APPLIED CONSULTANTS
environmental geology & engineering

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September 18, 2018

Infill Development
Attn: David Weiland
Via E-mail: infilldevelopment@yahoo.com

Subject: Geotechnical Investigation for the Euclid Avenue Project Located between Trinidad Way and La Paz Drive in San Diego, CA 92114
APN: 548-430-28-00

Dear Mr. Weiland:

In accordance with your request we have prepared this geotechnical investigation report for the subject property located at the aforementioned address. The purpose of this geotechnical investigation was to determine various parameters of the subsurface soils needed before development of the property can begin.

The proposed development is the construction of a multi-family complex with associated public right of way features and utilities upon the vacant lot. The proposed structures are conventional, wood framed, buildings, supported by slab on grade foundations.

Our work consisted of geotechnical observations, subsurface exploration, soil sampling, laboratory testing, calculations and analyses, and the preparation of this report. Location of the site, relative to general topography, streets and landmarks, is shown on the attached Figure 1.

GEOTECHNICAL INVESTIGATION CONCLUSIONS

After reviewing the results of our geotechnical investigation, Applied Consultants concludes that there are no significant geotechnical or geologic constraints that cannot be mitigated by proper planning, design, and the utilization of sound construction practices. It is our opinion that construction of the residence is feasible from a geotechnical standpoint.

Prior to construction of the new development all deleterious and oversized materials shall be screened and removed from the site soils. The upper thirty six inches of the proposed development shall be excavated, the upper 6" of the key scarified, and soils recompacted to greater than 90% of optimum compaction. The bottom of the excavations should be approved by our project geologist, engineer, or technician supervisor prior to placing fills or constructing improvements. If the subsoils are determined to be unsuitable when observed, they shall be removed to below the contact with the formational material. The removed fill materials may be stockpiled for reuse on the site as structural fill material, or be placed directly in areas approved by our representative to receive fill.

Design of the foundation of the proposed development shall be based on a 2,000 Pounds per Square Foot bearing capacity.

We certify that the site is suitable for its intended use.

We appreciate this opportunity to be of service. Should you have any questions, please call our office at (619) 258-9000.

Sincerely,

Jorge L. Valdez, EIT 164277
Staff Engineer

Bernard J. Luther, RCE 63653, CEG 1356
CEO

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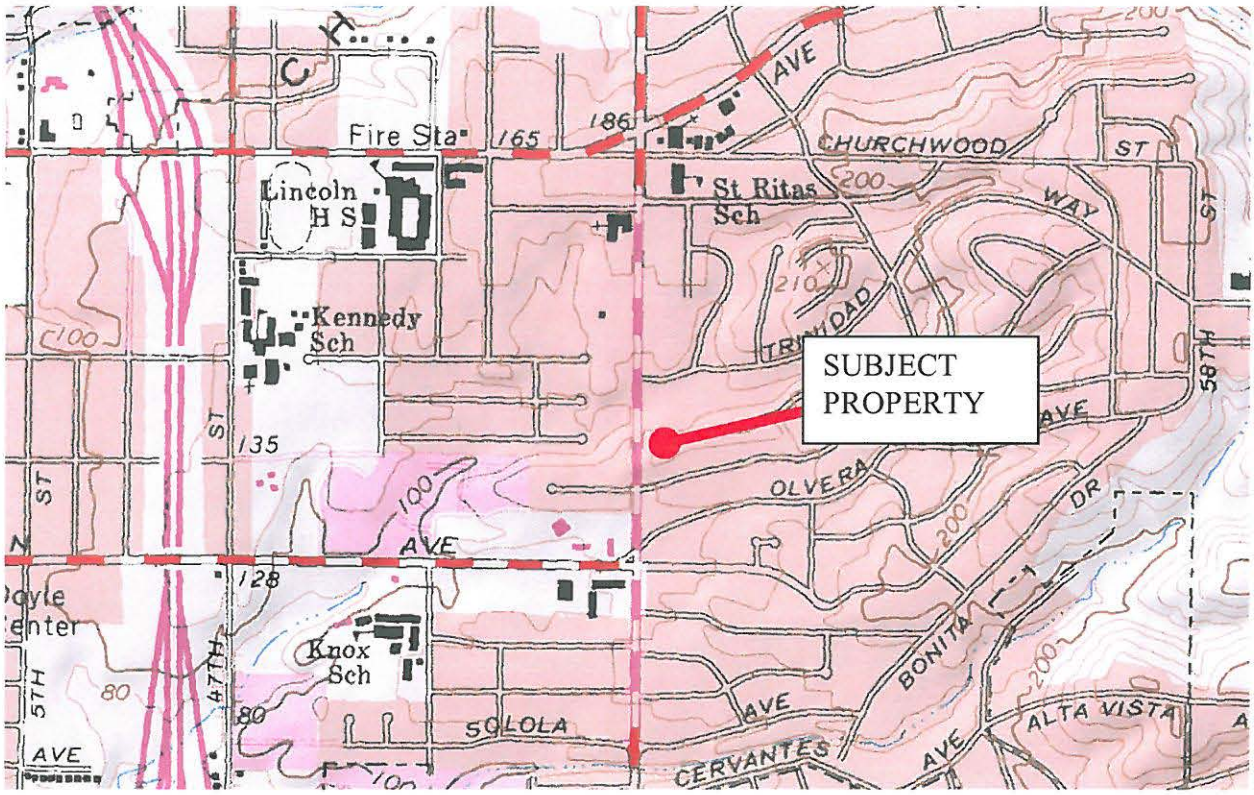
1.0 SITE DESCRIPTION

