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December 5, 2019
Project No. 19-1107A2

Subject: Geotechnical Investigation for Proposed Senior Housing Project
3710 Vista Way
Oceanside, CA 92056
APN 165-493-47-00

Ladies & Gentlemen:

In accordance with your request, we have performed a geotechnical investigation at the subject site to discuss the geotechnical aspects of the project and provide recommendations for design and construction of the proposed senior housing project.

SCOPE OF SERVICES

The following scope of work was performed for this investigation:

- Site reconnaissance and review of published geologic, seismologic and geotechnical reports and maps pertinent to the project area
- Subsurface exploration consisting of three test borings and six test pits within the limits of the proposed housing project. The test borings and test pits were logged by our project supervisor.
- Collection of representative soil samples at selected depths. The obtained samples were sealed in moisture-resistant containers and transported to the laboratory for subsequent analysis.
- Laboratory testing of soil samples obtained during the field investigation.
- Geotechnical analysis of the field and laboratory data, which provided the basis for our conclusions and recommendations.
- Preparation of this report, which summarizes the results of our analysis and presents our findings and recommendations for the proposed construction.

SITE DESCRIPTION AND PROPOSED CONSTRUCTION

The subject site is an irregular-shaped, residential lot located at the northwest corner of Vista Way and North Way, in the City of Oceanside, California. The property is a vacant, previously graded parcel that slopes gently down to the southeast. Vegetation consists of grass, shrub and a few trees. The parcel is bordered by Vista Way to the south, North Way to the east and similar residential developments to the west and north.

No building plans were available at the time of our investigation. It is our understanding that the proposed construction will consist of 16 to 20 senior housing residences. The buildings will be one-story, wood framed structures founded on continuous and/or individual spread footings with slab-on-grade floors.

FIELD INVESTIGATION AND LABORATORY TESTING

On September 18 and 30, 2019, three test borings and six test pits were excavated to a maximum depth of approximately 8 feet below existing grade with a hand auger and a Caterpillar mini-excavator equipped with a 24-inch bucket, respectively. The approximate locations of the test borings and test pits are shown on the attached Figure 2. Logs of the subsurface soils and bedrock materials are shown on Figure 3.

Following the field exploration, laboratory testing was performed to evaluate the pertinent engineering properties of the foundation materials. The laboratory tests included maximum density and optimum moisture content, in place moisture content and dry density, and expansion index. The tests were performed in general accordance with ASTM standards and other accepted methods. The test results are shown on the logs of the test pits, Figure 3 and on Figure 4.

SOIL CONDITIONS

The subsurface descriptions are interpreted from conditions encountered during the field investigation and/or inferred from the geologic literature. Detailed descriptions of the subsurface materials are presented on the logs of the test borings and test pits provided on Figure 3. The following are general descriptions of the encountered soil and bedrock types.

Fill

Fill soils were encountered in all test borings and test pits to depths ranging from approximately 6 inches to 5 feet below existing grades. The fill consisted of light grayish brown, silty sand that was dry to moist and loose to medium dense in consistency.

Bedrock-Santiago Formation

Bedrock of the Santiago Formation was encountered below the fill soils. The bedrock generally consisted of light gray, silty sandstone that was dry to moist and medium dense to dense in consistency.

SOIL PROPERTIES

a. Compressible Soils

Our field observations and testing indicate low compressibility within the underlying sandstone bedrock of the Santiago Formation. However, loose, fill soils were encountered to depths ranging from approximately 6 inches to approximately 5 feet below existing surface grades within the proposed building areas. The fill soils are compressible. As a result, all existing fill should be removed and recompacted to a minimum of 90 percent relative compaction, as discussed later in the report.

b. Expansive Soils

An expansion index test (ASTM D 4829) was performed on a representative sample of the fill soils to determine volumetric change characteristics with change in moisture content. An expansion index of 0 was obtained which indicates the foundation soils are non expansive.

GROUNDWATER

Static groundwater was not encountered to the depths of the boreholes. The building pads are located at an elevation greater than 200 feet above Mean Sea Level. We do not expect groundwater to affect the proposed construction. Recommendations for surface drainage are presented later in the Drainage section of this report.

