ADDENDUM NO. ONE (1)

Date: February 6, 2025 Engineer's Project No. E21-090

PROJECT: **Walnut Grove Land Application System Phase 2 Upgrades**

Client: City of Walnut Grove

This Addendum forms a part of the Contract Documents and Construction Drawings and modifies the original Bid Documents for the above referenced project.

The following items of the Contract Documents are modified as part of this addendum:

Bid Opening Date Change

CHANGE:
Bids should be submitted to Walnut Grove City Clerk no later than 5:00 P.M. on Tuesday, February 11, 2025. Bids to be delivered to Walnut Grove City Hall, 2581 Leone Avenue, Loganville, GA 30052. Any bids received after said time and date will not be considered by the City of Walnut Grove. **Bids will be publicly opened and read aloud at 11:00 AM on Wednesday, February 12, 2025.** All bids will be evaluated by the City of Walnut Grove and the project will be awarded, if it is awarded, within 45 days of the bid opening.

To:
Bids should be submitted to Walnut Grove City Clerk no later than 5:00 P.M. on Tuesday, February 18, 2025. Bids to be delivered to Walnut Grove City Hall, 2581 Leone Avenue, Loganville, GA 30052. Any bids received after said time and date will not be considered by the City of Walnut Grove. **Bids will be publicly opened and read aloud at 11:00 AM on Wednesday, February 19, 2025.** All bids will be evaluated by the City of Walnut Grove and the project will be awarded, if it is awarded, within 45 days of the bid opening.

Attachments
1. Plan Holder's List
2. Limited Subsurface Exploration

PLEASE NOTE: **Contractors should acknowledge receipt of this Addendum and include in Bid Documents. Failure to do so may result in rejection of bid.**

END OF ADDENDUM NO. ONE (1)

Acknowledgment Signature: ____

Print Name: ____

PLAN HOLDER LIST

Walnut Grove Land Application System Phase 2 Upgrade

PPI Project No. E21-090

BID DATE: 2/11/2025 @ 5:00 PM

Questions Deadline: 02/04/2025 @ 5:00 PM to 861np@ppi.us

CONTRACTORS

Legacy Water Group, LLC
Kkimble@legacywatergroup.com

IHC Construction Services, LLC
jarevalo@ihcconstruction.com

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Bruce@griffinbrothersinc.com

Heyward Atlanta Construction
Rory.russo@heywardatlanta.com

Lanier Contracting
Brian@laniercontracting.com

Mid-South Builders, Inc.
Ben@mid-southbuildersinc.com

Heavy Construction, Inc.
mhipps@heavyus.com

Lakeshore Engineering
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Sol Construction
Rdelacruz@solconstructionllc.com

Limited Subsurface Exploration
LAS Ponds – Wastewater Treatment and Collective Systems Facilities
Walnut Grove, Georgia
S&ME Job No. 1801-13-139

Prepared For:

City of Walnut Grove
c/o Precision Planning, Inc.
400 Pike Boulevard
P.O. Box 2210
Lawrenceville, Georgia 30046

Prepared By:

S&ME, INC.
11420 Johns Creek Parkway
Duluth, Georgia 30097

March 20, 2013

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March 20, 2013

City of Walnut Grove
c/o Precision Planning, Inc.
400 Pike Boulevard
P.O. Box 2210
Lawrenceville, Georgia 30046

Attention: Mr. David Leonard, P.E.

Subject: Limited Subsurface Exploration
LAS Ponds – Wastewater Treatment and Collective Systems Facilities
Walnut Grove, Georgia
S&ME Job No. 1801-13-139

Gentlemen:

1.0 INTRODUCTION

S&ME, Inc. has completed a limited subsurface exploration for the referenced project. This exploration was performed in general accordance with our Proposal No. AG1-13-132, dated February 12, 2013, as authorized by you on February 12, 2013. The purpose of the exploration was to obtain subsurface data so that we could evaluate general rock and groundwater levels at the site relative to earthwork procedures, slope inclinations, and groundwater control. This report contains our understanding of the project, a description of the subsurface conditions encountered, and our recommendations regarding the aforementioned items.

2.0 PROJECT INFORMATION

Our understanding of the project is based on our conversations with you; your e-mail dated February 5, 2013; and review of a drawing titled “Spray Field Plan”, prepared by Precision Planning, Inc., dated January 1, 2009.

