



AGS

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July 28, 2016
P/W 1602-06
Report No. 1602-06-B-4

Attention: Mr. Jeff Lundstrom

Subject: *Feasibility Study and Preliminary Design Recommendations for Onsite Wastewater Treatment, 2260 San Pasqual Valley Road Project, County of San Diego, California*

Pursuant to your request Advanced Geotechnical Solutions, Inc. (AGS) has prepared this feasibility study and preliminary design recommendations for onsite wastewater treatment at the 2260 San Pasqual Valley Road Project, located in San Diego County, California. The recommendations presented in the following report are based on the results of our subsurface investigation and percolation testing.

It is AGS's opinion that the use of onsite wastewater treatment systems for the proposed residential development is feasible.

1.0 SITE LOCATION AND DESCRIPTION

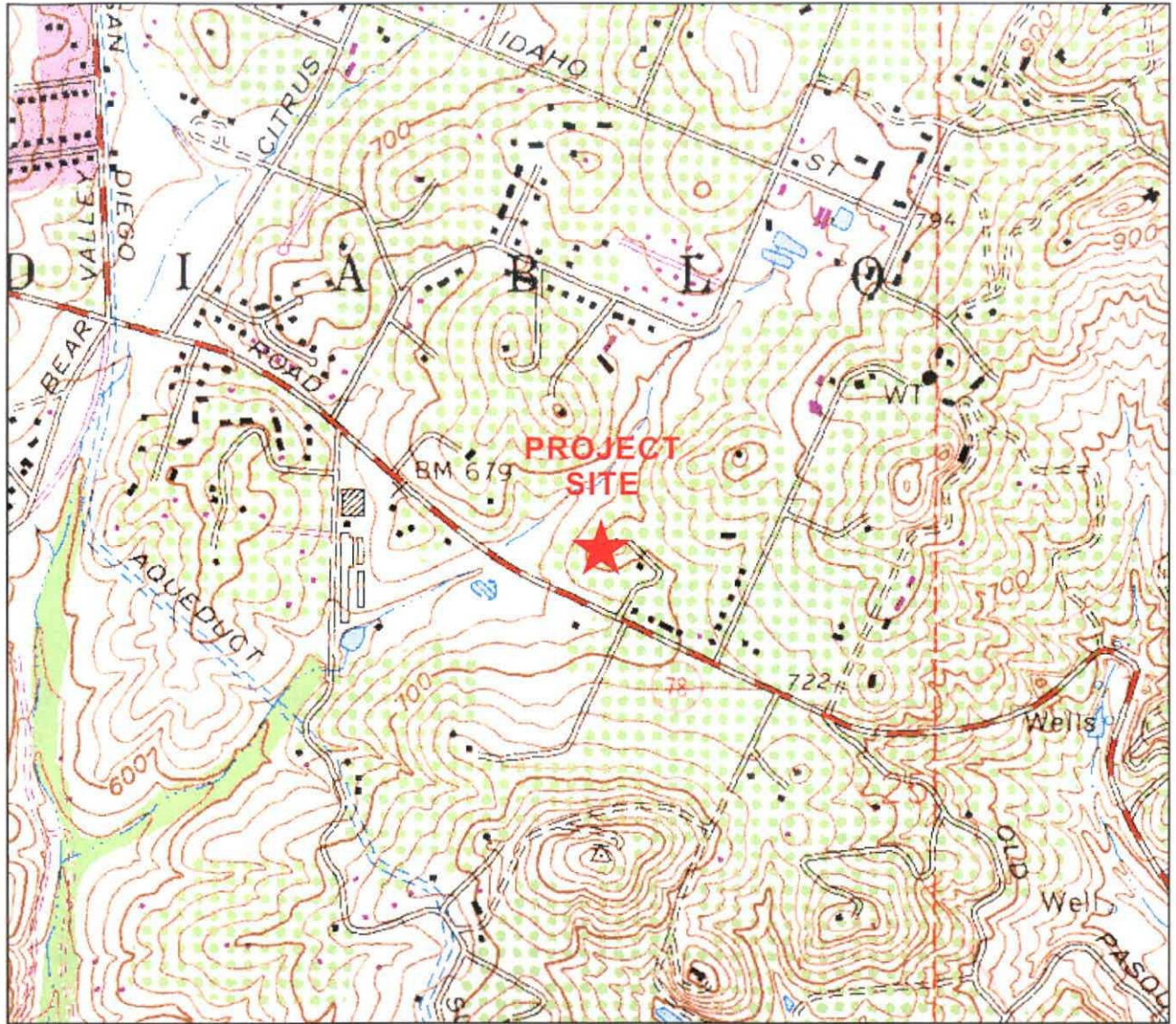
The irregular shaped site encompasses approximately 17 acres and is located in the County of San Diego, California (APN 234-261-23-00). The site is bounded to the south by San Pasqual Valley Road (Highway 78), to the west by a southwesterly trending drainage, and to the north and east by existing single-family residential properties (Figure 1). In general, the site exhibits gently to moderately sloping topography toward the south and west, with a hill in the central portion of the site. Approximate elevations within the overall site limits range from a low elevation of 655 msl at the southwesterly boundary to a high of 770 msl near the northeasterly boundary.

