Western Technologies Inc.

GEOTECHNICAL EVALUATION REPORT

SINGLE FAMILY SUBDIVISION
Sundt Road and Moonshine Road
Rio Rancho, New Mexico
WT Reference No. 3220JJ014

PREPARED FOR:
Abrazo Homes
9798 Coors Boulevard NW, Building C, Suite 400
Albuquerque, New Mexico
Attn: Chris K. Scott

February 21, 2020

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Project Engineer

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GEOTECHNICAL EVALUATION
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1.0 PURPOSE

This report contains the results of our geotechnical evaluation for the proposed subdivision, and was performed in general accordance with our contract. The purpose of our services is to provide information and recommendations regarding:

- Subsurface conditions
- Foundation design parameters
- Lateral earth pressures
- Seismic considerations
- Slabs-on-grade
- Drainage
- Pavements
- Earthwork, including site preparation, fill placement, and suitability of existing soils for fill materials, and compaction

Results of the field exploration, field and laboratory tests are presented in the Appendices.

2.0 PROJECT DESCRIPTION

Project information supplied indicates that the proposed development will include an 8-acre site as a single family subdivision. There will be approximately 44 lots, and the homes will be one- and two-story, slab-on-grade structures using wood frame construction with a stucco veneer. The maximum wall and column loads are assumed to be 2.5 kips per linear foot and 30 kips, respectively. We anticipate that the ground floor level will be at or slightly above existing site grade and that no extraordinary slab criteria are required. On-site asphalt residential roadways will be constructed. Final site grading plans were not available at the time of this report. Should our assumptions not be correct, we should be notified immediately.

3.0 SCOPE OF SERVICES

3.1 Field Exploration

Five borings were drilled to a depth of 21.5 feet below existing grade in the proposed subdivision. The borings were drilled at the approximate locations shown on the attached Boring Location Diagram. A field log was prepared for each boring. These logs contain visual classifications of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples. Final logs, included in Appendix A, represent our interpretation of the field logs and may include modifications based on laboratory observations and tests of the field samples. The final logs describe the materials encountered, their thicknesses, and the locations where samples were obtained.

The Unified Soil Classification System was used to classify soils. The soil classification symbols appear on the boring logs and are briefly described in Appendix A. Local and regional geologic characteristics were used to estimate the seismic design criteria.

3.2 Laboratory Analysis

Laboratory analyses were performed on representative soil samples to aid in material classification and to estimate pertinent engineering properties of the on-site soils for preparation of this report. The following tests were performed in general accordance with applicable procedures, and the results are presented in Appendix B.

- Field moisture content
- In-situ soil density
- -#200 Sieve
- Liquid limit and plasticity index
- Compression

3.3 Analyses and Report

Analyses were performed and this report was prepared for the exclusive purpose of providing geotechnical engineering and/or testing information and recommendations. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the Site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such

contamination, other studies should be undertaken. We are available to discuss the scope of such studies with you.

This geotechnical engineering report includes a description of the project, a discussion of the field and laboratory testing programs, a discussion of the subsurface conditions, and design recommendations as required to satisfy the purpose previously described.

4.0 SITE CONDITIONS

4.1 Surface

At the time of our exploration, the Site was undeveloped with a school located to the east and residential homes to the west. The ground surface contained a moderate growth of shrubs with a few trees**.** Site drainage trended to the southeast as surface sheet flow along a gradual slope.

4.2 Subsurface

As presented on the boring logs, site soils within the depths explored consisted of interbedded loose to dense Silty SAND, Silty to Clayey SAND, and poorly graded SAND. Near surface soils are non-plastic to low-plasticity. Groundwater was not encountered in any of the borings at the time of exploration.

5.0 GEOTECHNICAL PROPERTIES & ANALYSIS

5.1 Laboratory Tests

Laboratory test results (see Appendix B) indicate that native subsoils near shallow foundation level exhibit low compressibility at existing water contents. Moderate amounts of additional compression occurs when the water content is increased.

Near-surface soils are non-plastic to low plasticity. These soils are not expected to exhibit significant shrink/swell upon changes in moisture content.

