTENT	MODIFIERS
5% TO 12%	SLIGHTLY SILTY OR SLIGHTLY CLAYEY
12% TO 25%	SILTY OR CLAYEY
26% TO 49%	VERY SILTY OR VERY CLAYEY

APPROXIMATE SHELL CONTENT	MODIFIERS
0% TO 5%	WITH A TRACE OF SHELL
5% TO 12%	SLIGHTLY SHELLY
13% TO 30%	SHELLY
31% TO 50%	VERY SHELLY

APPROXIMATE ORGANIC CONTENT	MODIFIERS
2.5% TO 5%	WITH A TRACE
5% TO 20%	WITH ORGANICS
20% TO 75%	HIGHLY ORGANIC
75% TO 100%	PEAT

DEFINITION OF DESCRIPTIVE TERMS OF MODIFIERS FOR SILTS/CLAYS/SHELLS/GRAVELS ARE DESCRIBED AS FOLLOWS:

PERCENTAGE OF MODIFIER MATERIAL	FIRST QUALIFIER	SECOND QUALIFIER
5 - 12	SLIGHTLY + MODIFIER + Y	WITH A LITTLE
12 - 30	MODIFIER + Y	WITH SOME
30 - 50	VERY + MODIFIER + Y	AND

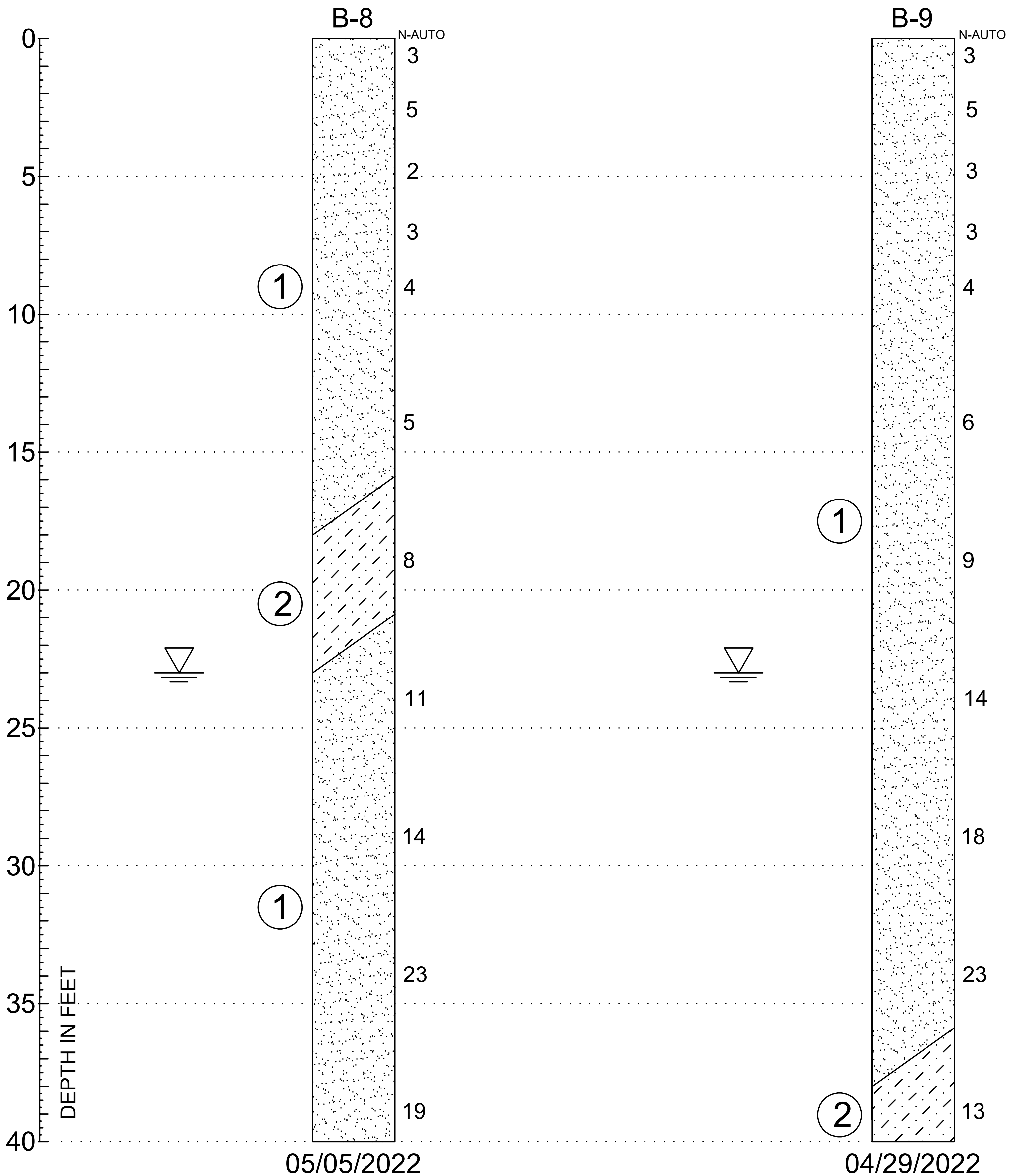
RECORD OF TEST BORINGS

Universal Engineering Sciences
201 Waldo Ave. N.
Lehigh Acres, Florida 33971
239-489-2443
www.universalengineering.com

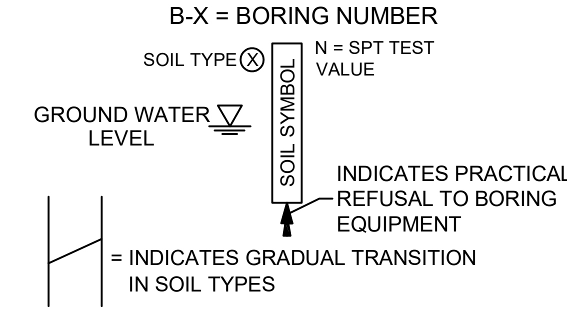
Client: Polston Engioneering
Project No: 0530.2100348.0000
Project:
Cemetery Road WWTP
4005 Cemetery Road
Sebring, Highlands County, FL

Date: 05/24/2022
Drilled By: DB
Rig: GP-3230
Drawn By: TJW
Approved by: AJD

SOIL PROFILES



SOIL PROFILE LEGEND



SOIL LEGEND

(1) Gray, Orange, Tan, SAND (SP) Very Loose to Very Dense

(2) Orange, Tan, Slightly Clayey SAND (SP-SC) Loose to Dense

(3) Tan, Clayey SAND (SC) Medium Dense

NOTES:

N - STANDARD PENETRATION RESISTANCE TEST (SPT) VALUE. NUMBERS TO THE RIGHT OF BORINGS INDICATE SPT VALUE FOR 12-INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).

WOH - BORING INTERVAL ADVANCED UNDER WEIGHT OF HAMMER.

WOR - BORING INTERVAL ADVANCED UNDER WEIGHT OF ROD.

LFC - LOSS OF DRILLING FLUID CIRCULATION.

WLS - WEATHERED LIMESTONE

CS - CEMENTED SANDS

HA - HAND AUGERED

SOIL CLASSIFICATION

CORRELATION OF N - VALUES WITH RELATIVE DENSITY AND CONSISTENCY

COHESIONLESS SOIL

N - VALUE (SAFETY)	N - VALUE (AUTO)	RELATIVE DENSITY
0 - 3	0 - 3	VERY LOOSE
4 - 10	4 - 8	LOOSE
11 - 30	9 - 24	MEDIUM DENSE
31 - 50	25 - 40	DENSE
OVER 50	OVER 40	VERY DENSE

SILTS AND CLAYS

N - VALUE (SAFETY)	N - VALUE (AUTO)	CONSISTENCY
0 - 1	0 - 1	VERY SOFT
2 - 4	2 - 4	SOFT
5 - 8	5 - 6	FIRM
9 - 15	7 - 12	STIFF
16 - 30	13 - 24	VERY STIFF
OVER 30	OVER 24	HARD

CORRELATION OF N - VALUES WITH HARDNESS DESCRIPTION

LIMEROCK

N - VALUE	RELATIVE DENSITY
0 - 50	SOFT
51 - 50 FOR 0"	HARD

APPROXIMATE FINES CONTENT	MODIFIERS
5% TO 12%	SLIGHTLY SILTY OR SLIGHTLY CLAYEY
12% TO 25%	SILTY OR CLAYEY
26% TO 49%	VERY SILTY OR VERY CLAYEY

APPROXIMATE SHELL CONTENT	MODIFIERS
0% TO 5%	WITH A TRACE OF SHELL
5% TO 12%	SLIGHTLY SHELLY
13% TO 30%	SHELLY
31% TO 50%	VERY SHELLY

APPROXIMATE ORGANIC CONTENT	MODIFIERS
2.5% TO 5%	WITH A TRACE
5% TO 20%	WITH ORGANICS
20% TO 75%	HIGHLY ORGANIC
75% TO 100%	PEAT

DEFINITION OF DESCRIPTIVE TERMS OF MODIFIERS FOR SILTS/CLAYS/SHELLS/GRAVELS ARE DESCRIBED AS FOLLOWS:

PERCENTAGE OF MODIFIER MATERIAL	FIRST QUALIFIER	SECOND QUALIFIER
5 - 12	SLIGHTLY + MODIFIER + Y	WITH A LITTLE
12 - 30	MODIFIER + Y	WITH SOME
30 - 50	VERY + MODIFIER + Y	AND

RECORD OF TEST BORINGS

Universal Engineering Sciences
201 Waldo Ave. N.
Lehigh Acres, Florida 33971
239-489-2443
www.universalengineering.com

Client: Polston Engioneering
Project No: 0530.2100348.0000
Project:
Cemetery Road WWTP
4005 Cemetery Road
Sebring, Highlands County, FL

Date: 05/24/2022
Drilled By: DB
Rig: GP-3230
Drawn By: TJW
Approved by: AJD

NOTES RELATED TO
RECORDS OF TEST BORING AND
GENERALIZED SUBSURFACE PROFILE

1. Groundwater level was encountered and recorded (if shown) following the completion of the soil test boring on the date indicated. Fluctuations in groundwater levels are common; consult report text for a discussion.

