GEOTECHNICAL INVESTIGATION
PROPOSED 3-STORY TOWNHOMES
3614 MOUNT PLEASANT
HOUSTON, TEXAS

REPORT TO:

SCANNER, INC.
HOUSTON, TEXAS

BY

BANDY & ASSOCIATES, INC.
TX Reg. No. F-10373
HOUSTON, TEXAS

JUNE 2022

Bandy & Associates, Inc.
Geotechnical, Environmental and Construction Materials Consultants

June 22, 2022
Report No. 122179

Scanner, Inc.

Attn: Mr. Edgar Shaknazarian

GEOTECHNICAL INVESTIGATION
PROPOSED 3-STORY TOWNHOMES
3614 MOUNT PLEASANT
HOUSTON, TEXAS

We have completed our Geotechnical Investigation of the above referenced property. The findings of our work, together with conclusions and recommendations are presented in the attached report. This study was authorized by Mr. Edgar Shaknazarian.

Bandy & Associates, Inc. also provides Material Testing Services (soil compaction, concrete, masonry, steel, etc.) required during construction and would be happy to assist you in this area. Attached, please find our Schedule of Fees for Material Testing Services along with a Contract Agreement form.

We will be happy to answer any questions concerning this report. It has been a pleasure working with you on this project.

Very truly yours,
BANDY & ASSOCIATES, INC.
TX Reg. No. F-10373

S. S. Bandy, Ph.D., P.E.
TX P.E. No. 51575
President

SSB/mh
Attachment

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GEOTECHNICAL INVESTIGATION
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1.0 INTRODUCTION

This report presents field and laboratory data and recommendations for the design and construction of the foundation of the proposed structure. One (1) copy of the report is being transmitted herewith.

The purpose of this investigation was to determine the various soil profile components, the engineering characteristics of the sub soils at the site and to develop recommendations for designs of the foundations and pavements.

The scope of the exploration and analysis included the subsurface exploration field and laboratory testing and engineering analysis and evaluation of the subsurface materials.

The soils engineer warrants that the findings, recommendations, specifications, or professional advice contained herein, have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the field of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

This report shall not be reproduced except in full, without the written approval of Bandy & Associates, Inc.

2.0 FIELD EXPLORATION

Subsurface conditions at the site were defined by one (1) undisturbed sample boring, B-1, located in plan as shown on Plate 1.

The boring was drilled to a depth of twenty-five feet (25') below the existing ground surface. The soils encountered are shown on the log of boring, Plate 2. Where possible, undisturbed samples were obtained using thin-walled Shelby tube samplers in general accordance with the procedure outlined in ASTM D-1587. In cohesionless soils, the standard penetration test and split-barrel sampling were conducted simultaneously using ASTM Specification D-1586 as a guide. Depth to water was measured in open boreholes after completion of drilling and when possible at different intervals during the field operation. Unless notified to the contrary, all samples will be disposed of after sixty (60) days after submittal of this report.

3.0 LABORATORY TESTING PROGRAM

Classification tests consisting of liquid and plastic limits, percent fines and moisture content determinations were performed to evaluate general uniformity of the soil conditions and shrink-swell potential of these soils. Results of these tests are tabulated on the boring logs at respective sample depth.

Undrained shear strength properties of cohesive soils were defined by unconfined compression tests on undisturbed samples. Results of these tests are tabulated on the boring logs.

All phases of the laboratory-testing program were conducted in general accordance with applicable ASTM Specifications.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 General

The stratification of the soils, as shown on the boring logs, represents the soil conditions in the actual boring locations, and other variations may occur between the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual. Should conditions be found to vary between boring locations during construction, Bandy & Associates, Inc. should be contacted to review recommendations and revise them, if necessary.

4.2 Description of Foundation Materials

The surface of the proposed construction site is presently covered with very stiff gray to gray, yellow, tan and red sandy clay, continuing to completion depth of the boring. The sandy clay stratum is high in plasticity with Liquid Limits of 62 to 65 and Plasticity Indices of 36 to 43. Moisture content ranges from 27 to 34 percent.

4.3 Groundwater Observation

No groundwater was encountered in open borehole during the time of drilling.

5.0 ANALYSES AND RECOMMENDATIONS

5.1 Foundation Type and Depth

Various foundation types have been considered for the support of the proposed structure. The foundation types considered include conventional spread and continuous wall footings and underream footings.