The site currently supports an existing single-family residence with an onsite wastewater treatment system (leach field) situated on top of the hill in the central portion of the site. The remainder of the site is currently vacant and undeveloped with the exception of a few dirt roads. The site is covered with a light to moderate growth of weeds and grass with localized small trees and bushes. Evidence of previous agricultural activities were noted during our onsite exploration.

No wells are known to exist on or within 150 feet of the property. It is our understanding that the site is serviced by City of Escondido Water Division.

2.0 PROPOSED DEVELOPMENT

Based upon our conversations, review of available documents and plans, AGS understands that the project will be developed to support fourteen single-family residences along with associated improvements. The residential lots will be approximately 1 to 1.5 acres in size. As depicted on Plate 1, each lot has an area for proposed onsite wastewater treatment system and reserve area. These areas range from approximately 7,800 to 13,000 sq ft and are located in areas of gently sloping terrain with grades



N
 1" = 100'
 (approx.)

SITE LOCATION MAP
2260 SAN PASQUAL VALLEY ROAD
SAN DIEGO COUNTY, CALIFORNIA

P/W 1602-06

FIGURE 1

SOURCE MAP - TOPOGRAPHIC MAP OF THE
 ESCONDIDO 7.5 MINUTE QUADRANGLE,
 SAN DIEGO COUNTY, CALIFORNIA



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less than 25 percent. It is our understanding that each residential lot will have its own onsite wastewater treatment system, utilizing a septic tank and shallow leach lines. The potable water source will be provided by City of Escondido Water Division.

3.0 FIELD INVESTIGATION

As part of the current study, AGS excavated, logged, and sampled 12 excavator test pits with a Cat 328 excavator (approximate weight of 80,000 lbs.). The purpose of the test pits was to determine the thickness and engineering characteristics of the soil and rock units onsite. The test pit depths ranged from 7.5 to 18.5 feet below ground surface. Logs of these test pits are presented in Appendix B.

AGS also excavated 14 percolation test borings with a backhoe equipped with a 12-inch diameter flight auger at predetermined locations onsite. Percolation testing was conducted in accordance with the San Diego County Design Manual for Onsite Wastewater Treatment Systems (OWTS Manual). One percolation test hole was excavated at each lot (P-1 through P-14) at the approximate locations depicted on Plate 1. Test holes were approximately twelve inches in diameter and three to four feet deep. The sides and bottoms of the holes were cleaned and the holes were pre-soaked by successively filling the holes with approximately 12 to 14 inches of water for 4 hours then allowed to soak overnight. The following day the holes were cleaned of sediment and approximately 2 inches of pea gravel was placed in the bottom. Testing was performed in accordance with Case III procedure. The holes were filled with approximately 6 inches of water over the gravel and allowed to drop for 30 minutes. Testing continued with readings every 30 minutes for approximately 4 to 6 hours until sufficiently stabilized rates were recorded. Results and calculations are presented in Appendix B.

4.0 SITE GEOLOGY

4.1. Regional Geologic and Geomorphic Setting

The subject site is situated within the western portion of the Peninsular Ranges Geomorphic Province. The Peninsular Ranges province occupies the southwestern portion of California, extending southward from the Transverse Ranges and Los Angeles Basin to the southern tip of Baja California. In general the province consists of young, steeply sloped, northwest trending mountain ranges underlain by Late Jurassic to Early Cretaceous-age metavolcanic and metasedimentary rock and Cretaceous-age igneous plutonic rock of the Peninsular Ranges Batholith. The westernmost portion of the province is predominantly underlain by younger marine and non-marine sedimentary rocks. The Peninsular Ranges' dominant structural feature is northwest-southeast trending crustal blocks bounded by active faults of the San Andreas transform system.