2. The boring location was identified and located in the field based on measured and estimated distances from existing site features.

3. The borehole was backfilled to site grade following boring completion, patched with asphalt cold patch mix when pavement was encountered.

4. The Record of Test Boring represents our interpretation of field conditions based on engineering examination of the soil samples.

5. The Record of Test Boring is subject to the limitations, conclusions, and recommendations presented in the report text.

6. The Standard Penetration Test (SPT) was performed in accordance ASTM Procedure D-1586. SPT testing procedure consists of driving a 1.4-inch I.D. split-tube sampler into the soil profile using a 140-pound hammer falling 30 inches.

7. On the Record of Test Boring listed as "Blow Counts", the N-value is the sum of the SPT hammer blows required to drive the split-tube sampler through the second and third 6-inch increment of the sampling layer, and is an indication of soil strength.

8. Shown on the Record of Test Boring an SPT N-value expressed as 50/2" is descriptive of the fact that 50 hammer blows were required to drive the split-spoon sampler a distance of approximately 2 inches.

9. The soil/rock strata interfaces shown on the Records of Test Boring are approximate and may vary from those in the field. The soil/rock conditions shown on the Records of Test Boring refer to conditions at the specific location tested; soil/rock conditions may vary between test locations.

10. Relative density and consistency for sands/gravels, silts/clays, and limestone are described as follows:

Cohesionless Soils		
Safety SPT (N-Value)	Auto SPT (N-Value)	Relative Density
0 – 4	0 – 3	Very Loose
5 – 10	4 – 8	Loose
11 – 30	9 – 24	Medium Dense
31 – 50	25 – 40	Dense
Over 50	Over 40	Very Dense

Silts and Clays		
Safety SPT (N-Value)	Auto SPT (N-Value)	Consistency
0 – 2	0 – 1	Very Soft
3 – 5	2 – 4	Soft
6 – 7	5 – 6	Firm
8 – 15	7 – 12	Stiff
16 – 30	13 – 24	Very Stiff
Over 30	Over 24	Hard

Limestone	
SPT (N-Value)	Relative Density
0 – 50	Soft
51 – 50 for 0"	Hard

11. Definition of descriptive terms of modifiers for silts/clays/shells/gravels are described as follows:

Percentage of Modifier Material	First Qualifier	Second Qualifier
0 – 5	(No mention)	(No mention)
5 – 12	Slightly + Modifier + y	With Trace
12 – 30	Modifier + y	With Some
30 – 50	Very + Modifier + y	And

12. Descriptive characteristics for organic content percentages are described as follows:

Percentage of Organic Material	Descriptor
0 – 2.5	(No mention)
2.5 – 5	With a Trace of Organics
5 – 20	Organic
20 – 75	Highly Organic
75 – 100	Peat

APPENDIX C

UNIVERSAL
ENGINEERING SCIENCES

201 Waldo Avenue North • Lehigh Acres, FL 33971 (239) 489-2443 • (239) 489-3438 (Fax)

UNIVERSAL® ENGINEERING SCIENCES

Fines Content Determination (200 Wash)
ASTM C117

Project: Proposed WWTP Pond
Project ID: 0530.2100348.0000
Client: Polston Engineering
Report ID: 0
Client Address: 2925 Kenilworth Boulevard, Sebring, Florida 33871-(
Lab/MAC ID: 22-1416 to 22-1419
Material Location: See below
Sampled By: A. Neela
Date Sampled: 5/18/2022
Tested By: CG
Date Tested: 5/26/2022
Material Description: See Below
Method: A
Material Classificatio 0

	A	B	[(A-B)/A]x100	
Material Location	Original Sample Weight Dry (g)	Dry Sample Weight After Wash (g)	% Passing No. 200 Sieve	USCS Material Classification
B-1 (2'-4')	615.6	604.6	1.8	SP
B-3 (2'-4')	807.5	800.5	0.9	SP
B-5 (2'-4')	766.2	757.2	1.2	SP
B-7 (2'-4')	493.0	487.7	1.1	SP

Respectfully Submitted

UNIVERSAL ENGINEERING SCIENCES, LLC
REGISTRY #0549

7/12/2022

Adam J. Dornacker, P.E
Registered Engineer # 85319
State of Florida

UNIVERSAL ENGINEERING SCIENCES

STANDARD TEST METHOD FOR PERMEABILITY OF GRANULAR SOILS (CONSTANT HEAD)
AASHTO T-215

Project: Proposed WWTP Pond
Project ID: 0530.2100348.0000
Client: Polston Engineering
Report ID: 0
Client Address: 2925 Kenilworth Boulevard, Sebring, Florida 33871-0588
Lab/MAC ID: 22-1409
Material Location: Boring B-1
Sampled By: A. Neela
Date Sampled: 5/18/2022
Tested By: Kat
Date Tested: 5/26/2022
Material Description: Light Gray, Orange Sand
Material Classification: SP

HYDRAULIC CONDUCTIVITY RESULTS					
Water Discharge, **Q** =	655	mL	=	655.00	cm^3
Length of Specimen, **L** =	5.565	in.	=	14.14	cm
Head, **H** =	36	in.	=	91.44	cm
Cross-Sectional Area of Specimen, **A** =	7.125	$in.^2$	=	45.97	cm^2
Time, **t** =	1	min	=	60	sec.
Water Temperature, **T** =	28.7	°C			
Viscosity of Water Ratio at Test Temperature, R_T =				**0.790**	
Hydraulic Conductivity, k = QL/AtH =				**0.037**	**cm/sec**
Hydraulic Conductivity Corrected, $k_{20°C}$ = QL/AtH =				**0.029**	**cm/sec**
Hydraulic Gradient, i = H/L =				**6.47**	**in/in**
$k_{20°C}$ =				**41.1**	**in/hr**
$k_{20°C}$ =				**82.2**	**ft/day**

SPECIMEN PARAMETERS			
Dry Sample Start Wt. (g):	1095.4	**Specimen Volume (in^3):**	39.65
Dry Remaining Sample Wt. (g):	0.0	**Specimen Volume (ft^3):**	0.023
Total Sample Wt. (g):	1095.4	**Specimen Unit Weight (lbs/ft^3):**	105.3
Total Sample Wt. (lbs):	2.42		

Respectfully, Submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC
REGISTRY #0549

7/12/2022

Adam J. Dornacker, P.E
Registered Engineer # 85319
State of Florida

UNIVERSAL ENGINEERING SCIENCES

STANDARD TEST METHOD FOR PERMEABILITY OF GRANULAR SOILS (CONSTANT HEAD) AASHTO T-215

Project:	Proposed WWTP Pond	**Project ID:**	0530.2100348.0000
Client:	Polston Engineering	**Report ID:**	0
Client Address:	2925 Kenilworth Boulevard, Sebring, Florida 33871-0588	**Lab/MAC ID:**	22-1410
Material Location:	Boring B-2		
Sampled By:	A. Neela	**Date Sampled:**	5/18/2022
Tested By:	Kat	**Date Tested:**	5/26/2022
Material Description:	Light Gray, Orange Sand		
Material Classification:	SP		

HYDRAULIC CONDUCTIVITY RESULTS

Water Discharge, **Q** =	660	mL	=	660.00	cm^3
Length of Specimen, **L** =	5.547	in.	=	14.09	cm
Head, **H** =	36	in.	=	91.44	cm
Cross-Sectional Area of Specimen, **A** =	7.125	$in.^2$	=	45.97	cm^2
Time, **t** =	1	min	=	60	sec.
Water Temperature, **T** =	26.7	°C			
Viscosity of Water Ratio at Test Temperature, R_T =				**0.826**	
Hydraulic Conductivity, k = QL/AtH =				**0.037**	**cm/sec**
Hydraulic Conductivity Corrected, $k_{20°C}$ = QL/AtH =				**0.030**	**cm/sec**
Hydraulic Gradient, i = H/L =				**6.49**	**in/in**
$k_{20°C}$ =				**43.1**	**in/hr**
$k_{20°C}$ =				**86.3**	**ft/day**