Plans are to construct two LAS ponds as part of a new spray field. The oblong oxidization pond to the east will measure approximately 200 feet by 140 feet and the triangular western storage pond will have average dimensions of 330 feet by 220 feet. Each pond will be 10 to 12 feet deep. Maximum excavation to achieve the planned bottom of pond elevation will approach 9 feet. We understand that the expected existence of shallow groundwater is your primary concern.

3.0 EXPLORATION AND TESTING PROCEDURES

Our geotechnical engineering professional made a brief site reconnaissance to observe pertinent site and topographic features as well as surface indications of the site geology. The four (4) borings were located in the field by estimating right angles and pacing distances from existing features shown on the site plan provided to us. Ground surface elevations at the boring locations were interpolated from the topographic/grading plan provided to us. Because of the methods used, the boring locations shown on the Boring Location Plan and Elevations on the boring records contained in the Appendix are approximate. If more precise location and elevation data are desired, a registered Professional Land Surveyor should obtain them.

The exploratory borings were made by mechanically twisting hollow-stem augers into the soil. Soil samples were obtained at 2 ½ to 5-foot depth intervals with a standard 1.4-inch I.D., 2-inch O.D. split-barrel sampler. The sampler was first seated 6 inches and then driven an additional foot with blows of 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "standard penetration resistance" with units of blows per foot (bpf).

Soil samples obtained during the exploration were returned to our laboratory and reviewed by our geotechnical engineering professional. The purposes of this review were to check the field descriptions, visually estimate the percentages of the soils' constituents (sand, clay, etc.), and identify pertinent structural features such as foliation planes and slickensides, etc., and observe evidence of soil origin. The stratification lines shown on the boring records represent the approximate boundaries between soil types, but the transitions may be more gradual.

The field sampling and testing performed by S&ME, Inc. are in general accordance with ASTM procedures and established geotechnical engineering practice. The Appendix contains brief descriptions of field procedures as well as the data obtained.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Conditions

The site is located on Forrester Cemetery Road about 3,000 feet south of its intersection with SR 138 in Walnut Grove, Georgia. The site is currently predominately open pasture/farmland. Ground cover in the area of the ponds typically consists primarily of grasses with some trees. The areas to be occupied by the ponds are relatively flat with topographic relief across the ponds of about 6 to 8 feet. There is a drainage swale between the two ponds and another north of the Oxidation Pond.

4.2 Area Geology

The project site is in Georgia's Piedmont physiographic province. The soil overburden of this area is residuum formed by in-place weathering of the parent rocks. A typical upland soil profile consists of thin topsoil underlain by a few feet of clayey soils that transition with increasing depth into less clayey, coarser grained silts and sands with varying mica content. Separating the completely weathered soil overburden from the unaltered parent rock is a transition zone of residuum with penetration resistances of more than 100 bpf which is locally described as partially weathered rock. Partially weathered rock retains much of the appearance and fabric of the parent rock formations, and may consist of thinly interlayered very hard or dense soil and rock.

The weathering processes that formed the overburden soils and partially weathered rock were extremely variable, depending on such factors as rock mineralogy, past groundwater conditions, and the tectonic history (joints, faults, and igneous intrusions) of the specific area. Differential weathering of the rock mass has resulted in erratically varying subsurface conditions, evidenced by abrupt changes in soil type and consistency in relatively short horizontal and vertical distances. Depths to rock can be irregular and isolated boulders, discontinuous rock layers, or rock pinnacles can be present within the overburden and transition zones.

The naturally developed soil profile can be altered through activities of man such as excavation , placement of fill, and farming activities. Several borings of this exploration penetrated an upper layer of soils that were classified as "cultivated". We note that cultivated soils often exist in a loose state and are subject to large variations in moisture content.

Soils that have been eroded and subsequently re-deposited by water are termed "alluvium". Alluvial soils vary significantly from their residual source and may vary from clays to gravels, depending on the depositional environment. Alluvial soils are often in a loose or soft state and can vary significantly in composition and consistency in short horizontal distances. While alluvial soils were not encountered by our borings performed for this exploration, some could exist near or within the drainage features.

4.3 Subsurface Conditions

Four soil test borings were performed during this exploration to assess subsurface conditions at the site. The borings initially penetrated a 1 to 2 feet thick layer of cultivated soil. This layer exhibited standard penetration resistance values of between 4 and 11 bpf. Several samples were assessed to be "damp to moist".