4.2. Site Geology

Published regional geologic maps indicate the site is underlain by Mid-Cretaceous Granodiorite of Woodson Mountain. For the purposes of this report, the simple nomenclature of "granitic materials" will be used. This unit is mantled by relatively thin veneers of colluvium and topsoil, and locally by undocumented artificial fill and older alluvium. The following section contains a summary of the soil and bedrock units encountered onsite. The approximate distribution of these

units are shown on Plate 1. Description of these geologic units, as observed during our investigation, are presented below. Test pit logs are presented in Appendix B.

4.2.1. Artificial Fill-undocumented (afu)

Undocumented artificial fill soils were locally encountered in test pit T-12 to a depth of 4.5 feet. As encountered these materials can generally be described as dark brown silty sand with some cobbles and small boulders in a generally dry to slightly moist and loose to moderately dense condition. Fills onsite are likely associated with previous agricultural activities and development of the existing residence and improvements.

4.2.2. Topsoil (No map symbol)

A thin veneer of topsoil was encountered in test pits throughout the site. As encountered, these materials can generally be described as brown, silty sand in a dry and loose condition. The topsoil ranged from 0.5 to 1.5 feet in thickness.

4.2.3. Colluvium (Qcol)

A relatively thin veneer colluvium mantles a majority of the project site and was encountered the majority of the test pits. The colluvium can generally be described as reddish brown, silty sand with some gravel and cobble, in a dry to slightly moist and loose to moderately dense condition. The colluvium ranged from 2.5 to 5.5 feet in thickness. It is anticipated that a majority of the proposed leach fields will be constructed within the colluvial soils.

4.2.4. Older Alluvium (Qoa)

Older alluvium was encountered to a depth of 16 feet in test pit T-1 and consisted of dark red brown silty to clayey sand with interbedded sandy clay. As encountered, the older alluvium was slightly moist to moist and moderately dense.

4.2.5. Granitic Materials (Kgr)

Granitic materials were encountered at depth across the site. The upper portion of this unit is completely weathered/decomposed and exhibits physical characteristics of a coarse grained soil. The decomposed granite generally ranged in thickness from 3 to 6 feet. Beneath the completely weathered/decomposed zone, the granitic materials became less weathered and increased in density. Much of the excavated materials were in a disaggregated condition with occasional chunks of hand friable granitic rock. This highly weathered zone generally extended to depths of approximately 6 to 12 feet within the granitic materials becoming less weathered with depth. Excavations within the granitic material extended to depths up to 18.5 feet below ground surface. The excavator locally encountered refusal at depths between 7.5 feet and 17.5 feet during our investigation.

Based on our preliminary subsurface exploration it is anticipated that the granitic materials onsite are sufficiently weathered/decomposed to allow for the minimum 5-foot separation to impervious bedrock.

5.0 RESULTS AND PRELIMINARY DESIGN RECOMMENDATIONS

Preliminary percolation rates (rounded up to the nearest whole number) ranged from 8 to 48 minutes per inch. However, 12 of the 14 percolation tests yielded rates between 8 and 20 minutes per inch. P-3 and P-12 yielded rates of 48 and 26 minutes per inch respectively. Based on the preliminary percolation rates, the systems for all lots can be designed with a 100 percent reserve area. The lots are approximately 1 to 1.5 acres, and meet the minimum lot size. The proposed treatment areas are located in gently sloping areas that do not have slopes exceeding 25 percent. Primary and reserve areas for the lots on the westerly property boundary can be adequately set back 50 feet or more from the top of the bank of the subjacent drainage course. System layouts should be designed such that the setbacks presented in the table on Page 13 of the OWTS Manual are maintained.