SPECIMEN PARAMETERS

Dry Sample Start Wt. (g):	1095.4	**Specimen Volume (in^3):**	39.52
Dry Remaining Sample Wt. (g):	0.0	**Specimen Volume (ft^3):**	0.023
Total Sample Wt. (g):	1095.4	**Specimen Unit Weight (lbs/ft^3):**	105.6
Total Sample Wt. (lbs):	2.42		

Respectfully, Submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC
REGISTRY #0549

7/12/2022

Adam J. Dornacker, P.E
Registered Engineer # 85319
State of Florida

201 Waldo Avenue North • Lehigh Acres, FL 33971 (239) 489-2443 • (239) 489-3438 (Fax)

UNIVERSAL ENGINEERING SCIENCES®

STANDARD TEST METHOD FOR PERMEABILITY OF GRANULAR SOILS (CONSTANT HEAD)
AASHTO T-215

Project:	Proposed WWTP Pond	**Project ID:**	0530.2100348.0000
Client:	Polston Engineering	**Report ID:**	0
Client Address:	2925 Kenilworth Boulevard, Sebring, Florida 33871-0588	**Lab/MAC ID:**	22-1411
Material Location:	Boring B-3		
Sampled By:	A. Neela	**Date Sampled:**	5/18/2022
Tested By:	Kat	**Date Tested:**	5/26/2022
Material Description:	Gray, Light Gray Fine Sand		
Material Classification:	SP		

HYDRAULIC CONDUCTIVITY RESULTS					
Water Discharge, **Q** =	676	mL	=	676.00	cm^3
Length of Specimen, **L** =	5.63	in.	=	14.30	cm
Head, **H** =	36	in.	=	91.44	cm
Cross-Sectional Area of Specimen, **A** =	7.125	$in.^2$	=	45.97	cm^2
Time, **t** =	1	min	=	60	sec.
Water Temperature, **T** =	27.6	°C			
Viscosity of Water Ratio at Test Temperature, R_T =				**0.809**	
Hydraulic Conductivity, k = QL/AtH =				**0.038**	**cm/sec**
Hydraulic Conductivity Corrected, $k_{20°C}$ = QL/AtH =				**0.031**	**cm/sec**
Hydraulic Gradient, i = H/L =				**6.39**	**in/in**
$k_{20°C}$ =				**44.0**	**in/hr**
$k_{20°C}$ =				**87.9**	**ft/day**

SPECIMEN PARAMETERS			
Dry Sample Start Wt. (g):	1095.4	**Specimen Volume (in^3):**	40.11
Dry Remaining Sample Wt. (g):	0.0	**Specimen Volume (ft^3):**	0.023
Total Sample Wt. (g):	1095.4	**Specimen Unit Weight (lbs/ft^3):**	104.0
Total Sample Wt. (lbs):	2.42		

Respectfully, Submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC
REGISTRY #0549

7/12/2022

Adam J. Dornacker, P.E
Registered Engineer # 85319
State of Florida

(239) 489-2443 • (239) 489-3438 (Fax)

STANDARD TEST METHOD FOR PERMEABILITY OF GRANULAR SOILS (CONSTANT HEAD)
AASHTO T-215

Project:	Proposed WWTP Pond	**Project ID:**	0530.2100348.0000
Client:	Polston Engineering	**Report ID:**	0
Client Address:	2925 Kenilworth Boulevard, Sebring, Florida 33871-0588	**Lab/MAC ID:**	22-1412
Material Location:	Boring B-5		
Sampled By:	A. Neela	**Date Sampled:**	5/18/2022
Tested By:	Kat	**Date Tested:**	5/26/2022
Material Description:	Light Orange Fine Sand		
Material Classification:	SP		

HYDRAULIC CONDUCTIVITY RESULTS					
Water Discharge, **Q** =	640	mL	=	640.00	cm^3
Length of Specimen, **L** =	5.598	in.	=	14.22	cm
Head, **H** =	36	in.	=	91.44	cm
Cross-Sectional Area of Specimen, **A** =	7.125	$in.^2$	=	45.97	cm^2
Time, **t** =	1	min	=	60	sec.
Water Temperature, **T** =	27.5	°C			
Viscosity of Water Ratio at Test Temperature, R_T =				**0.811**	
Hydraulic Conductivity, k = QL/AtH =				**0.036**	**cm/sec**
Hydraulic Conductivity Corrected, $k_{20°C}$ = QL/AtH =				**0.029**	**cm/sec**
Hydraulic Gradient, i = H/L =				**6.43**	**in/in**
$k_{20°C}$ =				**41.5**	**in/hr**
$k_{20°C}$ =				**82.9**	**ft/day**

SPECIMEN PARAMETERS			
Dry Sample Start Wt. (g):	1095.4	**Specimen Volume (in^3):**	39.89
Dry Remaining Sample Wt. (g):	0.0	**Specimen Volume (ft^3):**	0.023
Total Sample Wt. (g):	1095.4	**Specimen Unit Weight (lbs/ft^3):**	104.6
Total Sample Wt. (lbs):	2.42		

Respectfully, Submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC
REGISTRY #0549

7/12/2022

Adam J. Dornacker, P.E
Registered Engineer # 85319
State of Florida

(239) 489-2443 • (239) 489-3438 (Fax)

UNIVERSAL® ENGINEERING SCIENCES

STANDARD TEST METHOD FOR PERMEABILITY OF GRANULAR SOILS (CONSTANT HEAD) AASHTO T-215

Project:	Proposed WWTP Pond	**Project ID:**	0530.2100348.0000
Client:	Polston Engineering	**Report ID:**	0
Client Address:	2925 Kenilworth Boulevard, Sebring, Florida 33871-0588	**Lab/MAC ID:**	22-1413
Material Location:	Boring B-6		
Sampled By:	A. Neela	**Date Sampled:**	5/18/2022
Tested By:	Kat	**Date Tested:**	5/26/2022
Material Description:	Light Gray Sand		
Material Classification:	SP		

HYDRAULIC CONDUCTIVITY RESULTS					
Water Discharge, **Q** =	713	mL	=	713.00	cm^3
Length of Specimen, **L** =	5.576	in.	=	14.16	cm
Head, **H** =	36	in.	=	91.44	cm
Cross-Sectional Area of Specimen, **A** =	7.125	$in.^2$	=	45.97	cm^2
Time, **t** =	1	min	=	60	sec.
Water Temperature, **T** =	27	°C			
Viscosity of Water Ratio at Test Temperature, R_T =				**0.820**	
Hydraulic Conductivity, k = QL/AtH =				**0.040**	**cm/sec**
Hydraulic Conductivity Corrected, $k_{20°C}$ = QL/AtH =				**0.033**	**cm/sec**
Hydraulic Gradient, i = H/L =				**6.46**	**in/in**
$k_{20°C}$ =				**46.5**	**in/hr**
$k_{20°C}$ =				**93.1**	**ft/day**

SPECIMEN PARAMETERS			
Dry Sample Start Wt. (g):	1095.4	**Specimen Volume (in^3):**	39.73
Dry Remaining Sample Wt. (g):	0.0	**Specimen Volume (ft^3):**	0.023
Total Sample Wt. (g):	1095.4	**Specimen Unit Weight (lbs/ft^3):**	105.1
Total Sample Wt. (lbs):	2.42		

Respectfully, Submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC
REGISTRY #0549

7/12/2022

Adam J. Dornacker, P.E
Registered Engineer # 85319
State of Florida

201 Waldo Avenue North • Lehigh Acres, FL 33971 (239) 489-2443 • (239) 489-3438 (Fax)

UNIVERSAL ENGINEERING SCIENCES

STANDARD TEST METHOD FOR PERMEABILITY OF GRANULAR SOILS (CONSTANT HEAD)
AASHTO T-215

Project:	Proposed WWTP Pond	**Project ID:**	0530.2100348.0000
Client:	Polston Engineering	**Report ID:**	0
Client Address:	2925 Kenilworth Boulevard, Sebring, Florida 33871-0588	**Lab/MAC ID:**	22-1414
Material Location:	Boring B-8		
Sampled By:	A. Neela	**Date Sampled:**	5/18/2022
Tested By:	Kat	**Date Tested:**	5/26/2022
Material Description:	Light Gray, Orange Sand		
Material Classification:	SP		

HYDRAULIC CONDUCTIVITY RESULTS					
Water Discharge, **Q** =	610	mL	=	610.00	cm^3
Length of Specimen, **L** =	5.569	in.	=	14.15	cm
Head, **H** =	36	in.	=	91.44	cm
Cross-Sectional Area of Specimen, **A** =	7.125	$in.^2$	=	45.97	cm^2
Time, **t** =	1	min	=	60	sec.
Water Temperature, **T** =	27.5	°C			
Viscosity of Water Ratio at Test Temperature, R_T =				**0.811**	
Hydraulic Conductivity, k = QL/AtH =				**0.034**	**cm/sec**
Hydraulic Conductivity Corrected, $k_{20°C}$ = QL/AtH =				**0.028**	**cm/sec**
Hydraulic Gradient, i = H/L =				**6.46**	**in/in**
$k_{20°C}$ =				**39.3**	**in/hr**
$k_{20°C}$ =				**78.7**	**ft/day**

