Worcester County Administration Office
1 West Market Street, Room 1103
Snow Hill, MD 21863
Ph. 410-632-1194

Addendum # 1 – Biosolids Dewatering at Ocean Pines (Geotechnical Report)

Date of Addendum: **July 22, 2026**

NOTICE TO ALL BIDDERS AND PLANHOLDERS
The Bid Documents for the above-referenced Project are modified as set forth in this Addendum. The original Bid Documents and any previously issued addenda remain in full force and effect, except as modified by this Addendum, which is hereby made part of the Bid Documents. Vendors will take this Addendum into consideration when preparing and submitting a bid and shall acknowledge receipt of this Addendum in the space provided in the Bid Documents.

BID SUBMITTAL DEADLINE
The bid submittal time has not been changed.

1.0 – ATTACHMENTS

Item	Description
1	Geotechnical Report

2.0 – CLARIFICATIONS

The following clarifications are provided as a matter of information to clarify issues raised about the Bid Documents.

Item	Description

3.0 – QUESTIONS AND ANSWERS

The following questions and answers are provided as a matter of information to clarify issues raised about the Bid Documents.

Item	Questions and Answers

END OF ADDENDUM

APPENDIX A

GEOTECHNICAL REPORT

HYNES

JOHN D. HYNES & ASSOCIATES, INC.

Geotechnical and Environmental Consultants
Monitoring Well Installation
Construction Inspection and Materials Testing

July 31, 2024

Joshua J. Taylor, P.E.
Davis, Bowen & Friedel, Inc.
601 East Main Street, Suite 100
Salisbury, Maryland 21804

Re: Report of Subsurface Exploration and Geotechnical Consulting Recommendations
Ocean Pines Wastewater Treatment Plant Biosolids Dewatering Equipment and Building Design
Ocean Pines, Maryland
Project No.: JDH-10/23/394

Dear Mr. Taylor:

John D. Hynes & Associates, Inc. has completed the authorized subsurface exploration and geotechnical engineering evaluations for the Ocean Pines Wastewater Treatment Biosolids Dewatering Equipment and Building Design project located at the existing Worcester County Wastewater Facility at 1000 Shore Lane in Ocean Pines, Maryland. Our services were performed, generally, in accordance with our proposal dated July 6, 2023 and subsequent communications between our offices.

This report describes the exploration methods employed, exhibits the data obtained, and presents our evaluations and recommendations for the proposed new structure. In summary, we recommend that the structural elements of the new building be supported by deep foundations. We provide alternative recommendations for timber piles and helical piers installed to different depths.

We appreciate the opportunity to be of service to you. If you have any questions regarding the contents of this report or if we may be of further assistance, please contact our office.

Respectfully,
JOHN D. HYNES & ASSOCIATES, INC.

Evan H. Cross
Geologist

John D. Hynes, P.E.
President

STATE OF MARYLAND
JOHN DAVID HYNES
No. 16233
REGISTERED
PROFESSIONAL ENGINEER

EHC: JDH/jsl

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.

John D. Hynes, P.E.
License No. 16233

Expiration Date: 10/30/2024

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Email: jdh@jdhynesinc.com

REPORT OF
SUBSURFACE EXPLORATION
AND
GEOTECHNICAL CONSULTING SERVICES

OCEAN PINES WWTP BIOSOLIDS DEWATERING EQUIPMENT & BUILDING DESIGN
OCEAN PINES, MARYLAND

PREPARED FOR
DAVIS, BOWEN, & FRIEDEL, INC.

JULY 31, 2024
PROJECT NO.: JDH-10/23/394

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TABLE OF CONTENTS

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HYNES

PURPOSE AND SCOPE

The subsurface exploration study was performed to evaluate the subsurface conditions with respect to the following:

1. General site and subgrade preparation;
2. Fill and backfill construction;
3. Foundation recommendations, including allowable pile capacity, anticipated settlement, and estimated embedment depths for timber pile foundations;
4. Foundation recommendations for helical piers, including allowable compression capacity, uplift capacity, and estimated helical pier embedment depths;
5. Foundation construction and inspection procedures;
6. Slab subgrade support;
7. Location of groundwater and applicable construction dewatering control procedures; and
8. Other aspects of the design and construction for the proposed structures indicated by the exploration.

An evaluation of the site, with respect to potential construction problems and recommendations dealing with earthwork and inspection during construction, is included. The inspection is considered necessary both to confirm the subsurface conditions and to verify that the soils related construction phases are performed properly.

EXISTING SITE CONDITIONS

As shown on the Project Location Map (Drawing JDH-10/23/394-A) in the Appendix, the project site is located at the existing Worcester County Wastewater Facility at 1000 Shore Lane in Ocean Pines, Maryland. The project site is currently a vacant area that had recently been cleared of trees. Skyline Court borders the site to the south. Wooded properties border the site to the east and north. The existing wastewater treatment plant facility buildings border the site to the west. Topographically, the project site is relatively flat.

PROJECT DESCRIPTION

The project includes the construction of a new conventional masonry building that will contain biosolids dewatering equipment. The building is expected to be 1200 to 2000 sf and will be a single story CMU building with long span joists. Davis Bowen, & Friedel, Inc. (DBF) indicated column loads will not exceed 40 kips and wall loads will not exceed 3 klf. Based on contour maps provided by (DBF), existing site elevations range from Elevation EL. 3.0 to EL. 4.0.

