GEOTECHNICAL INVESTIGATION

Proposed La Quinta Inn
Highway 183 & Empire Central
Dallas, Texas

PROJECT NO. 10-DG3893

Prepared for:

Y-G CONSULTANTS
Frisco, Texas

Prepared by:

GEOSCIENCE
ENGINEERING & TESTING, INC.
Dallas, Texas

January 18, 2010

GeoScience

Project No. 10-DG3893

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15043 Daneway Drive
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Geotechnical Investigation
Proposed La Quinta Inn
Highway 183 & Empire Central
Dallas, Texas

This report presents the results of the geotechnical investigation performed at the site of the proposed referenced project located in Dallas, Texas. Our engineering analysis as well as the results of our field and laboratory investigations are included in this study.

Our Construction Materials Testing Division can provide the materials testing services that will be required during the construction phase of this project. We will be pleased to discuss a scope of work and submit a proposal for these services upon request.

We appreciate the opportunity to be of assistance on this project. Please feel free to contact us if you have any questions or if we can be of further service.

Respectfully,

Geoscience Engineering & Testing, Inc.
Firm Reg # F-11285

Syed S. Afsar, P.E.
Project Manager

01/18/2010

STATE OF TEXAS
SYED S. AFSAR
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INTRODUCTION

Project Description

This report presents the results of the geotechnical investigation performed at the site of the referenced project located in Dallas, Texas. Based on the project information provided, it is our understanding that construction will consist of a "La Quinta Inn" structure and the associated parking and drive areas. Information regarding the number of stories, structural loads, grading plans and other information regarding the referenced project was not available at the time of this investigation however; we anticipate the structural loads will be from light to moderate and expect that the finished floor elevation of the proposed building will be above surrounding ground surface.

Site Description

The site of the proposed project is located on the east side of Highway 183 & Empire Central. The physical address, as provided by the Client is: 8300 John Carpenter Freeway in Dallas, Texas. At the time of this investigation, the site was a vacant tract of land, free of any existing vegetation. Based on visual observations, the site appears to be relatively flat.

The general location and orientation of the site is shown in the **Illustrations** section of this report.

Purposes and Scope of Work

The principal purposes of this investigation were to evaluate the general soil conditions at the referenced site and develop geotechnical parameters for the design and construction of the building foundation. Our scope of work included:

1). developing subsurface soil and rock stratigraphy at the boring locations;

2). evaluating soil swell potential and alternatives to reduce the soil movement;

3). providing recommendations for foundation design parameters;

4). estimating uplift pressure on drilled piers due to expansive clays

5). providing pavement recommendations and

6). providing site preparation recommendations.

Report Format

The first sections of the report describe the field and laboratory phases of the study. The remaining sections present our recommendations to guide design and preparation of plans and specifications. Boring logs and laboratory test results are presented in the **Illustrations** section of this report.

FIELD INVESTIGATION

The field portion of this investigation involved drilling and sampling a total of five (5) test borings. Three (3) test borings were drilled in the proposed building pad to a depth of 20 to 25 feet and two (2) test borings were drilled in the proposed paving area to a depth of 5 feet below existing ground surface elevations.

The approximate locations of the borings are shown on the Boring Location Plan - Plate A. Boring Logs with descriptions of the soils encountered are presented on Plates 1 through 5. Soil strata boundaries shown on the boring logs are approximate.

The borings were advanced using continuous flight augers. Undisturbed cohesive soil samples were obtained using a 3-inch diameter thin-walled tube sampler pushed into the soil. The undrained compressive strength of cohesive soils was estimated in the field using a calibrated pocket penetrometer. All soil samples were extruded from the samplers in the field, visually classified, and placed in appropriate containers to prevent loss of moisture or disturbance during transfer to the laboratory.

The borings were drilled using dry auger procedures to observe the water level (if any) at the time of the exploration. These water level observations are recorded on the boring logs.

LABORATORY TESTING

Engineering properties of the foundation soils were evaluated in the laboratory by tests performed on representative soil samples. A series of moisture content and dry unit weight determinations were performed to develop soil moisture profiles and to aid in evaluating the uniformity of soil conditions at the boring locations. Liquid and Plastic limit tests (collectively termed "Atterberg limits") tests were performed on selected samples from the borings to confirm visual classification and to evaluate soil volume change potentials. Results of these tests are presented on the boring logs.

The shear strength of the cohesive soils was estimated by field pocket penetrometer and laboratory unconfined compression tests performed on selected samples. The laboratory test results are presented on the boring logs.