2016 CBC SEISMIC DESIGN CRITERIA

Seismic design values are presented on the attached Figure No. 5.

CONCLUSIONS

Based on our investigation, we conclude that the construction of the proposed senior housing project is feasible from a geotechnical standpoint, provided the recommendations presented in this report will be properly implemented during construction.

RECOMMENDATIONS

SITE GRADING

a. Clearing and Grubbing

The areas of the proposed construction should be cleared of vegetation and deleterious materials. Vegetation and the debris from the clearing operation should be properly disposed of off-site. The area should be thoroughly inspected for any possible buried objects that need to be rerouted or removed prior to construction. All holes, trenches, or pockets left by the removal of these objects should be properly backfilled with compacted fill materials.

b. Erosion Control

Due to the granular characteristics of the on-site soils, areas of recent grading or exposed ground may be subject to erosion. During construction, surface water should be controlled via berms, gravel/ sandbags, silt fences, straw wattles, siltation or bioretention basins, positive surface grades or other method to avoid damage to the finish work or adjoining properties. All site entrances and exits must have coarse gravel or steel shaker plates to minimize offsite sediment tracking. Best Management Practices (BMPs) must be used to protect storm drains and minimize pollution. The contractor should take measures to prevent erosion of graded areas until such time as permanent drainage and erosion control measures have been installed. After completion of grading, all excavated surfaces should exhibit positive drainage and eliminate areas where water might pond.

c. Temporary Slopes

For the excavation of foundations and utility trenches, temporary vertical cuts to a maximum height of 5 feet may be constructed. Any temporary cuts greater than 5 feet in height should be shored or laid back at a 3/4:1 (horizontal to vertical) slope ratio. CAL-OSHA guidelines for temporary slopes and trench excavation safety should be implemented during construction.

d. Soil Removals

The existing fill soils within building areas and to a distance of at least 5 feet outside building limits should be removed to their full depth (about 5 feet maximum) exposing the underlying sandstone of the Santiago Formation. Where the existing fill depths are less than 3 feet the existing fill/bedrock should be overexcavated to a minimum depth of 3 feet below proposed pad grades.

e. Compaction and Method of Filling

Prior to fill placement, the bottoms of the excavations should be scarified to a depth of 6 to 8 inches, moisture conditioned to slightly above optimum moisture content and compacted to at least 90 percent relative compaction.

The on-site soils may be reused as compacted fill provided they are free of organic materials and debris, and rocks or cobbles over 6 inches in dimension. Any imported fill soils should be predominantly granular and approved by our field representative.

All fill should be compacted to a minimum relative compaction of 90 percent as determined by ASTM D1557. Fill should be placed at a moisture content slightly above optimum moisture content, in lifts 6 to 8 inches thick, with each lift compacted by mechanical means.

Utility trench backfill should also be compacted to at least 90 percent relative compaction.

All grading, fill placement, and compaction should be performed in accordance with the grading requirements of the City of Oceanside. Fill placement and compaction should be observed and tested as necessary by our field representative.

FOUNDATIONS AND FLOOR SLABS

a. The proposed one-story buildings should be founded in properly compacted fill. Footings should have a minimum depth of 18 inches below building pad grade or lowest adjacent, finished grade, whichever is deeper. Continuous footings should be at least 15 inches wide and reinforced with a minimum of four #4 steel bars; two bars placed near the top of the footings and the other two bars placed near the bottom of the footings. Individual footings should be at least 18 inches square and reinforced with a grid of #4 bars spaced 12 inches on centers (each way) and placed on concrete blocks at the bottom of the footing.

b. Floor slabs should be at least 5 inches thick and reinforced with #4 bars placed at 18 inches on center in two directions in the middle of the slab. The reinforcing steel should be supported on steel chairs or concrete blocks. Floor slabs should be underlain by 2 inches of clean sand over a 10-mil visqueen moisture barrier over 2 inches of clean sand. To minimize the potential for shrinkage cracks, the maximum concrete slump should be 4 inches and the maximum water-cement ration should be 50 percent. Some shrinkage cracks are still possible.

f. An allowable soil bearing value of 2,000 pounds per square foot may be used for the design of continuous and individual spread footings. This value may be increased by one-third for short term wind or seismic loads.

g. Lateral loads may be resisted by an equivalent fluid passive soil pressure of 300 pounds per cubic foot. A coefficient of friction of 0.4 may also be used. If passive and friction values are used together, the friction value should be reduced by one-third.

h. All footing excavations should be inspected and approved by our representative.

i. For design purposes, total and differential settlements of ½ inch may be utilized.