Slab-on-grade with grade beam foundation and spread footings are generally economical when the existing soil conditions allow them to be founded at shallow depths. Due to presence of high plasticity soils at shallow depths at this site, shallow footings may experience heave and settlement due to moisture variations in the soil and are not considered practical for the support of the structure.

Underream footings are used most advantageously when relatively soft or expansive strata overlie a firm to stiff foundation material. Soil conditions at the boring locations and the magnitude of the proposed loads indicate that underream footings can also be used. It is recommended that **underream footings be founded at depths of seven feet (7') below finished grade (bottom of floor slab).** An engineering technician from Bandy & Associates, Inc. must be present at the time of drilling of piers to certify proper installation of piers, as per City of Houston's regulation. Concrete should be placed in the drilled holes immediately after excavation to reduce the risk of groundwater seepage, deterioration of the foundation bearing surface and underream collapse. In addition to perimeter underream footings, high interior loads, if needed, can also be supported on additional underream footings placed within the building area.

5.2 Allowable Bearing Values

The field and laboratory strength data were utilized to determine allowable soil loading as a function of foundation shape and depth. Analyses indicate that underream footings can be dimensioned for net allowable bearing capacities of 3000 psf.

The bearing capacity can be increased by 15 percent for transient loads. For underream footings, a shaft to bell ratio of 1:2 to 1:3 is recommended. Bell diameter larger than sixty-six inches (66") is discouraged due to possibility of sloughing and caving problems after completion of drilling. **Underream footings should not be spaced closer than two (2) underream diameters (edge to edge) based on the diameter of the larger underream.** If a clearance of two bell diameter cannot be maintained in every case, the above bearing capacities should be reduced by 25 percent for a clearance between one and two bell diameters. Drilled footings closer than a clearance of one bell diameter are not recommended. The uplift force on the piers, due to swelling of the expansive clays, can be approximated by assuming a uniform uplift pressure of 1000 psf acting over the perimeter of the shaft. The shafts should contain enough full-length reinforcing steel to resist uplift forces.

Foundations proportioned in accordance with the above value will have a factor of safety greater than two with respect to shear failure. Footing weight below final grade can be neglected in the determination of design loading. It is estimated that underream footings will experience total settlements of less than 1.0-inch after construction.

For underream footings, **allowable** uplift capacity (Factor of Safety = 2.0) can be computed from the following equation if ratio of pier depth to bell diameter is equal or greater than 1.5.

$$Q_u = 5.2C\ (D^2 - d^2)$$

Where:

Q_u	=	**Allowable** uplift capacity
C	=	Shear strength of soil = 800 psf
D	=	Diameter of bell in feet
d	=	Diameter of shaft in feet

Because of the potential for the upper two feet of the soil to shrink and pull away from drilled piers during dry periods, we recommend soil resistance to lateral loads on drilled piers be ignored in the upper 2-feet of the soil profile. For resistance of lateral loads on drilled piers, we recommend the following parameters that include a factor of safety of 2.

Depth (ft)	Soil Type	Effective Soil Unit Weight (pcf)	Allowable Cohesion (psf)	Angle of Internal Friction,Φ (degrees)	Strain at ½ Peak Strength, ε_{50}	Horizontal Modulus of Subgrade Reaction (tons per cubic foot)
0 – 2	Sandy Clay	115	0	0	N/A	N/A
2– 25	Sandy Clay	115	800	0	0.01	85

5.3 Floor Slab

Expansive soils can cause heave and structural distress of floor slab and grade beams even though these structural elements are connected to deeper drilled footings. Potential movement of expansive soils must be considered to evaluate foundation requirements and subgrade preparation in floor slab areas that are supported at grade.

Results of our computations indicate that subsoils can have a potential vertical rise (PVR – TXDOT Method Tex-124-E) of approximately 2.5-inches. To reduce potential upward movement of the floor slab, it is recommended that the floor slab be supported on at least thirty-six inches (36") of low plasticity select fill. Care must be taken so that all excavations made for the foundations are properly backfilled with suitable material compacted in accordance with the procedures outlined hereafter. Before the backfill is placed, all water and other loose debris should be removed from these excavations. We do not recommend cardboard void boxes under the floor slab or beams.

Prior to the placing of concrete floors or pavements on this site, or before any floor-supporting fill is a placed, all organic root and debris must be removed.