Review

Descriptions of strata made in the field were modified in accordance with results of laboratory tests and visual examination in the laboratory. All recovered soil samples were examined, classified and described in accordance with ASTM D 2487, ASTM D 2488 and Unified Soil Classification procedures. Classifications of the soils and finalized descriptions of soil strata are shown on the attached boring logs.

GENERAL SUBSURFACE CONDITIONS

Stratigraphy

Based on our interpretation of the borings drilled for this investigation, the subsurface stratigraphy at this site consists of fill soils underlain by clay soils deeper underlain by shaly clay.

The subsurface stratigraphy in the deeper Borings B-1 to B-3, (drilled to a depth of 20 feet in the (proposed building pad location) consisted of tan sandy clay intermixed with gravel (FILL SOILS) encountered to a depth of 6 inches to one foot below existing ground surface. Below sandy clay, dark gray high plasticity index clay soils were encountered and remained visible to a depth of 12.5 and 14 feet, below which, gray and tan highly plastic clay soils were encountered and remained visible to a depth of 14 and 17 feet. Tan and gray highly plastic shaly clay soils were encountered at 14 and 17 feet and remained visible to the completion depths of the borings drilled.

The subsurface stratigraphy in the shallower Boring B-4 (drilled to a depth of 5 feet in the (proposed paving area) consisted of tan sandy clay intermixed with gravel (FILL SOILS) encountered to a depth of two feet below existing ground surface. Below fill soils, dark gray highly plastic clay soils were encountered and remained visible to the completion depth of the boring drilled. The subsurface stratigraphy in Boring B-5 (also drilled to a depth of 5 feet) consisted of dark gray highly plastic clay soils encountered from existing ground surface elevation to the completion depth of the boring drilled

Detailed descriptions of the subsurface stratigraphy encountered at the locations of the test borings drilled for this study are included in the **Illustrations** section of this report.

Subsurface Water Conditions

The borings were advanced using auger drilling methods in order to observe groundwater seepage levels. At the time of this investigation, subsurface "Perched" ground water seepage was encountered in Boring B-5 at a depth of 3 feet. No subsurface ground water was encountered in any of the remaining test borings drilled. It should be noted that future construction activities may alter the surface and subsurface drainage characteristics of this site. As such, we suggest re-verifying the depth to groundwater just prior to and during construction. Based on short-term observations, it is not possible to accurately predict the magnitude of subsurface water fluctuations that might occur.

ANALYSIS AND RECOMMENDATIONS

Construction Consultation and Monitoring

We recommend that GETI be given the opportunity to review the final design drawings and specifications in order to evaluate if recommendations in this report have been properly interpreted. Wide variations in soil conditions are known to exist between the borings, particularly at this site. Further unanticipated variations in subsurface conditions may become evident during construction. During excavation and foundation phases of the work, we recommend that a reputable geotechnical engineering firm be retained to provide construction surveillance services in order to 1) observe compliance with the geotechnical design concepts, specifications and recommendations, and 2) to observe subsurface conditions during construction to verify that the conditions are as anticipated, based on the findings of this investigation.

Soil Movement

The near surface clay soils at this site exhibited Plasticity Index of 34 to 52. Based on the plasticity indices, these soils are considered as *extremely highly* expansive in nature and capable of vertical movement with changes in moisture conditions. The magnitude of the moisture induced soil potential vertical rise (PVR) was calculated using the Texas Department of Transportation (method 124-E) in conjunction with current moisture profile. Based on the aforementioned method, the estimated moisture induced potential vertical movement of the soils at the time of this investigation is 3 inches at existing ground surface elevation. However, a PVR of 5 inches can be expected when dry conditions of the soils exist. Considerably more movement will occur in areas where water ponding is allowed to occur during and/or after construction.

FOUNDATION TYPE

A. Drilled and Under-reamed Piers

The structural loads can be supported by auger excavated, under-reamed, steel reinforced, cast-in-place concrete piers. These piers should extend to a depth of 18 feet below existing ground surface or final grade (whichever is deeper). The piers may be sized using an allowable net end bearing pressure of 6,000 psf. This bearing capacity includes a factor of safety greater than 2.5.

The under-reamed piers should have a bell to shaft diameter ratio ranging between 2.5 and 3 to 1. The bearing capacity should be reduced for piers closer than 3-bell diameters center-to-center.

Soil Induced Uplift Loads

The drilled shafts will be subjected to some uplift loads due to heaving in the overlying clay soils. The uplift loads can be approximated by assuming a uniform uplift of 1,600 psf over the shaft perimeter of 10 feet of the pier. The uplift pressure can be neglected for the select fill thickness if used to raise the building pad or to reduce the soil swell potential. To resist the net tensile load, the shaft must contain sufficient continuous vertical reinforcement to the full depth of the pier. Foundation piers designed and constructed in accordance with the information provided in this report will have a factor of safety in excess of 2.5 against shear type failure and will experience minimal settlement (less than one inch).