DRAINAGE

Adequate measures should be undertaken so that drainage water is directed away from the foundations, footings, floor slabs and the tops of slopes via rain gutters, downspouts, surface swales and subsurface drains towards the natural drainage for this area. As required in the 2016 California Building Code, a minimum gradient of 2 percent is recommended in hardscape areas adjacent to the structure. In earth areas, a minimum gradient of 5 percent away from the structure for a distance of at least 10 feet should be provided. If this requirement cannot be met due to site limitations, drainage can be done through a swale in accordance with Section 1804.4 of the 2016 California Building Code. Earth swales should have a minimum gradient of 2 percent. Drainage should be directed to approved drainage facilities. Proper surface and subsurface drainage will be required to minimize the potential of water seeking the level of the bearing soils under the

foundations, footings and floor slabs, which may otherwise result in undermining and differential settlement of the structure and other improvements.

LIMITATIONS OF INVESTIGATION

Our investigation was performed using the skill and degree of care ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. This report provides no warranty, either expressed or implied, concerning future building performance. Future damage from geotechnical or other causes is a possibility.

This report is prepared for the sole use of our client and may not be assigned to others without the written consent of the client and ECSC&E, Inc.

The samples collected and used for testing, and the observations made, are believed representative of site conditions; however, soil and geologic conditions can vary significantly between exploration trenches, boreholes and surface exposures. As in most major projects, conditions revealed by construction excavations may vary with preliminary findings. If this occurs, the changed conditions must be evaluated by a representative of ECSC&E and designs adjusted as required or alternate designs recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative to ensure that the information and recommendations contained herein are brought to the attention of the project architect and engineer. Appropriate recommendations should be incorporated into the structural plans. The necessary steps should be taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of this present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside of our control. Therefore, this report is subject to review and should be updated after a period of two years.

ADDITIONAL SERVICES

The review of plans and specifications, field observations and testing under our direction are integral parts of the recommendations made in this report. If East County Soil Consultation and Engineering, Inc. is not retained for these services, the client agrees to assume our responsibility for any potential claims that may arise during construction. Observation and testing are additional services, which are provided by our firm, and should be budgeted within the cost of development.

Figures 1 through 5 are part of this report.