6.0 RECOMMENDATIONS

6.1 General

Recommendations contained in this report are based on our understanding of the project criteria described in **Section 2.0**, and the assumption that the soil and subsurface conditions are those disclosed by the borings. Others may change the plans, final elevations, number and type of structures, foundation loads, and floor levels during design or construction. Substantially different subsurface conditions from those described herein may be encountered or become known. Any changes in the project criteria or subsurface conditions shall be brought to our attention in writing.

6.2 Foundations

Conventional spread-type footings may be used to support the proposed structures. Since the native soils exhibit some hydrocollapse settlement potential, the footings should bear on engineered fills achieved by removal and recompaction of the soils below footings. The depth and lateral extent of the engineered fills is presented in the **Earthwork** section of this report. The following tabulation may be utilized to proportion the foundations:

Footing Depth Below Finished Grade (ft.) [1]	Allowable Bearing Capacity (psf) [2]
1.5 [3]	2,500
3.0	3,000

[1] Finished grade is the lowest adjacent grade for perimeter footings and floor level for interior footings.
[2] Allowable bearing capacities assume fulfillment of **EARTHWORK** recommendations.
[3] Minimum depth for frost protection for exterior footings or footings in unheated spaces.

We anticipate that differential movement of the proposed structures, supported as recommended, should be ¾ of one inch or less. Additional foundation movements could occur if water from any source infiltrates the foundation soils. Therefore, proper drainage should be provided in the final design and during construction.

All footings, stem walls, and masonry walls should be reinforced to reduce the potential for distress caused by differential foundation movements. The use of joints at openings or other discontinuities in masonry walls is recommended.

We recommend that the geotechnical engineer or his representative observe the footing excavations before reinforcing steel and concrete are placed. This observation is to assess whether the soils exposed are similar to those anticipated for support of the footings. Any soft, loose or unacceptable soils should be undercut to suitable materials and backfilled with approved fill materials or lean concrete. Soil backfill should be properly compacted.

6.3 Lateral Design Criteria

Earth retaining structures less than 10 feet in height, above any free water surface, with level backfill and no surcharge loads may be designed using the equivalent fluid pressure method. Recommended equivalent fluid pressures and coefficients of base friction are:

- Active:
  Undisturbed subsoil.....35 psf/ft
  Compacted imported backfill.....30 psf/ft

- Passive:
  Shallow wall footings.....250 psf/ft
  Shallow column footings.....400 psf/ft

- Coefficient of base friction..... 0.4*

*The coefficient of base friction should be reduced to 0.3 when used in conjunction with passive pressure.

The lateral earth pressures presented herein do not include the lateral pressures arising from the presence of:

- Hydrostatic conditions, submergence or partial submergence
- Sloping backfill, positively or negatively
- Surcharge loading, permanent or temporary
- Seismic or dynamic conditions

Fill against footings, stem walls, and retaining walls should be compacted to densities specified in **EARTHWORK**. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors. Over-compaction may cause excessive lateral earth pressures that could result in wall movements.

6.4 Seismic Considerations

For structural designs based upon the 2012/2015 International Building Code, the following criteria will apply. The soil site class is D. S_s, the spectral acceleration for short periods, is 0.476g. S_1, the spectral acceleration for a 1-second period, is 0.143g. F_a and F_v, are 1.419 and 2.226, respectively.

6.5 Conventional Slab-on-Grade Support

Interior slabs-on-grade can be supported on properly placed and compacted fill or approved natural soils. The slab subgrade should be prepared by the procedures outlined in this report. A four-inch layer of base course is desirable beneath all slabs to help prevent capillary rise and a damp slab. Final determination of the use of base course should be left to the slab designer.

The use of vapor retarders is desirable for any slab-on-grade where the floor will be covered by products using water based adhesives, wood, vinyl backed carpet, impermeable floor coatings (urethane, epoxy, acrylic terrazzo, etc.) or where the floor will be in contact with moisture sensitive equipment or product. When used, the design and installation should be in accordance with the recommendation given in ACI 302.1R and 302.2R (most recent versions). Final determination on the use of a vapor retarder should be left to the slab designer.

