

Geotechnical Engineering Report

Proposed Fairfield Inn & Suites

Vicksburg, Mississippi

November 11, 2013

Terracon Project No. EB135064

Prepared for:

MM Construction, LLC

Mandeville, Louisiana

Prepared by:

Terracon Consultants, Inc.

Ridgeland, Mississippi

Offices Nationwide
Employee-Owned

Established in 1965
terracon.com

Terracon

November 11, 2013



MM Construction, LLC
68073 Highway 59
Mandeville, Louisiana 70471

Attn: Mr. Mike Sarona
P: [662] 288 6080
E: mike38668@yahoo.co.uk

Re: Geotechnical Engineering Report
Proposed Fairfield Inn & Suites
Vicksburg, Mississippi
Terracon Project No. EB135064

Dear Mr. Sarona:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal number PEB130195 dated September 6, 2013, as authorized on September 30, 2013.

This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. Materials services are provided by Terracon. We would be happy to discuss these services with you. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Ryan P. Steiner, P.E.
Project Engineer
Geotechnical Services
Mississippi PE No. 21038

David A. Been, P.E.
Senior Consultant
Geotechnical Services

Enclosures cc: 1 – Client (PDF) & 1 – File



Terracon Consultants, Inc. 859 Pear Orchard Ridgeland, Mississippi 39157
P [601] 956 4467 F [601] 956 9533 terracon.com

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	i
1.0 INTRODUCTION.....	1
2.0 PROJECT INFORMATION.....	1
2.1 Project Description	1
2.2 Site Location and Description.....	2
3.0 SUBSURFACE CONDITIONS.....	2
3.1 Geology	3
3.2 Typical Profile.....	3
3.3 Groundwater.....	4
4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION.....	5
4.1 Geotechnical Considerations.....	5
4.1.1 Compressible Soils	5
4.1.2 Shallow Groundwater	6
4.1.3 Construction Debris/Uncontrolled Fill	7
4.2 Earthwork	8
4.2.1 Site Preparation	8
4.2.2 Engineered Fill Material Requirements.....	9
4.2.3 Engineered Fill Placement and Compaction Requirements	9
4.2.4 Utility Trench Backfill	10
4.2.5 Grading and Drainage	10
4.2.6 Earthwork Construction Considerations	10
4.3 Rammed Aggregate Piers	11
4.4 Lateral Earth Pressures.....	11
4.5 Pavements	14
4.5.1 Subgrade Preparation.....	14
4.5.2 Design Considerations.....	15
4.5.3 Asphaltic Cement Concrete Thickness Design Recommendations.....	16
4.5.4 Portland Cement Concrete Thickness Design Recommendations.....	16
4.5.5 Pavement Drainage.....	17
4.5.6 Pavement Maintenance.....	17
5.0 GENERAL COMMENTS.....	17

TABLE OF CONTENTS (continued)

APPENDIX A – FIELD EXPLORATION

Exhibit A-1	Site Location Plan
Exhibit A-2	Boring Location Plan
Exhibit A-3	Field Exploration Description
Exhibit A-4 to A-11	Boring Logs B-01 to B-08

APPENDIX B – SUPPORTING INFORMATION

Exhibit B-1	Laboratory Testing
Exhibit B-2	Consolidation Test Report: Boring B-03 14' – 16'

APPENDIX C – SUPPORTING DOCUMENTS

Exhibit C-1	General Notes
Exhibit C-2	Unified Soil Classification System

EXECUTIVE SUMMARY

This geotechnical investigation has been performed for the proposed Fairfield Inn & Suites to be located off Cypress Centre Boulevard in Vicksburg, Mississippi. Eight (8) soil borings, designated Borings B-01 through B-08, were drilled to depths of approximately 6 to 40 feet below existing grades within the development area.

The following geotechnical considerations were identified:

- The soil borings performed within the proposed building and pool areas encountered very soft to medium stiff silts (ML) extending below planned finished grades. These soils are compressible and will consolidate under the planned foundation loading conditions. Due to the proposed site grading and variable thickness of the soft soils, a structure supported on a conventional shallow foundation could experience total and differential settlements resulting from consolidation of these soils on the order of 2 to 3 inches. To limit the post-construction settlement to acceptable levels and allow for proper support of the building on a shallow foundation system, mitigation of the compressible soils will be required. Mitigation options are discussed in the report for the structure and pavement areas.
- Groundwater was initially encountered during drilling at depths of 6 to 8 feet below existing ground surface. Based on the proposed grading plan, groundwater should be expected to be encountered during mass grading and construction of the building foundations, floor slab, the pool and pavements. In order to prevent adverse effects of groundwater beneath the structure, pool and pavements, both temporary and permanent dewatering and design measures will be needed. These measures are discussed in the report.
- Construction debris and uncontrolled fill was observed at the ground surface and noted in Borings B-06 and B-07 to depths of about 4 to 6 feet. Based on the grading plan, it appears the majority of the construction debris noted should be removed during site grading. We caution that other areas of construction debris, burn pits, organic debris, or other deleterious materials could exist across the site between or away from our boring locations.
- Prior to beginning building and pavement construction, it will be important that site dewatering measures be in place, including installation of the storm drainage system and temporary drainage ditches. These measures will serve to collect and divert subsurface water away from the construction areas, and promote drying of the subgrade soils. Even with these dewatering measures in place, it should be anticipated that subgrade stabilization will be required as discussed in this report.

Geotechnical Engineering Report

Proposed Fairfield Inn & Suites ■ Vicksburg, Mississippi

November 11, 2013 ■ Terracon Project No. EB135064



- An economical and proven mitigation option for the site conditions would be to increase the subsurface stiffness by utilizing *Rammed Aggregate Piers (RAP)* below the structures. This technique allows for rapid construction and would reduce settlement to acceptable limits. Recommendations for subgrade improvements using RAP elements are presented in this report.
- Depending on the unbalanced height of retaining walls, the walls may need to be included in the RAP program to limit post construction settlement of these structures.
- After general grading is completed, the exposed subgrade is anticipated to be unstable upon initial exposure. The soils comprising the building pad subgrade will require mitigation to provide a construction platform for general construction prior to the installation of the RAP system. Mitigation should consist of overexcavation of the subgrade soils approximately 12 inches, placement of a non-woven geotextile fabric, and then backfilling the excavation with MDOT No. 610 stone.
- On-site soils appear suitable for use as engineered fill; however, high silt content soils are extremely sensitive to variations in moisture content and can lose strength rapidly with increases in moisture. Drying of soils excavated from deeper cut areas of the site should be anticipated prior to use as engineered fill. If the material does not meet the engineered fill criteria, it should not be utilized.
- The 2006 International Building Code (IBC), Table 1613.5.2 seismic site classification for this site is D.
- Provided the recommendations in this report are implemented, the pavement design could consist of either a rigid or flexible pavement system.
- Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. We therefore recommend that Terracon be retained to monitor this portion of the work.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

**GEOTECHNICAL ENGINEERING REPORT
PROPOSED FAIRFIELD INN & SUITES
VICKSBURG, MISSISSIPPI**

Terracon Project No. EB135064

November 11, 2013

1.0 INTRODUCTION

This geotechnical engineering report has been completed for the proposed Fairfield Inn & Suites to be located off Cypress Centre Boulevard in Vicksburg, Mississippi. Eight (8) soil borings, designated Borings B-01 through B-08, were drilled to depths of approximately 6 to 40 feet below existing grades within the development area. Logs of the borings along with a site location plan and boring location plan are included in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- earthwork
- seismic considerations
- foundation design and construction
- slab design and construction
- pavement design

2.0 PROJECT INFORMATION

The following sections present the project information that was available at the time this report was prepared. Should this information be incorrect, or change significantly, the project engineer should be contacted in order to evaluate the effect, if any, on our analysis and recommendations provided herein and make modifications if required.

2.1 Project Description

Item	Description
Site layout	Appendix A, Exhibit A-2: Boring Location Plan
Structure	Approximate 14,000 square-foot, four (4) story building with pool and associated pavements
Building Construction	Load bearing masonry walls and PTI concrete slab-on-grade
Finished floor elevation	Elev. 203 ft

Geotechnical Engineering Report

Proposed Fairfield Inn & Suites ■ Vicksburg, Mississippi

November 11, 2013 ■ Terracon Project No. EB135064



Item	Description
Maximum loads	Columns: 222 kips (provided) Walls: 5.5 klf (provided) Slabs: 125 psf max (assumed)
Existing grades	Elev. 190 ft to Elev. 240 ft
Grading	Cut: up to 15 feet (building and pavement) Fill: up to 5 feet (pavement)
Cut and fill slopes	3H:1V (Horizontal to Vertical) max
Free-standing retaining walls	Retaining wall with a maximum of height of 20 feet
Below grade areas	Pool

2.2 Site Location and Description

Item	Description
Location	Cypress Centre Boulevard in Vicksburg, Mississippi (Appendix A, Exhibit A-1: Site Location Plan)
Existing improvements	Undeveloped parcel
Current ground cover	Grass and construction debris
Existing topography	Sloping downward southwest to northeast with an elevation difference of approximately 50 feet

3.0 SUBSURFACE CONDITIONS

Soil and groundwater conditions at the site were investigated by means of eight (8) soil borings. Borings B-01 through B-04 were drilled in the proposed building and pool area. Borings B-05 through B-08 were drilled in areas of proposed pavement. The soil boring logs in Appendix A provide details of the conditions encountered at each boring location and the field and laboratory data collected.