SPECIMEN PARAMETERS			
Dry Sample Start Wt. (g):	1095.4	**Specimen Volume (in^3):**	39.68
Dry Remaining Sample Wt. (g):	0.0	**Specimen Volume (ft^3):**	0.023
Total Sample Wt. (g):	1095.4	**Specimen Unit Weight (lbs/ft^3):**	105.2
Total Sample Wt. (lbs):	2.42		

Respectfully, Submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC
REGISTRY #0549

7/12/2022

Adam J. Dornacker, P.E
Registered Engineer # 85319
State of Florida

(239) 489-2443 • (239) 489-3438 (Fax)

UNIVERSAL ENGINEERING SCIENCES

STANDARD TEST METHOD FOR PERMEABILITY OF GRANULAR SOILS (CONSTANT HEAD)
AASHTO T-215

Project:	Proposed WWTP Pond	**Project ID:**	0530.2100348.0000
Client:	Polston Engineering	**Report ID:**	0
Client Address:	2925 Kenilworth Boulevard, Sebring, Florida 33871-0588	**Lab/MAC ID:**	22-1415
Material Location:	Boring B-9		
Sampled By:	A. Neela	**Date Sampled:**	5/18/2022
Tested By:	Kat	**Date Tested:**	5/26/2022
Material Description:	Gray, Light Gray Sand		
Material Classification:	SP		

HYDRAULIC CONDUCTIVITY RESULTS					
Water Discharge, **Q** =	687	mL	=	687.00	cm^3
Length of Specimen, **L** =	5.56	in.	=	14.12	cm
Head, **H** =	36	in.	=	91.44	cm
Cross-Sectional Area of Specimen, **A** =	7.125	$in.^2$	=	45.97	cm^2
Time, **t** =	1	min	=	60	sec.
Water Temperature, **T** =	28	°C			
Viscosity of Water Ratio at Test Temperature, R_T =				**0.802**	
Hydraulic Conductivity, k = QL/AtH =				**0.038**	**cm/sec**
Hydraulic Conductivity Corrected, $k_{20°C}$ = QL/AtH =				**0.031**	**cm/sec**
Hydraulic Gradient, i = H/L =				**6.47**	**in/in**
$k_{20°C}$ =				**43.7**	**in/hr**
$k_{20°C}$ =				**87.5**	**ft/day**

SPECIMEN PARAMETERS			
Dry Sample Start Wt. (g):	1095.4	**Specimen Volume (in^3):**	39.62
Dry Remaining Sample Wt. (g):	0.0	**Specimen Volume (ft^3):**	0.023
Total Sample Wt. (g):	1095.4	**Specimen Unit Weight (lbs/ft^3):**	105.4
Total Sample Wt. (lbs):	2.42		

Respectfully, Submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC
REGISTRY #0549

7/12/2022

Adam J. Dornacker, P.E
Registered Engineer # 85319
State of Florida

APPENDIX D

UNIVERSAL
ENGINEERING SCIENCES

WELL ID: Cemetary Road WWTP POND

Local ID: B-1
Date: 9/8/2022
Time: 13:52

INPUT

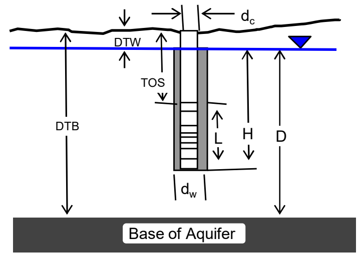
Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	20.6	Feet
top of screen (TOS)	20	Feet
Base of Aquifer (DTB)	40	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Cement	
Aquifer Material --	Surficial Aquifer, central Flc	

COMPUTED

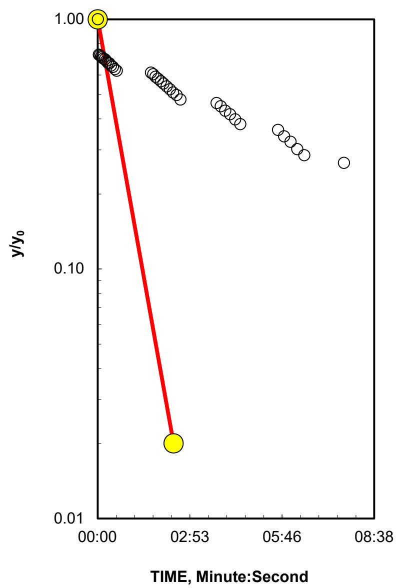
L_{wetted}	9.4	Feet
D =	19.4	Feet
H =	9.4	Feet
L/r_w =	56.40	
$y_{0\text{-DISPLACEMENT}}$ =	2.02	Feet
$y_{0\text{-SLUG}}$ =	2.11	Feet
From look-up table using L/r_w		
Partial penetrate A =	3.311	
B =	0.534	
ln(Re/rw) =	2.701	
Re =	2.48	Feet
Slope =	0.011965	log_{10}/sec
$t_{90\%}$ recovery =	84	sec

Input is consistent.

K =	2.4	Feet/Day



Adjust slope of line to estimate K



Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	13:52:31.9	18.58
2	13:52:33.7	19.15
3	13:52:35.8	19.15
4	13:52:37.9	19.17
5	13:52:40.1	19.18
6	13:52:42.5	19.19
7	13:52:45.0	19.20
8	13:52:47.6	19.23
9	13:52:50.5	19.25
10	13:52:53.5	19.26
11	13:52:56.6	19.28
12	13:53:00.0	19.30
13	13:53:03.6	19.32
14	13:53:07.2	19.34
15	13:54:11.4	19.37
16	13:54:15.6	19.39
17	13:54:19.8	19.41
18	13:54:24.6	19.43
19	13:54:30.0	19.46
20	13:54:34.8	19.49
21	13:54:40.8	19.51
22	13:54:46.8	19.54
23	13:54:52.8	19.57
24	13:54:59.4	19.60
25	13:55:06.6	19.64
26	13:56:14.4	19.67
27	13:56:22.2	19.70
28	13:56:30.6	19.73
29	13:56:39.6	19.76
30	13:56:49.2	19.80
31	13:56:58.8	19.83
32	13:58:09.6	19.87
33	13:58:21.0	19.91
34	13:58:33.0	19.95
35	13:58:45.6	19.99
36	13:58:58.8	20.02
37	14:00:13.2	20.06

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

WELL ID: Cemetary Road WWTP POND

Local ID: B-1
Date: 9/8/2022
Time: 14:07

INPUT

Construction:

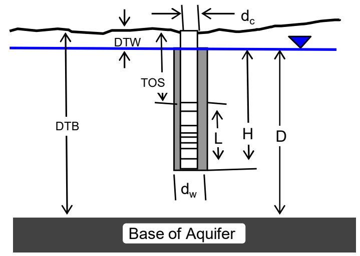
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet

Depths to:

water level (DTW)	20.6	Feet
top of screen (TOS)	20	Feet
Base of Aquifer (DTB)	40	Feet

Annular Fill:
across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc



COMPUTED

L_{wetted}	9.4	Feet
D =	19.4	Feet
H =	9.4	Feet
L/r_w =	56.40	
$y_{0\text{-DISPLACEMENT}}$ =	1.90	Feet
$y_{0\text{-SLUG}}$ =	2.30	Feet

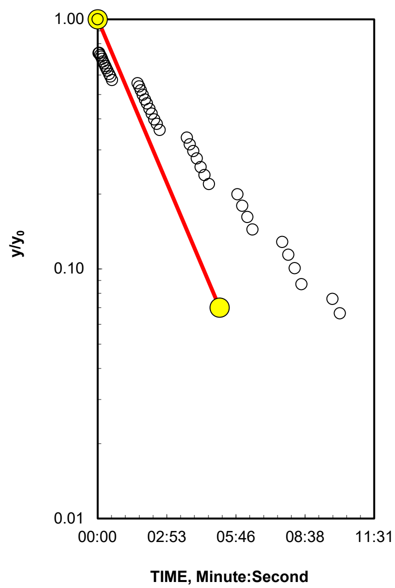
From look-up table using L/r_w

Partial penetrate A =	3.311	
B =	0.534	
ln(Re/rw) =	2.701	
Re =	2.48	Feet
Slope =	0.003787	$\log_{10}$/sec
$t_{90\%}$ recovery =	264	sec

Input is consistent.