Respectfully Submitted,

Martin R. Owen, PE, GE
Geotechnical Engineer

FIGURE 1
VICINITY MAP

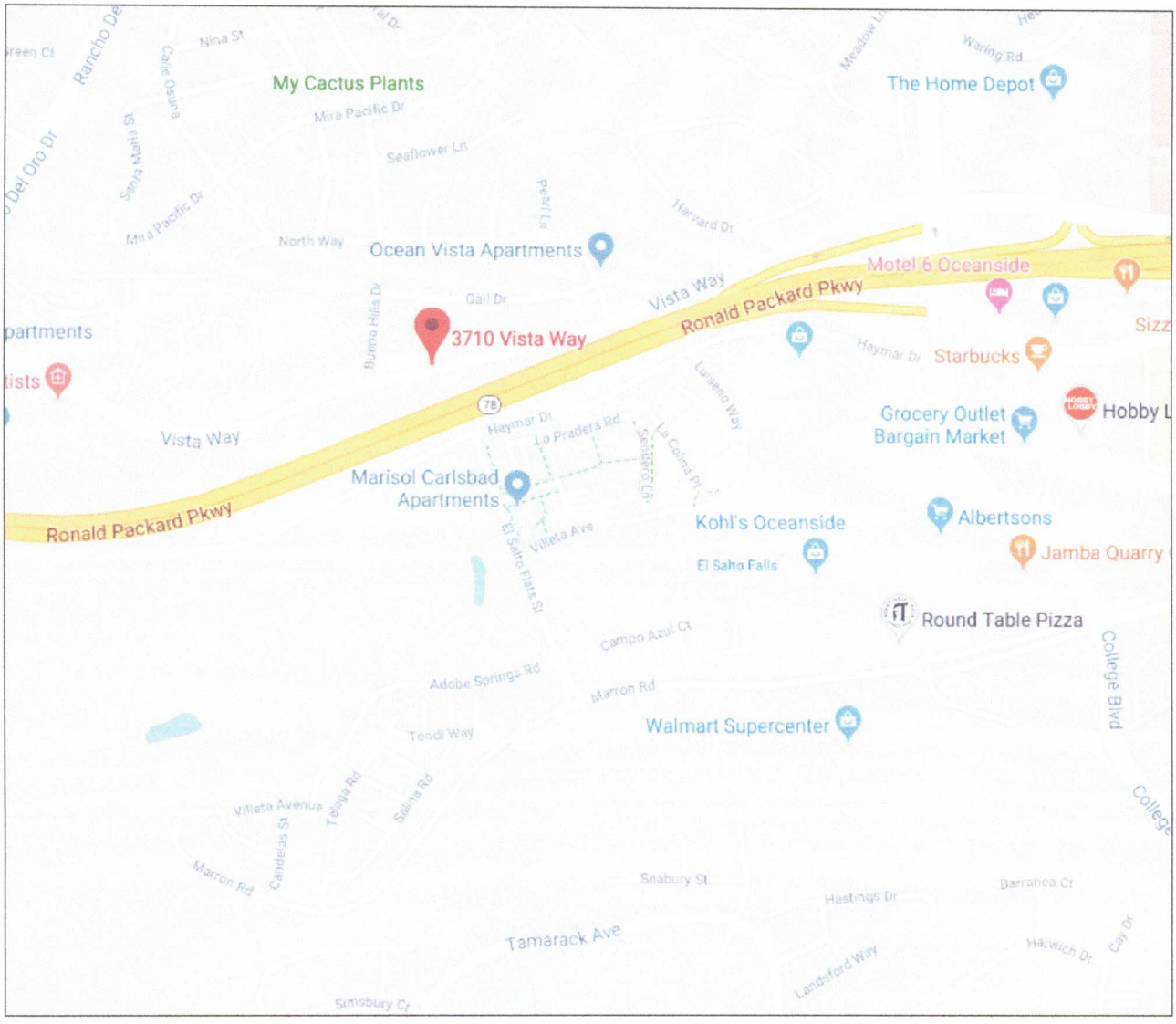
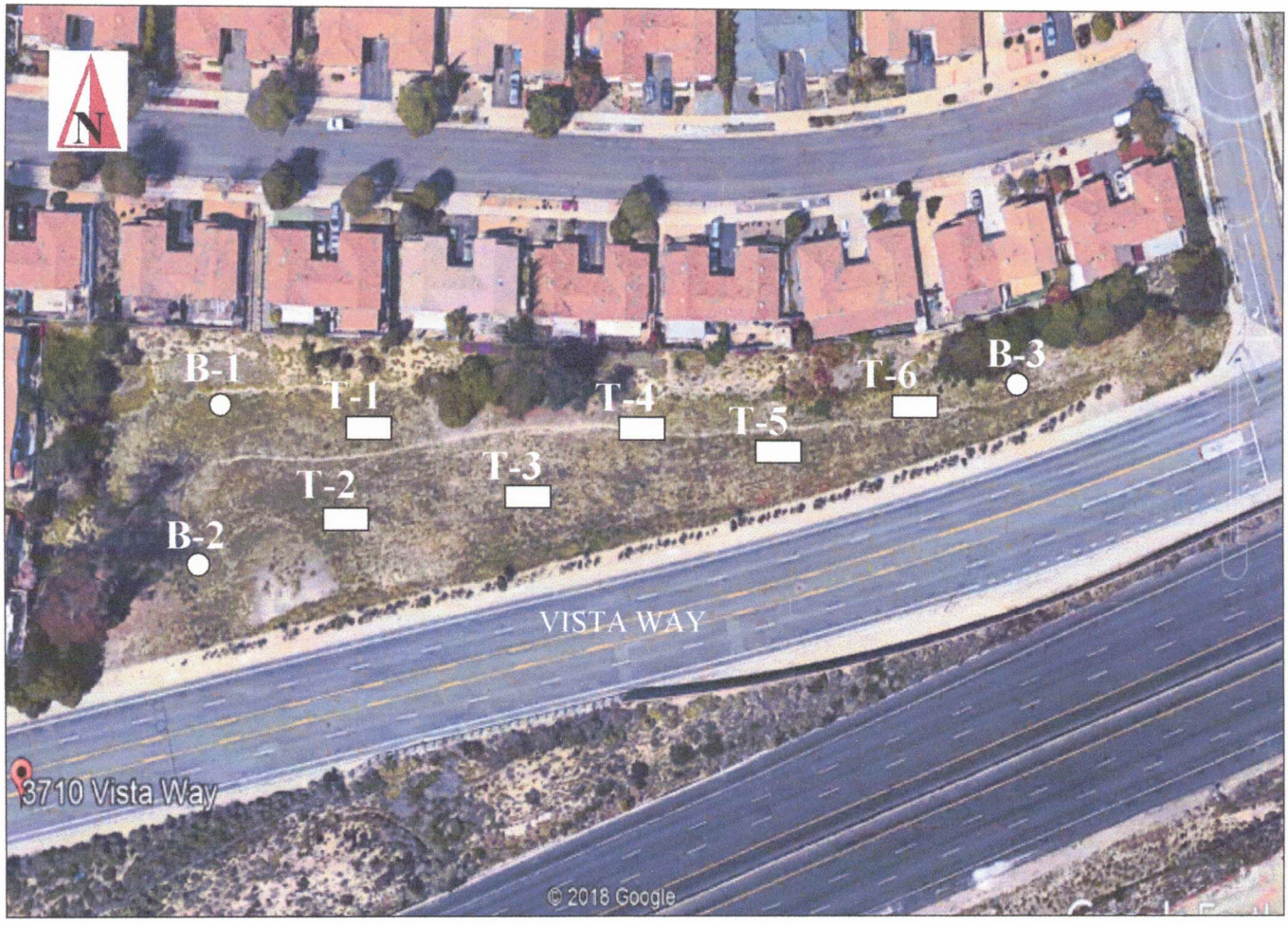