FIELD EXPLORATION AND STUDY

In order to determine the nature of the subsurface conditions at the site, 2 test borings, designated as B-1 and B-2, were drilled at the locations indicated on the Boring Location Plan (Drawing JDH-10/23/394-B) in the Appendix. Borings were drilled on May 21, 2024 at opposing corners of the proposed building as indicated on the attached Boring Location Plan. Borings B-1 and B-2 were drilled to depths of 50.5 and 30.5 feet, respectively. A track-mounted Geoprobe 7822 DT drill rig was used to drill the test borings.

Soil sampling and testing were carried out in accordance with ASTM Specification D-1586. A brief description of our field procedures is included in the Appendix. The results of all boring and sampling operations are shown on the boring logs.

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Samples of the subsurface soils were examined by our engineering staff and were visually classified in accordance with the Unified Soil Classification System (USCS) and ASTM Specification D-2488. The estimated USCS symbols appear on the boring logs. Included in the Appendix are reference sheets which define the terms and symbols used on the boring logs and explain the Standard Penetration Test procedures.

We note that the test boring records represent our interpretation of the field data based on visual examination. Indicated interfaces between materials may be gradual.

The field exploration data was supplemented with laboratory testing data. The laboratory at John D. Hynes & Associates, Inc. performed 2 Natural Moisture Content tests and 2 Sieve Analysis tests on selected samples. The test results are presented on the boring logs in the Appendix.

SUBSURFACE CONDITIONS

At the time of our field exploration, 2 to 6 inches of organic bearing soil were encountered at the ground surface at the test boring locations. Varying thicknesses of organic bearing soils or other surficial materials may be encountered at other locations on site.

The soils encountered were visually classified in accordance with the USCS and consisted of interbedded layers of SAND (SP, SP-SM), Silty SAND (SM), SAND and Clayey SILT (SM-ML, ML-SM), clayey SILT (ML), and Organic SILT (OL) to the boring termination depths. Standard Penetration Test (SPT) values (N-values) in the sand layers ranged from 4 to 28 blows per foot, indicating in-place relative densities of very loose to medium dense. The SPT values in the cohesive soil layers ranged from 5 to 26 blows per foot, indicating in-place consistencies of soft to very stiff.

We note that a soft, 2 foot thick layer of Organic SILT (OL) containing trace amounts of organic matter was encountered at depths of 2 to 4 feet below existing grade at test boring location B-1. We note that Organic SILT is compressible. Refer to the boring logs in the Appendix for the individual soil layers encountered at each soil test boring location.

Groundwater was encountered during drilling operations at depths of 3.5 to 7 feet below existing grade at the test boring locations during the drilling operation. Groundwater was measured at 3 feet below existing grade after drilling at soil test boring B-1 at the boring cave in depth of 4 feet. Groundwater elevations may vary at other times due tidal fluctuations in Isle of Wight Bay.

RECOMMENDATIONS

The following recommendations and considerations are based on our understanding of the proposed construction, the data obtained from the exploration, and our previous experience with similar subsurface conditions and projects. If there are any significant changes to the project characteristics, such as revised building location, elevations, varying loads, etc., we request that this office be advised so the recommendations of this report can be re-evaluated. When the final house design is complete, we should be contacted so that we can evaluate the foundations in consideration of the actual loads, and provide additional recommendations, if necessary.

A. Site Preparation

Prior to the installation of foundations, ground slabs, or the placement of fill in any structural areas, all existing organic materials, tree stumps, organic matter, frozen or wet soils, excessively soft or loose soils, demolition

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debris, old foundations, and other deleterious materials should be removed and wasted. The organic bearing soil should be stripped from the building area.

Following the organic bearing soil removal, the subgrade should be prepared and filled in accordance with the recommendations of this report. If groundwater or perched surface water is encountered during any grading or excavation process, Hynes & Associates should be consulted for additional recommendations regarding the stabilization of the bases of the excavations and backfilling. If any excavations encroach upon the groundwater depth, then Hynes & Associates should be consulted for additional recommendations.

After the stripping operations have been completed, the exposed subgrade soils should be inspected by the Geotechnical Engineer or his approved representative. The inspector should verify that organic matter has been removed from structural subgrade areas. The engineer may wish to proofroll the subgrade, or may excavate shallow test holes to evaluate the stability of the building subgrade. Debris, rubble, old foundations and abandoned utilities should be removed and should be backfilled in accordance with Section B below. The Geotechnical Engineer should be consulted to evaluate poor subgrade conditions during construction. Overexcavated areas resulting from the removal of organic matter, rubble, tree stumps, or otherwise unacceptable materials should be backfilled with properly compacted materials in accordance with the procedures discussed in the following section.

B. Fill Selection, Placement and Compaction

It is recommended that all materials to be used as structural fill be inspected, tested and approved by the Geotechnical Engineer prior to use. The native SP, SP-SM, and SM material that do not contain organics may be re-used as structural fill. Acceptable borrow material should include GW, SM, SW and SP classified in accordance with the USCS. Furthermore, the material to be utilized as structural fill should have a Plasticity Index (PI) less than 20.