All concrete placement and curing operations should follow the American Concrete Institute manual recommendations. Improper curing techniques and/or high slump (high water-cement ratio) could cause excessive shrinkage, cracking or curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture sensitive floor covering.

6.6 Drainage

The major cause of soil problems in this vicinity is moisture increase in soils below structures. Therefore, it is extremely important that positive drainage be provided throughout the life of the subdivision. Infiltration of water into utility or foundation excavations must be prevented during construction. Planters or other surface features that could retain water adjacent to the homes should be limited to “Xeriscape” type landscaping with minimal irrigation. It is very important that proper planning and control of any landscape and irrigation practices be performed.

In areas where sidewalks, patios, or other hardscaped flatwork do not immediately adjoin the homes, protective slopes should be provided with a positive (as high as practical) outfall away from the homes. Splash pads, scuppers and drainpipes should be designed to provide drainage away from the structure for a minimum of 10 feet. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to minimize the possibility of moisture infiltration.

6.7 Pavements

The on-site soils are considered as good quality materials for support of pavements. The City of Rio Rancho residential pavement sections (per Drawing PS-01, dated May 22, 2008 are applicable. The pavement section should consist of 3 inches of asphalt concrete over 4 inches of aggregate base course, over 12 inches of compacted subgrade.

Normal maintenance, including crack sealing, slurry sealing, and/or chip sealing, should be performed during the life of the pavement.

Bituminous surfacing should be constructed of dense-graded, central plant-mix, asphalt concrete. Base course, portland cement, and asphalt concrete should conform with City of Rio Rancho specifications.

Material and compaction requirements should conform to recommendations presented in the **Earthwork** section of this report. The gradient of paved surfaces should ensure positive drainage. Water should not pond in areas directly adjoining paved sections.

7.0 EARTHWORK

7.1 General

The conclusions contained in this report for the proposed construction are contingent upon compliance with recommendations presented in this section. Any excavating, trenching, or disturbance that occurs after completion of the earthwork must be backfilled, compacted and tested in accordance with the recommendations contained herein. It is not reasonable to rely upon our conclusions and recommendations if any future unobserved and untested trenching, earthwork activities or backfilling occurs.

7.2 Site Clearing

Strip and remove any existing vegetation, organic topsoils, debris, and any other deleterious materials from the building and pavement areas. The building area is defined as that area within the building footprint plus five feet beyond the perimeter of the footprint. All exposed surfaces should be free of mounds and depressions that could prevent uniform compaction.

7.3 Foundation Preparation

In footing areas, remove existing soils to a minimum depth of 2 feet below the bottom of the footing. Removal should extend a minimum of 2 feet beyond the footing edges. Replace with engineered fill material. After any overexcavation has been accomplished, the exposed soils should be scarified, moistened or dried as required, and compacted to a minimum depth of 10 inches.

7.4 Conventional Interior Slab Preparation

Scarify, moisten or dry as required, and compact all subgrade soils to a minimum depth of 10 inches. The subgrade preparation is to be accomplished in a manner that will result in uniform water contents and densities after compaction.

7.5 Pavement Preparation

The subgrade should be scarified, moistened as required, and recompacted for a minimum depth of 10 inches prior to placement of fill and pavement materials.

7.6 Materials

Clean on-site native soils with low-expansive potentials or imported materials may be used as fill material for the following:

- Foundation areas
- Interior slab areas
- Pavement areas
- Backfill

Imported soils should conform to the following:

- Gradation (ASTM C136):

	percent finer by weight
6"	100
4"	85-100
¾"	70-100
No. 4 Sieve	50-100
No. 200 Sieve	30 (max)

- Maximum soluble sulfates (%) 0.10
- Maximum Plasticity Index (PI) ..... Non-Plastic

Base course should conform to the City of Rio Rancho or NMDOT specifications.