K = 0.75 Feet/Day

Adjust slope of line to estimate K



Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	14:07:31.9	18.70
2	14:07:33.7	19.21
3	14:07:35.8	19.21
4	14:07:37.9	19.24
5	14:07:40.1	19.26
6	14:07:42.5	19.28
7	14:07:45.0	19.31
8	14:07:47.6	19.34
9	14:07:50.5	19.37
10	14:07:53.5	19.39
11	14:07:56.6	19.42
12	14:08:00.0	19.46
13	14:08:03.6	19.48
14	14:08:07.2	19.52
15	14:09:11.4	19.55
16	14:09:15.6	19.58
17	14:09:19.8	19.61
18	14:09:24.6	19.65
19	14:09:30.0	19.69
20	14:09:34.8	19.73
21	14:09:40.8	19.77
22	14:09:46.8	19.81
23	14:09:52.8	19.85
24	14:09:59.4	19.88
25	14:10:06.6	19.92
26	14:11:14.4	19.96
27	14:11:22.2	20.00
28	14:11:30.6	20.04
29	14:11:39.6	20.08
30	14:11:49.2	20.12
31	14:11:58.8	20.15
32	14:12:09.6	20.19
33	14:13:21.0	20.22
34	14:13:33.0	20.26
35	14:13:45.6	20.29
36	14:13:58.8	20.33
37	14:15:13.2	20.36
38	14:15:28.2	20.38
39	14:15:43.8	20.41
40	14:16:00.6	20.44
41	14:17:18.6	20.46
42	14:17:37.2	20.47

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

WELL ID: Cemetary Road WWTP POND

Local ID: B-1
Date: 9/8/2022
Time: 14:22

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet

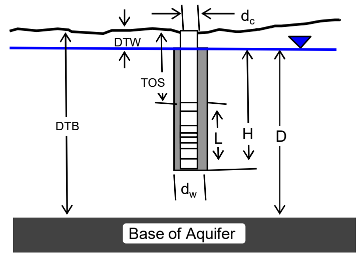
Depths to:

water level (DTW)	20.6	Feet
top of screen (TOS)	20	Feet
Base of Aquifer (DTB)	40	Feet

Annular Fill:

across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc



COMPUTED

L_{wetted}	9.4	Feet
D =	19.4	Feet
H =	9.4	Feet
L/r_w =	56.40	
$y_{0\text{-DISPLACEMENT}}$ =	2.06	Feet
$y_{0\text{-SLUG}}$ =	2.11	Feet

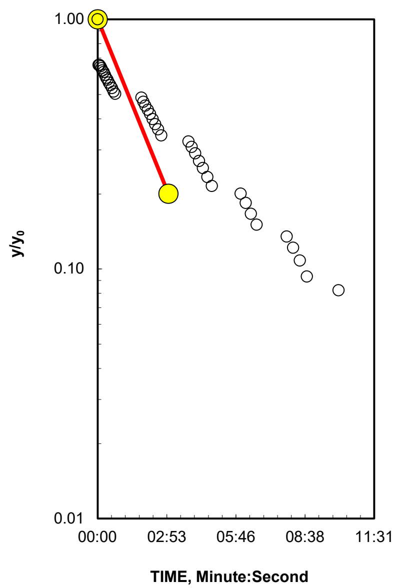
From look-up table using L/r_w

Partial penetrate A =	3.311	
B =	0.534	
ln(Re/rw) =	2.701	
Re =	2.48	Feet
Slope =	0.003949	log_{10}/sec
$t_{90\%}$ recovery =	253	sec

Input is consistent.

K = 0.78 Feet/Day

Adjust slope of line to estimate K



Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	14:22:35.8	18.54
2	14:22:37.9	19.25
3	14:22:40.1	19.25
4	14:22:42.5	19.27
5	14:22:45.0	19.29
6	14:22:47.6	19.32
7	14:22:50.5	19.34
8	14:22:53.5	19.37
9	14:22:56.6	19.40
10	14:23:00.0	19.42
11	14:23:03.6	19.45
12	14:23:07.2	19.48
13	14:23:11.4	19.51
14	14:23:15.6	19.54
15	14:23:19.8	19.57
16	14:24:24.6	19.60
17	14:24:30.0	19.64
18	14:24:34.8	19.67
19	14:24:40.8	19.71
20	14:24:46.8	19.74
21	14:24:52.8	19.78
22	14:24:59.4	19.82
23	14:25:06.6	19.86
24	14:25:14.4	19.89
25	14:26:22.2	19.93
26	14:26:30.6	19.97
27	14:26:39.6	20.00
28	14:26:49.2	20.04
29	14:26:58.8	20.08
30	14:27:09.6	20.12
31	14:27:21.0	20.16
32	14:28:33.0	20.19
33	14:28:45.6	20.22
34	14:28:58.8	20.26
35	14:29:13.2	20.29
36	14:30:28.2	20.32
37	14:30:43.8	20.35
38	14:31:00.6	20.38
39	14:31:18.6	20.41
40	14:32:37.2	20.43

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

WELL ID: Cemetary Road WWTP POND

Local ID: B-1
Date: 8/14/1997
Time: 13:58

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet

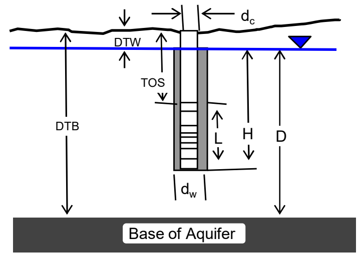
Depths to:

water level (DTW)	20.6	Feet
top of screen (TOS)	20	Feet
Base of Aquifer (DTB)	40	Feet

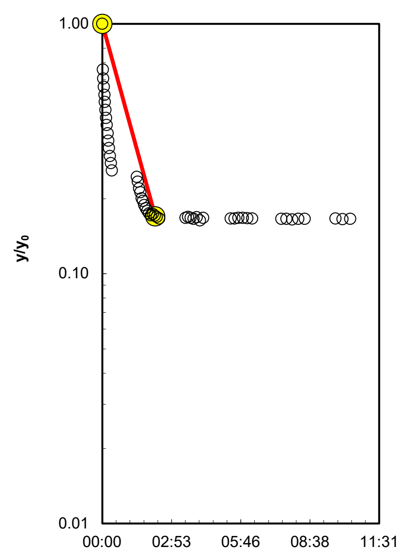
Annular Fill:

across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc



Adjust slope of line to estimate K



COMPUTED

L_{wetted}	9.4	Feet
D =	19.4	Feet
H =	9.4	Feet
L/r_w =	56.40	
$y_{0\text{-DISPLACEMENT}}$ =	2.23	Feet
$y_{0\text{-SLUG}}$ =	2.30	Feet

From look-up table using L/r_w

Partial penetrate A =	3.311	
B =	0.534	
ln(Re/rw) =	2.701	
Re =	2.48	Feet
Slope =	0.00583	$\log_{10}$/sec
$t_{90\%}$ recovery =	172	sec

Input is consistent.

K = 1.2 Feet/Day

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

Reduced Data

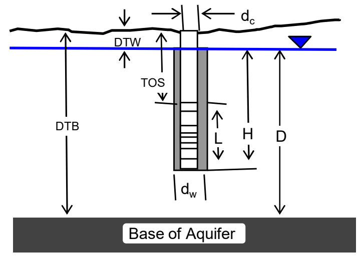
Entry	Time, Hr:Min:Sec	Water Level
1	13:58:19.0	22.83
2	13:58:20.1	22.07
3	13:58:21.3	21.95
4	13:58:22.6	21.85
5	13:58:23.9	21.76
6	13:58:25.3	21.69
7	13:58:26.8	21.61
8	13:58:28.4	21.54
9	13:58:30.1	21.48
10	13:58:31.9	21.42
11	13:58:33.7	21.36
12	13:58:35.8	21.31
13	13:58:37.9	21.26
14	13:58:40.1	21.22
15	13:58:42.5	21.18
16	13:59:45.0	21.15
17	13:59:47.6	21.12
18	13:59:50.5	21.09
19	13:59:53.5	21.07
20	13:59:56.6	21.05
21	14:00:00.0	21.04
22	14:00:03.6	21.02
23	14:00:07.2	21.01
24	14:00:11.4	21.00
25	14:00:15.6	20.99
26	14:00:19.8	20.98
27	14:00:24.6	20.99
28	14:00:30.0	20.98
29	14:00:34.8	20.98
30	14:00:40.8	20.97
31	14:01:46.8	20.97
32	14:01:52.8	20.98
33	14:01:59.4	20.97
34	14:02:06.6	20.97
35	14:02:14.4	20.98
36	14:02:22.2	20.97
37	14:02:30.6	20.97
38	14:03:39.6	20.97
39	14:03:49.2	20.97
40	14:03:58.8	20.97
41	14:04:09.6	20.97
42	14:04:21.0	20.97
43	14:04:33.0	20.97
44	14:05:45.6	20.97
45	14:05:58.8	20.97

WELL ID: Cemetary Road WWTP POND

Local ID:	B-1
Date:	9/8/2022
Time:	14:14

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	20.6	Feet
top of screen (TOS)	20	Feet
Base of Aquifer (DTB)	40	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Cement	
Aquifer Material --	Surficial Aquifer, central Flc	



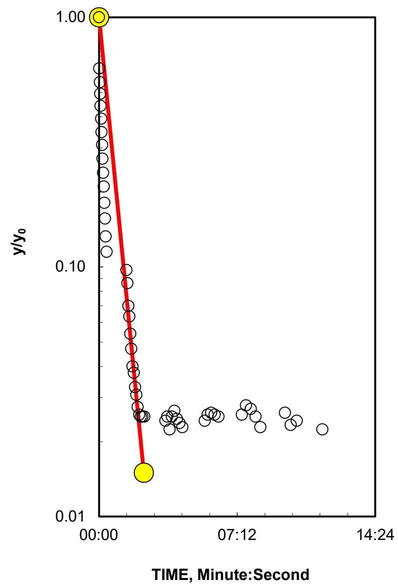
COMPUTED

L_{wetted}	9.4	Feet
D =	19.4	Feet
H =	9.4	Feet
L/r_w =	56.40	
$y_{0\text{-DISPLACEMENT}}$ =	2.15	Feet
$y_{0\text{-SLUG}}$ =	2.30	Feet
From look-up table using L/r_w		
Partial penetrate A =	3.311	
B =	0.534	
ln(Re/rw) =	2.701	
Re =	2.48	Feet
Slope =	0.013028	log_{10}/sec
$t_{90\%}$ recovery =	77	sec

Input is consistent.