Pier Installation

The construction of all piers should be observed by experienced geotechnical personnel during construction to ensure compliance with design assumptions and to verify: (1) the bearing stratum; (2) the minimum penetration; (3) the removal of all smear zones and cuttings; (4) that groundwater seepage is correctly handled; and (5) that the shafts are vertical and within acceptable tolerance levels. Our firm is available to provide these services upon request.

Reinforcing steel and concrete should be placed immediately after the excavation has been completed and observed. In no event should a pier excavation be allowed to remain open for more than 8 hours. Concrete should be placed in such a manner to prevent segregation of the aggregates.

Subsurface conditions at the time the borings were advanced and indicate that temporary casing would not be required at the recommended pier installation depth. In the event that perched water seepage is encountered at the time of the pier drilling operations then adjustment to the pier depth may be required in order to avoid installation of the piers within the water bearing stratum.

B. Shallow Foundation

The foundation of the proposed "La Quinta Inn" can be supported by spread footings. The spread footings should be placed at a minimum depth of 4 feet from existing - or - finished ground surface elevation installed within natural soils or re-worked and density controlled fill soil. The spread footings can be designed using an allowable net bearing pressure of 2,500 psf bearing with in natural soils and 1,800 psf for moisture conditioned soils. This value includes a factor of safety of 2.5 with respect to the un-drained shear strength of the foundation soils.

Shallow foundation base may loosen during excavation; therefore, additional compaction effort may be required prior to construction of footings. Each foundation excavation should be evaluated by a geotechnical engineer from our office to ensure that the foundation bears within hard stratum. At the time of such evaluation, it may be necessary to perform compaction testing or hand penetrometer probe tests in the base of the foundation excavation to assure that the above recommendations are adhered to. It should also be noted that the edges of the spread footings may slough, in the event that such situation the size of the spread footing should be increased or the net allowable soil bearing capacity should be decreased.

Grade Beams

Grade beams should be structurally connected into the top of the piers or spread footing or spread footing pedestal and should be designed to resist the vertical movements anticipated at this site or the estimated soil vertical movement can further be reduced by various methods as mentioned in the following sections of this report.

Alternatively, the grade beam should be structurally connected into the top of the piers or shallow footing with a minimum void space of 6 inches. The void space should be provided beneath the grade beams. This void space allows movement of the soils below the grade beams without distressing the structural system. Structural cardboard forms are typically used to provide this void beneath grade beams. Cardboard forms must have sufficient strength to support the concrete grade beams during construction.

Our previous experiences indicate that major distress in the grade beams will occur if the integrity of the void box is not maintained during and after construction. The excavation that the void box lays in must remain dry. Cardboard cartons can easily collapse during concrete placement if the cardboard becomes wet. Backfill material must not be allowed to enter the carton area below grade beams and slab as this reduces the void space which underlying soils need to swell.

Floor Systems

Two types of floor systems may be considered for use at this site:

i). Suspended Floor System - The floor system of the proposed building should be structurally supported on the foundation piers and a minimum void space of 6 inches should be provided between the bottom of the slab and the underlying soils.

ii). Ground Supported Slab - A ground-supported slab may be considered for use at this site, provided the risk of some post-construction movement is acceptable. The slab may be of a grid-type grade beam and slab reinforced with conventional rebar or post tension strands type foundation system. A ground-supported slab, if used, should be designed to resist the soil swell potential anticipated at this site, or, the PVR should be reduced to a more tolerable level. An allowable net bearing capacity of 1,500 psf should be used to design the grade beam and slab bearing in the compacted and tested fill.

The potential vertical rise can be reduced to more tolerable level by the following method:

- *By Placement of select fill soils:*

In the event that a reduction in the vertical movement is planned, then the expansive clay soils should be replaced with select fill soils. The reduction in the vertical movements after the placement of select fill soils under controlled conditions is as follows:

Thickness of Select Fill (feet)	PVR Movements (± inches)
0	3.5
2	3
3	2.5
4	2
5.5	1

Select fill soils can be placed on an undercut building pad so that the existing fill soils are completely removed. It should be noted that no uncontrolled fill soils should be present underneath the select fill soils. In the event that such a situation occurs, then all the fill soils should be re- worked as per the procedures outlined in this report. Select fill soils should be placed in the building pad area in 6 to 8 inch loose lifts. Each lift should be compacted to between 95 and 100 percent of the maximum standard proctor dry density with moisture contents between optimum and 3 points above optimum. We recommend the improvements extend an additional five feet beyond the perimeter of the building pad. However, the upper one foot of the select fill soils should not be extended beyond the building line however, should be capped with on site clay soils in order to resist any seepage of the water in the underlying subgrade soils. Specifications for select fill are outlined in the **Select Fill Section** of this report.