3.1 Geology

Soils encountered at this site appear to be sediments of loessial soils typical of the Vicksburg area. Loess soils are characterized by grayish to yellowish-brown and tan massive silts and extend south from western Tennessee into Mississippi and portions of northern Louisiana. The loess material was originally transported by winds and is a product of volcanic origin as well as five periods of glaciation on the North American continent. The grain size of this material is mostly silt, and the soil will stand in vertical cuts before being disturbed. Loessial soils are highly erodible and embankments or slopes require protection against surface drainage.

3.2 Typical Profile

Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency
Surface	0.3	Topsoil	N/A
1	6 to 18, Termination ^{1,4}	Silty Clay (CL) / Silt (ML)	Soft to Stiff
2	28, Termination ²	Silty Clay (CL) / Silt (ML)	Very Soft to Soft
3	Termination ³	Silty Clay (CL)	Medium Stiff to Stiff

1. Borings B-04, B-05 and B-08 were terminated in this stratum.
2. Boring B-02 was terminated in this stratum.
3. Borings B-01 and B-03 were terminated in this stratum.
4. Borings B-06 and B-07 encountered construction debris and apparent uncontrolled fill to depths of 4 to 6 feet.

Conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs in Appendix A.

3.3 Groundwater

The boreholes were observed while drilling and after completion for the presence and level of groundwater. In addition, delayed water levels were also obtained in some borings. The water levels observed are noted on the attached boring logs, and are summarized below.

Boring Location	Depth to Groundwater During Drilling (feet)	Depth to Groundwater After Drilling (feet)
B-01	6	11.7 (24 hrs)
B-02	6	9.5 (24 hrs)
B-03	8	19.5 (15 mins)
B-04	6	No rise detected (1 hr)
B-05	6	No rise detected (3 hrs)
B-06	No free water observed during drilling	--
B-07	No free water observed during drilling	--
B-08	No free water observed during drilling	--

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may differ than indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The information provided by the designers for this project has been combined with our findings from the site investigation to develop recommendations for foundation and pavement design. The following sections summarize these considerations.

4.1 Geotechnical Considerations

Based upon the preliminary grading plan, the existing grades within the building pad vary from about Elev. 204 feet to Elev. 215 feet and the finished floor elevation has been established at Elev. 203 feet. Therefore, the building pad will be cut approximately 13-ft on the southwestern corner and taper down to a 2-ft cut on the northeastern corner. Based on the proposed cuts within the building, the finished subgrade will be comprised of very soft to medium stiff silts (ML). Given the current grading plan and soil conditions, the following geotechnical considerations have been identified:

- Compressible Soils
- Shallow Groundwater
- Construction Debris/Uncontrolled Fill

4.1.1 Compressible Soils

The very soft to medium stiff silts (ML) encountered at the project site are compressible and could result in settlement-related distress in the proposed structure. In order to better understand the compressibility of the silts (ML), a consolidation test was run on a selected sample and the results of the test are provided in Appendix B.

Given the current soil conditions, laboratory data, structural loading conditions, and the proposed grading plan, post-construction settlement of a structure supported on conventional shallow foundations could be on the order of 2 to 3 inches. To limit the post-construction settlement to acceptable levels and allow for proper support of the building on a shallow foundation system, mitigation of the compressible soils will be required. The following are typical construction options for projects of this nature:

- Subgrade improvement consisting of *Rammed Aggregate Piers (RAP)*;
- Post-Tensioned Concrete Foundation System; or
- Deep foundation systems consisting of auger cast piles or driven piles.

From previous experience in the region, we expect that the RAP option may be the most economical option for this type of construction. RAP can be rapidly constructed at the project site and would provide a higher bearing capacity. Details related to RAP construction are provided in Section 4.3, **Rammed Aggregate Piers**. The remaining options noted above are

not addressed in the report, but can be provided upon request. Final grades will greatly affect the post-construction settlements. This office should be notified upon completion of site grading plans to revisit the mitigation recommendations contained herein.

It is understood that a retaining wall will be constructed near the southern and western edges of the property. Depending on the loading conditions and allowable movements of the retaining wall, a RAP system may be required to support the retaining wall. This report provides parameters for lateral earth pressure for the retaining wall design. However, no settlement analysis or global stability analysis of the retaining wall has been performed. This analysis should be performed by the wall designer.

Prior to beginning building and pavement construction, it will be important that site dewatering measures be in place as described in Section 4.1.2, **Shallow Groundwater**. After general grading is completed, the exposed subgrade is anticipated to be unstable upon initial exposure. The soils comprising the building pad subgrade will require mitigation to provide a construction platform for general construction prior to the installation of the RAP system. Mitigation should consist of overexcavation of the subgrade soils approximately 12 inches, placement of a non-woven geotextile fabric, and then backfilling the excavation with MDOT No. 610 stone. The use of light construction equipment would aid in reducing subgrade disturbance.

In the pavement area, very soft to medium stiff soils will comprise the subgrade upon completion of grading on the western portion of the project site. It should be anticipated that these soils will not be suitable for pavement support and will require mitigation. Mitigation should consist of overexcavating the unstable soils to a stable subgrade. If unstable soils are still present at a depth of 3 feet below finished subgrade, the unstable soils may be bridged using a non-woven geotextile (i.e., engineering fabric or geogrid) and a bridge lift of clean sand. The geotextile should be placed with a minimum overlap of 24 inches at all joints with the overlap placed in the intended direction of fill placement. The sand should be a clean, nonplastic sand. The sand should be dumped and then spread onto the geotextile with a small dozer with little compaction to achieve a bridge lift thickness of about 12 to 18 inches. The initial lift of fill material over the sand should be placed with a loose thickness of not greater than 12 inches and compacted to achieve at least 95 percent of the standard Proctor (ASTM D698) maximum dry density. Subsequent lifts of engineered fill material should be placed as recommended in Section 4.2.3.

4.1.2 Shallow Groundwater

Groundwater was initially encountered during drilling at depths of 6 to 8 feet below existing ground surface. Based on the proposed grading plan, groundwater should be expected to be encountered during mass grading and the construction of the building foundations, floor slab, the pool and pavements, particularly following rainfall events. In order to prevent adverse effects of groundwater beneath the structure, it is recommended that an under slab drainage piping system be installed.

The under slab drainage piping system should consist of a French drain around the exterior south, east and west sides of the building and a series of “finger” drains spaced at a maximum 25-ft centers beneath the floor slab. The base of the French drain and “finger” drains should be a minimum of 12 inches below the lowest point of the foundation system. The drains should be backfilled with a free-draining granular material that has less than 5 percent fines passing the No. 200 sieve (i.e., No. 57 stone) with a perforated drain pipe installed near the base of the excavation. The granular material should be encapsulated with a layer of non-woven geotextile to prevent clogging due to migration of soils into the drainage media. The French drain and “finger” drains should be tied to a collector pipe installed along the exterior of the north side of the building. The drain pipes should have a minimum slope of 1% to promote positive drainage of the groundwater and should day-light to a drainage structure or to a sump.

During construction of the foundation and pavement systems, the groundwater should be controlled to a minimum depth of 2 feet below the base of excavations to assist in providing a stable construction platform. Prior to the initiation of mass grading, temporary ditches could be excavated to assist in dewatering the project site, especially in the cut areas that are anticipated to encounter groundwater. Free draining gravel beds underground should be considered in the pavement areas to allow groundwater to drain into the subsurface storm drainage structures. Also, the retaining walls should be designed so that proper drainage is established behind the planned retaining walls.

Prior to beginning building and pavement construction, it will be important that site dewatering measures be in place, including installation of the storm drainage system and temporary drainage ditches. These measures will serve to collect and divert subsurface water away from the construction areas, and promote drying of the subgrade soils. Even with these dewatering measures in place, it should be anticipated that subgrade stabilization will be required as discussed in this report.

It is understood that a below grade pool is planned for the development. The pool should be designed to resist full hydrostatic uplift pressures exerted by the groundwater.

4.1.3 Construction Debris/Uncontrolled Fill

Construction debris and uncontrolled fill was observed at the ground surface and noted in Borings B-06 and B-07 to depths of about 4 to 6 feet. Based on the grading plan, it appears the majority of the construction debris noted should be removed during site grading. However, areas of construction debris may be present between the boring locations and vary in depth. Care should be taken to delineate the limits of the construction debris and uncontrolled fill during general grading of the project. However, even with the recommended construction testing services, there is an inherent risk for the owner that compressible fill or unsuitable material within or buried by the fill will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill, but can be reduced by performing additional testing and evaluation.

4.2 Earthwork

A critical aspect of the successful construction project is earthwork construction and site preparation. Proper site preparation is critical to the overall performance of the foundation system for the proposed structure. The following sections provide recommendations for site preparation.

4.2.1 Site Preparation

The project site is currently undeveloped and contains ground cover consisting of grass. However, areas of construction debris were noted at the surface and in the soil borings throughout the project site. Stripping and grubbing of the entire site will be necessary to remove topsoil, roots and any other organic matter that could otherwise be detrimental to subsequent construction. All construction debris within the proposed development area, including concrete footings, slabs, asphalt and Portland cement pavement should be removed from the entire construction area. Soils containing these objectionable materials should not be used for backfill. Stripping should be carried to a depth where all organic containing soils have been removed. Any topsoil encountered within construction limits should be stripped and could be stockpiled for landscaping purposes.