K =	**2.6**	**Feet/Day**

Adjust slope of line to estimate K



Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	14:14:19.0	22.75
2	14:14:20.1	21.94
3	14:14:21.3	21.78
4	14:14:22.6	21.66
5	14:14:23.9	21.55
6	14:14:25.3	21.44
7	14:14:26.8	21.35
8	14:14:28.4	21.26
9	14:14:30.1	21.18
10	14:14:31.9	21.11
11	14:14:33.7	21.05
12	14:14:35.8	20.99
13	14:14:37.9	20.94
14	14:14:40.1	20.89
15	14:14:42.5	20.85
16	14:15:45.0	20.81
17	14:15:47.6	20.79
18	14:15:50.5	20.75
19	14:15:53.5	20.74
20	14:15:56.6	20.72
21	14:16:00.0	20.70
22	14:16:03.6	20.69
23	14:16:07.2	20.68
24	14:16:11.4	20.67
25	14:16:15.6	20.67
26	14:16:19.8	20.66
27	14:16:24.6	20.66
28	14:16:30.0	20.65
29	14:16:34.8	20.65
30	14:16:40.8	20.65
31	14:17:46.8	20.65
32	14:17:52.8	20.65
33	14:17:59.4	20.65
34	14:18:06.6	20.65
35	14:18:14.4	20.66
36	14:18:22.2	20.65
37	14:18:30.6	20.65
38	14:18:39.6	20.65
39	14:19:49.2	20.65
40	14:19:58.8	20.66
41	14:20:09.6	20.66
42	14:20:21.0	20.66
43	14:20:33.0	20.65
44	14:21:45.6	20.66
45	14:21:58.8	20.66

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

WELL ID: Cemetary Road WWTP POND

Local ID: B-1
Date: 9/8/2022
Time: 14:29

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet

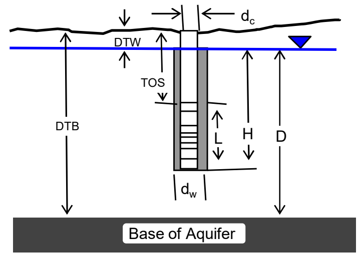
Depths to:

water level (DTW)	20.6	Feet
top of screen (TOS)	20	Feet
Base of Aquifer (DTB)	40	Feet

Annular Fill:

across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc



COMPUTED

L_{wetted}	9.4	Feet
D =	19.4	Feet
H =	9.4	Feet
L/r_w =	56.40	
$y_{0\text{-DISPLACEMENT}}$ =	2.14	Feet
$y_{0\text{-SLUG}}$ =	2.30	Feet

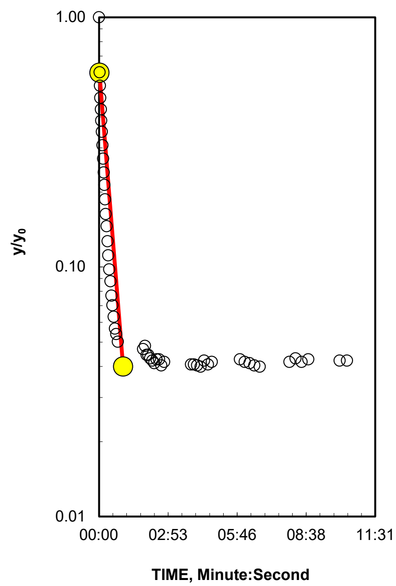
From look-up table using L/r_w

Partial penetrate A =	3.311	
B =	0.534	
ln(Re/rw) =	2.701	
Re =	2.48	Feet
Slope =	0.019934	$\log_{10}$/sec
$t_{90\%}$ recovery =	50	sec

Input is consistent.

K = 4 Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	14:29:16.9	22.74
2	14:29:17.9	21.89
3	14:29:19.0	21.74
4	14:29:20.1	21.62
5	14:29:21.3	21.51
6	14:29:22.6	21.42
7	14:29:23.9	21.34
8	14:29:25.3	21.26
9	14:29:26.8	21.18
10	14:29:28.4	21.11
11	14:29:30.1	21.06
12	14:29:31.9	21.00
13	14:29:33.7	20.95
14	14:29:35.8	20.91
15	14:29:37.9	20.87
16	14:29:40.1	20.84
17	14:29:42.5	20.81
18	14:29:45.0	20.79
19	14:29:47.6	20.76
20	14:29:50.5	20.75
21	14:29:53.5	20.74
22	14:29:56.6	20.72
23	14:30:00.0	20.72
24	14:30:03.6	20.71
25	14:31:07.2	20.70
26	14:31:11.4	20.70
27	14:31:15.6	20.70
28	14:31:19.8	20.70
29	14:31:24.6	20.69
30	14:31:30.0	20.69
31	14:31:34.8	20.69
32	14:31:40.8	20.69
33	14:31:46.8	20.69
34	14:31:52.8	20.69
35	14:31:59.4	20.69
36	14:33:06.6	20.69
37	14:33:14.4	20.69
38	14:33:22.2	20.69
39	14:33:30.6	20.69
40	14:33:39.6	20.69
41	14:33:49.2	20.69
42	14:33:58.8	20.69
43	14:35:09.6	20.69
44	14:35:21.0	20.69
45	14:35:33.0	20.69

WELL ID: Cemetary Road WWTP POND

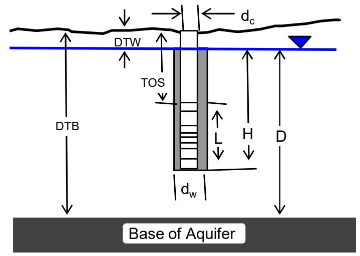
Local ID: B-2
Date: 9/8/2022
Time: 13:02

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	21.6	Feet
top of screen (TOS)	30	Feet
Base of Aquifer (DTB)	45	Feet

Annular Fill:
across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc



COMPUTED

L_{wetted}	10	Feet
D =	23.4	Feet
H =	18.4	Feet
L/r_w =	60.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.19	Feet
$y_{0\text{-SLUG}}$ =	1.35	Feet

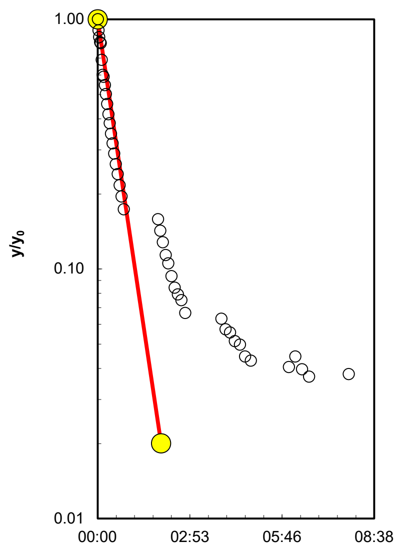
From look-up table using L/r_w

Partial penetrate A =	3.414	
B =	0.552	
ln(Re/rw) =	3.105	
Re =	3.72	Feet
Slope =	0.014277	$\log_{10}$/sec
$t_{90\%}$ recovery =	70	sec

Input is consistent.

K = 3.1 Feet/Day

Adjust slope of line to estimate K



Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	13:02:22.6	20.41
2	13:02:23.9	20.53
3	13:02:25.3	20.59
4	13:02:26.8	20.64
5	13:02:28.4	20.65
6	13:02:30.1	20.78
7	13:02:31.9	20.89
8	13:02:33.7	20.90
9	13:02:35.8	20.95
10	13:02:37.9	21.01
11	13:02:40.1	21.06
12	13:02:42.5	21.11
13	13:02:45.0	21.14
14	13:02:47.6	21.19
15	13:02:50.5	21.22
16	13:02:53.5	21.26
17	13:02:56.6	21.29
18	13:03:00.0	21.32
19	13:03:03.6	21.34
20	13:03:07.2	21.37
21	13:03:11.4	21.39
22	13:04:15.6	21.41
23	13:04:19.8	21.43
24	13:04:24.6	21.45
25	13:04:30.0	21.47
26	13:04:34.8	21.48
27	13:04:40.8	21.49
28	13:04:46.8	21.50
29	13:04:52.8	21.51
30	13:04:59.4	21.51
31	13:05:06.6	21.52
32	13:06:14.4	21.53
33	13:06:22.2	21.53
34	13:06:30.6	21.53
35	13:06:39.6	21.54
36	13:06:49.2	21.54
37	13:06:58.8	21.55
38	13:07:09.6	21.55
39	13:08:21.0	21.55
40	13:08:33.0	21.55
41	13:08:45.6	21.55
42	13:08:58.8	21.56
43	13:10:13.2	21.56