Beneath the cultivated soils, each boring encountered a clayey layer with standard penetration resistance values of 4 to 16 bpf. Several samples were also assessed to be moist. Below the "clayey" horizon were silty sands. These soils exhibited standard penetration resistance values of 10 to 34 bpf. No partially weathered rock or hard rock was encountered by the borings and each boring was terminated at its planned depth of 20 feet.

Groundwater was encountered in each of the borings from 13 to 17 ½ feet below the ground surface at the time of drilling. Delayed groundwater levels indicated stabilized groundwater levels to be 11 ½ to 15 ½ feet. At one location, a piezometer was installed to allow further groundwater measurements. We note that groundwater levels can fluctuate several feet with seasonal and yearly rainfall variations and other factors. Therefore, in the future, groundwater levels may be encountered at shallower depths.

The preceding is a generalized description of the subsurface conditions at the boring locations. The test boring records in the Appendix contain detailed descriptions of the subsurface materials encountered at each boring location.

5.0 LIMITATIONS OF CONCLUSIONS AND RECOMMENDATIONS

This report is for the exclusive use of City of Walnut Grove and Precision Planning, Inc. for specific application to the subject project. Our conclusions and recommendations have been prepared using generally accepted standards of geotechnical engineering practice in the State of Georgia. No other warranty is expressed or implied. S&ME is not responsible for the conclusions, opinions, or recommendations of others based on these data.

Our conclusions and recommendations are based on the limited conceptual project information furnished to us, the data obtained from this subsurface exploration, and our past experience. They do not reflect variations in the subsurface conditions which are likely to exist between our borings and in unexplored areas of the site resulting from: the inherent variability of the subsurface conditions in this geologic region; past site use and farming activities; and possible past alluvial deposition. If such variations become apparent during construction, it will be necessary for us to re-evaluate our conclusions and recommendations based upon on-site observation of the conditions.

Subsequent report sections include our comments about geotechnical engineering aspects of the proposed construction. The recommendations contained herein are not intended to dictate construction methods or sequences. They are based on findings from this limited subsurface exploration and are furnished solely to help designers understand subsurface conditions related to earthwork plans and specifications. Depending on the final design of the project, the recommendations also may be useful to personnel who observe construction activity.

6.0 PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

6.1 General Discussion

Because the project is in the conceptual phase, our comments regarding geotechnical engineering aspects of the site development and design will be general in nature. The following paragraphs outline our conclusions and recommendations regarding slopes, earthwork, and other geotechnical engineering aspects of the planned construction.

6.2 Subgrade Preparation

Topsoil, organics, stumps, large root systems, and cultivated soils should be stripped to prepare the site for construction. After stripping, the site should be observed by a representative of our firm, and any remaining pockets of organics or large root systems should be undercut. Stripping should extend at least 10 feet beyond the ponds' perimeters. After our representative has observed the subgrade, proofrolling and placement of structural fill may commence.

After the site is stripped, at-grade areas and areas that are to receive fill should be evaluated by a member of our staff by observing proofrolling with a heavily loaded dump truck or similar rubber-tired equipment. Proofrolling consists of applying repeated passes to the subgrade with this equipment. Any materials judged to deflect excessively under the wheel loads and which cannot be densified by continued rolling should be undercut to more stable soils before placing fill. Undercutting should extend to the limits of the unstable area, or to at least 10 feet beyond the pond embankments' perimeters.

6.3 Earth Material Utilization/Fill Placement

Based on the provided grading plan, some fill will be placed to create the embankments. Structural fill for this project can be defined as soil with maximum particle sizes of 4 inches or less and a Plasticity Index (PI) of 30 or less. The residual soils similar to those encountered in our borings should be suitable from a composition standpoint for re-use as compacted structural fill and backfill. We expect that the cultivated soils will be too sandy and potentially too wet to be used for embankment construction. It may; however, be used to dress slopes to help establish vegetation cover. We recommend that all structural fill be placed to achieve a degree of compaction corresponding to at least 95 percent of the soil's standard Proctor maximum dry density (ASTM D698). Some wetting or drying of the soils may be needed to achieve a moisture content that is compatible with achieving the recommended degree of compaction. The specific moisture adjustment necessary will depend on the natural moisture content of the soils and weather conditions at the time of construction.