- *Water Pressure Injection Method:*

The potential vertical movement can be reduced to more tolerable levels by water pressure injection method. Water pressure injection of the subgrade soils should be performed to a depth of 10 feet from finished grade elevation to pre-swell the subsurface soils and reduce future vertical movements prior to the construction of the building foundations. We recommend the improvements extend an additional five feet beyond the perimeter of the building pad and include areas sensitive to soil swell potential. The number of injections required generally depends on: a). the rate at which the soils absorb water, b). the initial moisture condition and hardness of the soils, and c). the amount of reduction that is desired and tolerable of the slab foundations. Upon completion of water pressure injection, post-injection testing will be required to ensure that the swell potential of the soils is adequately reduced for the design of the slab foundations. The upper 2 feet, or the plumbing line depth (whichever is deeper) of the building pad area should be sealed with on-site soils stabilized with 6 percent of lime or with off-site select fill soils placed in controlled lifts. The general intent for additional thickness of select fill is to avoid plumbing trenches penetrating the water injected subgrade and causing it to dry out or lose moisture content. We recommend the improvements extend an additional five feet beyond the perimeter of the building pad. However, the upper one foot of select fill soils should not be extended beyond the building line but rather should be capped with on-site highly plasticity index clay soils in order to resist any seepage of water in the underlying subgrade soils.

Construction of the building slab should start shortly upon completion of the injection process. In the event that construction is prolonged, then we recommend that the surface of the injected soils be kept moist and adequately covered during the waiting period. Moisture loss of the water-injected soils should not be allowed to occur between the time the injection procedures are completed and the start of the construction. To limit the evaporation of water occurring in the building pads areas, we recommended periodic wetting. A net allowable soil bearing capacity of 1,500 psf should be used in designing the grade beam and slab.

Recommendations for water injection are included in the **Appendix Section** of this report.

- *By moisture conditioning of the sub-grade soils (Mechanical Means)::*

Remove the subgrade soils to a depth of 10 feet from finished grade elevation and stockpile. The exposed soils should then be scarified, watered as needed and compacted to 95 and 100 percent of maximum dry density with moisture content between optimum and 4 points above optimum The previously removed fill soils should be placed back in the building pad area in 6 to 8 inch loose lifts. Each lift should be compacted to between 93 and 98 percent of the maximum standard proctor dry density with moisture contents between 4 and 7 points above optimum. The upper 2 feet, or the plumbing line depth (whichever is deeper) of the building pad area should be sealed with on-site soils stabilized with 6 percent of lime or with off-site select fill soils placed in controlled lifts. The general intent for additional thickness of select fill is to avoid plumbing trenches penetrating the water injected subgrade and causing it to dry out or lose moisture content. We recommend the improvements extend an additional five feet beyond the perimeter of the building pad. However, the upper one foot of select fill soils should not be extended beyond the building line but rather should be capped with on-site highly plasticity index clay soils in order to resist any seepage of the water in the underlying subgrade soils.

PTI Parameters

The following assumptions were made in calculating the "PTI" values using the PTI Manual, "Volflo" software program and engineering judgments:

- Suction Profile: Dry Design Envelope
- Horizontal Barrier: None
- Vertical Barrier: 2 feet
- Constant Suction: 3.6 pf
- Fabric Factor: 1
- Depth to Constant Suction: 7 feet
- Edge moisture variation distance for center lift (e_m): 5.5 feet
- Edge moisture variation distance for edge lift (e_m): 4.5 feet
- Allowable bearing pressure: 1,500 psf for moisture conditioned soils and compacted and tested fill.

Based on the aforementioned assumptions, the estimated PTI differential movements (y_m) are as follows:

	DIFFERENTIAL SWELL (y_m) (inches)	
CONDITION	Center Lift	Edge Lift
Slab on moisture conditioned/water injected subgrade in conjunction with select fill	2.5	1.4
Slab on 5.5 feet of select fill soils	2.5	1.3
Slab on natural soils	4.2	1.7

Building Pad Preparation

Prior to placing any fill material, all existing fill soils should be removed and disposed of off-site.