The in-place soils must be stable prior to the placement of fill materials or structures. After achieving finished subgrade elevation in cut areas, and prior to placing fill in any areas that are currently below finished subgrade elevation, the exposed subgrade should be evaluated to confirm that all soft, yielding and unsuitable materials have been removed. During this evaluation, those areas which are at finished subgrade or are to receive fill should be proof-rolled with a loaded tandem-axle dump truck or similar pneumatic-tired equipment with a minimum weight of 15 tons and a maximum weight of 25 tons. Proof-rolling will help reveal the presence of unstable materials that were not identified during our drilling program.

Any areas that yield or pump under proof-roll equipment should be mitigated. Mitigation might include processing to remove excess moisture, overexcavation and backfilling, chemical stabilization, or modification with geotextile reinforcement. Should mitigation of wet and pumping soils be required, our office should be notified so that appropriate mitigation can be prescribed by the project geotechnical engineer.

The proof-roll should be conducted within 48 hours of the placement of fill or the construction of foundations and pavement. In the event a time period beyond 48 hours elapses, a supplemental proof-roll should be conducted. This is necessary because the subgrade is subject to water softening and rutting if exposed to weather or traffic.

4.2.2 Engineered Fill Material Requirements

Engineered fill should meet the following material property requirements:

Fill Type ¹	USCS Classification	Physical Properties	Acceptable Location for Placement
Lean Clay, Sandy Lean Clay	CL	10 ≤ PI ≤ 25 LL ≤ 45	All locations and elevations
Clayey Sand	SC	6 ≤ PI ≤ 25 LL ≤ 45	All locations and elevations
On-Site Soils ²	CL, ML	4 ≤ PI ≤ 25 LL ≤ 45	Typically appear suitable for re-use as fill

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris. A sample of each material type should be submitted to Terracon for evaluation.
2. High silt content soils are extremely sensitive to variations in moisture content and can lose strength rapidly with increases in moisture. It should be noted that the moisture content of the silt must be closely controlled in order to achieve the desired degree of compaction. Drying of soils excavated from deeper cut areas of the site should be anticipated prior to use as engineered fill.

4.2.3 Engineered Fill Placement and Compaction Requirements

Engineered fill should be placed in accordance with the following requirements:

Item	Description
Fill Lift Thickness	9 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e., jumping jack or plate compactor) is used
Minimum Compaction Requirements ¹	98% of the material's standard Proctor maximum dry density (ASTM D 698)
Moisture Content	Within -2 to +2 percent of optimum moisture content as determined by the standard Proctor test at the time of placement and compaction
Minimum Testing Frequency Requirements	Building Area: 1 test per 2,500 square feet per lift Pavement Area: 1 test per 5,000 square feet per lift Utility Trench: 1 test per 100 linear feet per lift

1. Engineered fill should be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.

4.2.4 Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. If utility trenches are backfilled with relatively clean granular material, they should be capped with at least 18 inches of cohesive fill in non-pavement areas to reduce the infiltration and conveyance of surface water through the trench backfill.

Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches that could migrate below the building. We recommended constructing an effective clay “trench plug” that extends at least 5 feet out from the face of the building exterior. The plug material should consist of clay compacted at a water content at or above the soils optimum water content. The clay fill should be placed to completely surround the utility line and be compacted in accordance with recommendations in this report.

4.2.5 Grading and Drainage

Final surrounding grades should be sloped away from the structure on all sides to prevent ponding of water. Gutters and downspouts that drain water a minimum of 5 feet beyond the footprint of the proposed structures are recommended. This can be accomplished through the use of splash-blocks, downspout extensions, and flexible pipes that are designed to attach to the end of the downspout. Flexible pipe should only be used if it is daylighted in such a manner that it gravity-drains collected water. Splash-blocks should also be considered below hose bibs and water spigots.

It is recommended that all exposed earth slopes be seeded to provide protection against erosion. Seeded slopes should be protected with erosion control mats or other measures until the vegetation is established.

4.2.6 Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to foundation and pavement construction. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to floor slab and pavement construction.

Trees or other vegetation whose root systems have the ability to remove excessive moisture from the subgrade and foundation soils should not be planted next to the structure. Trees and shrubbery should be kept away from the exterior edges of the foundation element a distance at least equal to 1.5 times their expected mature height.

As a minimum, all temporary excavations should be sloped or braced as required by Occupational Safety and Health Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Terracon should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proof-rolling; placement and compaction of controlled compacted fills; backfilling of excavations to the completed subgrade, and just prior to construction of building floor slabs.

4.3 Rammed Aggregate Piers

The shallow foundation system for the proposed buildings should be augmented with intermediate foundation support consisting of Rammed Aggregate Piers (RAP). The RAP would serve to improve the strength (e.g., modulus) of the existing very soft to soft subsurface silt, allowing for an increase in the bearing capacity along with a reduction in total settlement to within tolerable limits.

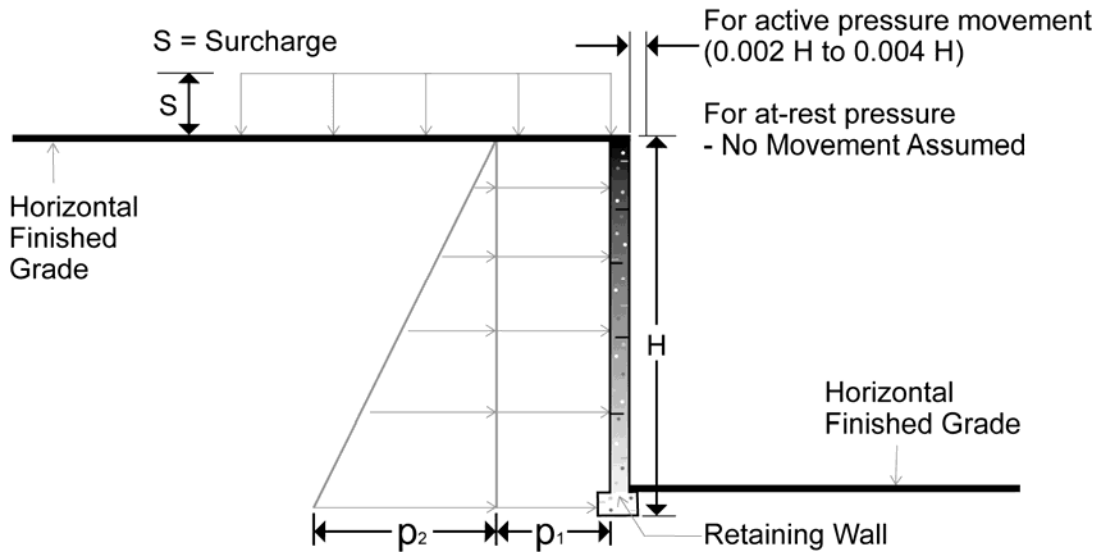
The process is designed and performed only by specialty contractors. The specific design (depth and spacing) of the RAP units is developed in order to limit settlements to tolerable limits. The local *Geopier* representative is Mr. Matt Caskey in Memphis, Tennessee. Mr. Caskey can be reached at 901-867-5369 for consultation on the design and specifics of the *Geopier* system.

4.4 Lateral Earth Pressures

Reinforced concrete walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls.

Geotechnical Engineering Report

Proposed Fairfield Inn & Suites ■ Vicksburg, Mississippi
 November 11, 2013 ■ Terracon Project No. EB135064



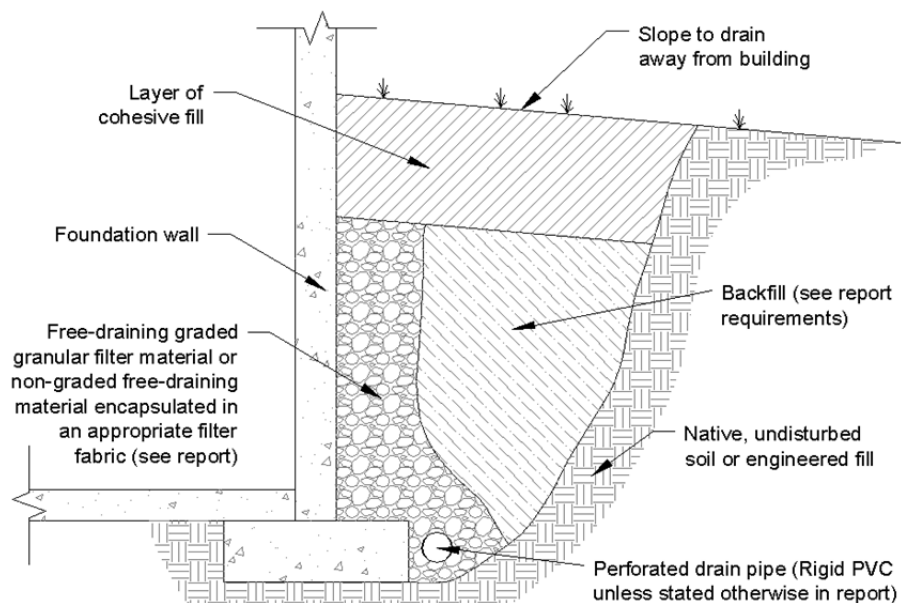
Earth Pressure Coefficients				
Earth Pressure Conditions	Coefficient for Backfill Type	Equivalent Fluid Density (pcf)	Surcharge Pressure, p_1 (psf)	Earth Pressure, p_2 (psf)
Active (K_a)	Granular - 0.33	40	$(0.33)S$	$(40)H$
	Lean Clay - 0.42	50	$(0.42)S$	$(50)H$
At-Rest (K_o)	Granular - 0.46	55	$(0.46)S$	$(55)H$
	Lean Clay - 0.58	70	$(0.58)S$	$(70)H$
Passive (K_p)	Granular - 3.0	360	---	---
	Lean Clay - 2.4	290	---	---

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about base, with top lateral movements of about $0.002 H$ to $0.004 H$, where H is wall height
- For passive earth pressure to develop, wall must move horizontally to mobilize resistance
- Uniform surcharge, where S is surcharge pressure
- In-situ soil backfill weight a maximum of 120 pcf
- Horizontal backfill, compacted between 95 and 98 percent of standard Proctor maximum dry density
- Loading from heavy compaction equipment not included
- No hydrostatic pressures acting on wall
- No dynamic loading
- No safety factor included

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively. To calculate the resistance to sliding, a value of 0.32 should be used as the ultimate coefficient of friction between the footing and the underlying soil.