6.4 Excavation Conditions

We anticipate that the moderate consistency residual soils (less than about 30 bpf) encountered in our borings can be excavated with small to medium sized front-end loaders and rubber-tired backhoes. Higher consistency residual soils (greater than about 30 bpf) and weathered rock will likely require use of large tracked excavators (Caterpillar 320 or larger) for productive excavation. We do not expect excavation difficulty due to weathered rock or high consistency soils based on the boring data obtained during this exploration.

6.5 Density Testing

In-place density testing must be performed as a check that the previously recommended compaction is achieved. We further recommend that these tests be performed on a full-time basis during construction of the pond embankments. During full-time density testing, the test frequency can be determined by our personnel based on the area to be tested, the grading equipment used, and construction schedule. Test should be performed at vertical intervals of 2 feet of less as the fill is being placed. We recommend density testing by a technician working undercut the direction of our project engineer.

6.6 Groundwater Effect

Groundwater was not encountered within the anticipated depth of excavation in our borings. Thus, we do not believe groundwater will adversely affect the planned construction. Again, we reiterate that groundwater levels fluctuate and it could exist at different levels in the future.

Groundwater was measured within about 4 feet of the planned bottom of pond depth. If there is still a concern regarding the proximity of the groundwater, an underdrain system could be installed below the liner.

7.0 SLOPES

Generally, permanent cut and fill slopes should be no steeper than 2H:1V and temporary slopes no steeper than 1½H:1V. These slope recommendations are based on our previous experience with similar conditions since no detailed slope stability analysis was performed to justify steeper slopes.

It is difficult to construct fill on the specified slopes without leaving a loose, poorly compacted zone on the slope face. For this reason, we recommend that the fill slopes be slightly over-built, then cut back to firm, well compacted soils prior to applying a vegetative cover. If the slopes cannot be slightly over-built and cut back, we recommend that finished soil slopes be compacted to reduce, as much as practical, the thickness of this soft surficial veneer. The compaction may be done by making several coverages from top to bottom of the slopes with a track-mounted bulldozer or front-end loader.

8.0 ACKNOWLEDGMENT

S&ME, Inc. appreciates being selected to participate in this phase of the project. Please contact us if you have questions about this report or if we may be of further service.

Respectfully submitted,

S&ME, Inc.