The importation of high quality, granular material should be allowed, and acceptable unit rates for importation and placement should be established. Sand, gravel or sand/gravel mixtures would be appropriate for wet weather placement. Otherwise, the materials noted above will be acceptable for use as structural fill. Native or imported SM soils will be sensitive to alteration in moisture content and will become unworkable during and following periods of precipitation. For this reason, if earthwork is attempted in late autumn, winter or early spring, the above mentioned high quality imported granular material should be limited to those soils better than SM. SM materials become unworkable at moisture contents greater than 3 percentage points above optimum. The contractor would have to dry these SM materials or set them aside for use in landscape areas.

Structural fill should be placed in lifts which are eight inches or less in loose thickness and should be compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557). Adjustments to the natural moisture content of the soils may be required in order to obtain specified compaction levels. Should utility construction be performed after earthwork, the Contractor should be responsible for achieving 95 percent compaction in all trench backfill. These guidelines should be set for all structural fill at the site including, but not limited to building, and ground slab fills.

For the fill compaction operations, fill limits should be extended at least 5 feet beyond the structure exterior walls, and exterior columns. A sufficient number of in-place density tests should be performed by an engineering technician to verify that the proper degree of compaction is being obtained in all fill soils.

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C. Timber Pile Foundations

We provide alternative recommendations to support the building on timber piles, or helical piers. Hynes & Associates' timber pile recommendations are based upon local site characteristics, the subsurface soil parameters determined from the field exploration and the physical characteristics of the piles. We provide recommendations for Class B timber piles with minimum tip and butt diameters of 7 and 12 inches, respectively. Assuming conformance to the embedment requirements, the assigned pile capacities may be used by the Structural Engineer for pile spacing according to structure design and the loads to be applied. Total elastic settlement of the piles is anticipated to be approximately ½ inch. Considering the subsurface soil characteristics and the parameters used in our assignment of pile embedments, long term settlement of the pile foundations is expected to be minimal if the recommendations of this report are followed. The noted pile embedments are from existing grades. When ordering pile lengths, the contractor must consider proposed grade changes (if applicable), the depth of the grade beams and pile caps, etc. Pile tips are proposed to be designed to be installed to the same tip elevation. Exterior stairways and porches should, also, be pile supported. We estimated pile caps to extend approximately 2 feet below grade.

Based upon the above, we recommend the following pile embedment and capacities of Class "B" timber piles for design purposes for the building:

Embedment Below Existing Ground (feet)	Compressive Capacity (tons)	Tensile (Uplift) Capacity (tons)
27	13.5	6.5
32	17.5	10
37	20.5	12

The compressive capacity of the timber piles were determined based on a Factor of Safety of 2. The tensile capacity is based on a Factor of Safety 2.5.

Timber piles should conform to the dimensions and strength requirement of ASTM D-25, should be treated with Chromated Copper Arsenate (CCA), and should be straight. For the required maximum design loads, it is recommended that the pile be no closer than 2.5 diameters, center to center. We recommend predrilling each pile location to a minimum of 6 feet.

The compression design capacity of each timber production pile should be confirmed by the geotechnical engineer or an experienced pile inspector during the pile driving operations by using an acceptable pile driving formula such as the Engineering News Formula. In instances where the design capacity cannot be obtained within the production pile lengths, additional piles would be required. Minimum timber pile tip and butt diameters of 7 and 12 inches, respectively, are recommended. If other pile capacities are requested by the Structural Engineer, our office should be consulted for additional recommendations.

The characteristics of the piles-pile groups should be designed for adequate structural requirements as specified by the Structural Engineer. These requirement should include the strength of the piles under static, dynamic uplift and lateral loads, where applicable.

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The installation of all piles should be in accordance with local code requirements. In addition, the installation of all piles should be inspected by a qualified Geotechnical Engineer or foundation inspector. The inspector should verify and record all aspects of the installation including pile tip and butt diameters, pile length before driving, cut-off length, tip installation depth and the driving data.

D. Helical Pier Foundations

We provide alternative recommendations for supporting the proposed building on helical piers. Helical piers consist of a central shaft with one or more helical shaped bearing plates, extension shafts, and a bracket that can be embedded in a pile/pier cap or grade beam. Helical piers are available from a variety of manufacturers and the manufacturer's specifications and installation procedures should be incorporated into the construction documents for any project where helical piers are to be used. Our recommendations are provided using Chance Helical Piers.

Installation of helical piers is by means of a rotary tool, either machine mounted or hand held, capable of indicating torque output (foot-pounds). While the anchoring capacity of helical pier installation is based upon the bearing capacity relationship of the helices relative to the soil properties, an empirical relationship has been established so that the capacity of the helical pier can be estimated by means of the average torque over the final three feet of installation. The empirical factor is multiplied by the average torque to obtain the ultimate uplift (tensile) capacity.

We point out that, because of the variable soil density within each boring location, some shallow soil layers may be denser than those below, resulting in high torque readings to depths shallower than specified. For this reason, the helical pier installations should be monitored by the Geotechnical Engineer to ensure that the recommended depth and capacity requirements are met.