If a suspended floor system is planned, the site may then be filled (if additional fill is required) to grade using a suitable fill, free from deleterious matter. If use of a ground supported floor system is intended - or - if a reduction in the vertical soil movement is planned, then the use of select fill soils or moisture conditioning or water pressure injection of the subgrade soils is recommended. Both methods are described in detail in previous sections of this report.

Select Fill

"Select fill," as referred to in this report, should consist of clayey sands free of organic materials and have a Plasticity Index between 4 and 15, a Liquid Limit of 35 or less and between 25 and 45 percent passing a No. 200 sieve. Placement and compaction of the select fill should be performed in accordance with the "Site Preparation" section of this report. The provision of a subsurface drainage system will be required in areas where the select fill is placed below the surrounding ground surface.

PAVEMENT AND SUBGRADE

Concrete Pavement

The following concrete pavement sections are recommended for use at this site:

	Thickness (inches)
Light Traffic	
Portland Cement Concrete	5
Minimum Lime Stabilized Subgrade	6
Heavy Traffic	
Portland Cement Concrete	6
Minimum Lime Stabilized Subgrade	6

Prior to the placement of any fill soils, we recommend all surface vegetation be removed and disposed of off-site. On site soils can be used in the event additional fill soils are required. The fill soils should be placed as per the procedure outlined in the building pad preparation section of this report.

The upper six inches of subgrade soils should be stabilized with lime. We estimate approximately 6 to 8 percent of hydrated lime will be required to stabilize the subgrade soils (to reduce the plasticity index to 15 or less). It should be noted that after the final grade is complete, the actual amount of lime required should be calculated by lime series test in the laboratory.

In the event that lime stabilization is not economically feasible, then the concrete thickness should be increased by an additional one inch. In the event the limestone is encountered then, lime stabilization to the subgrade soils is not required.

Some differential movement in the pavement is anticipated over time due to the swelling of the subgrade clays at this site. Design of the concrete pavement should specify a minimum 28-day concrete compressive strength of 3000 psi with 4 percent to 6 percent entrained air. The concrete should be placed within one and one-half hours of batching. During hot weather, the concrete placement should follow ACI 311 Hot Weather concreting and in no case should the concrete temperature be allowed to exceed 95°F. To avoid excessive heat periods, consideration should be given to limiting concrete placement to a time of day that will minimize large differences in the ambient and concrete temperature.

Past experience indicates that pavements with sealed joints on 15 to 20-foot spacings, cut to a depth of at least one-quarter of the pavement thickness, generally exhibit less uncontrolled post-construction cracking than pavements with wider spacings. As a minimum, expansion joints should be used wherever the pavement abut a structural element subject to a different magnitude of movement, e.g., light poles, retaining walls, existing pavement, building walls, or manholes. After construction, the construction and expansion joints should be inspected periodically and resealed, if necessary. The pavement should be reinforced using at least No. 3 bars, 24 inches on center, each way.

ADDITIONAL DESIGN CONSIDERATIONS

The following information has been assimilated after examination of numerous projects constructed in similar soils throughout the area. If these features are incorporated in the overall design of the project, the performance of the structure should be improved.

1) Any structural floor system should have the underlying exposed soils graded to drain to a collection point where the water is channeled away from the structure. We further recommend that any step-down, below grade walls, etc., be provided with suitable dewatering devices to reduce accumulated water.

2) Roof drainage should be collected by a system of gutters and downspouts and channeled by pipe to a storm drainage system or paved surface area where the water can drain away without entering the building subgrade.

3) Sidewalks should not be structurally connected to the building. They should be sloped away from the building so that water will drain away from the structure.

4) The general ground surface should be sloped away from the building on all sides so that water will always drain away from the structure. Water should not be allowed to pond near the building after the slab has been placed.

5) Every attempt should be made to limit the extreme wetting or drying of the subsurface soils since swelling and shrinkage will result. Standard construction practices of providing good surface water drainage should be used. A positive slope of the ground away from the foundation and ditches or swales provided to carry off the runoff water both during and after construction is necessary.