Richard Mockridge, P.E.
Principal Geotechnical Engineer
Reg. Ga. 12692

Timothy J. Mirocha, P.E.
Principal Geotechnical Engineer
Reg. Ga. 21386

RM/TJM/kh

Enclosures

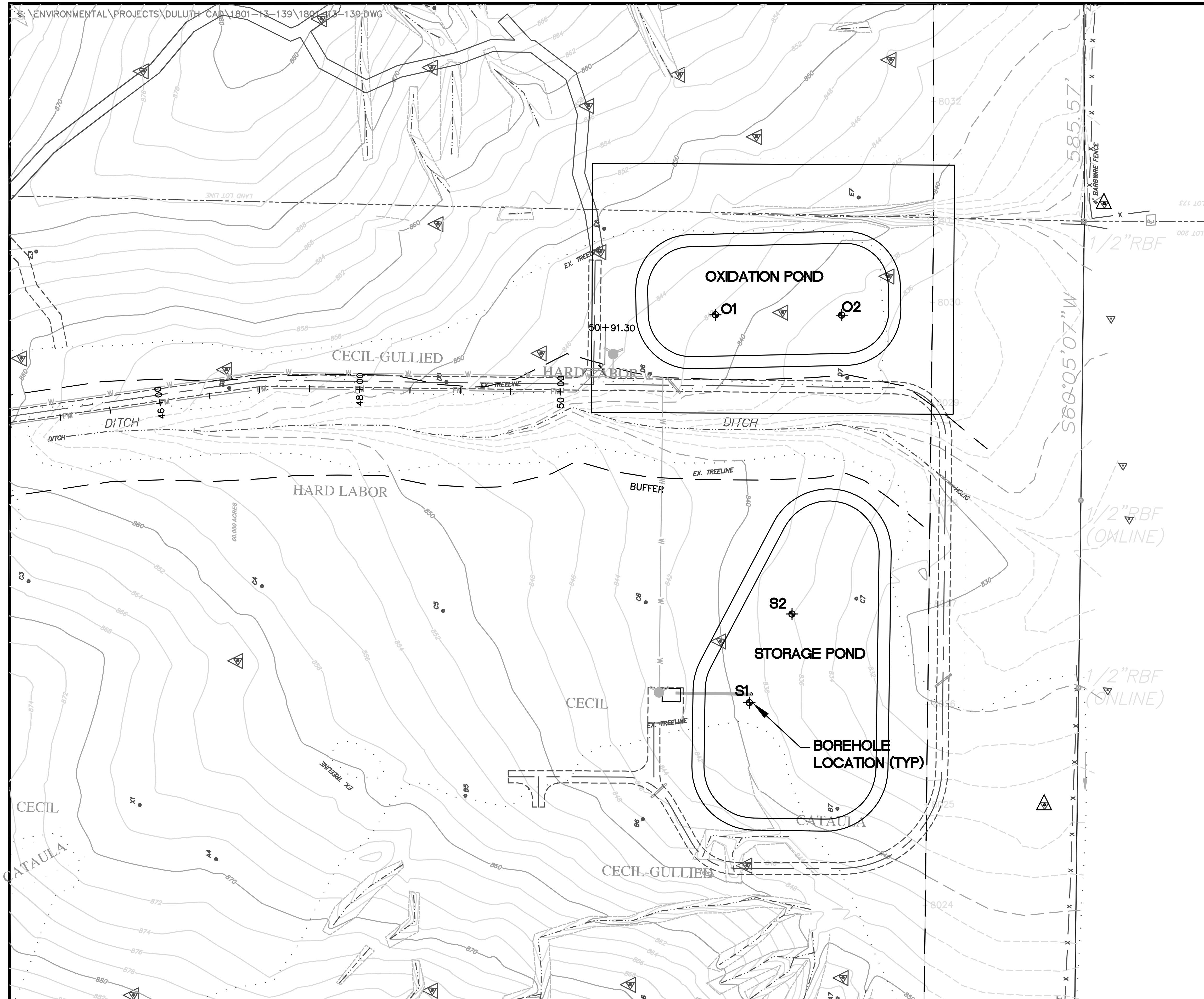
APPENDIX

BORING LOCATION PLAN

BORING RECORDS

PROCEDURES

IMPORTANT INFORMATION ABOUT
YOUR GEOTECHNICAL ENGINEERING REPORT



SCALE

100 50 0 100

1"=100'

LEGEND

SOIL TEST BORING LOCATION

S&ME

BORING LOCATION PLAN

WALNUT GROVE LAS PONDS
WALNUT GROVE, GEORGIA

FILE NAME: 1801-13-139	DRAWN BY: CLH	CHK'D BY: RM
JOB NO: 1801-13-139	DATE: 3-15-13	FIGURE NO: 1

CLIENT Precision Planning

PROJECT NUMBER 1801-13-139

DATE STARTED 3/11/13 COMPLETED 3/11/13

DRILLING CONTRACTOR Sunrise Drilling Company

DRILLING METHOD Hollow Stem Auger, Rope and Cathead

LOGGED BY Driller CHECKED BY Rich Mockridge

NOTES

PROJECT NAME Walnut Grove LAS Ponds

PROJECT LOCATION Walnut Grove

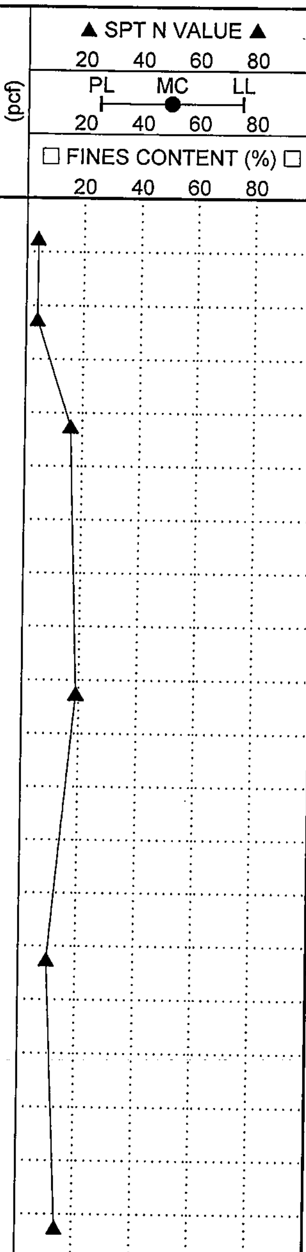
GROUND ELEVATION 842 ft HOLE SIZE 6 inches