FIGURE 2
LOCATIONS OF TEST BORINGS AND TEST PITS



LEGEND

B-3 ○ APPROXIMATE LOCATION OF TEST BORING
T-6 ▭ APPROXIMATE LOCATION OF TEST PIT

FIGURE 3
LOGS OF TEST BORINGS AND TEST PITS

TEST BORING NO. 1

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry to moist, loose to medium dense, silty sand		
1.0'	**BEDROCK-SANTIAGO FORMATION**		
	light gray, dry to moist, medium dense to dense, silty sandstone		
2.0'	becomes moist and dense		
3.0'	bottom of borehole, no caving, no groundwater		
	borehole backfilled 9/18/19		

TEST BORING NO. 2

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry to moist, loose to medium dense, silty sand		
0.5'	**BEDROCK-SANTIAGO FORMATION**		
	light gray, dry to moist, medium dense to dense, silty sandstone		
2.5'	becomes moist and dense		
3.0'	bottom of borehole, no caving, no groundwater		
	borehole backfilled 9/18/19		

TEST BORING NO. 3

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry to moist, loose to medium dense, silty sand		
3.5'	**BEDROCK-SANTIAGO FORMATION**		
	light gray, dry to moist, medium dense to dense, silty sandstone		
4.0'	becomes moist and dense		
5.0'	bottom of borehole, no caving, no groundwater		
	borehole backfilled 9/18/19		

Y = DRY DENSITY IN PCF
M = MOISTURE CONTENT IN %

FIGURE 3
LOGS OF TEST BORINGS AND TEST PITS (CONTINUED)

TEST PIT NO. 1

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry, loose to medium dense, silty sand		
1.0'	" " " " " " "	98.4	2.9
2.0'	**BEDROCK-SANTIAGO FORMATION**		
	light gray, dry to moist, dense, silty sandstone	112.5	10.8
3.0'	becomes moist and dense		
4.0'	" " "	109.8	11.0
5.0'	bottom of test pit, no caving, no groundwater		
	test pit backfilled 9/30/19		