A perforated rigid plastic or metal drain line installed behind the base of walls that extend below adjacent grade is recommended to prevent hydrostatic loading on the walls. The invert of a drain line around a below-grade building area or exterior retaining wall should be placed near foundation bearing level. The drain line should be sloped to provide positive gravity drainage or to a sump pit and pump. The drain line should be surrounded by clean, free-draining granular material having less than 5 percent passing the No. 200 sieve. The free-draining aggregate should be encapsulated in a filter fabric. The granular fill should extend to within 2 feet of final grade, where it should be capped with compacted cohesive fill to reduce infiltration of surface water into the drain system.



As an alternative to free-draining granular fill, a pre-fabricated drainage structure may be used. A pre-fabricated drainage structure is a plastic drainage core or mesh which is covered with filter fabric to prevent soil intrusion, and is fastened to the wall prior to placing backfill.

If controlling hydrostatic pressure behind the wall as described above is not possible, then combined hydrostatic and lateral earth pressures should be calculated for lean clay backfill using an equivalent fluid weighing 90 and 100 pcf for active and at-rest conditions, respectively. For granular backfill, an equivalent fluid weighing 85 and 90 pcf should be used for active and at-rest, respectively. These pressures do not include the influence of surcharge, equipment or

pavement loading, which should be added. Heavy equipment should not operate within a distance closer than the exposed height of retaining walls to prevent lateral pressures more than those provided.

4.5 Pavements

The following sections present recommendations for pavement design and construction. Based on experience with similar projects, either asphalt cement concrete (flexible) or a Portland cement concrete (rigid) pavement system could be used for the proposed project. Pavement designs were performed for estimated traffic types and volumes. We would be pleased to provide revised pavement thickness designs upon your request and the provision of additional data related to the anticipated traffic.

4.5.1 Subgrade Preparation

As previously discussed in Section 4.1, it should be anticipated that much of the subgrade soils exposed during grading will not be suitable for pavement support and will require mitigation. The mitigation measures were discussed in Section 4.1.1, **Compressible Soils**.

On most project sites, the site grading is accomplished relatively early in the construction phase. Fills are placed and compacted in a uniform manner. However, as construction proceeds, excavations are made into these areas, rainfall and surface water saturate some areas, heavy traffic from concrete trucks and other delivery vehicles disturb the subgrade and many surface irregularities are filled in with loose soils to improve trafficability temporarily. As a result, the pavement subgrades, initially prepared early in the project, should be carefully evaluated as the time for pavement construction approaches.

We recommend the moisture content and density of the top 9 inches of the subgrade be evaluated and the pavement subgrades be proof-rolled within two days prior to commencement of actual paving operations. Areas not in compliance with the required ranges of moisture or density should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills.

After proof-rolling and repairing deep subgrade deficiencies, the entire subgrade should be scarified and developed as recommended in Section 4.2 Earthwork to provide a uniform subgrade for pavement construction. Areas that appear excessively moist or wet following site stripping may require further undercutting and moisture conditioning. If a significant precipitation event occurs after the evaluation or if the surface becomes disturbed, the subgrade should be reviewed by qualified personnel immediately prior to paving. The subgrade should be in its finished form at the time of the final review.

4.5.2 Design Considerations

Detailed traffic patterns and anticipated loading conditions were not available at the time that this report was prepared. We anticipate that traffic loads will be produced primarily by automobile traffic and occasional delivery and trash removal trucks. The thickness of pavements subjected to heavy truck traffic should be determined using expected traffic volumes, vehicle types, and vehicle loads and should be in accordance with local, city, or county ordinances.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%;
- The subgrade and pavement surface should have a minimum 2% slope to promote proper surface drainage;
- Install below pavement drainage systems surrounding areas anticipated for frequent wetting;
- Install joint sealant and seal cracks immediately;
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils;
- Place compacted, low permeability backfill against the exterior side of curb and gutter; and,
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

Estimates of minimum thicknesses for new pavement sections for this project have been based on the procedures outlined in the 1993 Guideline for Design of Pavement Structures by the American Association of State Highway and Transportation Officials (AASHTO-1993). The following minimum thicknesses were estimated based upon our estimated traffic loading, limited soils information, variation across the project area, and experience with similar projects and soil conditions.

4.5.3 Asphaltic Cement Concrete Thickness Design Recommendations

The below pavement sections represent minimum thicknesses and not averages. Asphaltic concrete should conform to the requirements for surface and binder course from the Mississippi Department of Transportation (MDOT) *Standard Specifications for Road and Bridge Construction*, 1990 Edition.

Minimum ACC Pavement Section (inches)				
Traffic Area	Asphalt Surface ¹	Asphalt Binder ²	Aggregate Base ³	Total Thickness
Automobile Parking	1.5	1.5	6.0	9.0
Drive Lanes/ Entrances/Exits	1.5	2.5	8.0	12.0

1. MDOT *Standard Specifications for Road and Bridge Construction*, 1990 Edition, SC-1, Type 8 material.
2. MDOT BC-1, Type 6 material.
3. Granular base course should consist of a MDOT Size No. 610 stone or crushed concrete material. Granular base course should be compacted to 100 percent of its maximum dry density as determined by ASTM D-698, Standard Proctor Test.

4.5.4 Portland Cement Concrete Thickness Design Recommendations

The following table presents the minimum thicknesses and not averages for Portland cement concrete pavement sections.

Minimum PCC Pavement Section (inches)			
Traffic Area	Portland Cement Concrete ^{1,2}	Aggregate Base ³	Total Thickness
Automobile Parking	5.0	4.0	9.0
Drive Lanes/ Entrances/Exits	6.0	4.0	10.0
Dumpster Pad ⁴	8.0	4.0	12.0

1. 4,000 psi at 28 days, 4-inch maximum slump. PCC pavements are recommended for trash container pads and in any other areas subjected to heavy wheel loads and/or turning traffic.
2. Joint design should be performed in accordance with ACI330R-01 "Guide for Design and Construction of Concrete Parking Lots".
3. Granular base course should consist of a MDOT Size No. 610 stone or crushed concrete material. Granular base course should be compacted to 100 percent of its maximum dry density as determined by ASTM D-698, Standard Proctor Test.
4. The trash container pad should be large enough to support the container and the tipping axle of the collection truck.

We recommend all Portland cement concrete pavement details for joint spacing, joint reinforcement, and joint sealing be prepared in accordance with American Concrete Institute (ACI 330R-01 and ACI 325R.9-91). Portland cement concrete pavements should be provided with mechanically reinforced joints (doweled or keyed) in accordance with ACI 330R-01.

4.5.5 Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. Due to the anticipated shallow groundwater conditions, we recommend installing a French drain (as described in Section 4.1.2, **Shallow Groundwater**) behind the pavement curb on the high side of the site. The drain should be sloped to drain by gravity into the storm sewer system or other suitable receptacle. Additional lateral drainage or “finger” drains may be required beneath the pavement areas to maintain groundwater a minimum 2 feet below finished subgrade. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