GROUND WATER LEVELS:

AT TIME OF DRILLING 17.50 ft / Elev 824.50 ft

24hrs AFTER DRILLING 15.50 ft / Elev 826.50 ft

DEPTH (ft)	ELEV. (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0	842.0	SILTY SAND, brown, fine to medium grained, very loose, CULTIVATED SOIL	SS 1		2-2-2 (4)		
	840.0	SANDY CLAYEY SILT, red - brown, soft, RESIDUUM	SS 2		2-2-2 (4)		
5	838.5	SANDY CLAYEY SILT, red - brown, very stiff	SS 3		5-6-10 (16)		
	836.0	SILTY SAND, red - brown, yellow - tan, fine grained, medium dense					
10			SS 4		10-9-10 (19)		
	830.0	SILTY SAND, multi-colored, fine to medium grained, loose to medium dense					
15			SS 5		4-5-5 (10)		
20			SS 6		4-5-9 (14)		



Bottom of borehole at 20.0 feet.

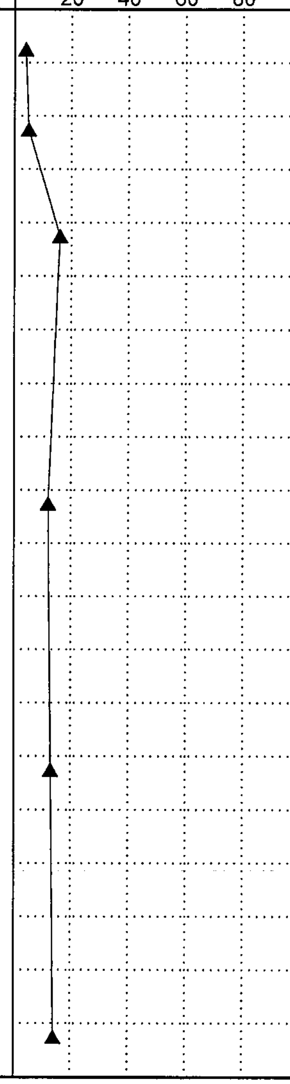
BORING NUMBER O2

S&ME, Inc.

CLIENT Precision Planning
PROJECT NAME Walnut Grove LAS Ponds
PROJECT NUMBER 1801-13-139
PROJECT LOCATION Walnut Grove
DATE STARTED 3/11/13 COMPLETED 3/11/13
GROUND ELEVATION 839 ft HOLE SIZE 6 inches
DRILLING CONTRACTOR Sunrise Drilling Company
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger, Rope and Cathead
AT TIME OF DRILLING 15.00 ft / Elev 824.00 ft
LOGGED BY Driller CHECKED BY Rich Mockridge
24hrs AFTER DRILLING 12.00 ft / Elev 827.00 ft
NOTES

DEPTH (ft)	ELEV. (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0	839.0	SILTY SAND, brown, fine to medium grained, very loose, CULTIVATED SOIL	SS 1		2-2-2 (4)		
	838.0	SILTY SANDY CLAY, red - brown, firm, RESIDUUM (damp)	SS 2		2-2-3 (5)		
	836.0	SILTY SAND, red - brown, tan and yellow - tan, fine to medium grained, medium dense, with a trace of clay	SS 3		6-7-9 (16)		
5							
	831.0	SILTY SAND, multi-colored, fine to medium grained, medium dense	SS 4		7-5-7 (12)		
10							
15			SS 5		5-6-7 (13)		
20			SS 6		6-7-7 (14)		

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80



Bottom of borehole at 20.0 feet.