The property is an irregularly shaped parcel of land located in San Diego, California. The approximate location of the property is at latitude 32°41'58"N and longitude 117° 5' 02"W. The subject property and slopes from south to north at an inclination of 2:1 to 3:1. A level bench is located along the southern section of the lot. Approximately forty feet of elevation difference is located at the subject property with the high point located at the southeast corner and the low point at the northwest corner.

A natural drainage channel is located along the northern property line.

Based upon the topography and surrounding improvements, we feel that the majority of the subject property consists of native soils and formational units.



Geographic Location

Euclid Avenue Project
Located between Trinidad Way and La Paz Drive
San Diego, CA 92114
APN: 548-430-28-00

APPLIED CONSULTANTS environmental geology & engineering	**Site Location Map**	**Fig. 1**

2.0 SURFACE AND GROUND WATER

On August 31, 2018, a representative of this firm visited the site to perform physical reconnaissance and field work at the subject property. We excavated five exploratory trenches at the subject property to various depths. The exploratory trenches were excavated under the supervision and the exposed geologic cross sections were logged by a certified engineering geologist. The exploratory trenches were excavated throughout the slope and to a maximum depth of fifteen feet below existing grade.

No groundwater was encountered in our exploratory trenches.

3.0 SITE GEOLOGY

3.1 Geologic Literature Review and Field Findings

We reviewed the Geologic Map of the San Diego 30' x 60' Quadrangle, California (Kennedy and Tan, 2005) for references concerning the geologic structure underlying the subject property and surrounding areas.

Review of the Geologic Map of the San Diego 30' x 60' Quadrangle indicates that the underlying geologic structure at the subject property consists of Very old paralic deposits undivided (Qvop). The Very old paralic deposits undivided are "Mostly poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate."

Locally the materials encountered in the trenches were:

Test Pit #1 (T-1):

> From grade to 8' below grade a fine to medium grained, reddish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

Test Pit #2 (T-2):

> From grade to 7' below grade a fine to medium grained, reddish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.
>
> From 7' below grade to 13' below grade a fine to medium grained, reddish brown poorly graded silty sand (SP-SM) and concretions with iron deposits was encountered.

Test Pit #3 (T-3):

> From grade to 1.5' below grade a fine to medium grained, reddish dark brown silty sand (SM) was encountered. (Top soil)

From 1.5' below grade to 4.5' below grade a fine to medium grained, reddish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

From 4.5' below grade to 14' below grade a fine to medium grained, moist orangish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

Test Pit #4 (T-4):

From grade to 1.5' below grade a fine to medium grained, reddish dark brown silty sand (SM) was encountered. (Top soil)

From 1.5' below grade to 8' below grade a fine to medium grained, reddish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

Test Pit #5 (T-5):