The required thirty-six inches (36") of select fill under the floor slab, as well as any additional fill used to increase the elevation of floor slab, should be a non-expansive material with Liquid Limit less than 40 and Plasticity Index between 8 and 20. The fill should be placed in layers of not more than nine inches (9") in loose thickness and compacted to six inches (6") in thickness with density of at least 95 percent of standard Proctor (ASTM D-698). Moisture content of the fill should not be less than two points below optimum value nor more than three points above the optimum value. An impervious membrane should be provided as vapor barrier beneath the slab.

5.4 Seismic Design Parameters

A. Site Classification: D

B. Soil Classification: --

C. Poisson's Ration: 0.5

D. Shear Modulus: 5 to 15 ksi

E. Young's Modulus: 10 to 30 ksi

F. Bulk Modulus: 600 to 700 ksi

G. Shear Wave Velocity: 400-500 ft./sec.

H. Compression Wave Velocity: 5000 ft./sec.

I. Spectral Response Coefficient:

$S_{DS} = 0.13$ g

$S_{D1} = 0.10$ g

J. Liquefaction Potential: None

5.5 Drainage

The upper portion of utility excavations should be backfilled with properly compacted clayey soils to minimize infiltration of surface water. A clay "plug" should be provided on the exterior of the building by extending the top compacted clay layer five feet (5') to prevent water from gaining access to the subgrade beneath the structure.

All grades must be adjusted to provide positive drainage away from the structure. Where paving or flatwork abuts the structure, care should be taken that the joint is properly sealed and maintained.

Roof drains should discharge on pavement or be extended away from the structure. Ideally, roof drains should discharge to storm sewers by closed pipe.

The absence of landscaping immediately adjacent to the building removes a common trigger for changes in moisture content. Landscaping should be selected with an appreciation of its impact on the moisture regime of the building pad. Trees or other shrubbery with high water needs should be located no closer to the edge of the prepared building pad than a distance equal to the mature height of the tree or landscaping. Irrigation systems are effective in maintaining moisture balance for small shrubbery and grass cover but do not provide sufficient moisture for mature trees. Irrigation systems can be contributors to distress when accumulation of water results or when excess watering is performed.

A remaining water source that could promote movement is from building utilities. The impacts of potential utility leaks can be lessened although not fully removed by selection of pipe bedding, pipe backfill and building pad fill material that does not readily promote water movement. The most effective way to reduce the impact of utility leaks is to repair the leak when it develops. Bedding and backfill for the below-slab utilities located within 10 feet of the building should be cement-stabilized sand or homogenous lean clay meeting the requirements for structural fill as outlined herein.

Two options are available to retard infiltration of water from exterior sources traveling along utility trenches and entering the building footprint. The first option includes installation of a bentonite seal away from the building within each utility trench that enters the building footprint. The second option is to create a cement-stabilized sand plug within each utility trench that enters the building footprint.

If bentonite is used, the seal should be about 1-foot thick and should extend the full width and depth of the trench (perpendicular to pipe orientation). The purpose of the seal is to create a barrier so water cannot flow from the building exterior, through the utility trench material and into the soils below the building footprint. The bentonite seal should not be located immediately adjacent to or under grade beams and should not be located within the footprint of the building. We recommend that the seal be located 5 feet outside of the building to assure that bentonite is not placed adjacent to or under grade beams.

If cement-stabilized sand is used, the cement-stabilized sand plug should extend for 5 feet outside of the building and 5 feet inside the building, for a total plug length of 10 feet within each trench. The cement-stabilized sand should extend the full width and depth of the trench (perpendicular to pipe orientation).

5.6 Pavement Design for Parking Area

It is anticipated that traffic will mainly consist of passenger cars and light trucks. Thickness of the pavement will depend on the magnitude of axle load and number of repetitions. Accordingly, rigid and flexible pavement sections are presented for different classes of passenger traffic. Due to presence of high plasticity soils, the upper six inches (6") of subgrade may be stabilized with six percent (6%) Lime by dry weight (28 lbs./square yard of surface area) and stabilized soil must be compacted to 95 percent of its Standard Proctor density. After mixing lime, allow the mixture to cure for 2-4 days and then resume mixing until a homogeneous friable mixture is obtained. If the subgrade is not stabilized, design life of the pavement will be reduced to ten (10) years.