Based on our subsurface exploration, the proposed treatment areas generally exhibit a soil profile of topsoil/colluvium/decomposed granite and highly weathered granitic bedrock overlying fresher, impervious granitic bedrock. These surficial soils and highly weathered, pervious bedrock are generally 8 to 18 feet in thickness, allowing for the minimum 5 feet of separation from the bottom of leach line trenches to highly consolidated bedrock. Groundwater was not observed in our excavations onsite nor was any evidence of historic high groundwater observed in our excavations which extended to a maximum depth of 18.5 feet below ground surface. Shallow groundwater is not anticipated to affect the design.

The proposed potable water source will be City of Escondido Water Division. No wells are known to exist on or within 150 feet of the project site. If wells are encountered during construction, they should be abandoned and destroyed in accordance with the County of San Diego DEH Requirements.

Presented below in Table 5.0 are preliminary percolation rates and leach line lengths for each lot, assuming a single dwelling having 4 bedrooms and a septic tank of at least 1,200 gallons.

TABLE 5.0 Preliminary Percolation Rates and Design			
<u>Lot Number</u>	<u>Percolation Test Boring</u>	<u>Percolation Rate (minutes per inch)</u>	<u>Disposal Trench Length (lineal feet)</u>
1	P-1	13	390
2	P-2	10	370
3	P-3	48	550
4	P-4	12	380
5	P-5	11	380
6	P-6	12	380
7	P-7	9	360
8	P-8	8	360
9	P-9	17	410
10	P-10	17	410
11	P-11	13	390
12	P-12	26	450
13	P-13	8	360
14	P-14	9	360

6.0

FUTURE STUDIES

The scope of work performed for this study was intended to evaluate the feasibility of onsite wastewater treatment systems based on the prevailing soil and geologic conditions. Although there was no evidence which precludes use of onsite wastewater treatment systems, additional testing in accordance with the OTWS Manual will be required for final design. Once the final design is determined, layout exhibits for each lot depicting the tank and line locations and other pertinent information should be prepared.

7.0

LIMITATIONS

This report is based on the project as described and the information obtained from the excavations at the approximate locations indicated on the Plate 1. The findings are based on the results of the field, laboratory, and office investigations combined with an interpolation and extrapolation of conditions between and beyond the excavation locations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and

any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.


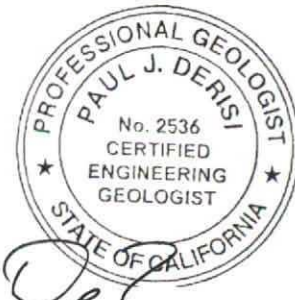
AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.