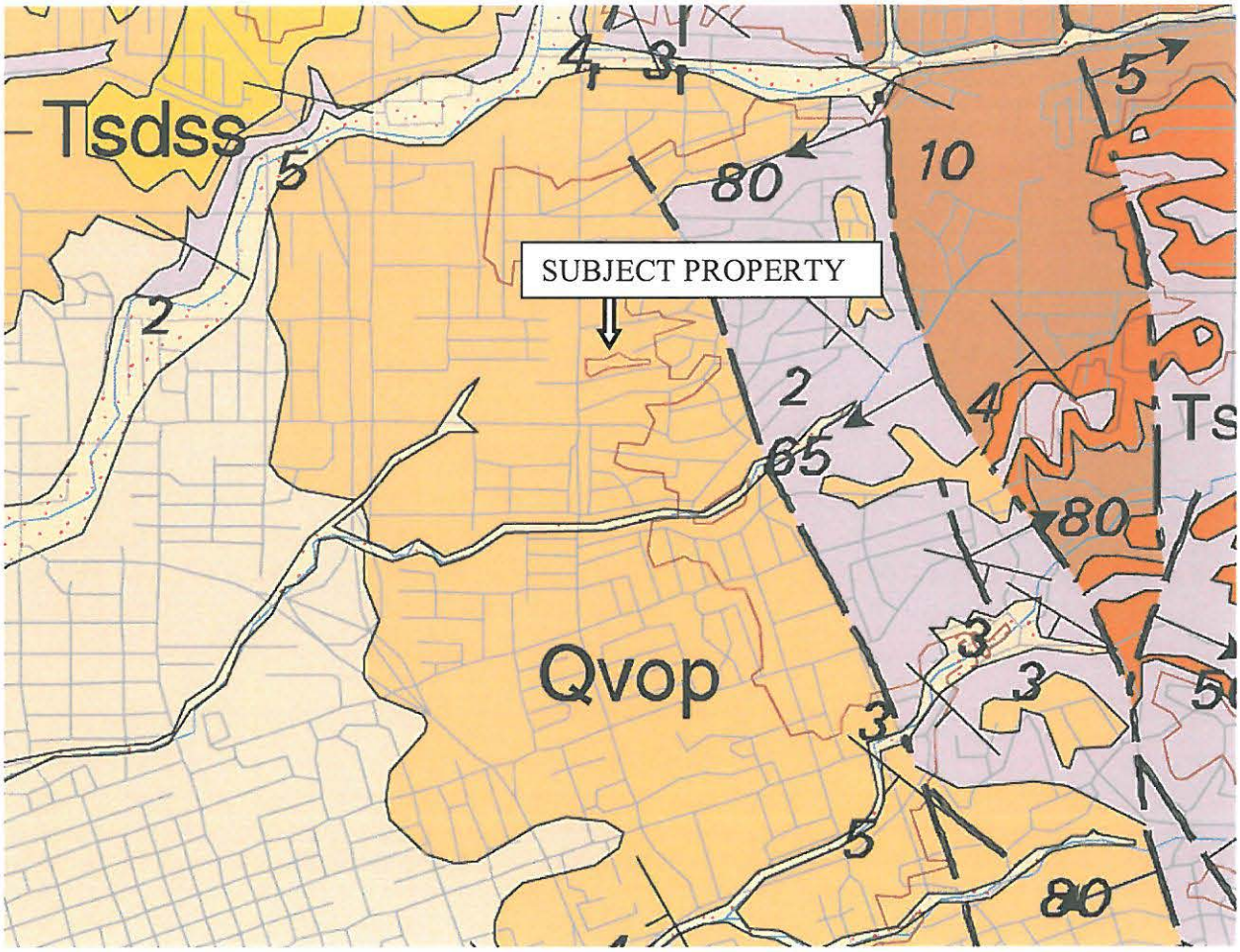
From grade to 6' below grade a fine to medium grained, reddish dark brown silty sand (SM) with organics was encountered.

From 6' to 10' below grade a fine to medium grained, moist orangish brown silty sand (SM) was encountered.

From 10' to 15' below grade a fine to medium grained, moist brown poorly graded sand (SP) was encountered.

Test pit #5 was excavated outside the proposed development footprint and adjacent to the creek at the northern side of the property. This area has been disturbed by human and animal activity and do not represent the general geologic condition of the site.

No groundwater was encountered at any of the trenches.



Geologic Map:

Euclid Avenue Project
Located between Trinidad Way and La Paz Drive
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APPLIED CONSULTANTS environmental geology & engineering	**Geologic Map**	Fig. 2

3.2 Tectonic Setting

Southern California, including the City of San Diego and surrounding areas, is located in an area of late Tertiary to Quaternary-aged fault zones (Kennedy 1975) which strike conservatively to the northwest. Some of these fault zones are known to be active according to the California Division of Mines and Geology. "Active" faults are ones which have had faulting activity within the Holocene Epoch, or the last 11,000 years (California Division of Mines and Geology).

The northerly trending Rose Canyon Fault system has been mapped as underlying the San Diego county area. Some segments of the Rose Canyon Fault system have recently been designated as active by the State of California with the establishment of Alquist-Priolo special Studies Zones (State of California, 1991).