7.7 Placement and Compaction

a. Place and compact fill in horizontal lifts, using equipment and procedures that will produce recommended water contents and densities throughout the lift.
b. Uncompacted fill lifts should not exceed 10 inches.
c. Frozen soil should not be used as fill and no fill should be placed over frozen ground.
d. Materials should be compacted to the following:

Material	Minimum Percent Compaction (ASTM D1557)
On-site soil, reworked and fill	95
Imported soil	95
Aggregate base course below slabs-on-grade	95
Aggregate base below pavement	100
Nonstructural backfill	90

On-site and imported soils should be compacted within a water content range of two percent below to three percent above optimum.

7.8 Compliance

Recommendations for foundations, slabs-on-grade, and pavements supported on compacted fills or prepared subgrade depend upon compliance with the **EARTHWORK** recommendations. To assess compliance, observation and testing should be performed

under the direction of a WT geotechnical engineer. Please contact us to provide these observation and testing services.

8.0 LIMITATIONS

This report has been prepared assuming the project criteria described in Section 2.0. If changes in the project criteria occur, or if different subsurface conditions are encountered or become known, the conclusions and recommendations presented herein shall become invalid. In any such event, contact WT to assess the effect that such variations may have on our conclusions and recommendations. If WT is not retained for the construction observation and testing services to determine compliance with this report, our professional responsibility is accordingly limited.

The recommendations presented are based entirely upon data derived from a limited number of samples obtained from widely spaced borings. The attached logs are indicators of subsurface conditions only at the specific locations and times noted. This report assumes the uniformity of the geology and soil structure between borings, however variations can and often do exist. Whenever any deviation, difference or change is encountered or becomes known, WT should be contacted.

This report is for the exclusive benefit of our client alone. There are no intended third-party beneficiaries of our contract with the client or this report, and nothing contained in the contract or this report shall create any express or implied contractual or any other relationship with, or claim or cause of action for, any third party against WT.

This report is valid until the earlier of one year from the date of issuance, a change in circumstances, or discovered variations. After expiration, no person or entity shall have any right to rely on this report without the express written authorization of WT.

9.0 CLOSURE

We prepared this report as an aid to the designers of the proposed project. The comments, statements, recommendations and conclusions set forth in this report reflect the opinions of the authors. These opinions are based upon data obtained at the location of the borings, and from laboratory tests. Work on your project was performed in accordance with generally accepted standards and practices utilized by professionals providing similar services in this locality. No warranty, express or implied, is made.

Approximate Boring Location

Proposed Site

NOT TO SCALE

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PLATE

1

BORING LOCATION DIAGRAM

Allowable Soil Bearing Capacity	The recommended maximum contact stress developed at the interface of the foundation element and the supporting material.
Backfill	A specified material placed and compacted in a confined area.
Base Course	A layer of specified aggregate material placed on a subgrade or subbase.
Base Course Grade	Top of base course.
Bench	A horizontal surface in a sloped deposit.
Caisson/Drilled Shaft	A concrete foundation element cast in a circular excavation which may have an enlarged base (or belled caisson).
Concrete Slabs-On-Grade	A concrete surface layer cast directly upon base course, subbase or subgrade.
Crushed Rock Base Course	A base course composed of crushed rock of a specified gradation.
Differential Settlement	Unequal settlement between or within foundation elements of a structure.
Engineered Fill	Specified soil or aggregate material placed and compacted to specified density and/or moisture conditions under observations of a representative of a soil engineer.
Existing Fill	Materials deposited through the action of man prior to exploration of the site.
Existing Grade	The ground surface at the time of field exploration.
Expansive Potential	The potential of a soil to expand (increase in volume) due to absorption of moisture.
Fill	Materials deposited by the actions of man.
Finished Grade	The final grade created as a part of the project.
Gravel Base Course	A base course composed of naturally occurring gravel with a specified gradation.
Heave	Upward movement.
Native Grade	The naturally occurring ground surface.
Native Soil	Naturally occurring on-site soil.
Rock	A natural aggregate of mineral grains connected by strong and permanent cohesive forces. Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation.
Sand and Gravel Base Course	A base course of sand and gravel of a specified gradation.
Sand Base Course	A base course composed primarily of sand of a specified gradation.
Scarify	To mechanically loosen soil or break down existing soil structure.
Settlement	Downward movement.
Soil	Any unconsolidated material composed of discrete solid particles, derived from the physical and/or chemical disintegration of vegetable or mineral matter, which can be separated by gentle mechanical means such as agitation in water.
Strip	To remove from present location.
Subbase	A layer of specified material placed to form a layer between the subgrade and base course.
Subbase Grade	Top of subbase.
Subgrade	Prepared native soil surface.