Asphalt Pavement

		Traffic Classification		
		5000*	15,000*	30,000*
A.	Wearing Course Hot Mixed Asphalt Concrete, Surface Course (Inches)	3.0	3.0	3.0
B.	Base Course Hot Mixed Asphalt Concrete, Base Course (Inches)	5.0	6.5	8.0
C.	Subgrade Lime Stabilized Subgrade (Inches)	6.0	6.0	6.0

Concrete Pavement

	5000*	15,000*	30,000*
Concrete Pavement Thickness (Inches)	6.0	7.0	8.5
Subgrade: Lime Stabilized Subgrade (Inches)	6.0	6.0	6.0

***Gross vehicle weight in pounds.**

These sections were developed only for passenger cars and light trucks using design procedures developed by the Portland Cement Association and the Asphalt Institute and an estimated CBR subgrade value of 5. For traffic consisting of heavy tractor-trailer trucks, pavement sections recommended above should not be used. Instead, in addition to stabilized subgrade, a base course of crushed limestone base, at least eight inches (8") in thickness and total asphalt thickness of fourteen inches (14") or total concrete thickness of ten inches (10") should be used.

A design life other than 20 years or the attainment of a higher CBR subgrade support value may result in slightly different pavement sections. These should be reviewed on a case-by-case basis. Pavements subjected to extremely heavy loads or unusual traffic conditions, such as industrial storage areas, should also be designed on an individual basis. Should you desire an individual pavement design to satisfy specific conditions such as those mentioned above, please contact us.

Large front-loading trash dumpsters frequently impose concentrated front-wheel loads on pavements during loading. This type of loading typically results in rutting of the pavement and ultimately, pavement failures. Therefore, we recommend that the pavement in trash pickup areas consist of a 7-inch thick, reinforced concrete slab. Concrete with a minimum 28-day compressive strength of 3500 psi should be used for entire parking area.

Concrete pavement slabs should be provided with adequate steel reinforcement. Proper finishing of concrete pavements requires the use of sawed and sealed joints, which should be designed in accordance with current Portland Cement Association or American Concrete Institute (ACI) guidelines. The paving should be reinforced with #4 bars at 15-inches center-to-center each way. Suggested longitudinal and transverse joint spacing for concrete paving is 15-feet. The expansion joint spacing is approximately 80-feet. Steel used for reinforcements should be grade 60. Dowel bars should be used to transfer loads at the transverse joints.

Related civil design factors such as drainage, cross-sectional configurations, surface elevations and environmental factors, which will significantly affect the service life, must be included in the preparation of the construction drawing and specifications. Normal periodic maintenance will be required.

5.7 Site Preparation

Structural fill under building areas should be selected with respect to plasticity characteristics. Sandy clay with a liquid limit not greater than 40 and plasticity index between 8 and 20 will be suitable for select impervious fill. The recommended earthwork construction procedures under building and paving areas are as follows:

1. Remove all organic soils to a depth of at least six inches.
2. Proofroll structural and pavement areas with a loaded dump truck or heavy roller in the presence of an engineering technician from Bandy & Associates, Inc. **If no pumping is encountered and proofroll inspection passes, skip Item 3 and go directly to Item 4 of this section.**
3. **Only if pumping is encountered during proofroll inspection, the upper two to four feet (2'-4') of soil may be removed first, followed by mixing of upper twelve inches (12") of exposed subgrade with flyash, lime, Portland cement and/or Tru-Blend to absorb excess moisture in the existing soil and improve strength of the soil. Once the subgrade is resistant to yielding, select fill can be placed lift by lift and compacted to 95% of Standard Proctor density. Other options include drying the upper two to four feet (2'-4') soil by natural means (aeration and scarification) if the schedule and weather allows or replacement of wet silty soil with dry select fill.**
4. Place fill in loose lifts not exceeding nine inches and compact to not less than 95 percent of the maximum dry density determined by ASTM Specification D-698 (Standard

Proctor). The moisture content of the fill should not be less than two points below optimum value nor more than three points above the optimum value.

5. Excavate the soil in cut areas to grade and proofroll the surface soil.

6. Compact stabilized soil in parking and driveway areas to not less than 95 percent of the maximum dry density of stabilized soil.

7. Perform field density tests to verify compaction at a frequency of one test per lift of fill for every 2,000 square feet of compacted area in building pad. Also, perform field density tests on stabilized soil in parking and driveway areas at a frequency of one test for every 2,000 square feet of compacted area.

8. Maintain the moisture content of both fill and natural soil until it is permanently sealed with the floor slab or pavement.

9. Sand should not be used as a leveling course under floor slab and pavement, since it provides ready path for moisture to get in.