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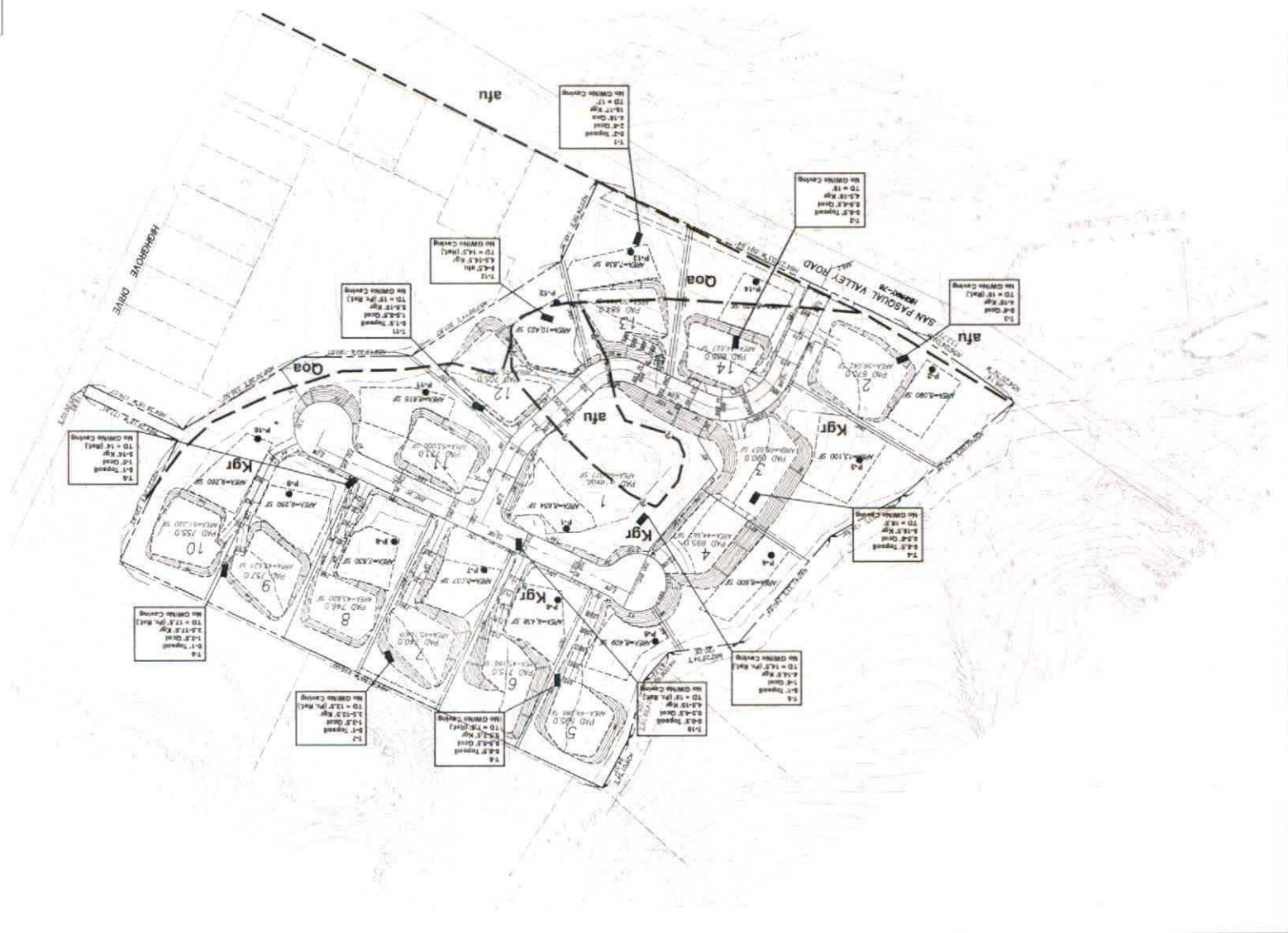
Distribution: (3) Addressee

Attachments: Figure 1 – Site Location Map
Plate 1 – Geologic Map and Exploration Location Plan;
Appendix A – References
Appendix B – Field Data and Calculations

SCALE: 1"=80'



- Geotechnical Legend:**
- 1-1: Approximate Location of Exploratory Test Pit (P18-2018)
 - 1-2: Approximate Location of Preservation Test Boring (P18-2018)
 - 1-3: Geologic Contact (Dashed where uncertain, dotted where buried)
 - 1-4: Artificial Fill (documentation unavailable)
 - 1-5: Cobolium
 - 1-6: Other Alluvium (dashed where buried)
 - 1-7: Gravelly Rock
 - 1-8: Kgr (Breached where buried)



APPENDIX A

REFERENCES

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Advanced Geotechnical Solutions, Inc., *Preliminary Geotechnical Investigation, 2260 San Pasqual Valley Road Project, County of San Diego, CA*, Report Number 1602-06-B-3, dated July 27, 2016.

County of San Diego, Department of Environmental Health, *Design Manual for Onsite Wastewater Treatment Systems*, Updated November 25, 2013.

Lundstrom Engineering and Surveying, Inc., (2016). *80-scale Preliminary Design Study for San Pasqual Valley Road, California*, dated March 2, 2016.

APPENDIX B
FIELD DATA AND CALCULATIONS

Project San Pasqual
Date Excavated 5/23/16
Logged by PJD
Equipment Cat 328

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
T-1	0.0 – 2.0	SM	<u>Topsoil</u> SILTY SAND, brown to reddish brown, dry, loose.
	2.0 – 4.0	SC	<u>Colluvium (Qcol)</u> SILTY SAND, fine to coarse grained, reddish brown, dry to slightly moist, loose to moderately dense; weakly cemented, porous.
	4.0 – 16.0		<u>Older Alluvium</u> SILTY to CLAYEY SAND interbedded with SANDY CLAY, dark red brown, slightly moist to moist, moderately dense. @ 6' Dense
	16.0 – 17.0		<u>Granitic Materials (Kgr):</u> Highly weathered, moderately hard, friable, breaks into dark olive brown, fine to coarse grained SILTY SAND TOTAL DEPTH 17.0 FT. NO WATER, NO CAVING