In selecting acceptable and efficient helical pier configurations, Hynes & Associates considered the depth of competent anchoring material at approximately 17.5 to 30 feet below existing grade. For this project, Hynes & Associates evaluations were based on commonly available double-helix pier configuration. We have assumed that the helical piers will be used in pairs along the length of the walkway.

Based on our analysis, we recommend the following helix embedment and corresponding axial compressive capacities and uplift capacities:

Helical Pier Allowable Capacities				
Minimum Helix Embedment (below ground surface)		**Compressive Capacity (tons)**	**Uplift Capacity (tons)**	**Shaft Required (Chance)**
Double Helix	*Depth (ft)*			
10 inch	18	6	4	SS5
8 inch	20			
12 inch	17.5	8.5	5.5	SS5
10 inch	20			

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Helical Pier Allowable Capacities				
Minimum Helix Embedment (below ground surface)		Compressive Capacity (tons)	Uplift Capacity (tons)	Shaft Required (Chance)
Double Helix	*Depth (ft)*			
10 inch	28	7.5	5	SS5
8 inch	30			
12 inch	27.5	11	7	SS5
10 inch	30			

Allowable capacities for compressive and uplift are based on a Factor of Safety of 2. The above capacities were selected within the available subsurface and installation limits to provide the Structural Engineer with pier capacities to use in their design. Other configurations of helices are possible and can be provided by Hynes & Associates, if requested. For details relating to the helical pier foundation system, installation tools, and other hardware, reference should be made to the manufacturer's technical documents.

Standard vertical helical piers provide little lateral support. The structure lateral support may be provided by structure framing elements, by using "battered" helical piers, or by a combination of these methods. Helical pier manufacturers, also, offer grouted shaft, and larger cross section pier shafts that provide a greater amount of lateral support than the standard pier shafts. The Structural Engineer may provide lateral support for foundation piers using one or more of these approaches.

E. Floor Slab Support

Ground supported slabs may be supported on firm, natural soils or on a layer of controlled, structural fill. The subgrade should be prepared in accordance with the procedures described in Sections A and B of this report. It is, also, recommended that a 4 to 6 inch clean, granular, leveling and load-distributing material such as washed gravel, or screened crushed stone, be used beneath the floor slabs. This material will require acquisition from off-site sources. Prior to placing the leveling and load distributing material, the slab subgrade should be free of standing water or mud. An acceptable moisture barrier should, also, be provided for the building slabs. These procedures will help to prevent capillary rise and damp floor slab conditions. For native soil or fill material placed and compacted according to the procedures outlined in this report, we recommend using a value of modulus of subgrade reaction of 150 pounds per cubic inch.

F. Groundwater and Drainage

Groundwater was encountered during drilling operations at depths of 3.5 to 7 feet below existing grade at the test boring locations during the drilling operation. Groundwater was measured at 3 feet below existing grade at soil test boring B-1 at the boring cave in depth of 4 feet. Groundwater elevations may vary at other times due tidal fluctuations in Isle of Wight Bay. During high tides and extreme high tides, groundwater will be likely be shallower than 3 feet below grade. The contractor should be prepared to dewater the lowest excavations due to the infiltration of groundwater. Dewatering methods may include sumping and pumping, dewatering wells, well point systems, etc.

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Adequate drainage should be provided at the site to minimize any increase in moisture content of the foundation subgrade soils. All exterior ground slabs, pavements, and site grades should be sloped away from the buildings to prevent ponding of water around them. The final site drainage should, also, be designed such that run-off onto adjacent properties is controlled properly.

ADDITIONAL SERVICES RECOMMENDED

Additional engineering, testing and consulting services recommended for this project are summarized below.

A. Site Preparation Inspection

The Geotechnical Engineer or experienced soils inspector should inspect the site after it has been stripped and excavated. The inspector should determine if any undercutting or in-place densification is necessary to prepare a subgrade for fill placement, or slab support. The inspector should verify that organic soils, organic matter, old foundations and demolition debris have been removed from all structural subgrade areas prior to filling operations.

B. Fill Placement and Compaction Monitoring

The Geotechnical Engineer or experienced soils inspector should witness all fill operations and take sufficient in-place density tests to verify that the specified degree of fill compaction is achieved. The inspector should observe and approve borrow materials used and should determine if their existing moisture contents are acceptable.

C. Pile Installation Inspection

The Geotechnical Engineer or experienced foundation inspector should verify and record all aspects of the timber pile installation including pile diameters, pile length before driving, cut off length, tip installation depth, and the driving data. The inspecting engineer should verify that the driving data indicates that the design compression capacity of each pile has been achieved.

D. Helical Pier Installation Inspection

The Geotechnical Engineer should observe and document the installation of each helical pier. Average torque readings over the final 3 feet and pier tip depths should be logged to verify the pier capacity has been achieved.

REMARKS

This report has been prepared solely and exclusively for Davis, Bowen, & Friedel, Inc. to provide guidance to design professionals in developing facilities plans for the Ocean Pines Wastewater Treatment Biosolids Dewatering Equipment and Building Design project located at the existing Worcester County Wastewater Facility at 1000 Shore Lane in Ocean Pines, Maryland. It has not been developed to meet the needs of others, and application of this report for other than its intended purpose could result in substantial difficulties. The Consulting Engineer cannot be held accountable for any problems which occur due to the application of this report to other than its intended purpose. This report in its entirety should be attached to the project specifications.