4.5.6 Pavement Maintenance

The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the

Geotechnical Engineering Report

Proposed Fairfield Inn & Suites ■ Vicksburg, Mississippi

November 11, 2013 ■ Terracon Project No. EB135064

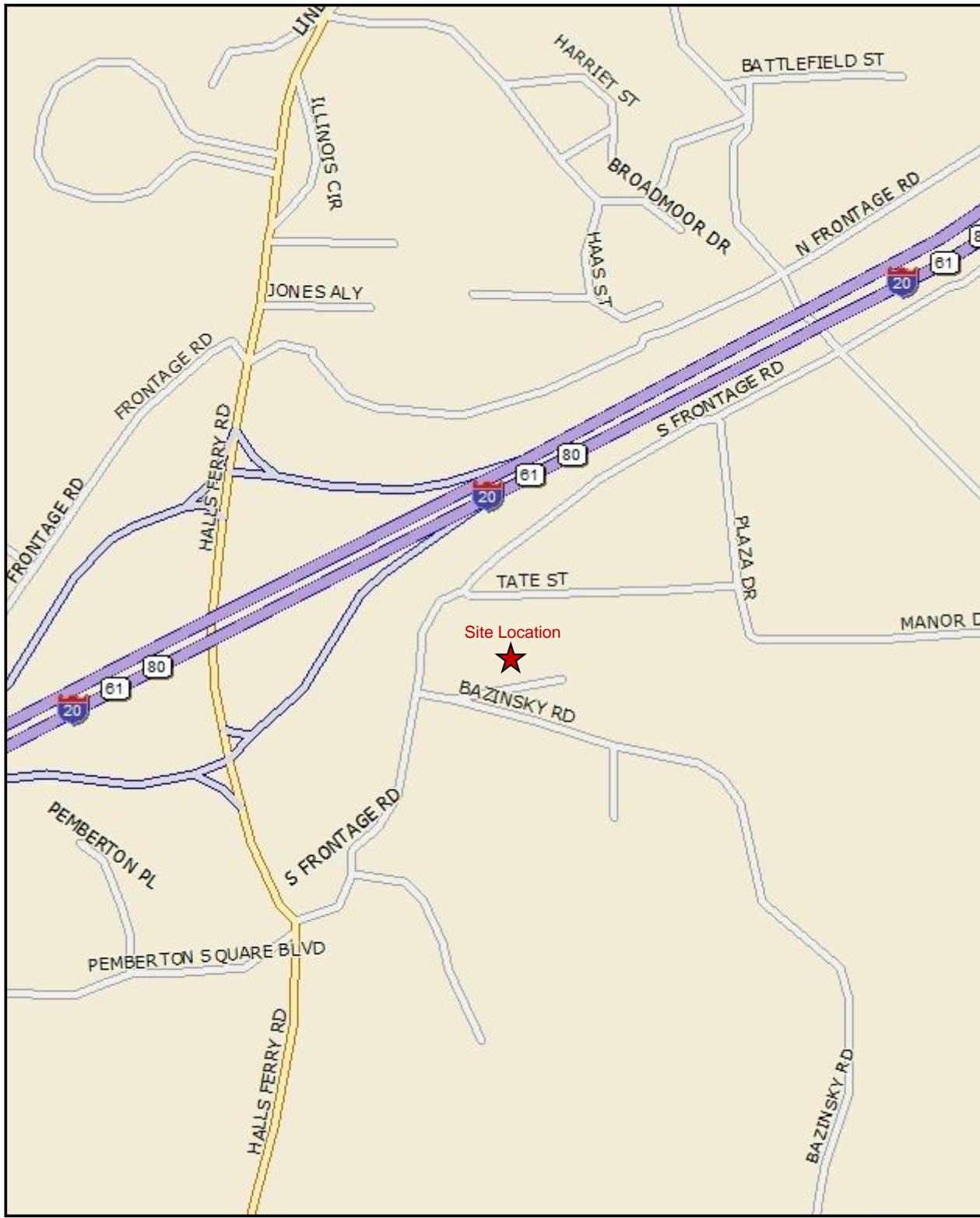


site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



SCALE



Project Manager: RPS	Project No. EB135064
Drawn by: AS	Scale: As Shown
Checked by: AS	File Name: Exhibit A-1.EB135064
Approved by: RPS	Date: October 2013

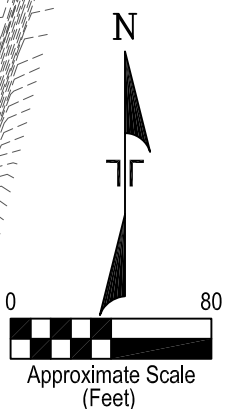
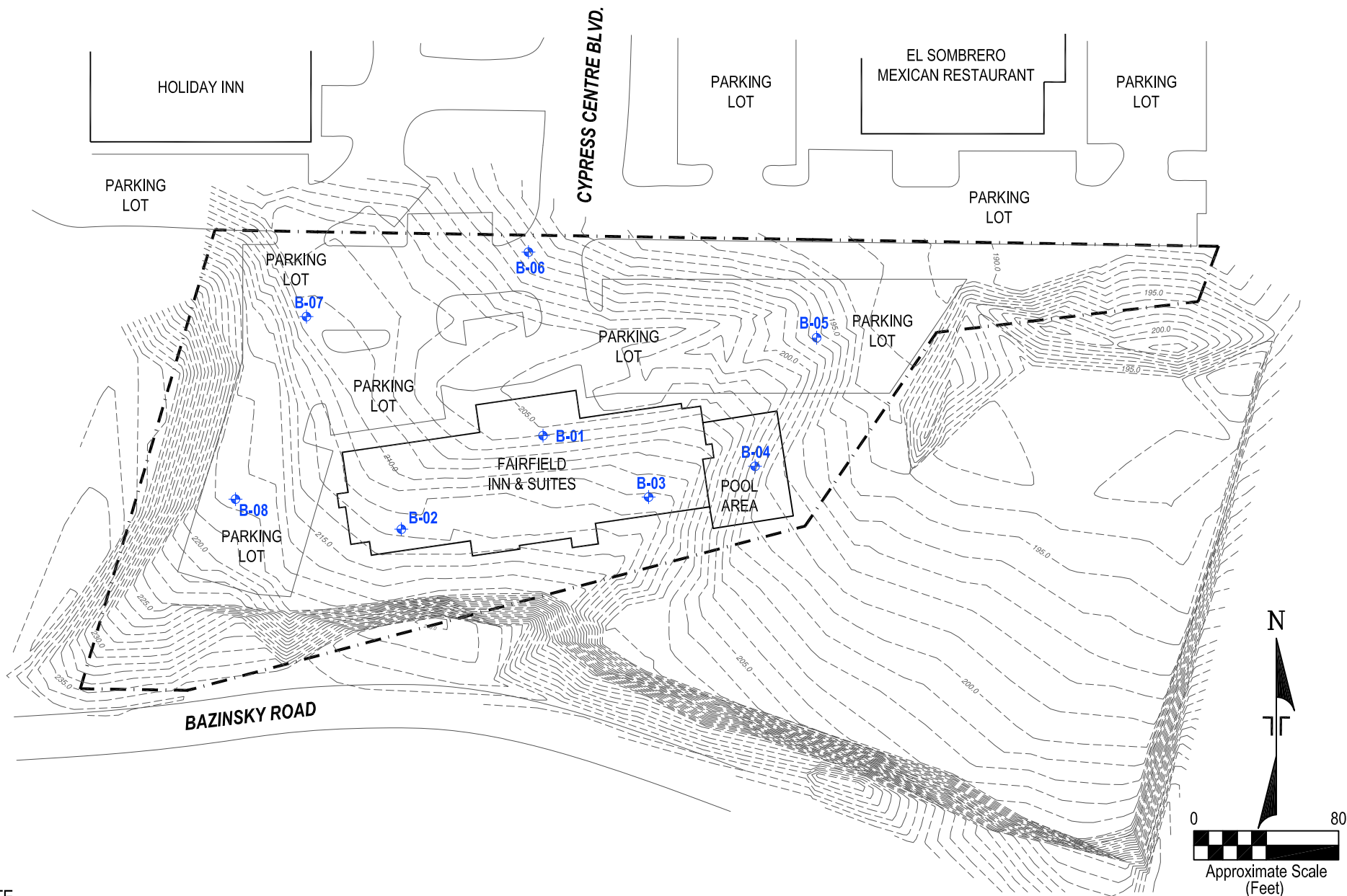
Terracon

859 Pear Orchard Road
PHONE (601) 956 4467

Ridgeland, Mississippi 39157
FAX (601) 956 9533

SITE LOCATION PLAN
GEOTECHNICAL ENGINEERING REPORT
PROPOSED FAIRFIELD INN & SUITES
CYPRESS CENTRE BOULEVARD
VICKSBURG, MISSISSIPPI

EXHIBIT
A-1



LEGEND

- SITE
- ⊕ APPROXIMATE BORING LOCATION

Project Mngr:	RPS
Drawn By:	RLW
Checked By:	RPS/MRF
Approved By:	RPS

Project No.	EB135064
Scale:	AS SHOWN
File No.	GEOEB135064-2
Date:	NOV. 2013

Terracon
Consulting Engineers and Scientists

859 Pear Orchard Road Ridgeland, MS 39157
(601) 956-4467 (601) 956-9533

BORING LOCATION PLAN
GEOTECHNICAL ENGINEERING REPORT
PROPOSED FAIRFIELD INN & SUITES
CYPRESS CENTRE BOULEVARD
VICKSBURG, MS

EXHIBIT
A-2

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Field Exploration Description

The subsurface exploration consisted of drilling and sampling eight (8) borings at the property. The boring locations were laid out by the drill crew using a scaled drawing and GPS coordinates. Ground surface elevations indicated on the boring logs were obtained by interpolation from plan contours provided by the client. The locations and elevations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

The borings were drilled with a ATV-mounted rotary drill rig using short-flight augers to advance the boreholes. Samples of the soil encountered in the borings were obtained using the undisturbed and split-barrel sampling procedures.

In the thick-wall tube sampling procedure, the relatively undisturbed samples were obtained by pushing a three-inch diameter, Shelby tube sampler a distance of two feet into the soil in general accordance with ASTM D1587. Depths at which these undisturbed samples were obtained are indicated by a shaded portion in the "Samples" column of the attached boring logs.

In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the middle 12 inches of the typical total 24-inch (from 6 to 18 inches of) penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N value). This value is used to estimate the in-situ relative density of cohesionless soils and consistency of cohesive soils.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled in accordance with Mississippi state regulations.