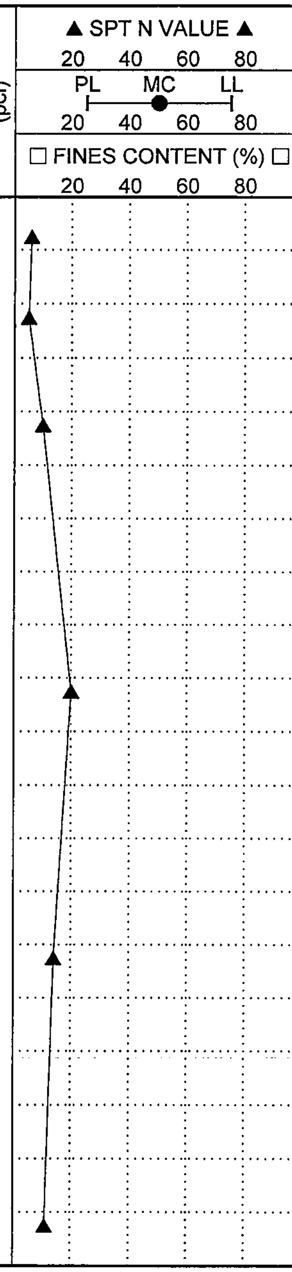
BORING NUMBER S1

S&ME, Inc.

CLIENT	Precision Planning	PROJECT NAME	Walnut Grove LAS Ponds
PROJECT NUMBER	1801-13-139	PROJECT LOCATION	Walnut Grove
DATE STARTED	3/11/13 COMPLETED 3/11/13	GROUND ELEVATION	837 ft HOLE SIZE 6 inches
DRILLING CONTRACTOR	Sunrise Drilling Company	GROUND WATER LEVELS:	
DRILLING METHOD	Hollow Stem Auger, Rope and Cathead	AT TIME OF DRILLING	17.00 ft / Elev 820.00 ft
LOGGED BY	Driller CHECKED BY Rich Mockridge	24hrs AFTER DRILLING	11.50 ft / Elev 825.50 ft
NOTES			

DEPTH (ft)	ELEV. (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0	837.0	SILTY SAND, brown, fine to medium grained, loose, TOPSOIL/CULTIVATED SOIL, (moist)	SS 1		2-3-3 (6)		
	836.0	SILTY CLAYEY SAND, red - brown, fine grained, loose, RESIDUUM	SS 2		2-2-3 (5)		
5			SS 3		5-5-5 (10)		
	831.0	SILTY SAND, gray, tan, and brown, fine to medium grained, medium dense					
10			SS 4		7-9-11 (20)		
	826.0	SILTY SAND, tan and gray, fine to coarse grained, medium dense, with quartz fragments, (moist)					
15			SS 5		5-7-7 (14)		
20			SS 6		4-5-6 (11)		

Bottom of borehole at 20.0 feet.



BORING NUMBER S2

S&ME, Inc.

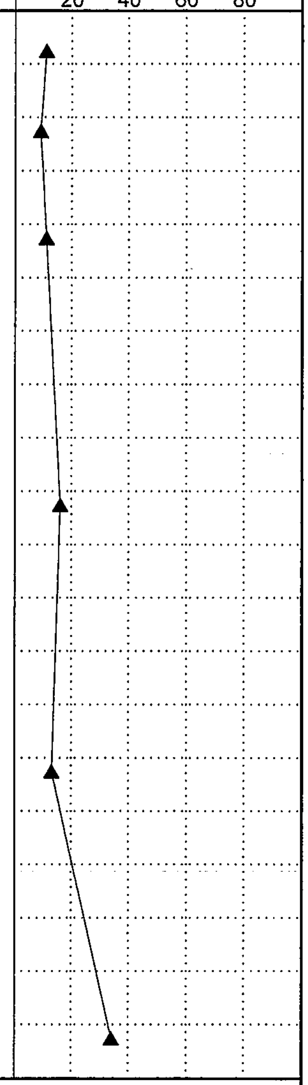
CLIENT	Precision Planning	**PROJECT NAME**	Walnut Grove LAS Ponds
PROJECT NUMBER	1801-13-139	**PROJECT LOCATION**	Walnut Grove
DATE STARTED	3/11/13 **COMPLETED** 3/11/13	**GROUND ELEVATION**	836 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR	Sunrise Drilling Company	**GROUND WATER LEVELS:**	
DRILLING METHOD	Hollow Stem Auger, Rope and Cathead	∇ **AT TIME OF DRILLING**	13.00 ft / Elev 823.00 ft
LOGGED BY	Driller **CHECKED BY** Rich Mockridge	▼ **24hrs AFTER DRILLING**	11.50 ft / Elev 824.50 ft
NOTES			