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

WELL ID: Cemetary Road WWTP POND

Local ID: B-2
Date: 9/8/2022
Time: 13:17

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet

Depths to:

water level (DTW)	21.6	Feet
top of screen (TOS)	30	Feet
Base of Aquifer (DTB)	45	Feet

Annular Fill:

across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc

COMPUTED

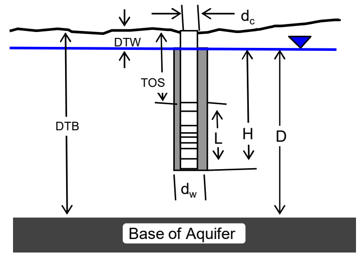
L_{wetted}	10	Feet
D =	23.4	Feet
H =	18.4	Feet
L/r_w =	60.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.70	Feet
$y_{0\text{-SLUG}}$ =	1.55	Feet

From look-up table using L/r_w

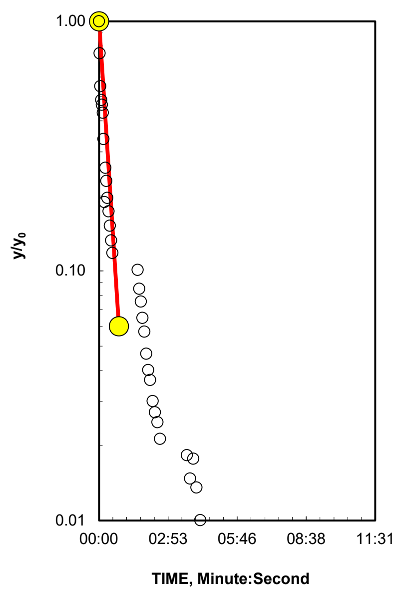
Partial penetrate A =	3.414	
B =	0.552	
ln(Re/rw) =	3.105	
Re =	3.72	Feet
Slope =	0.024437	$\log_{10}$/sec
$t_{90\%}$ recovery =	41	sec

Input is consistent.

K = 5.2 Feet/Day



Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

Reduced Data

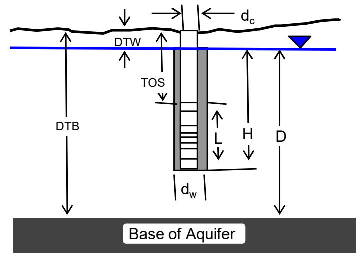
Entry	Time, Hr:Min:Sec	Water Level
1	13:17:26.8	19.90
2	13:17:28.4	20.34
3	13:17:30.1	20.67
4	13:17:31.9	20.78
5	13:17:33.7	20.81
6	13:17:35.8	20.87
7	13:17:37.9	21.03
8	13:17:40.1	21.28
9	13:17:42.5	21.16
10	13:17:45.0	21.21
11	13:17:47.6	21.27
12	13:17:50.5	21.31
13	13:17:53.5	21.34
14	13:17:56.6	21.38
15	13:18:00.0	21.40
16	13:19:03.6	21.43
17	13:19:07.2	21.46
18	13:19:11.4	21.47
19	13:19:15.6	21.49
20	13:19:19.8	21.50
21	13:19:24.6	21.52
22	13:19:30.0	21.53
23	13:19:34.8	21.54
24	13:19:40.8	21.55
25	13:19:46.8	21.55
26	13:19:52.8	21.56
27	13:19:59.4	21.56
28	13:21:06.6	21.57
29	13:21:14.4	21.58
30	13:21:22.2	21.57
31	13:21:30.6	21.58
32	13:21:39.6	21.58
33	13:21:49.2	21.59
34	13:21:58.8	21.59
35	13:23:09.6	21.59
36	13:23:21.0	21.59
37	13:23:33.0	21.59
38	13:23:45.6	21.59
39	13:23:58.8	21.59
40	13:25:13.2	21.59
41	13:25:28.2	21.59
42	13:25:43.8	21.59

WELL ID: Cemetary Road WWTP POND

Local ID: B-2
Date: 9/8/2022
Time: 13:30

INPUT

Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	4 Inch
Screen Length (L)	10 Feet
Depths to:	
water level (DTW)	21.6 Feet
top of screen (TOS)	30 Feet
Base of Aquifer (DTB)	45 Feet
Annular Fill:	
across screen --	Coarse Sand
above screen --	Cement
Aquifer Material --	Surficial Aquifer, central Flc



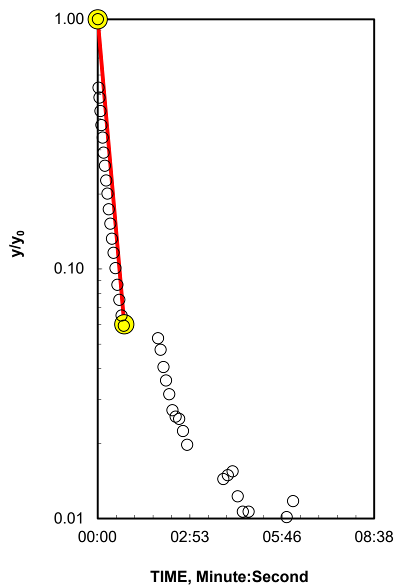
COMPUTED

L_{wetted}	10 Feet
D =	23.4 Feet
H =	18.4 Feet
L/r_w =	60.00
$y_{0\text{-DISPLACEMENT}}$ =	1.88 Feet
$y_{0\text{-SLUG}}$ =	1.55 Feet
From look-up table using L/r_w	
Partial penetrate A =	3.414
B =	0.552
ln(Re/rw) =	3.105
Re =	3.72 Feet
Slope =	0.024437 log_{10}/sec
$t_{90\%}$ recovery =	41 sec

Input is consistent.

K =	5.2 Feet/Day

Adjust slope of line to estimate K



Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	13:30:26.8	19.72
2	13:30:28.4	20.60
3	13:30:30.1	20.69
4	13:30:31.9	20.79
5	13:30:33.7	20.89
6	13:30:35.8	20.97
7	13:30:37.9	21.05
8	13:30:40.1	21.11
9	13:30:42.5	21.18
10	13:30:45.0	21.22
11	13:30:47.6	21.28
12	13:30:50.5	21.32
13	13:30:53.5	21.35
14	13:30:56.6	21.38
15	13:31:00.0	21.41
16	13:31:03.6	21.44
17	13:31:07.2	21.46
18	13:31:11.4	21.48
19	13:31:15.6	21.49
20	13:32:19.8	21.50
21	13:32:24.6	21.51
22	13:32:30.0	21.52
23	13:32:34.8	21.53
24	13:32:40.8	21.54
25	13:32:46.8	21.55
26	13:32:52.8	21.55
27	13:32:59.4	21.55
28	13:33:06.6	21.56
29	13:33:14.4	21.56
30	13:34:22.2	21.57
31	13:34:30.6	21.57
32	13:34:39.6	21.57
33	13:34:49.2	21.58
34	13:34:58.8	21.58
35	13:35:09.6	21.58
36	13:36:21.0	21.58
37	13:36:33.0	21.58
38	13:36:45.6	21.58
39	13:36:58.8	21.58

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

WELL ID: Cemetary Road WWTP POND

Local ID: B-2
Date: 9/8/2022
Time: 13:11

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet

Depths to:

water level (DTW)	21.6	Feet
top of screen (TOS)	30	Feet
Base of Aquifer (DTB)	45	Feet

Annular Fill:

across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc

COMPUTED

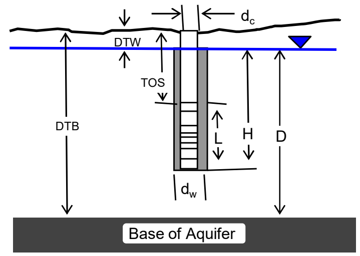
L_{wetted}	10	Feet
D =	23.4	Feet
H =	18.4	Feet
L/r_w =	60.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.85	Feet
$y_{0\text{-SLUG}}$ =	1.55	Feet

From look-up table using L/r_w

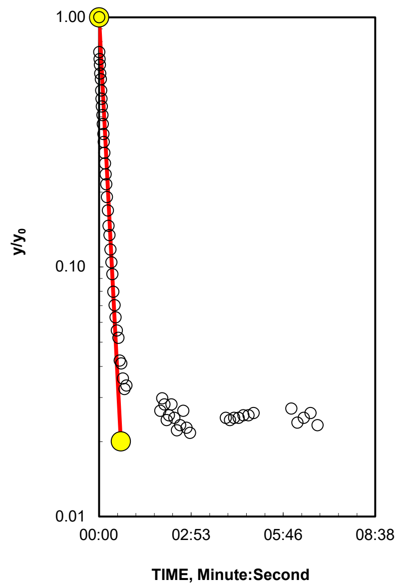
Partial penetrate A =	3.414	
B =	0.552	
ln(Re/rw) =	3.105	
Re =	3.72	Feet
Slope =	0.041438	log_{10}/sec
$t_{90\%}$ recovery =	24	sec

Input is consistent.