10. Unless otherwise stated, earthwork and concrete construction must follow the following Texas DOT Specifications:

    Item 110: Excavation
    Item 216: Proof Rolling
    Item 260: Lime Treatment
    Item 275: Cement Treatment
    Item 360: Concrete Pavement

5.8 Drilled-and-Underream Footings

The successful completion of drilled-and-underreamed excavations will depend, to a large extent, on the suitability of the drilling and underreaming equipment together with the skill of the operator. The sequence of operations should be scheduled so that each underreamed excavation can be completed, reinforcing steel placed, and the concrete poured in a continuous, rapid, and orderly manner to reduce the time the excavation is open. Groundwater seepage in drilled excavation is a possibility if it is kept open for more than one to two hours.

In case groundwater is encountered, concrete should not be poured until water is pumped out.

Shafts and underreams should be clean and be free of all loose materials prior to placement of concrete. A qualified representative of the soils engineer should verify that footings are bearing on competent bearing materials, and that the underream installation procedures meet specifications. The bearing capacity of the foundation soils should be verified in the bottom of underreams, using a calibrated penetrometer, or other suitable means.

6.0 CONSTRUCTION MATERIALS TESTING

Bandy & Associates, Inc. also provides Construction Materials Testing Services, such as soil densities, concrete inspections, masonry inspections, steel inspections and various other services required during construction and would be happy to assist you in this area. Please contact us for information, estimates and scheduling.

7.0 STANDARD NOTES

1. Geotechnical Engineering and Quality Control Testing services by this firm are recommended during construction.

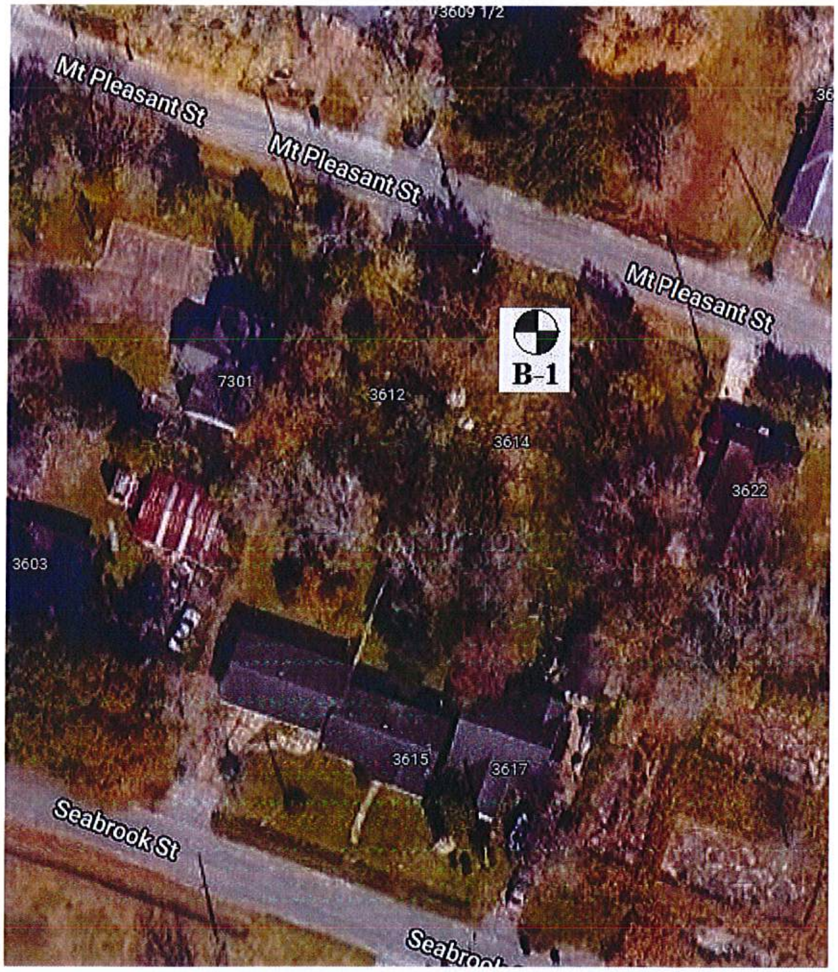
2. We have endeavored to analyze the site foundation conditions in accordance with basic geotechnical engineering principles; however, we are not aware of all the loading or structural conditions; therefore, we suggest that your professional staff carefully review our report for any design criteria for which we may not be familiar, or for which we may have inadvertently omitted. Accordingly, the contractual documents should advise that no claims will be allowed as a result of our geotechnical investigation and recommendations.

3. If any conditions are encountered during final design and/or during construction which are materially different that those presented in this report or assumed to exist at the site, this firm should be notified at once so that we may have an opportunity to make further studies and recommendations.