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These analyses and recommendations are, of necessity, based on the concepts made available to us at the time of the writing of this report, and on-site conditions, surface and subsurface that existed at the time the exploratory borings were drilled. Further assumption has been made that the limited exploratory borings, in relation both to the areal extent of the site and to depth, are representative of conditions across the site. It is also recommended that we be given the opportunity to review all plans for the project in order to comment on the interaction of soil conditions as described herein and the design requirements.

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted engineering principles and practices.

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APPENDIX

1. Investigative Procedures
2. Project Location Map
3. Boring Location Plan
4. Boring Logs
5. Unified Soil Classification Sheet
6. Field Classification Sheet
7. Information Sheet

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HYNES

INVESTIGATIVE PROCEDURES

SOIL TEST BORINGS

Soil drilling and sampling operations were conducted in accordance with ASTM Specification D-1586. The borings were advanced by mechanically turning continuous hollow stem auger flights into the ground. At regular intervals, samples were obtained with a standard 1.4 inch I.D., 2.0 inch O.D. splitspoon sampler. The sampler was first seated 6 inches to penetrate any loose cuttings and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is the "Standard Penetration Resistance". The penetration resistance, when properly evaluated, is an index to the soil's strength, density and behavior under applied loads. The soil descriptions and penetration resistances for each boring are presented on the Test Boring Records in the Appendix.

SOIL CLASSIFICATION

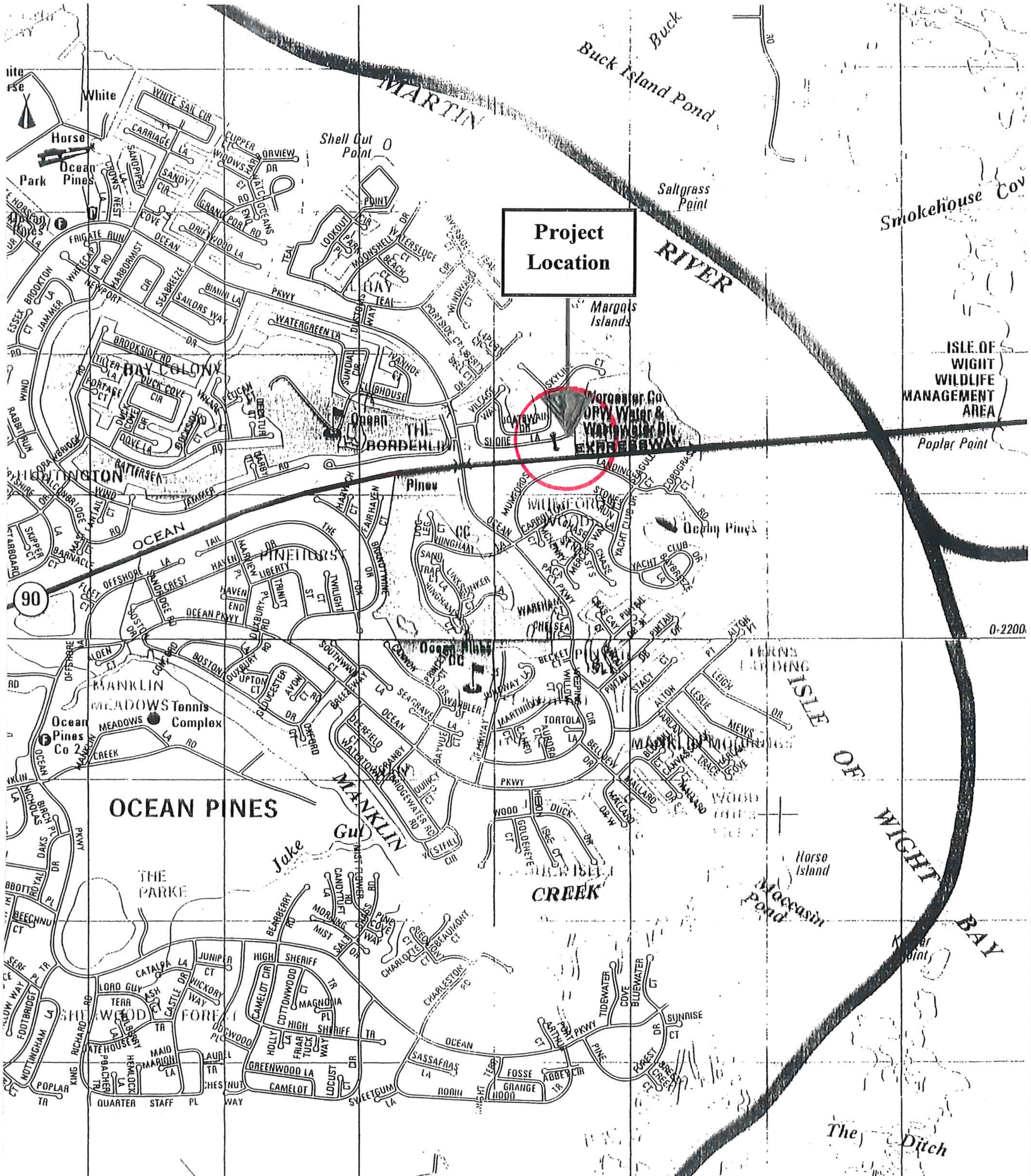
Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigation, jar samples obtained during drilling operations are examined in our laboratory and visually classified by the geotechnical engineer in accordance with ASTM Specification D-2488. The soils are classified according to the AASHTO or Unified Classification System (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior.