Based upon magnitude of the earthquake event and distance from the subject property, an earthquake on any of the above mentioned faults would cause slight to severe shaking at the subject property.

3.3 Seismic Design Recommendations

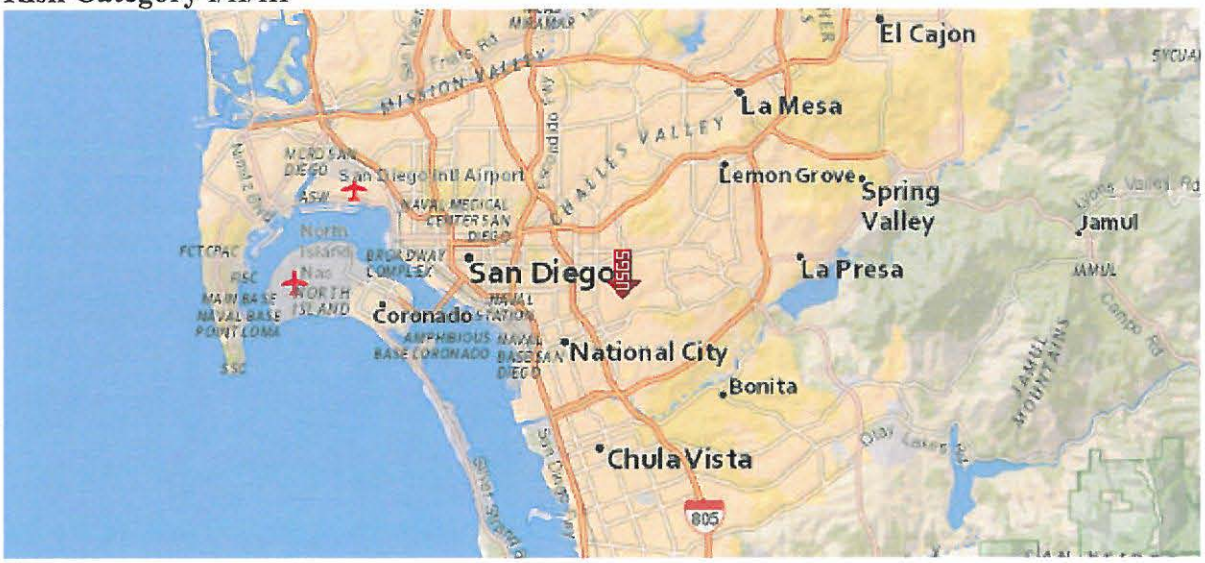
The proposed development should be designed in accordance with seismic considerations contained in the 2016 California Building Code (2016 CBC), American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) Standard 7-10: Minimum Design Loads for Buildings and other Structures and City of San Diego requirements. The following parameters may be considered for design:

Seismic Importance Factor (I):	**1.0**	*(ASCE 7-10)*
Occupancy Category:	**II**	*(2016 CBC)*
Site Class:	**D**	*(2016 CBC)*
Spectral Response Coefficient (S_{DS})	**0.728g**	*(USGS)*
Spectral Response Coefficient (S_{D1})	**0.413g**	*(USGS)*
Seismic Design Category (S_{DS} – based):	**D**	*(2016 CBC)*
Seismic Design Category (S_{D1} – based):	**D**	*(2016 CBC)*

USGS

Design Maps Summary Report

- **Building Code Reference Document** ASCE 7-10 Standard(which utilizes USGS hazard data available in 2008)
- **Site Coordinates** 32.69868°N, 117.08235°W
- **Site Soil Classification** Site Class D – "Stiff Soil"
- **Risk Category** I/II/III



USGS–Provided Output

S_S =	0.988 g	S_{MS} =	1.091 g	S_{DS} =	0.728 g
S_1 =	0.375 g	S_{M1} =	0.619 g	S_{D1} =	0.413 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.
Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.
substitute for technical subject-matter knowledge.