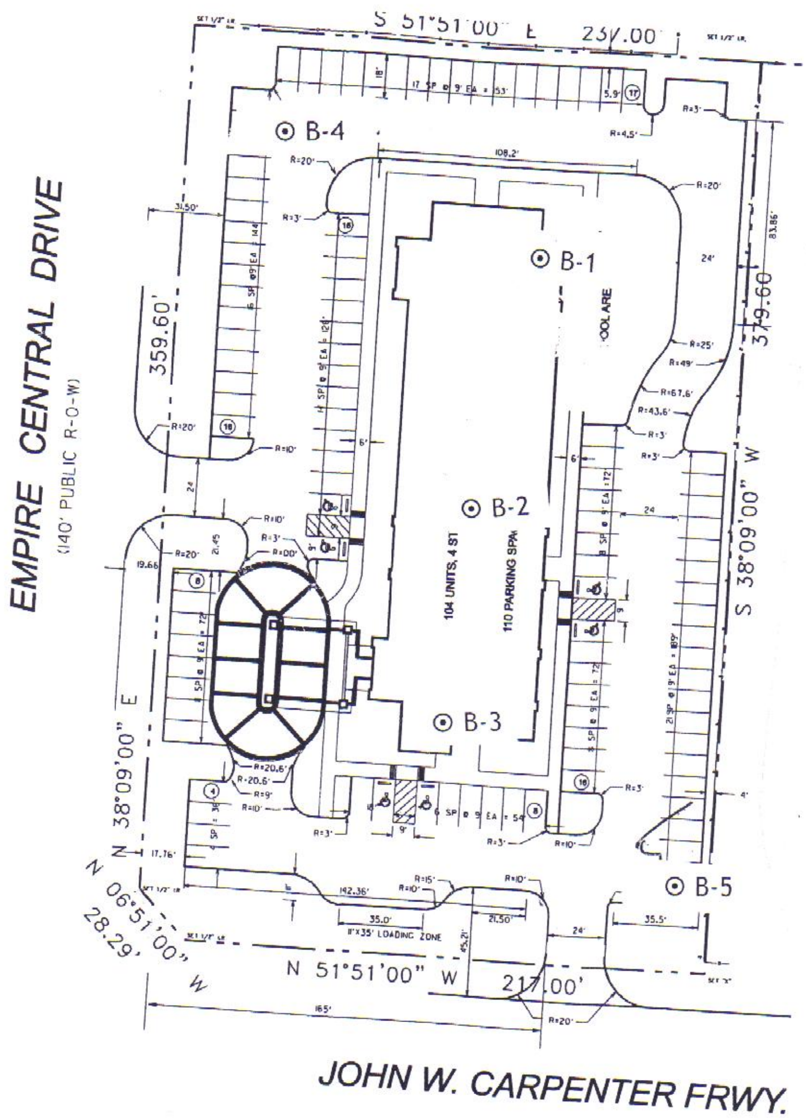
CLOSURE

It should be noted that some variations in soil and moisture conditions may exist between boring locations. Statements in this report as to subsurface variations over given areas are intended as estimations only, based upon the data obtained from specific boring locations.

The professional services, which form the basis for this report, were conducted with the same degree of care and skill ordinarily exercised, under similar circumstances, by other reputable geotechnical engineers practicing in the same locality. No other warranty, expressed or implied, is made as to the professional advice set forth.

The results, conclusions, and recommendations contained in this report are directed at, and intended to be utilized within the scope of work outlined in this report. The report is not intended for use in any other manner. *Geoscience Engineering and Testing, Inc.*, makes no claim or representation concerning any activity or condition falling outside the specified purposes for which this report is directed; said purposes being specifically limited to the scope of work as defined herein. Inquiries regarding scope of work, activities and/or conditions not specifically outlined herein, should be directed to *GETI*

ILLUSTRATIONS



⊙ Approximate Boring Location

BORING LOCATION PLAN
Proposed La Quinta Inn
Highway 183 & Empire Central
Dallas, Texas

GETI Project No. 10-DG3893

Plate A

LOG OF BORING NO. B-1

Proposed La Quinta Inn
Highway 183 & Empire Central
Dallas, Texas

Project No. 10-DG3893

Location: See Location Plan
Surface Elevation: Unknown
Drilling Method: Continuous Flight Auger & Intermittent Sampling
Date Boring Drilled: 01/10/10
Completion Depth: 20 feet
Groundwater Information:
Seepage Encountered During Drilling: None
Upon Completion: Dry

FIELD DATA						LABORATORY DATA							
DEPTH (ft.)	SOIL & ROCK SYMBOL / SAMPLE TYPE	P: HAND PEN., TSF T: THD, BLOWS/FT. N: SPT, BLOWS/FT.	STRATUM DEPTH (FT.)	DESCRIPTION OF STRATUM		WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNIT DRY WEIGHT (PCF)	UNCONFINED STRENGTH (TSF)	% PASSING NO. 200 SIEVE	SOIL SUCTION TEST (TOTAL CM. OF WATER)
0		P2.6	1	Tan SANDY CLAY (CL) intermixed with GRAVEL - FILL		32				92			
		P2.8		Dark gray CLAY (CH)		33	82	30	52				
5		P1.8				33				91	1.0		
		P2.0				30							
10			13										
		P4.2		Gray and tan CLAY (CH)		24	72	26	46				
15			17										
		P2.9		Tan and gray SHALY CLAY (CH)									
20			20			26	75	28	47	97	1.6		
25													
30													