SIEVE ANALYSIS TEST

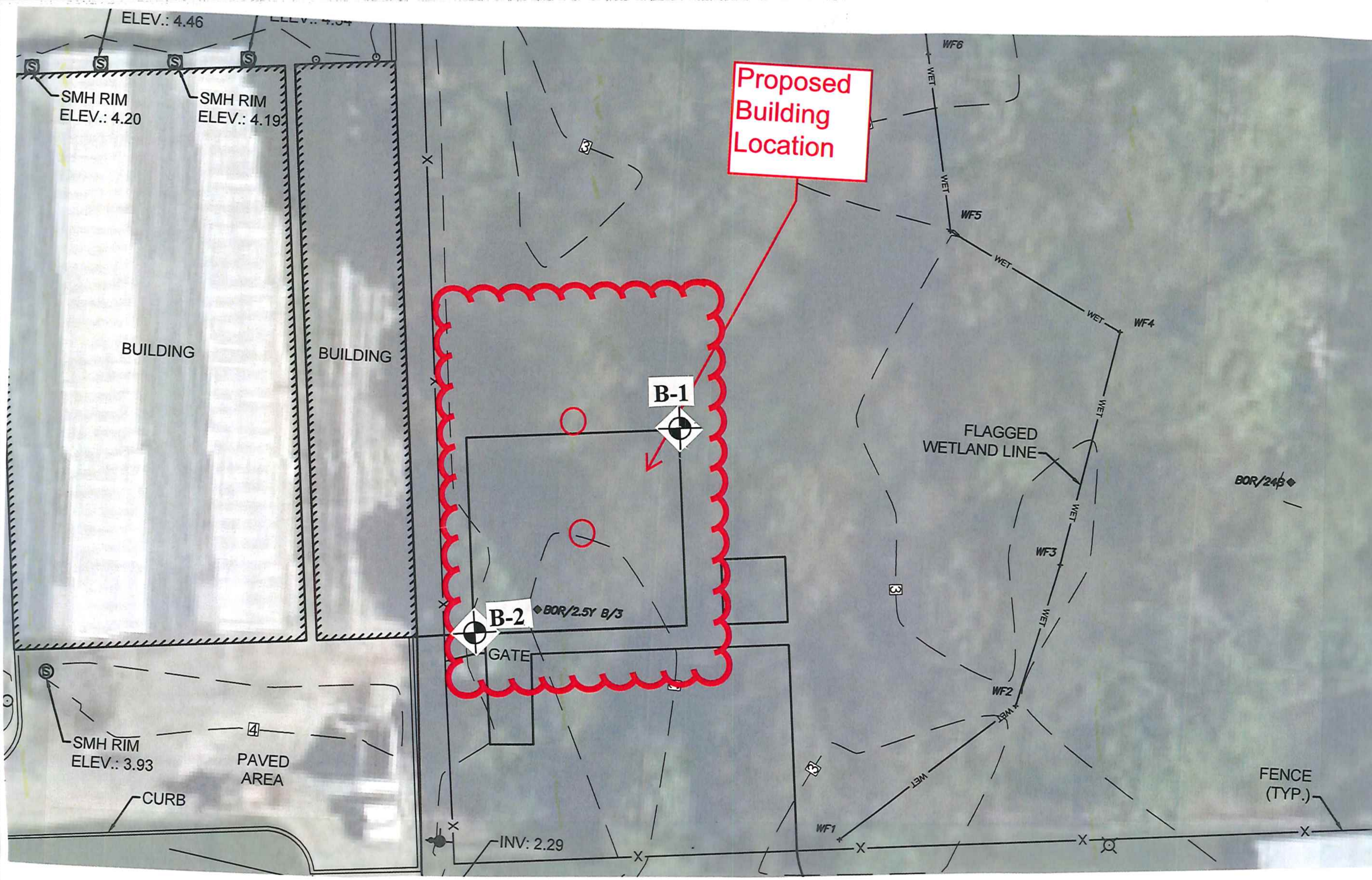
Gradational analysis tests were performed to determine the particle size and distribution of the samples tested. The grain size distribution of soils coarser than a No. 200 sieve is determined by passing the sample through a standard set of nested sieves. The percentage of materials passing the No. 200 sieve is determined by washing the material over a No. 200 sieve. These tests are in accordance with ASTM D-421, D-422 and D-1140. The results are presented in the Appendix to our report.

NATURAL MOISTURE

Portions from representative soil samples obtained during drilling operations were selected for Natural Moisture Content tests. The Natural Moisture Content Test determines the water content of soils by drying into an oven with a standard drying temperature of 110 °C. The lost of mass drying the sample, determines the water content into the soil. The water content of the sample is calculated in percentage. The water content of soils (natural moisture) is determined in accordance with ASTM Specification D-2216.