3.4 Geologic Hazards

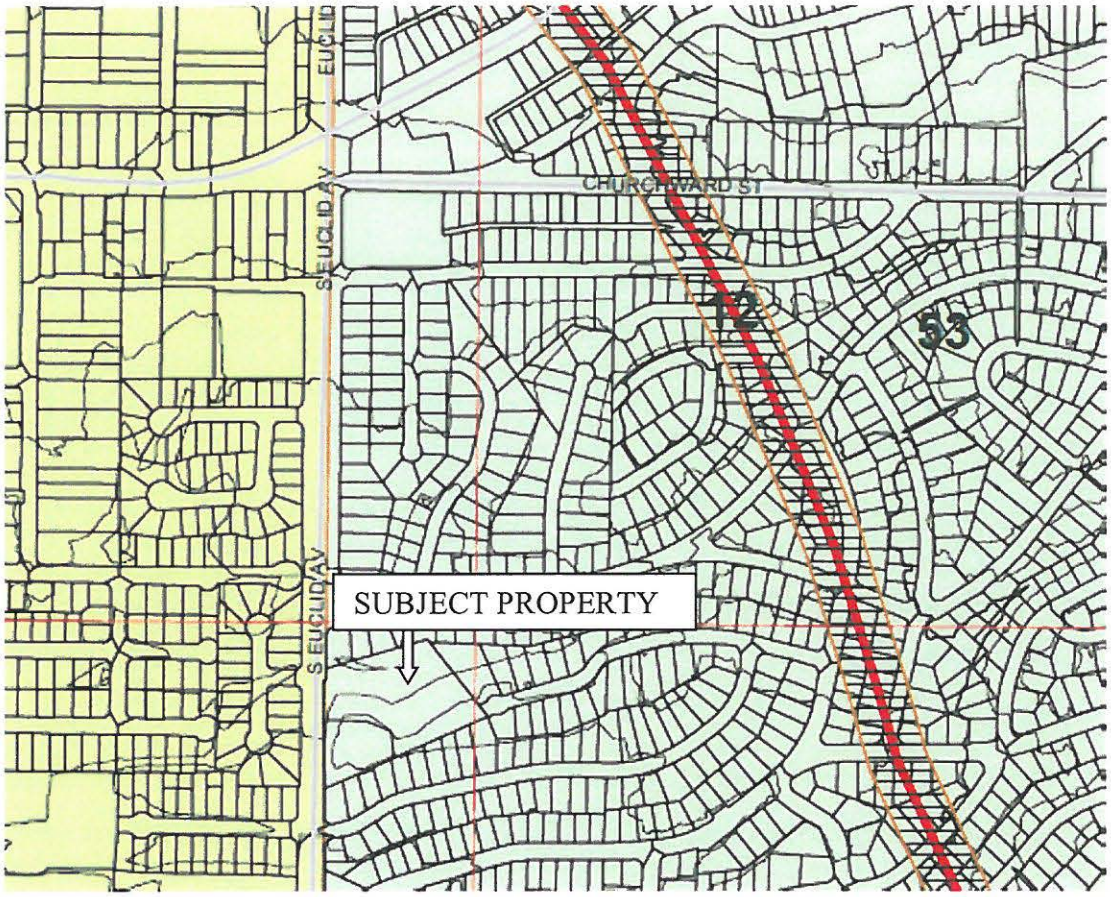
We reviewed the City of San Diego Geologic Hazards and Faults map and noted that the subject property rests upon Geologic Hazard Category 53: "Level or sloping terrain, unfavorable geologic structure, Low to moderate risk"

No visible evidence of earth movement was seen during the site inspection and field work conducted at the subject property. We feel that the potential for failure in landslide and earth movement is low.

Liquefaction of cohesionless soils can be caused by strong cyclic accelerations resulting from nearby earthquakes. Research and historical data indicate that loose, granular materials saturated by a near-surface groundwater table are most susceptible to liquefaction.

No near surface ground water table was encountered. The soils at the subject property are not loose granular material and have cohesive properties. We feel that the potential for failure in liquefaction is low.

The Federal Emergency Management Agency, Flood Insurance Rate Map, states that the subject property does not rest upon a flood zone. The subject property is categorized as, "Areas determined to be outside the 0.2% annual chance floodplain (Other areas, Zone X)."Based upon the local topography and the FEMA Flood Insurance Rate Map, we feel that the potential for flooding at the subject property is low.



53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk

Geographic Location:

N

Euclid Avenue Project
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APPLIED CONSULTANTS environmental geology & engineering	**Geologic Hazards Tile 18**	Fig. 3

Geographic Location:
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N

APPLIED CONSULTANTS environmental geology & engineering	**FEMA** **Flood Insurance Rate Map**	Fig. 4

4.0 FIELD WORK AND SOIL SAMPLING

4.1 Subsurface Investigation

On August 31, 2018, a representative from Applied Consultants conducted the field investigation. Exploratory trenches were excavated throughout the vacant lot. The maximum depth of the exploratory trenches was fifteen foot below existing grade. Bulk samples were collected at various depths to determine the engineering characteristics of the soils at the subject property.