DEPTH (ft)	ELEV. (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0	836.0	SILTY SAND, brown, fine to medium grained, medium dense, CULTIVATED SOIL, (moist)	SS 1		5-5-6 (11)		
	835.0	SILTY SAND, brown, fine to medium grained, loose to medium dense, with a trace of clay, RESIDUUM, (damp)	SS 2		3-3-6 (9)		
5			SS 3		5-5-6 (11)		
	830.0	SILTY SAND, gray, tan, and brown, fine grained, medium dense, with a trace of clay, (moist)					
10			SS 4		5-7-9 (16)		
		▼ (11.5 ft) ∇ (13.0 ft)					
15			SS 5		6-6-7 (13)		
	820.0	SILTY SAND, yellow - tan and orange, fine to medium grained, dense, (moist)					
20			SS 6		10-17-17 (34)		

▲ SPT N VALUE ▲ 20 40 60 80

PL MC LL 20 40 60 80

☐ FINES CONTENT (%) ☐ 20 40 60 80



Bottom of borehole at 20.0 feet.

PROCEDURES

INTRODUCTION

S&ME, Inc. performs most all tests in general accordance with the American Society for Testing and Materials (ASTM) or the United States Army Corps of Engineers procedures. These procedures are generally recognized as the basis for uniformity and consistency of test results in the geotechnical engineering profession. All work is initiated and supervised by qualified engineers. Our tests are performed by skilled technicians trained in either ASTM or Corps procedures. Our equipment is well maintained, and our laboratory equipment is calibrated at least yearly.

Subsequent portions of this Appendix present brief descriptions of our testing procedures. Where applicable, we have referenced these procedures to either ASTM or the Corps of Engineers. Reference should be made to the following publications for specific descriptions of apparatus, procedures, reporting, etc.

Annual Book of ASTM Standards, Section 4, Volume 4.08: Soil and Rock: Building Stones. American Society for Testing and Materials, Latest Edition

EM 1110-2-1803. Subsurface Investigations, Soils, Chapter 3. U.S. Army Corps of Engineers, 1972.

EM 1110-1-1801, Geological Investigations. U.S. Army Corps of Engineers, 1978.

EM 1110-2-1907, Soil Sampling. U.S. Army Corps of Engineers, 1972.

EM 1110-1-1802, Geophysical Exploration. U.S. Army Corps of Engineers, 1979.

EM 1110-2-1906, Laboratory Soils Testing. U.S. Army Corps of Engineers, 1970.

PROCEDURES

SOIL TEST BORING PROCEDURES, ASTM D-1586

The borings were advanced by a hollow stem auger which was mechanically driven by a 125-horsepower drill rig. At regular intervals, soil samples were obtained through the hollow central portion of the augers with a standard 1.4 inch I.D., 2.0 inch O.D. split tube sampler.

The sampler was initially seated six inches to penetrate any loose cuttings; 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 was recorded and is designated as the *standard penetration resistance*. Penetration resistance, when properly evaluated, is an index to the soil's strength and density.

The samples were classified in the field by the driller as they were obtained. Representative portions of each soil sample were then sealed in containers and transported to our laboratory. The samples were examined by a graduate geotechnical engineer or engineering geologist to visually check the field classifications. All boring data, including sampling intervals, penetration resistances, soil classifications, and groundwater level are presented on the attached Test Boring Records.

AUGER REFUSAL MATERIALS

Auger refusal is a term that describes subsurface materials sufficiently competent to prevent further penetration by our $5^5/_8$-inch O.D. hollow-stem augers. Our criteria for auger refusal is the inability of our 125-horsepower drill rig to advance the augers while operating in second gear. Typically, refusal materials exhibit penetration resistances in excess of 100 blows per foot. Refusal materials can be hard cemented soil, soft weathered rock, coarse gravel or boulders, rubble or other hard debris, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE COMPACTNESS AND CONSISTENCY

Sand and Gravel

Standard Penetration Resistance Blows/Foot	Relative Compactness
0-4	Very Loose
5-10	Loose
11-20	Firm
21-30	Very Firm
31-50	Dense
Over 50	Very Dense

Silt and Clay

Standard Penetration Resistance Blows/Foot	Consistency
0-1	Very Soft
2-4	Soft
5-8	Firm
9-15	Stiff
16-30	Very Stiff
31-50	Hard
Over 50	Very Hard

Important Information About Your
Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions
Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Scope of Geotechnical Services
Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects
Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project. Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues
The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final
Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.