HYNES **JOHN D. HYNES & ASSOCIATES, INC.** 32185 Beaver Run Drive • Salisbury, Maryland 21804 410-546-6462 / Fax: 410-548-5346	**Date: June 4, 2024** **Scale: 1 in. ≈ 2,000 ft.** **Drawn: ADC Map**
Project Location Map Ocean Pines WWTP Biosolids Ocean Pines, Maryland	**DWG. No.** **JDH-10/23/394-A**



HYNES **JOHN D. HYNES & ASSOCIATES, INC.** **32185 Beaver Run Drive • Salisbury, Maryland 21804** **410-546-6462 / Fax: 410-548-5346**	Project Lot Layout Ocean Pines WWTP Biosolids Ocean Pines, Maryland	**Date: June 4, 2024** **Scale: NTS** **Drawn: DBF** **DWG. No.: JDH-10/23/394-B**

HYNES & ASSOCIATES

LOG OF BORING B-1

Davis, Bowen & Friedel, Inc.
601 East Main Street
Salisbury, Maryland 21801

Ocean Pines WWTP Biosolids

Project No.: JDH-10/23/394

Date Completed:	: May 21, 2024
Logged By:	: A. Garkushin
Drilled By:	: B. Hynes
Drilling Method:	: HSA (Geoprobe 7822 DT)
Total Depth:	: 50.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample	Blow Count
0–2	Brown, wet, medium dense, fine to medium SAND, with trace silt		SP	1	2-4-6-6
2–4	Gray, wet, loose, fine to medium SAND and clayey SILT		SM-ML	2	3-6-3-4
4–6	Dark brown, saturated, soft, organic SILT (organic matter)		OL	3	1-2-2-3
6–8	Brown, saturated, loose, fine to medium SAND, with little silt		SM	4	3-6-4-6
8–12	Brown, saturated, loose, fine to medium SAND, with trace to little silt		SP-SM	5	4-4-5-5
12–17	Light gray, saturated, medium dense, fine to medium SAND, with trace to little silt		SP-SM	6	7-10-16
17–22	Light brown, saturated, medium dense, SILT and fine to medium SAND		ML-SM	7	6-10-16
22–27	Brown, saturated, medium stiff, clayey SILT, with some sand		ML	8	3-4-6
27–32	Brown, saturated, medium dense, fine to medium SAND and SILT		SM-ML	9	4-7-10
32–37	Light gray, saturated, medium dense, fine to medium SAND, with little silt, trace clay		SM	10	3-6-12
37–50.5	Brown, saturated, medium dense, fine to coarse SAND, with little silt		SM	11	3-7-12
				12	7-12-16
				13	7-10-14
	Boring terminated at 50.5 feet.				

REMARKS

Scale 1" ~ 7.75 feet

Approximately 6 inches of organic bearing soil was encountered at the ground surface.

Groundwater was encountered at 7 feet during drilling operations.

At completion, water was at 3 feet; boring caved in at 4 feet.

Latitude: 38.3910°
Longitude: -75.1322°

Laboratory Test Results

Sample No. 2
From 2 to 4 feet

Natural Moisture = 28.6%

Sample No. 7
From 19 to 20.5 feet

Sieve Analysis

Sieve Size	Passing %
No. 4	100
No. 10	99.9
No. 20	99.3
No. 40	97.8
No. 60	95.5
No. 100	93.1
No. 200	51.2

Natural Moisture = 26.1%

HYNES & ASSOCIATES

LOG OF BORING B-2

Davis, Bowen & Friedel, Inc.
601 East Main Street
Salisbury, Maryland 21801

Ocean Pines WWTP Biosolids

Project No.: JDH-10/23/394

Date Completed:	: May 21, 2024
Logged By:	: A. Garkushin
Drilled By:	: B. Hynes
Drilling Method:	: HSA (Geoprobe 7822 DT)
Total Depth:	: 30.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample	Blow Count
0–2	Light gray, wet, medium dense, fine to medium SAND, with trace silt		SP	1	2-4-5-7
2–4	Light gray, saturated, medium dense, fine to medium SAND, with trace silt		SP	2	2-4-6-6
4–6	Dark gray, saturated, very loose, fine to medium SAND, with trace silt		SM-ML	3	1-3-2-2
6–8	Light gray, saturated, medium dense, fine to medium SAND, with trace to little silt		SP-SM	4	3-6-8-11
8–12	Light gray, saturated, medium dense, fine to medium SAND, with little silt, trace clay		SM	5	4-3-6-7
12–17	Light gray, saturated, medium dense, fine to medium SAND, with trace to little silt		SP-SM	6	5-10-15
17–22	Light gray, saturated, medium dense, fine to medium SAND and SILT		SM-ML	7	5-9-12
22–30.5	Brown, saturated, medium dense, fine to medium SAND and clayey SILT		SM-ML	8	3-5-8
				9	5-5-12
30.5	Boring terminated at 30.5 feet.				