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS:

LOG OF BORING NO. B-2

Proposed La Quinta Inn
Highway 183 & Empire Central
Dallas, Texas

Project No. 10-DG3893

Location: See Location Plan
Surface Elevation: Unknown
Drilling Method: Continuous Flight Auger & Intermittent Sampling
Date Boring Drilled: 01/10/10
Completion Depth: 25 feet
Groundwater Information:
Seepage Encountered During Drilling: None
Upon Completion: Dry

FIELD DATA / DESCRIPTION OF STRATUM

STRATUM DEPTH (FT.)	DESCRIPTION OF STRATUM
1	Tan SANDY CLAY (CL) intermixed with GRAVEL - FILL
14	Dark gray CLAY (CH)
17	Gray and tan CLAY (CH)
25	Tan and gray SHALY CLAY (CH)

DEPTH (ft.) (approx.)	SAMPLE TYPE	P: HAND PEN., TSF / T: THD, BLOWS/FT. / N: SPT, BLOWS/FT.
0-2	Tube	P2.5
2-4	Tube	P2.5
4-6	Tube	P3.3
8-10	Tube	P3.0
13-15	Tube	P4.5+
18-20	Tube	P4.5+
23-25	Tube	P4.5+

LABORATORY DATA

DEPTH (ft.) (approx.)	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNIT DRY WEIGHT (PCF)	UNCONFINED STRENGTH (TSF)	% PASSING NO. 200 SIEVE	SOIL SUCTION TEST (TOTAL CM. OF WATER)
0.5	26							
2.5	28	77	26	51	96	1.5		
4.5	25							
9.5	27	80	30	50				
15	24							
20	24							
25	22	68	24	44	99	2.1		

Sample type legend: TUBE SAMPLE | AUGER SAMPLE | SPLIT-SPOON | ROCK CORE | THD CONE PEN. | NO RECOVERY

REMARKS:

LOG OF BORING NO. B-3

Proposed La Quinta Inn
Highway 183 & Empire Central
Dallas, Texas

Project No. 10-DG3893

Location: See Location Plan
Surface Elevation: Unknown
Drilling Method: Continuous Flight Auger & Intermittent Sampling
Date Boring Drilled: 01/10/10
Completion Depth: 20 feet
Groundwater Information:
Seepage Encountered During Drilling: None
Upon Completion: Dry

DEPTH (ft.)	SOIL & ROCK SYMBOL	SAMPLE TYPE	P: HAND PEN., TSF T: THD, BLOWS/FT. N: SPT, BLOWS/FT.	STRATUM DEPTH (FT.)	DESCRIPTION OF STRATUM	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNIT DRY WEIGHT (PCF)	UNCONFINED STRENGTH (TSF)	% PASSING NO. 200 SIEVE	SOIL SUCTION TEST (TOTAL CM. OF WATER)
0				0.5	Tan SANDY CLAY (CL) intermixed with GRAVEL - FILL								
			P3.5		Dark gray CLAY (CH)	23	56	22	34	96			
			P1.8			29	65	24	41				
5			P2.2			29							
			P3.5			20							
10													
				12.5	Gray and tan CLAY (CH)								
				14	Tan and gray SHALY CLAY (CH)								
15			P2.8			29	69	25	44				
			P4.5+										
20				20		23				98	1.8		
25													
30													

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS:

LOG OF BORING NO. B-4

Proposed La Quinta Inn
Highway 183 & Empire Central
Dallas, Texas

Project No. 10-DG3893

Location: See Location Plan
Surface Elevation: Unknown
Drilling Method: Continuous Sampling
Date Boring Drilled: 01/10/10
Completion Depth: 5 feet
Groundwater Information:
Seepage Encountered During Drilling: None
Upon Completion: Dry

DEPTH (ft.)	SOIL & ROCK SYMBOL	SAMPLE TYPE	P: HAND PEN., TSF T: THD, BLOWS/FT. N: SPT, BLOWS/FT.	STRATUM DEPTH (FT.)	DESCRIPTION OF STRATUM	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNIT DRY WEIGHT (PCF)	UNCONFINED STRENGTH (TSF)	% PASSING NO. 200 SIEVE	SOIL SUCTION TEST (TOTAL CM. OF WATER)
0			P2.9	2	Tan SANDY CLAY (CL) intermixed with GRAVEL - FILL	10	31	16	15				
			P2.0		Dark gray CLAY (CH)	31				90	0.6		
5			P2.0	5		32							
10													
15													
20													
25													
30													