A field log of each boring was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.

BORING LOG NO. B-01

PROJECT:

CLIENT: MM Construction, LLC
Mandeville, Louisiana

SITE: Cypress Centre Boulevard
Vicksburg, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 32.31833° Longitude: 90.87301° Approximate Surface Elev: 206 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	DEPTH ELEVATION (Ft.)	0.3											
	TOPSOIL	2.0			12	2-2-1-2 N=3				24			
	LEAN CLAY (CL) , brown, soft	2.0			18	3.50 (HP)	UC	1.57	6.5	22	103	36-24-12	
	LEAN CLAY (CL) , brown, stiff				18	2.75 (HP)				22			
	- medium stiff below 6'		▽		14	2-2-3-3 N=5				21			
					24	1.00 (HP)				27			
			▽		18	1.25 (HP)				26		30-22-8	
					16	1-2-3-4 N=5				29			
	LEAN CLAY (CL) , brown, soft	18.0			16	0-0-2-1 N=2				27			
					16	0-2-2-2 N=4				25			
	LEAN CLAY (CL) , brown, stiff	28.0			16	2-5-7-10 N=12				21			
					18	4-6-6-7 N=12				27		35-23-12	
	Boring Terminated at 40 Feet	40.0			14	5-6-7-7 N=13				24			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger: 0' to 40'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with cement-bentonite grout upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ After 24 hours



Boring Started: 10/1/2013

Boring Completed: 10/1/2013

Drill Rig: ATV

Driller: Contract

Project No.: EB135064

Exhibit: A-4

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

BORING LOG NO. B-02

PROJECT:

CLIENT: MM Construction, LLC
Mandeville, Louisiana

SITE: Cypress Centre Boulevard
Vicksburg, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 32.31815° Longitude: 90.87318° Approximate Surface Elev: 213 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			
	DEPTH ELEVATION (Ft.)											
	0.3 TOPSOIL / 212.5+/-											
	SILT (ML), brown, soft to medium stiff				12	2-2-2-2 N=4				27		
					12	2-2-3-2 N=5				28		
	6.0 207+/-	5	▽		10	2-2-2-1 N=4				27		30-24-6
	SILT (ML), brown, very soft				16	WOH N=0				28		
					16	0-0-2-2 N=2				27		
					16	WOH N=0				28		30-24-6
	- soft from 14' to 16'	15			16	2-2-1-1 N=3				27		
					16	WOH N=0				27		
	20.0 193+/-	20										
Boring Terminated at 20 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ After 24 hours



Boring Started: 10/1/2013

Boring Completed: 10/1/2013

Drill Rig: ATV

Driller: Contract

Project No.: EB135064

Exhibit: A-5

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

BORING LOG NO. B-03

PROJECT:

CLIENT: MM Construction, LLC
Mandeville, Louisiana

SITE: Cypress Centre Boulevard
Vicksburg, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 32.3183° Longitude: 90.87273° Approximate Surface Elev: 211 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			LL-PL-PI	
	DEPTH ELEVATION (Ft.)												
	0.2' TOPSOIL 211+/-												
	SILT (ML) , brown, very stiff - soft to medium stiff below 2'												
	11.0 200+/-	5											
	SILT (ML) , brown, very soft												
	14.0 197+/-												
	SILT (ML) , brown, medium stiff												
	20.0 191+/-	15											
	Boring Terminated at 20 Feet												
		20											
		25											
		30											
		35											
		40											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ After 15 minutes



Boring Started: 10/2/2013

Boring Completed: 10/2/2013

Drill Rig: ATV

Driller: Contract

Project No.: EB135064

Exhibit: A-6

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

BORING LOG NO. B-04

PROJECT:

CLIENT: MM Construction, LLC
Mandeville, Louisiana

SITE: Cypress Centre Boulevard
Vicksburg, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 32.31833° Longitude: 90.8726° Approximate Surface Elev: 201 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			
	DEPTH ELEVATION (Ft.) 0.3 TOPSOIL / 200.5 +/- SILT (ML), brown, soft											
		5	▽	X		3-2-2-3 N=4				28		
				X		4-2-2-4 N=4				29		
				X		3-2-2-3 N=4				31		32-26-6
				X		2-2-2-2 N=4				30		
						0.50 (HP)				26		
	10.0 Boring Terminated at 10 Feet 191 +/-	10										
		15										
		20										
		25										
		30										
		35										
		40										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger: 0' to 10'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected after 1 hour



Boring Started: 10/2/2013

Boring Completed: 10/2/2013

Drill Rig: ATV

Driller: Contract

Project No.: EB135064

Exhibit: A-7

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

BORING LOG NO. B-05

PROJECT:

CLIENT: MM Construction, LLC
Mandeville, Louisiana

SITE: Cypress Centre Boulevard
Vicksburg, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 32.31859° Longitude: 90.87231° Approximate Surface Elev: 197 (Ft.) +/- ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			
0.3	196.5+/-											
	TOPSOIL					8-12-11-10 N=23				12		38-23-15
	LEAN CLAY (CL) , brown, very stiff				4	11-14-15-11 N=29				19		
	- stiff below 4'	5			16	5-4-4-4 N=8				26		
6.0	191+/-		▽									
Boring Terminated at 6 Feet												
		10										
		15										
		20										
		25										
		30										
		35										
		40										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger: 0' to 6'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected after 3 hours



Boring Started: 10/1/2013

Boring Completed: 10/1/2013

Drill Rig: ATV

Driller: Contract

Project No.: EB135064

Exhibit: A-8

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

BORING LOG NO. B-06

PROJECT:

CLIENT: MM Construction, LLC
Mandeville, Louisiana

SITE: Cypress Centre Boulevard
Vicksburg, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 32.31848° Longitude: 90.87299° Approximate Surface Elev: 200 (Ft.) +/- ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			
0.3	TOPSOIL	199.5+/-				2-5-4-5 N=9				13		
6.0	FILL - LEAN CLAY (CL) , brown - asphalt debris encountered from 2' to 4'	194+/-				4-35-17-12 N=52				15		36-24-12
6.0	Boring Terminated at 6 Feet	194+/-				3-4-4-3 N=8				23		
		10										
		15										
		20										
		25										
		30										
		35										
		40										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger: 0' to 6'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed



859 Pear Orchard Road
Ridgeland, Mississippi

Boring Started: 10/2/2013

Boring Completed: 10/2/2013

Drill Rig: ATV

Driller: Contract

Project No.: EB135064

Exhibit: A-9

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

BORING LOG NO. B-07

PROJECT:

CLIENT: MM Construction, LLC
Mandeville, Louisiana

SITE: Cypress Centre Boulevard
Vicksburg, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 32.3185° Longitude: 90.87342° Approximate Surface Elev: 210 (Ft.) +/- ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			
0.2	TOPSOIL	210+/-				2-3-4-5 N=7				15		26-19-7
	FILL - LEAN CLAY (CL) , brown - concrete debris and trash encountered to 6'					5-6-6-30 N=12				16		
		5				2-8-14-5 N=22				15		
						3-2-3-2 N=5				24		
8.0	Boring Terminated at 8 Feet	202+/-										
		10										
		15										
		20										
		25										
		30										
		35										
		40										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger: 0' to 6'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed



859 Pear Orchard Road
Ridgeland, Mississippi

Boring Started: 10/1/2013

Boring Completed: 10/1/2013

Drill Rig: ATV

Driller: Contract

Project No.: EB135064

Exhibit: A-10

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

BORING LOG NO. B-08

PROJECT:

CLIENT: MM Construction, LLC
Mandeville, Louisiana

SITE: Cypress Centre Boulevard
Vicksburg, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 32.31821° Longitude: 90.8735° Approximate Surface Elev: 218 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)			
	DEPTH ELEVATION (Ft.)											
	0.2' TOPSOIL 218+/-					0-0-1-13 N=1				15		
	2.0' LEAN CLAY (CL) , brown, very soft 216+/-					4-5-6-6 N=11				26		31-23-8
	LEAN CLAY (CL) , brown, stiff - medium stiff below 4'	5				3-4-3-4 N=7				26		
	Boring Terminated at 6 Feet	6.0' 212+/-										
		10										
		15										
		20										
		25										
		30										
		35										
		40										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger: 0' to 6'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed



859 Pear Orchard Road
Ridgeland, Mississippi

Boring Started: 10/1/2013

Boring Completed: 10/1/2013

Drill Rig: ATV

Driller: Contract

Project No.: EB135064

Exhibit: A-11

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

APPENDIX B
SUPPORTING INFORMATION

Geotechnical Engineering Report

Proposed Fairfield Inn & Suites ■ Vicksburg, Mississippi

November 11, 2013 ■ Terracon Project No. EB135064



Laboratory Testing

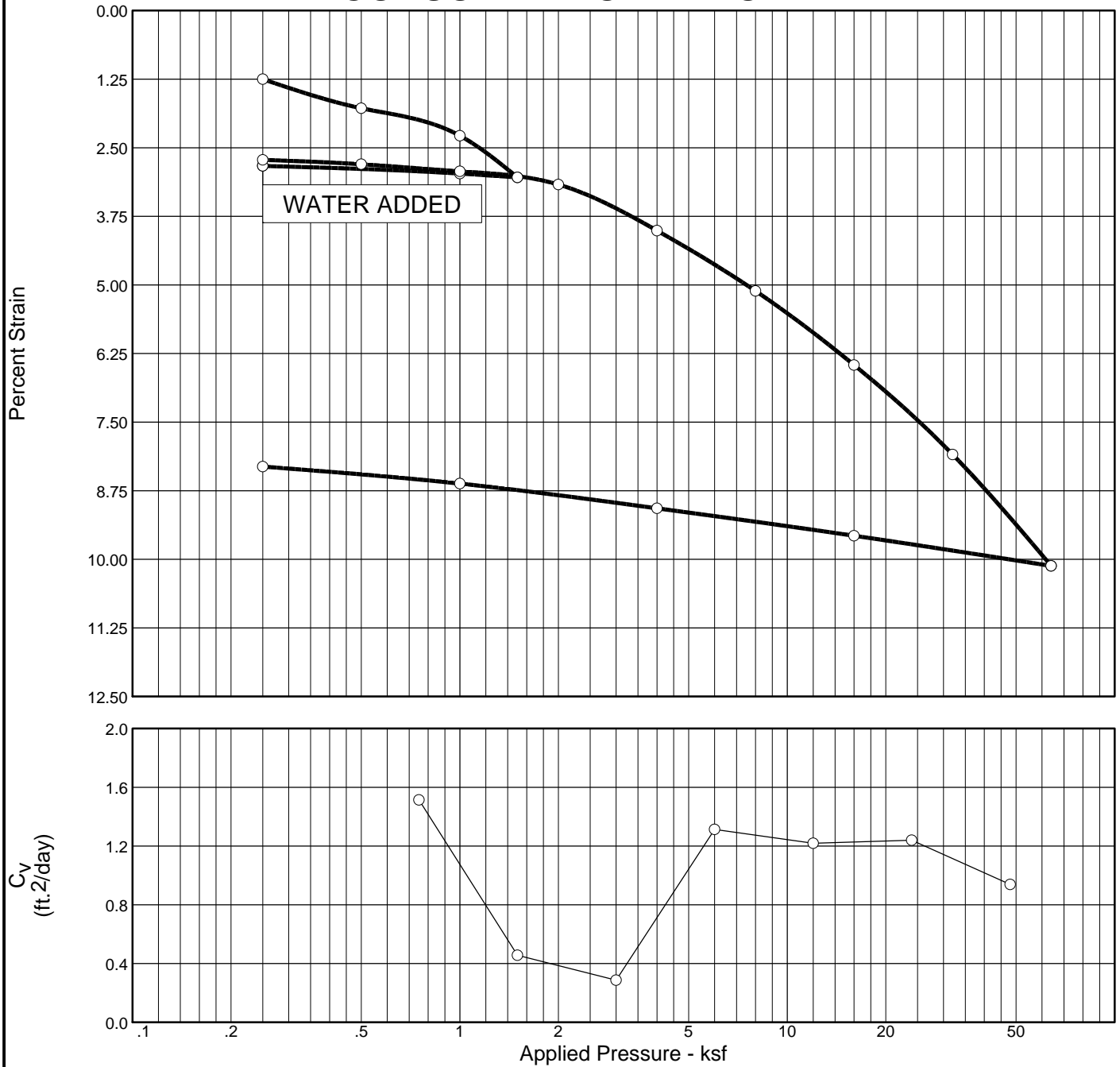
The laboratory testing program consisted of performing water content tests, Atterberg Limits, unconfined compression tests, and a consolidation test on representative soil samples. Information from these tests was used in conjunction with field penetration test data to evaluate soil strength in-situ, volume change potential, and soil classification. Results of these tests are provided on the boring logs included in Appendix A.

Descriptive classifications of the soils indicated on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System. Also shown are estimated Unified Soil Classification Symbols. A brief description of this classification system is attached to this report in Appendix C. All classification was by visual manual procedures. Selected samples were further classified using the results of Atterberg limits and grain size distribution testing. The Atterberg limits test results and percent fines (i.e. percent passing the No. 200 sieve) are also provided on the boring logs.

Atterberg Limits provide a quantitative measure of the soil plasticity and are useful in evaluating the potential for the soil to change volume with variation in water content. The calibrated hand penetrometer has been correlated with unconfined compression tests and provides a better estimate of soil consistency than visual examination alone. Information from these tests was used in conjunction with field penetration test data to evaluate in-situ soil strength and volume change potential.

The consolidation tests were selected for one-dimensional consolidation testing to observe the consolidation properties of these fine grained soils. Testing was performed in general accordance with the procedures outlined in ASTM D 4186. The results of the consolidation testing are presented in Appendix B.

CONSOLIDATION REPORT



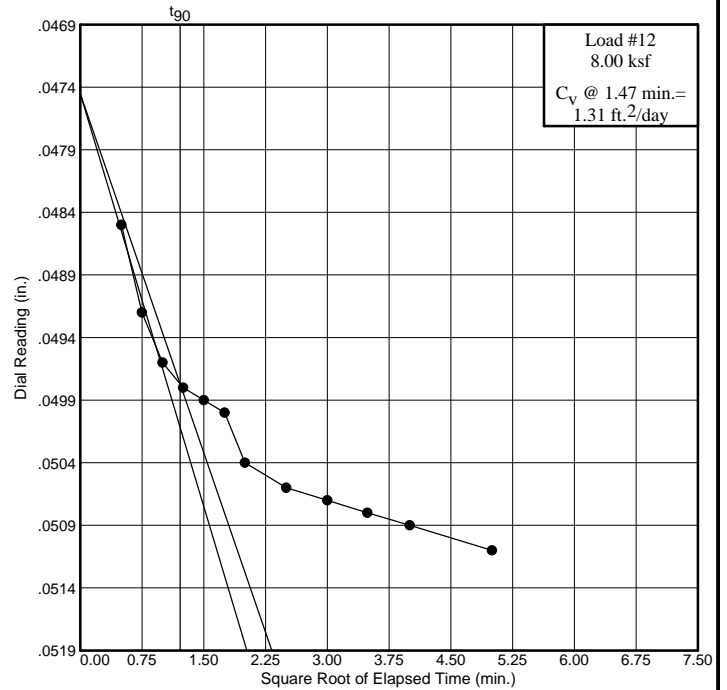
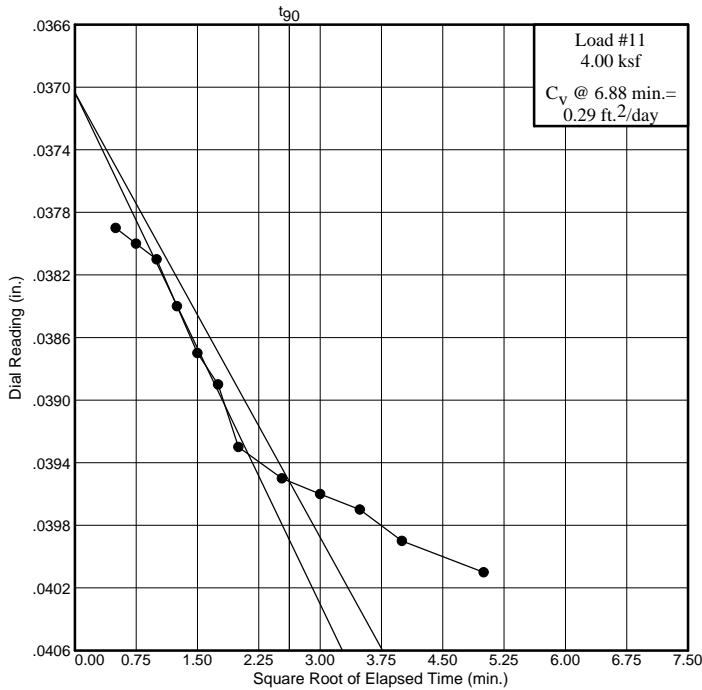
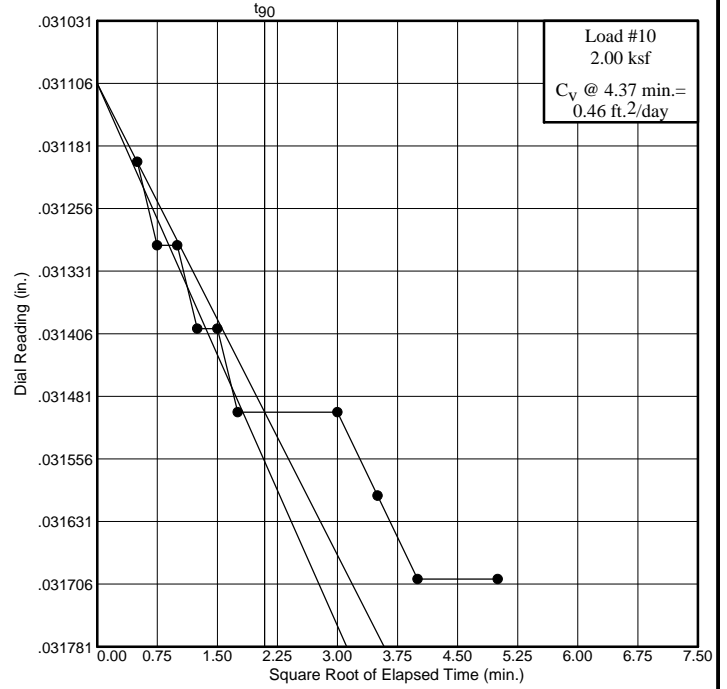
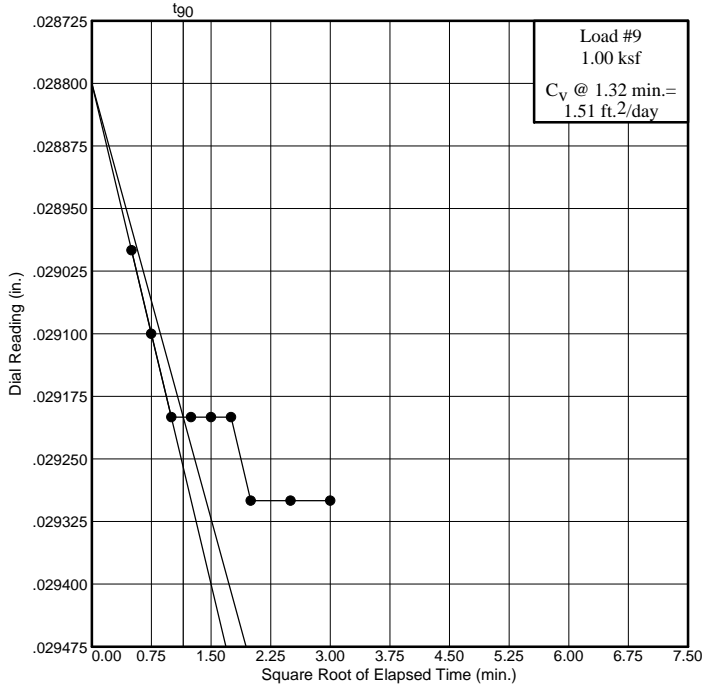
	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P _c (ksf)	C _c	C _r	Initial Void Ratio
102.1 %	30.2 %	93.7	33	8	2.7	1.50	4.00	0.09	0.01	0.799