COARSE-GRAINED SOILS

LESS THAN 50% FINES

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
GW	WELL-GRADED GRAVEL OR WELL-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE
GP	POORLY-GRADED GRAVEL OR POORLY-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES	
GM	SILTY GRAVEL OR SILTY GRAVEL WITH SAND, MORE THAN 12% FINES	
GC	CLAYEY GRAVEL OR CLAYEY GRAVEL WITH SAND, MORE THAN 12% FINES	
SW	WELL-GRADED SAND OR WELL-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE
SP	POORLY-GRADED SAND OR POORLY-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES	
SM	SILTY SAND OR SILTY SAND WITH GRAVEL, MORE THAN 12% FINES	
SC	CLAYEY SAND OR CLAYEY SAND WITH GRAVEL, MORE THAN 12% FINES	

NOTE: Coarse-grained soils receive dual symbols if they contain 5% to 12% fines (e.g., SW-SM, GP-GC).

FINE-GRAINED SOILS

MORE THAN 50% FINES

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
ML	SILT, SILT WITH SAND OR GRAVEL, SANDY SILT, OR GRAVELLY SILT	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50
CL	LEAN CLAY OF LOW TO MEDIUM PLASTICITY, SANDY CLAY, OR GRAVELLY CLAY	
OL	ORGANIC SILT OR ORGANIC CLAY OF LOW TO MEDIUM PLASTICITY	
MH	ELASTIC SILT, SANDY ELASTIC SILT, OR GRAVELLY ELASTIC SILT	SILTS AND CLAYS LIQUID LIMIT MORE THAN 50
CH	FAT CLAY OF HIGH PLASTICITY, SANDY FAT CLAY, OR GRAVELLY FAT CLAY	
OH	ORGANIC SILT OR ORGANIC CLAY OF HIGH PLASTICITY	
PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	HIGHLY ORGANIC SOILS

NOTE: Fine-grained soils may receive dual classification based upon plasticity characteristics (e.g. CL-ML).

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	Above 12 in.
COBBLES	3 in. – 12 in.
GRAVEL	No. 4 – 3 in.
Coarse	¾ in. – 3 in.
Fine	No. 4 – ¾ in.
SAND	No. 200 – No. 4
Coarse	No. 10 – No. 4
Medium	No. 40 – No. 10
Fine	No. 200 – No. 40
Fines (Silt or Clay)	Below No. 200

NOTE: Only sizes smaller than three inches are used to classify soils

CONSISTENCY

CLAYS & SILTS	BLOWS PER FOOT
VERY SOFT	0 – 2
SOFT	3 – 4
FIRM	5 – 8
STIFF	9 – 15
VERY STIFF	16 – 30
HARD	OVER 30

RELATIVE DENSITY

SANDS & GRAVELS	BLOWS PER FOOT
VERY LOOSE	0 – 4
LOOSE	5 – 10
MEDIUM DENSE	11 – 30
DENSE	31 – 50
VERY DENSE	OVER 50

NOTE: Number of blows using 140-pound hammer falling 30 inches to drive a 2-inch-OD (1⅜-inch ID) split-barrel sampler (ASTM D1586).

PLASTICITY OF FINE GRAINED SOILS

PLASTICITY INDEX	TERM
0	NON-PLASTIC
1 – 7	LOW
8 – 20	MEDIUM
Over 20	HIGH

DEFINITION OF WATER CONTENT

DRY
SLIGHTLY DAMP
DAMP
MOIST
WET
SATURATED

The number shown in **"BORING NO."** refers to the approximate location of the same number indicated on the "Boring Location Diagram" as positioned in the field by pacing or measurement from property lines and/or existing features, or through the use of Global Positioning System (GPS) devices. The accuracy of GPS devices is somewhat variable.