T-2	0.0 – 0.5	SM	<u>Topsoil:</u> SILTY SAND, fine to coarse grained, brown, dry, loose; abundant roots.
	0.5 – 4.5	SM	<u>Colluvium (Qcol):</u> SILTY SAND, fine to coarse grained, reddish brown, dry, medium dense; occasional angular gravel; trace clay; porous.
	4.5 – 18.0		<u>Granitic Materials (Kgr):</u> RESIDUAL SOIL, completely weathered to SILTY TO CLAYEY SAND, fine to coarse grained, reddish brown, dry to slightly moist, medium dense. @7 ft. Highly weathered, moderately hard, friable, breaks into olive brown, fine to coarse grained SILTY SAND. @9 ft. Hard. @13 ft. Larger cobble-size chunks. @15 ft. Slow digging. TOTAL DEPTH 18.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
T-3	0.0 – 4.0	SM	<u>Colluvium (Qcol)</u> SILTY SAND, fine to coarse grained, reddish brown, dry, loose. @1.5 ft. Medium dense; porous; few large boulders to 3 ft. diameter.
	4.0 – 10.0		<u>Granitic Materials (Kgr):</u> Completely weathered, moderately hard, breaks into fine to coarse grained SAND with SILT. @6 to 6.5' Highly weathered, hard, breaks into fine to coarse grained SAND with friable cobble size chunks; freshening with depth. TOTAL DEPTH 10.0 FT. (REFUSAL) NO WATER, NO CAVING

T-4	0.0 – 0.5	SM	<u>Topsoil:</u> SILTY SAND, brown to reddish brown, dry, loose.
	0.5 – 6.0	SM	<u>Colluvium (Qcol):</u> SILTY SAND with CLAY, fine to coarse grained, reddish brown, dry, loose to moderately dense. @3 ft. Weakly cemented; porous.
	6.0 – 18.5		<u>Granitic Materials (Kgr):</u> RESIDUAL SOIL, completely weathered to SILTY to CLAYEY SAND, fine to coarse grained, reddish brown, dry, medium dense. @6.5 ft. Weathered, olive brown to yellowish brown, moderately hard; breaks into fine to coarse grained SAND with SILT and small GRAVEL. @8 ft. Hard. @13 ft. Slow digging. @14 ft. Dark olive gray; breaks into very coarse SAND with small GRAVEL. @17 ft. Very slow digging. TOTAL DEPTH 18.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
T-5	0.0 – 1.0	SM	<u>Topsoil</u> SILTY SAND, brown, dry, loose.
	1.0 – 4.0	SM	<u>Colluvium (Qcol)</u> SILTY SAND, fine to coarse grained, reddish brown, dry, loose to moderately dense; with occasional gravel and small angular cobble.
	4.0 – 14.5		<u>Granitic Materials (Kgr):</u> RESIDUAL SOIL, completely weathered to SILTY to CLAYEY SAND with small GRAVEL, orange brown, moderately hard. @6 ft. Weathered, olive brown, hard, breaks into fine to coarse grained SAND with small GRAVEL. @9 ft. Olive brown to gray. @11 ft. Slow digging. TOTAL DEPTH 14.5 FT. (PRACTICAL REFUSAL) NO WATER, NO CAVING

T-6	0.0 – 0.5	SM	<u>Topsoil:</u> SILTY SAND, brown, dry, loose.
	0.5 – 5.5	SM	<u>Colluvium (Qcol):</u> SILTY SAND, reddish brown, loose to medium dense; with occasional gravel and cobble; weakly cemented; porous; roots to 24" deep.
	5.5 – 7.5		<u>Granitic Materials (Kgr):</u> Weathered, moderately hard to hard, olive brown; breaks into fine to coarse grained SILTY SAND with small GRAVEL. @6.5 ft. Freshens, hard; slow digging. TOTAL DEPTH 7.5 FT. (REFUSAL) NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
T-7	0.0 – 1.0	SM	<u>Topsoil</u> SILTY SAND, brown, dry, loose.
	1.0 – 3.5	SM	<u>Colluvium (Qcol)</u> SILTY SAND, fine to coarse grained, reddish brown, dry, loose to moderately dense.
	3.5 – 13.5		<u>Granitic Materials (Kgr):</u> RESIDUAL SOIL, completely weathered to SILTY SAND with CLAY, fine to coarse grained, reddish brown, moderately hard. @5 ft. Hard, orange brown; breaks into fine to coarse grained SILTY SAND with small GRAVEL. @8 ft. Freshens, yellowish brown to orange brown. @10 ft. Slow digging. @11.5 ft. Very slow digging. TOTAL DEPTH 13.5 FT. (PRACTICAL REFUSAL) NO WATER, NO CAVING