4. This publication is intended for the use of professional personnel competent to evaluate the significance and limitations for its contents and who will accept responsibility for the applications of the material it contains.

5. It is considered prudent and recommended that the soils engineer be consulted further during the final stages of design, and the preparation of plans and specifications, to ascertain that the earthwork and foundation recommendations have been interpreted and implemented basically in accordance with our intent. It thus may be necessary to submit supplementary recommendations to these items. All communications concerning this report must be made in writing.

6. This geotechnical engineering investigation report is not intended to be utilized as an earthwork specification for construction.



NOTE: NOT TO SCALE

Bandy & Associates, Inc. 11710 Almeda Genoa Houston, Texas 77034	GEOTECHNICAL INVESTIGATION PROPOSED 3-STORY TOWNHOMES 3614 MOUNT PLEASANT HOUSTON, TEXAS 122179	PLATE 1 PLAN OF BORING

Project: **Proposed 3-Story Townhomes** Project Location: **3614 Mount Pleasant, Houston, Texas** Project Number: **122179**	# Log of Boring B-1 **Sheet 1 of 1**	**Bandy & Associates, Inc.** 11710 Almeda Genoa Road Houston, Texas 77034 (713) 947-1055

Date(s) Drilled **6/13/2022**	Logged By **Richard Brady**	Checked By **Dr. Bandy**
Drilling Method **Flight Auger**	Drill Bit Size/Type **4.0 in.**	Total Depth of Borehole **25 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Bandy & Associates, Inc.**	Approximate Surface Elevation
Groundwater Level and Date Measured **None**	Sampling Method(s) **Tube**	Hammer Data
Borehole Backfill **Cuttings**	Location **See Plate 1**	

Depth (feet)	Sample Number	Material Type	Relative Consistency	MATERIAL DESCRIPTION	Percent Fines	Sampling Resistance, blows/ft	Liquid Limit, %	Plasticity Index, %	Moisture Content, %	Shear Strength, tsf: Pocket Pen, tsf	Shear Strength, tsf: UC, tsf	Dry Unit Weight, pcf
0	Q-1	CL-CH	VERY STIFF	Gray SANDY CLAY			63	36	27	1.5	2.2	84
	Q-2						64	38	29	1.5	1.7	84
5	Q-3			Gray and Yellow			62	38	31	0.9	0.9	82
	Q-4			Tan and Red, w/Rocks			65	43	34	0.9	0.8	84
	Q-5									0.9		
10												
	Q-6								34	0.9	0.7	79
15												
	Q-7								30	1.0	0.8	83
20												
	Q-8									1.0		
25				Boring Terminated at 25.0 Feet								
30												
35												
40												
45												
50												

Project: Proposed 3-Story Townhomes Project Location: 3614 Mount Pleasant, Houston, Texas Project Number: 122179	Key to Log of Boring **Sheet 1 of 1**	**Bandy & Associates, Inc.** 11710 Almeda Genoa Road Houston, Texas 77034 (713) 947-1055

Depth (feet)	Sample Type	Sample Number	Graphic Log	Material Type	Relative Consistency	MATERIAL DESCRIPTION	Percent Fines	Sampling Resistance, blows/ft	Liquid Limit, %	Plasticity Index, %	Moisture Content, %	Shear Strength, tsf: Pocket Pen, tsf	Shear Strength, tsf: UC, tsf	Dry Unit Weight, pcf
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

COLUMN DESCRIPTIONS

1 Depth (feet): Depth in feet below the ground surface.
2 Sample Type: Type of soil sample collected at the depth interval shown.
3 Sample Number: Sample identification number.
4 Graphic Log: Graphic depiction of the subsurface material encountered.
5 Material Type: Type of material encountered.
6 Relative Consistency: Relative consistency of the subsurface material.
7 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8 Percent Fines: The percent fines (soil passing the No. 200 Sieve) in the sample. WA indicates a Wash Sieve, SA indicates a Sieve Analysis.
9 Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
10 Liquid Limit, %: Liquid Limit, expressed as water content.
11 Plasticity Index, %: Plasticity Index, expressed as a water content.
12 Moisture Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
13 Shear Strength, tsf: Pocket Pen, tsf: Pocket Penetrometer reading, in tons per square foot
14 Shear Strength, tsf: UC, tsf: Unconfined compressive strength, in tons per square foot.
15 Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Lean-Fat CLAY, CLAY w/SAND, SANDY CLAY (CL-CH)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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