TEST PIT NO. 2

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry to moist, loose to medium dense, silty sand		
0.5'	**BEDROCK-SANTIAGO FORMATION**		
	light gray, dry to moist, medium dense to dense, silty sandstone		
2.5'	" " " " " " "	108.4	9.3
3.0'	bottom of test pit, no caving, no groundwater		
	test pit backfilled 9/30/19		

TEST PIT NO. 3

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry to moist, loose to medium dense, silty sand		
2.0'	" " " " " " "	101.0	7.4
5.0'	**BEDROCK-SANTIAGO FORMATION**		
	light gray, dry to moist, medium dense to dense, silty sandstone		
6.0'	becomes moist and dense		
8.0'	bottom of test pit, no caving, no groundwater		
	test pit backfilled 9/30/19		

Y = DRY DENSITY IN PCF M = MOISTURE CONTENT IN %

FIGURE 3
LOGS OF TEST BORINGS AND TEST PITS (CONTINUED)

TEST PIT NO. 4

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry to moist, loose to medium dense, silty sand		
3.0'	" " " " " " "	104.6	8.2
5.0'	**BEDROCK-SANTIAGO FORMATION**		
	light gray, dry to moist, medium dense to dense, silty sandstone		
6.0'	bottom of test pit, no caving, no groundwater		
	test pit backfilled 9/30/19		

TEST PIT NO. 5

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry to moist, loose to medium dense, silty sand		
1.5'	" " " " " " "	99.0	9.1
3.0'	**SANTIAGO FORMATION**		
	light gray, dry to moist, medium dense to dense, silty sandstone		
4.0'	bottom of test pit, no caving, no groundwater		
	test pit backfilled 9/30/19		

TEST PIT NO. 6

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL**		
	light grayish brown, dry to moist, loose to medium dense, silty sand		
2.5'	" " " " " " "	104.5	9.6
4.0'	**BEDROCK-SANTIAGO FORMATION**		
	light gray, dry to moist, medium dense to dense, silty sandstone		
5.0'	becomes moist and dense		
6.0'	bottom of test pit, no caving, no groundwater		
	test pit backfilled 9/30/19		

Y = DRY DENSITY IN PCF M = MOISTURE CONTENT IN %

FIGURE 4
RESULTS OF LABORATORY TESTS

EXPANSION INDEX TEST
(ASTM D 4829

TEST LOCATION	INITIAL MOISTURE CONTENT (%)	SATURATED MOISTURE CONTENT (%)	INITIAL DRY DENSITY (PCF)	EXPANSION INDEX	EXPANSION POTENTIAL
TP-3 @ 2.0'	9.2	17.6	111.8	0	NONE

MAXIMUM DENSITY TEST
(ASTM D 1557)

TEST LOCATION	SOIL TYPE/ PROCEDURE	SOIL DESCRIPTION	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)
TP-3 @ 2.0'	1/A	LIGHT GRAYISH BROWN SILTY SAND	125.0	10.0

FIGURE 5
SEISMIC DESIGN VALUES

The following 2016 CBC seismic design values may be used.

PARAMETER	VALUE	2016 CBC & ASCE 7 REFERENCES
Site Class	D	Table 20.3-1/ ASCE 7, Chapter 20
Mapped Spectral Acceleration for Short Periods, S_s	1.070g	Figure 1613.3.1(1)
Mapped Spectral Acceleration For a 1-Second Period, S_1	0.414g	Figure 1613.3.1(2)
Site Coefficient, F_a	1.072	Table 1613.3.3(1)
Site Coefficient, F_v	1.586	Table 1613.3.3(2)
Adjusted Max. Considered Earthquake Spectral Response Acceleration for Short Periods, S_{MS}	1.147g	Equation 16-37
Adjusted Max. Considered Earthquake Spectral Response Acceleration for 1-Second Period, S_{M1}	0.657g	Equation 16-38
5 Percent Damped Design Spectral Response Acceleration for Short Periods, S_{DS}	0.765g	Equation 16-39
5 Percent Damped Design Spectral Response Acceleration for 1-Second Period, S_{D1}	0.438g	Equation 16-40