"DRILLING TYPE" refers to the exploratory equipment used in the boring wherein **HSA = hollow stem auger**, and the dimension presented is the outside diameter of the HSA used.

"N" in "BLOW COUNTS" refers to a 2-inch outside diameter split-barrel sampler driven into the ground with a 140 pound drop-hammer dropped 30 inches repeatedly until a penetration of 18 inches is achieved or until refusal. The number of blows, or "blow count", of the hammer is recorded for each of three 6-inch increments totaling 18 inches. The number of blows required for advancing the sampler for the last 12 inches (2nd and 3rd increments) is defined as the Standard Penetration Test (SPT) "**N**"-Value. Refusal to penetration is considered more than 50 blows per 6 inches. (Ref. ASTM D1586).

"R" in "BLOW COUNTS" refers to a 3-inch outside diameter ring-lined split barrel sampler driven into the ground with a 140 pound drop-hammer dropped 30 inches repeatedly until a penetration of 12 inch is achieved or until refusal. The number of blows required to advance the sampler 12 inches is defined as the "**R**" blow count. The "**R**" blow count requires an engineered conversion to an equivalent SPT N-Value. Refusal to penetration is considered more than 50 blows per foot. (Ref. ASTM D3550).

"CS" in "BLOWS/FT." refers to a 2½-in. outside diameter California style split-barrel sampler, lined with brass sleeves, driven into the ground with a 140-pound hammer dropped 30 inches repeatedly until a penetration of 18 inches is achieved or until refusal. The number of blows of the hammer is recorded for each of the three 6-inch increments totaling 18 inches. The number of blows required for advancing the sampler for the last 12 inches (2nd and 3rd increments) is defined as the "CS" blow count. The "CS" blow count requires an engineered conversion to an equivalent SPT N-Value. Refusal to penetration is considered more than 50 blows for a 6-inch increment. (Ref. ASTM D 3550)

"SAMPLE TYPE" refers to the form of sample recovery, in which **N** = Split-barrel sample, **R** = Ring-lined sample, **"CS"** = California style split-barrel sample, **G** = Grab sample, **B** = Bucket sample, **C** = Core sample (ex. diamond bit rock coring).

"DRY DENSITY (LBS/CU FT)" refers to the laboratory-determined dry density in pounds per cubic foot. The symbol **"NR"** indicates that no sample was recovered.

"WATER (MOISTURE) CONTENT" (% of Dry Wt.) refers to the laboratory-determined water content in percent using the standard test method ASTM D2216.

"USCS" refers to the "Unified Soil Classification System" Group Symbol for the soil type as defined by ASTM D2487 and D2488. The soils were classified visually in the field, and where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans nor as defining construction conditions.

Boring logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

The stratification lines shown on the boring logs represent our interpretation of the approximate boundary between soil or rock types based upon visual field classification at the boring location. The transition between materials is approximate and may be more or less gradual than indicated.

DATE DRILLED: **2-7-20**
LOCATION: **See Location Diagram**
ELEVATION: **Not Determined**

BORING NO. 1

EQUIPMENT TYPE: **CME-75**
DRILLING TYPE: **7"HSA**
FIELD ENGINEER: **J. Phillips**

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOW COUNTS	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
9.0		G				SC-SM		Silty, Clayey SAND; red brown, loose, moist
		N		5				light brown, damp
		N		7	5	SM		Silty SAND; light brown, loose, damp
		N		6	10			
		N		6	15			
		N		34	20	SP-SM		Poorly Graded SAND with Silt; light brown, dense, damp, some gravel
								BORING TERMINATED AT 21.5 FEET

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**

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PLATE **A-4**

BORING LOG

DATE DRILLED: **2-7-20**
LOCATION: **See Location Diagram**
ELEVATION: **Not Determined**