K = 8.9 Feet/Day



Adjust slope of line to estimate K



Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	13:11:09.0	23.40
2	13:11:09.5	22.89
3	13:11:10.1	22.81
4	13:11:10.7	22.74
5	13:11:11.3	22.65
6	13:11:11.9	22.59
7	13:11:12.7	22.49
8	13:11:13.4	22.42
9	13:11:14.2	22.36
10	13:11:15.1	22.30
11	13:11:16.0	22.24
12	13:11:16.9	22.18
13	13:11:17.9	22.14
14	13:11:19.0	22.08
15	13:11:20.1	22.03
16	13:11:21.3	21.98
17	13:11:22.6	21.95
18	13:11:23.9	21.90
19	13:11:25.3	21.86
20	13:11:26.8	21.82
21	13:11:28.4	21.80
22	13:11:30.1	21.77
23	13:11:31.9	21.74
24	13:11:33.7	21.72
25	13:11:35.8	21.70
26	13:11:37.9	21.68
27	13:11:40.1	21.67
28	13:11:42.5	21.65
29	13:11:45.0	21.65
30	13:11:47.6	21.63
31	13:11:50.5	21.63
32	13:11:53.5	21.62
33	13:11:56.6	21.61
34	13:12:00.0	21.61
35	13:13:03.6	21.60
36	13:13:07.2	21.61
37	13:13:11.4	21.60
38	13:13:15.6	21.60
39	13:13:19.8	21.60
40	13:13:24.6	21.60
41	13:13:30.0	21.60
42	13:13:34.8	21.59
43	13:13:40.8	21.59
44	13:13:46.8	21.60
45	13:13:52.8	21.59

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

WELL ID: Cemetary Road WWTP POND

Local ID: B-2
Date: 9/8/2022
Time: 13:23

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet

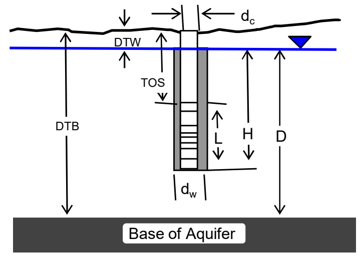
Depths to:

water level (DTW)	21.6	Feet
top of screen (TOS)	30	Feet
Base of Aquifer (DTB)	45	Feet

Annular Fill:

across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc



COMPUTED

L_{wetted}	10	Feet
D =	23.4	Feet
H =	18.4	Feet
L/r_w =	60.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.85	Feet
$y_{0\text{-SLUG}}$ =	1.55	Feet

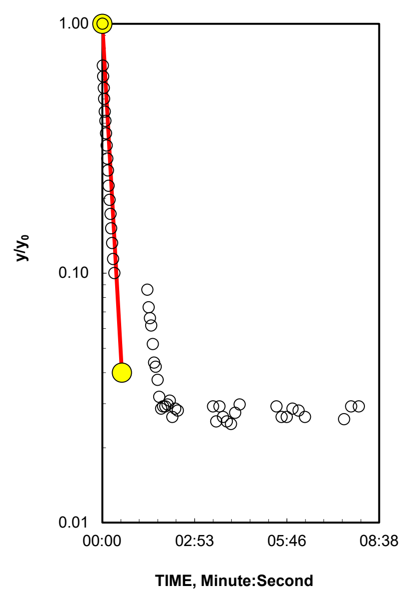
From look-up table using L/r_w

Partial penetrate A =	3.414	
B =	0.552	
ln(Re/rw) =	3.105	
Re =	3.72	Feet
Slope =	0.037782	$\log_{10}$/sec
$t_{90\%}$ recovery =	26	sec

Input is consistent.

K = 8.1 Feet/Day

Adjust slope of line to estimate K



Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	13:23:13.4	23.40
2	13:23:14.2	22.81
3	13:23:15.1	22.69
4	13:23:16.0	22.57
5	13:23:16.9	22.47
6	13:23:17.9	22.37
7	13:23:19.0	22.30
8	13:23:20.1	22.22
9	13:23:21.3	22.15
10	13:23:22.6	22.08
11	13:23:23.9	22.03
12	13:23:25.3	21.96
13	13:23:26.8	21.91
14	13:23:28.4	21.87
15	13:23:30.1	21.83
16	13:23:31.9	21.79
17	13:23:33.7	21.76
18	13:23:35.8	21.74
19	13:24:37.9	21.71
20	13:24:40.1	21.69
21	13:24:42.5	21.67
22	13:24:45.0	21.66
23	13:24:47.6	21.65
24	13:24:50.5	21.63
25	13:24:53.5	21.63
26	13:24:56.6	21.62
27	13:25:00.0	21.61
28	13:25:03.6	21.60
29	13:25:07.2	21.60
30	13:25:11.4	21.60
31	13:25:15.6	21.61
32	13:25:19.8	21.61
33	13:25:24.6	21.60
34	13:25:30.0	21.60
35	13:25:34.8	21.60
36	13:26:40.8	21.60
37	13:26:46.8	21.60
38	13:26:52.8	21.60
39	13:26:59.4	21.60
40	13:27:06.6	21.60
41	13:27:14.4	21.60
42	13:27:22.2	21.60
43	13:27:30.6	21.61
44	13:28:39.6	21.60
45	13:28:49.2	21.60

REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

WELL ID: Cemetary Road WWTP POND

Local ID: B-2
Date: 9/8/2022
Time: 13:35

INPUT

Construction:

Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	4	Inch
Screen Length (L)	10	Feet

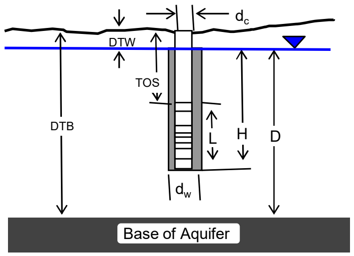
Depths to:

water level (DTW)	21.6	Feet
top of screen (TOS)	30	Feet
Base of Aquifer (DTB)	45	Feet

Annular Fill:

across screen -- Coarse Sand
above screen -- Cement

Aquifer Material -- Surficial Aquifer, central Flc



COMPUTED

L_{wetted}	10	Feet
D =	23.4	Feet
H =	18.4	Feet
L/r_w =	60.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.81	Feet
$y_{0\text{-SLUG}}$ =	1.55	Feet

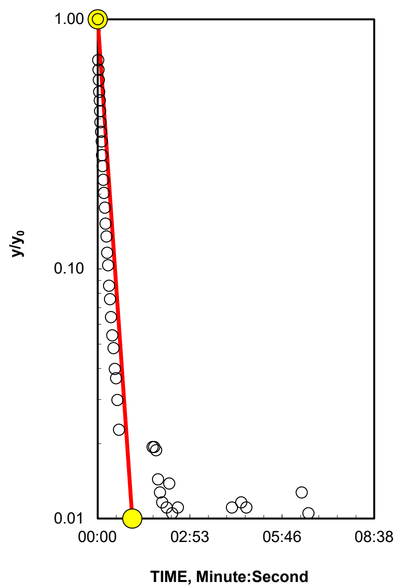
From look-up table using L/r_w

Partial penetrate A =	3.414	
B =	0.552	
ln(Re/rw) =	3.105	
Re =	3.72	Feet
Slope =	0.030769	log_{10}/sec
$t_{90\%}$ recovery =	33	sec

Input is consistent.

K = 6.6 Feet/Day

Adjust slope of line to estimate K



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

Slug test was conducted in surficial aquifer, central Florida, which is mostly medium and fine sand.

Thanks to Hannu Etelämäki for identifying bugs in the unit conversion.

Reduced Data

Entry	Time, Hr:Min:Sec	Water Level
1	13:35:10.7	23.40
2	13:35:11.3	22.83
3	13:35:11.9	22.73
4	13:35:12.7	22.63
5	13:35:13.4	22.52
6	13:35:14.2	22.45
7	13:35:15.1	22.37
8	13:35:16.0	22.29
9	13:35:16.9	22.23
10	13:35:17.9	22.18
11	13:35:19.0	22.11
12	13:35:20.1	22.06
13	13:35:21.3	22.00
14	13:35:22.6	21.96
15	13:35:23.9	21.91
16	13:35:25.3	21.87
17	13:35:26.8	21.83
18	13:35:28.4	21.80
19	13:35:30.1	21.78
20	13:35:31.9	21.75
21	13:35:33.7	21.73
22	13:35:35.8	21.71
23	13:35:37.9	21.69
24	13:35:40.1	21.68
25	13:35:42.5	21.66
26	13:35:45.0	21.66
27	13:35:47.6	21.64
28	13:35:50.5	21.63
29	13:36:53.5	21.63
30	13:36:56.6	21.63
31	13:37:00.0	21.62
32	13:37:03.6	21.62
33	13:37:07.2	21.61
34	13:37:11.4	21.61
35	13:37:15.6	21.61
36	13:37:19.8	21.61
37	13:37:24.6	21.62
38	13:37:30.0	21.61
39	13:37:34.8	21.61
40	13:37:40.8	21.61
41	13:37:46.8	21.61
42	13:38:52.8	21.61
43	13:38:59.4	21.60
44	13:39:06.6	21.60
45	13:39:14.4	21.61

APPENDIX E

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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GBC GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

CONSTRAINTS & RESTRICTIONS

The intent of this document is to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of exploration. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.

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