MATERIAL DESCRIPTION	USCS	AASHTO
Silt; brown	ML	

Project No. EB135064 Client: MM Construction, LLC Project: Proposed Fairfield Inn and Suites Vicksburg, Mississippi Location: B-03 14' - 16'	Remarks: Final Moisture 23.9
Terracon Consultants Ridgeland, Mississippi	Exhibit B-2

Dial Reading vs. Time

Project No.: EB135064
 Project: Proposed Fairfield Inn and Suites
 Vicksburg, Mississippi
 Location: B-03 14' - 16'



Terracon Consultants
 Ridgeland, Mississippi

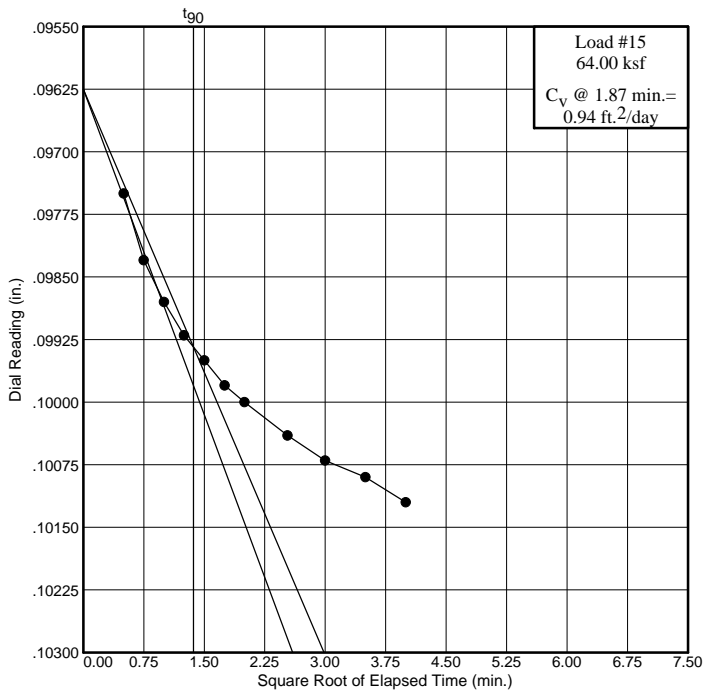
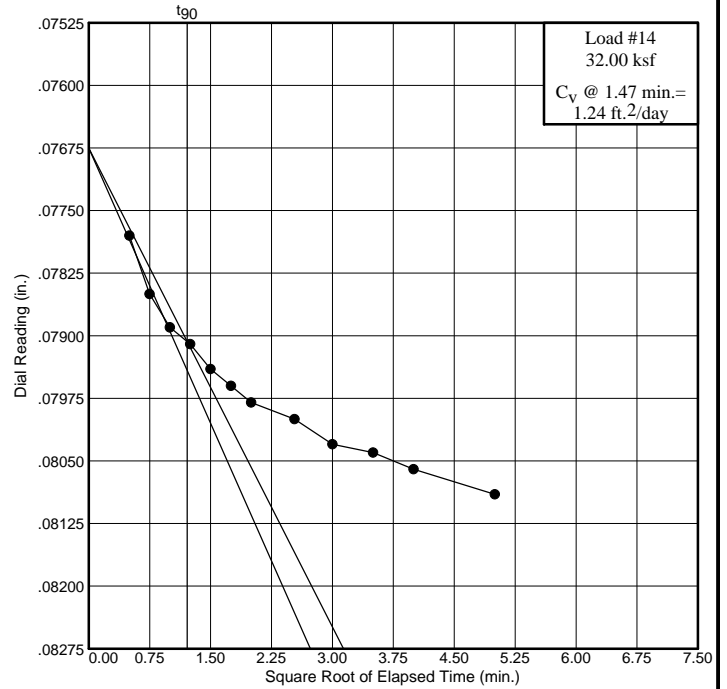
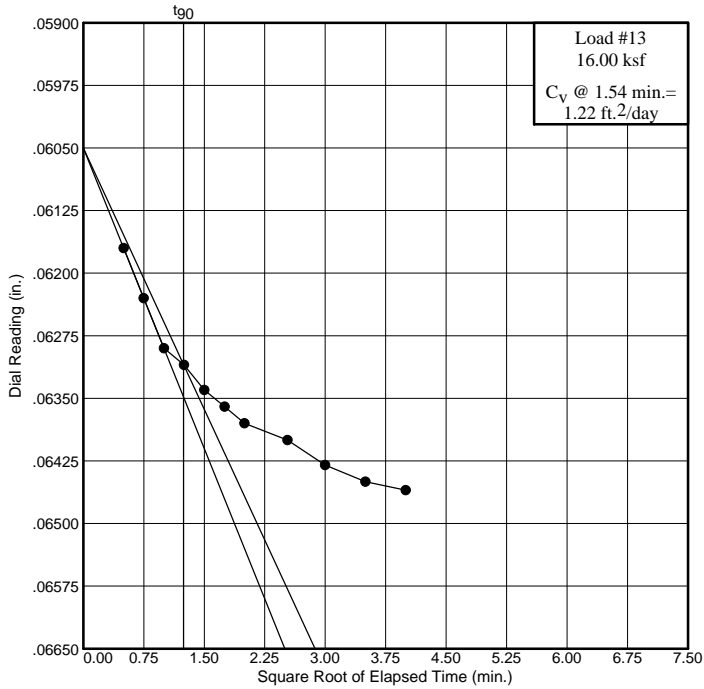
Dial Reading vs. Time

Project No.: EB135064

Project: Proposed Fairfield Inn and Suites

Vicksburg, Mississippi

Location: B-03 14' - 16'














Terracon Consultants
Ridgeland, Mississippi

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING			WATER LEVEL		Water Initially Encountered	FIELD TESTS	(HP) Hand Penetrometer	
	Auger	Split Spoon			Water Level After a Specified Period of Time		(T) Torvane	
					Water Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)	
	Shelby Tube	Macro Core		Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.			(PID) Photo-Ionization Detector	
							(OVA) Organic Vapor Analyzer	
								
Grab Sample	No Recovery							

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, tsf	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	0 - 6	Very Soft	less than 0.25	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	0.25 to 0.50	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	0.50 to 1.00	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	1.00 to 2.00	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	2.00 to 4.00	15 - 30	19 - 42
			Hard	> 4.00	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	$Cu < 4$ and/or $1 > Cc > 3$ ^E	GP	Poorly graded gravel ^F	
		Clean Sands: Less than 5% fines ^D	Fines classify as ML or MH	GM	Silty gravel ^{F,G,H}	
		Sands with Fines: More than 12% fines ^D	Fines classify as CL or CH	GC	Clayey gravel ^{F,G,H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I	
		Sands with Fines: More than 12% fines ^D	$Cu < 6$ and/or $1 > Cc > 3$ ^E	SP	Poorly graded sand ^I	
		Clean Sands: Less than 5% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G,H,I}	
		Sands with Fines: More than 12% fines ^D	Fines classify as CL or CH	SC	Clayey sand ^{G,H,I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}	
		Inorganic:	$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K,L,M}	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K,L,M,N}
		Organic:	Liquid limit - not dried		OH	Organic silt ^{K,L,M,O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K,L,M}	
		Inorganic:	PI plots below "A" line	MH	Elastic Silt ^{K,L,M}	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K,L,M,P}
		Organic:	Liquid limit - not dried		OH	Organic silt ^{K,L,M,Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$E \quad Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.