T-8	0.0 – 1.0	SM	<u>Topsoil:</u> SILTY SAND, brown, dry, loose.
	1.0 – 3.5	SM	<u>Colluvium (Qcol):</u> SILTY SAND with CLAY, reddish brown, dry, loose to moderately dense.
	3.5 – 17.5		<u>Granitic Materials (Kgr):</u> RESIDUAL SOIL, completely weathered to SILTY SAND with CLAY, fine to coarse grained, reddish brown, dry to slightly moist, medium dense to dense. @5 ft. Weathered, orange brown, hard; breaks into fine to coarse grained SILTY SAND with small GRAVEL. @9 ft. Olive brown, slow digging. @12 ft. Orange brown, breaks into fine to coarse grained SAND with hard cobble size chunks. @14.5 ft. Very slow digging. TOTAL DEPTH 17.5 FT. (PRACTICAL REFUSAL) NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
T-9	0.0 – 1.0	SM	<u>Topsoil</u> SILTY SAND, brown, dry, loose.
	1.0 – 5.0	SM	<u>Colluvium (Qcol)</u> SILTY SAND, reddish brown, dry to slightly moist, loose to moderately dense; weakly cemented; porous.
	5.0 – 14.0		<u>Granitic Materials (Kgr):</u> Completely to highly weathered, olive brown, hard; breaks into fine to coarse grained SILTY SAND with GRAVEL. @7 ft. Some cobble size non-friable chunks. @10 ft. Slow digging. @12 ft. Very slow digging. TOTAL DEPTH 14.0 FT. (REFUSAL) NO WATER, NO CAVING

T-10	0.0 – 0.5	SM	<u>Topsoil:</u> SILTY SAND, brown, dry, loose.
	0.5 – 4.5	SM	<u>Colluvium (Qcol):</u> SILTY SAND, fine to coarse grained, reddish brown, dry to slightly moist; with occasional gravel. @3 ft. Slightly moist.
	4.5 – 15.0		<u>Granitic Materials (Kgr):</u> Completely weathered, olive brown, moderately hard; breaks into fine to coarse grained SILTY SAND with GRAVEL. @7 ft. Hard. @9 ft. Hard cobble-size chunks. @10 ft. Slow digging. @12 ft. Larger chunks up to 15" (tabular) @13 ft. Very slow digging. TOTAL DEPTH 15.0 FT. (PRACTICAL REFUSAL) NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
T-11	0.0 – 1.5	SM	<u>Topsoil</u> SILTY SAND, brown, dry, loose; with roots.
	1.5 – 5.5	SM	<u>Colluvium (Qcol)</u> SILTY SAND, fine to coarse grained, reddish brown, dry to slightly moist, loose to moderately dense. @2.5 to 3 ft. Slightly moist, medium dense; weakly cemented; porous.
	5.5 – 15.0		<u>Granitic Materials (Kgr):</u> Completely weathered, hard, orange brown; breaks into fine to coarse grained SILTY SAND with small gravel. @7.5 ft. Olive brown, hard; freshens with depth. @10 ft. Olive gray; slow digging. @12 ft. Very slow digging. @13.5 ft. Very hard. TOTAL DEPTH 15.0 FT. (PRACTICAL REFUSAL) NO WATER, NO CAVING

T-12	0.0 – 4.5	SM	<u>Artificial Fill – Undocumented (afu):</u> SILTY SAND, dark brown, dry to slightly moist, loose; with cobbles and small boulders to 15". @1.5 ft. Moist, loose to moderately dense.
	4.5 – 14.5		<u>Granitic Materials (Kgr):</u> Completely weathered, moderately hard, olive brown; breaks into fine to coarse grained SILTY SAND with small GRAVEL. @7.5 ft. Hard. @12 ft. Very hard. TOTAL DEPTH 14.5 FT. (REFUSAL) NO WATER, NO CAVING