BORING NO. 2

EQUIPMENT TYPE: **CME-75**
DRILLING TYPE: **7"HSA**
FIELD ENGINEER: **J. Phillips**

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	BLOW COUNTS	DEPTH (FEET)	USCS	SOIL DESCRIPTION
		G			SM	Silty SAND; red brown, medium dense, moist
						light brown, damp
3.4	98	R	19			
3.4	105	R	24	5		
3.6	103	R	10	10		loose
		N	8	15		
		N	12	20		medium dense
						BORING TERMINATED AT 21.5 FEET

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**

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PLATE **A-5**

BORING LOG

DATE DRILLED: **2-7-20**
LOCATION: **See Location Diagram**
ELEVATION: **Not Determined**

BORING NO. 3

EQUIPMENT TYPE: **CME-75**
DRILLING TYPE: **7"HSA**
FIELD ENGINEER: **J. Phillips**

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOW COUNTS	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
4.3		G				SM		Silty SAND; light brown, loose, damp to moist
3.8	99	R		12				
		R		11	5			
1.6	114	R		24	10	SP-SM		Poorly Graded SAND with Silt; light brown, medium dense, damp
		N		35	15			dense
		N		37	20			
								BORING TERMINATED AT 21.5 FEET

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

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PLATE **A-6**

BORING LOG

DATE DRILLED: **2-7-20**
LOCATION: **See Location Diagram**
ELEVATION: **Not Determined**

BORING NO. 4

EQUIPMENT TYPE: **CME-75**
DRILLING TYPE: **7"HSA**
FIELD ENGINEER: **J. Phillips**

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOW COUNTS	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SM		Silty SAND; light brown, medium dense, moist, some gravel
2.6	108	R		32				damp
3.3	102	R		15	5			loose
1.7	112	R		28	10	SP-SM		Poorly Graded SAND with Silt; light brown, medium dense, damp
		N		41	15			dense
		N		32	20			
								BORING TERMINATED AT 21.5 FEET

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

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PROJECT: **SINGLE FAMILY SUBDIVISION**
JOB NO.: **3220JJ014**

PLATE **A-7**

BORING LOG

DATE DRILLED: **2-7-20**
LOCATION: **See Location Diagram**
ELEVATION: **Not Determined**

BORING NO. 5

EQUIPMENT TYPE: **CME-75**
DRILLING TYPE: **7"HSA**
FIELD ENGINEER: **J. Phillips**

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOW COUNTS	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
3.9		G				SM		Silty SAND; light brown, dense, moist
		N		44				with gravel
		N		34	5			
						SP-SM		Poorly Graded SAND with Silt; light brown, dense, damp, some gravel
		N		25	10			medium dense
		N		30	15			
		N		35	20			dense
								BORING TERMINATED AT 21.5 FEET

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**

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PROJECT: **SINGLE FAMILY SUBDIVISION**
JOB NO.: **3220JJ014**

PLATE **A-8**

BORING LOG

Boring No.	Depth (ft.)	USCS Class.	Initial Dry Density (pcf)	Initial Water Content (%)	Compression Properties			Expansion Properties		Plasticity		Percent Passing #200	Soluble Sulfate (ppm)	Remarks
					Surcharge (ksf)	Total Compression (%)		Surcharge (ksf)	Expansion (%)	Liquid Limit	Plasticity Index			
						In-Situ	After Saturation							
1	0-5	SC-SM		9.0						21	4	33		
2	2-3	SM	97	3.4	0.5	0.2								
					1.0	0.8								
					2.0	1.5	3.5							2
					4.0		5.0							2
3	0-5	SM		4.3						--	NP	13		
3	2-3	SM	98	3.8	0.6	0.5								
					1.1	0.9								
					2.2	1.6	4.0							2
					4.4		5.1							2
5	0-5	SM		3.9						--	NP	14		

Note: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.
NP = Non-Plastic

Remarks

1. Compacted density (approx. 95% of ASTM D1557 max. density at moisture content slightly below optimum.)
2. Submerged to approximate saturation.
3. Slight rebound after saturation.
4. Sample disturbance observed.

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PROJECT: **Single Family Subdivision**
JOB NO.: **3220JJ014**

SOIL PROPERTIES

PLATE **B-1**