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS:

LOG OF BORING NO. B-5

Proposed La Quinta Inn
Highway 183 & Empire Central
Dallas, Texas

Project No. 10-DG3893

Location: See Location Plan
Surface Elevation: Unknown
Drilling Method: Continuous Sampling
Date Boring Drilled: 01/10/10
Completion Depth: 5 feet
Groundwater Information:
Seepage Encountered During Drilling: 3 ft
Upon Completion: Dry

FIELD DATA						LABORATORY DATA							
DEPTH (ft.)	SOIL & ROCK SYMBOL	SAMPLE TYPE	P: HAND PEN., TSF T: THD, BLOWS/FT. N: SPT, BLOWS/FT.	STRATUM DEPTH (FT.)	DESCRIPTION OF STRATUM	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNIT DRY WEIGHT (PCF)	UNCONFINED STRENGTH (TSF)	% PASSING NO. 200 SIEVE	SOIL SUCTION TEST (TOTAL CM. OF WATER)
0		Tube	P1.5		Dark gray CLAY (CH)	33							
		Tube	P1.5		▽	36	74	26	48	86			
5		Tube	P0.5	5		41							
10													
15													
20													
25													
30													

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS:

APPENDIX

WATER PRESSURE INJECTION GUIDELINES

Purpose

The purpose of water pressure injection is to obtain a relatively uniform, moist, stable zone of soil beneath the building pad at this site. Due to the extreme variations in the quality of injection subcontractors, water pressure injection is not recommended as a stabilization technique unless a full-time laboratory inspector of *Geoscience Engineering & Testing, Inc.* is retained.

Material

A nonionic surfactant (wetting agent) should be used according to the manufacturer's recommendations, but in no case should proportions be less than one part (undiluted) per 3,500 gallons water.

Application

1. Provide injection work after the subgrade has been undercut to the desired depth and prior to fill placement, installation of underground utilities and pavement.

2. Injection vehicle should have injection pipes spaced on 5-foot centers, and each injection pipe should be capable of exerting a minimum penetration force of 1,000 psi. Force injection pipe into the soil; do not wash down by scouring action of fluid. Furnish track-mounted injection vehicle in order to traverse the ground under its own power, or if rubber tire-mounted vehicle is used, provide a track-mounted machine where necessary to pull injection vehicle through mud.

3. Continue injection of fluid until refusal at all probes (i.e., until soil will not take any more and fluid is running freely on the surface, either out of previous injection holes or has fractured the ground in several places around refusal. If this occurs around any probe, cut this probe off so that water can be properly injected through the remaining probes until refusal occurs for all probes.

4. Injection pipes should penetrate the soil in approximately 12-inch intervals, injecting to refusal at each interval to the recommended depth.

5. Lower portion of injection pipe should consist of a hole pattern that will uniformly disperse fluid throughout the entire depth. Injection vehicle should be fitted with individual cutoff valves for each probe. At each 12-inch interval, each valve should be cut off and on to assure that each probe is not blocked and that injection fluid is flowing. If one of two probes is blocked, cut the others off so that the added pressure will clear out the blockage.

6. Do not exceed five feet on center each way for injection spacing. Each consecutive injection should be five feet in center and spaced 1-1/2 feet offset in two orthogonal directions from the previous injection.

7. Adjust injection pressures to inject the greatest quantity of fluid possible within a pressure range of 50 to 100 psi. In order to assure that pressure is within this specified range, equip each injection vehicle with an accurate pressure gauge attached to the manifold (the pipefitting on which the probe valves are attached).

8. Extend injection three feet outside the edge of the building pad.

9. The water pass should penetrate the soil in approximate 12-inch intervals, injecting to refusal at each interval to the recommended depth.

10. At a minimum, three water injections should be performed prior to testing.

11. The swell potential, moisture content, and other soil properties will be evaluated to determine acceptance of injected areas. The test results should be used to determine if additional water injections are required.

12. Repeat injections with water and surfactant five feet on center. Each consecutive water and surfactant injection should extend to the depths as described previously in this report.

13. A minimum of 24 hours should elapse between each injection application in any one area to allow for moisture absorption.

Observations

1. A full-time laboratory technician should be present throughout the injection operations. Undisturbed samples should be obtained at every one-foot interval to the total injected depth from two test holes per each lot. Adjustments in the testing program should be at the discretion of the testing engineer.

2. A minimum of three free swell tests should be performed per test hole. Samples will be tested at the approximate overburden pressure of the sample depth.

3. Minimum of one boring should be required for every 5,000 square foot to verify that potential vertical rise is reduced to approximately one inch.