REMARKS

Scale 1" ~ 7.75 feet

Approximately 2 inches of organic bearing soil was encountered at the ground surface.

Groundwater was encountered at 3.5 feet during drilling operations.

Boring caved in at 3.5 feet.

Latitude: 38.3909
Longitude: -75-1522°

Laboratory Test Results

Sample No. 2
From 2 to 4 feet

Natural Moisture = 23.0%

Sample No. 4
From 6 to 8 feet

Sieve Analysis

Sieve Size	Passing %
No. 4	100
No. 10	99.7
No. 20	97.1
No. 40	81.5
No. 60	52.0
No. 100	20.6
No. 200	10.1

Natural Moisture = 17.4%

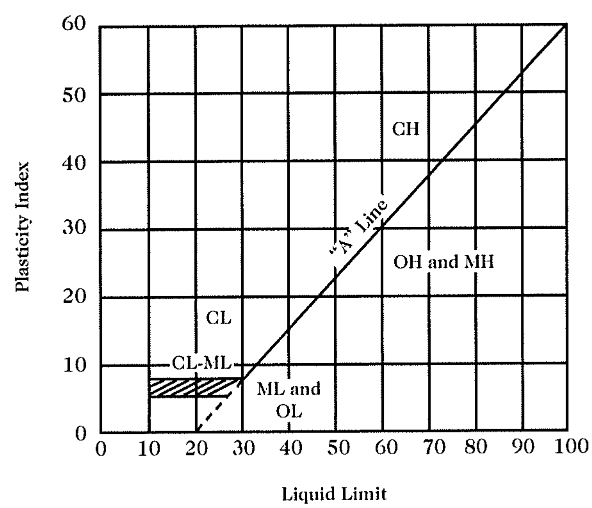
HYNES

JOHN D. HYNES & ASSOCIATES, INC.

Geotechnical and Environmental Consultants
Monitoring Well Installation
Construction Inspection and Materials Testing

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions			*Group Symbols*	*Typical Names*	*Laboratory Classification Criteria*		
Coarse-grained soils (More than half of material is larger than No 200 sieve size)	Gravels (More than half of coarse fraction is larger than No 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No 200 sieve size), coarse grained soils are classified as follows: Less than 5 percent: GW, GP, SW, SP; More than 12 percent: GM, GC, SM, SC; 5 to 12 percent: *Borderline cases requiring dual symbols*[b]	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			GP	Poorly graded gravels, gravel sand mixtures, little or no fines		Not meeting all graduation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM[a] d / u	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are *border-line* cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
	Sands (More than half of coarse fraction is smaller than No 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands,		$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			SP	Poorly graded sands, gravelly sands, little or no fines		Not meeting all graduation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM[a] d / u	Silty sands, sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are *border-line* cases requiring use of dual symbols.
			SC	Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity			
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL	Organic silts and organic silty clays of low plasticity			
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH	Inorganic clays of high plasticity, fat clays			
			OH	Organic clays of medium to high plasticity, organic silts			
	Highly organic soils		Pt	Peat and other highly organic soils			



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HYNES

FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

NON-COHESIVE SOILS
(Silt, Sand, Gravel and Combinations)

DENSITY

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	- 11 to 30 blows/ft.
Dense	- 31 to 50 blows/ft.
Very Dense	- 51 blows/ft. or more

RELATIVE PROPORTIONS

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

PARTICLE SIZE IDENTIFICATION

Boulders	- 8 inch diameter or more
Cobbles	- 3 to 8 inch diameter
Gravel	- Coarse - 1 to 3 inch
	- Medium - 1/2 to 1 inch
	- Fine - 4.75 mm to 1/2 inch
Sand	- Coarse - 2.0 mm to 4.75 mm
	- Medium - 0.425 mm to 2.0 mm
	- Fine - 0.075 mm to 0.425 mm
Silt	- 0.075 mm to 0.002 mm

COHESIVE SOILS
(Clay, Silt and Combinations)

CONSISTENCY

Very Soft	- 3 blows/ft. or less
Soft	- 4 to 5 blows/ft.
Medium Stiff	- 6 to 10 blows/ft.
Stiff	- 11 to 15 blows/ft.
Very Stiff	- 16 to 30 blows/ft.
Hard	- 31 blows/ft. or more

PLASTICITY

Degree of Plasticity	Plasticity Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	over 22

Classification on logs are made by visual inspection of samples unless a sample has been subjected to laboratory classification testing.

Standard Penetration Test - Driving a 2.0" O.D., 1-3/8" I.D., splitspoon sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. It is customary to drive the spoon 6 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the test are recorded for each 6 inches of penetration on the drill log (Example - 6/8/9). The standard penetration test value (N - value) can be obtained by adding the last two figures (i.e. 8 + 9 = 17 blows/ft.). (ASTM D-1586)

Strata Changes - In the column "Soil Descriptions," on the drill log, the horizontal lines represent strata changes. A solid line (—) represents an actually observed change, a dashed line (----) represents an estimated change.

Groundwater - Observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc. may cause changes in the water levels indicated on the logs.

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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.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:
- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:
- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are <u>not</u> final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include 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.

Geoenvironmental Concerns Are <u>Not</u> Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will <u>not</u> of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are <u>not</u> building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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