4.2 Soil Sample Analyses

The purpose of collecting the bulk soil sample was to determine the soil's physical characteristics through laboratory testing. The soil sample was analyzed for the following:

- Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates - ASTM C136 / C136M
- Optimum Moisture Content and Maximum Density - ASTM D1557
- Standard Test Method for Expansion Index of Soils - ASTM D4829
- Direct Normal "Remolded" Shear Resistance Value - ASTM D3080
- R-Value – ASTM D 2844

5.0 FINDINGS

5.1 Sub-surface Conditions

Locally the materials encountered in the trenches were:

Test Pit #1 (T-1):

From grade to 8' below grade a fine to medium grained, reddish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

Test Pit #2 (T-2):

From grade to 7' below grade a fine to medium grained, reddish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

From 7' below grade to 13' below grade a fine to medium grained, reddish brown poorly graded silty sand (SP-SM) and concretions with iron deposits was encountered.

Test Pit #3 (T-3):

From grade to 1.5' below grade a fine to medium grained, reddish dark brown silty sand (SM) was encountered. (Top soil)

From 1.5' below grade to 4.5' below grade a fine to medium grained, reddish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

From 4.5' below grade to 14' below grade a fine to medium grained, moist orangish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

Test Pit #4 (T-4):

From grade to 1.5' below grade a fine to medium grained, reddish dark brown silty sand (SM) was encountered. (Top soil)

From 1.5' below grade to 8' below grade a fine to medium grained, reddish light brown poorly graded sand with silt (SP-SM) and concretions was encountered.

Test Pit #5 (T-5):

From grade to 6' below grade a fine to medium grained, reddish dark brown silty sand (SM) with organics was encountered.

From 6' to 10' below grade a fine to medium grained, moist orangish brown silty sand (SM) was encountered.

From 10' to 15' below grade a fine to medium grained, moist brown poorly graded sand (SP) was encountered.

Test pit #5 was excavated outside the proposed development footprint and adjacent to the creek at the northern side of the property. This area has been disturbed by human and animal activity and do not represent the general geologic condition of the site.

No groundwater was encountered at any of the test pits.

5.2 Soils Laboratory Analyses Findings

Applied Consultants chose to analyze several bulk samples from various exploratory borings. The samples are representative of the different soil types encountered at the subject property. The following table (Table 1) is a compilation of Applied Consultants' soils analyses results from the various samples collected:

Table 1: Applied Consultants' Soils Analyses Results

Sample ID	Description	Opt. Moist.	Max Density	Remolded Shear			Expansion Index
				Phi	Cohesion	Sample Type	
		(%)	(pcf)	(angle)	(psf)		
TP-1 @ 3' to 4'	Reddish light brown poorly graded sand with silt (SP-SM) and concretions	9.3	130	31.5	10	Remolded	1 (Very low)
TP-2 @ 7' to 8'	Reddish brown poorly graded silty sand (SP-SM) and concretions with iron deposits	11.5	121	30.0	50	Remolded	3 (Very low)
TP-4 @ 0.5' to 1.5'	Reddish dark brown silty sand (SM)	10	128	31	30	Remolded	10 (Very low)

E.I. – Expansion Index
Pot. – Potential
pcf - pounds per cubic foot
psf - pounds per square foot

Applied Consultants calculated that the load bearing capacity of the underlying soils (Lamb & Whitman, 1969). The table below contains the calculated soil pressures and load bearing capacities for the site (Table 2):

Table 2: Calculated Soil Pressures and Load Bearing Capacities

Sample ID Direct Normal	Depth	Pressure		Load Bearing Capacity
		Act.	Pass	
	(ft)	(psf)	(psf)	(psf)
TP-1 @ 3' to 4'	4	45	350	2,000

Act – Active
Pass – Passive

6.0 CONCLUSIONS

6.1 Impact of Geologic Hazards upon Subject Property

In Applied Consultants' professional opinion, geologic hazards of significant magnitude are not present. Based upon our field work and historical research results, Applied Consultants makes the following conclusions:

- **Ground Shaking is a likely hazard to the site.** Seismic activity on any active and potentially active faults will cause ground movement at the subject property that will be proportional to the magnitude of seismic event. Ground movement at the subject property would be moderated by the distance from the epicenter of the seismic event. It is expected that the structure will have to endure this to some degree.

- **Liquefaction.** The soils characteristics at the subject property are not conducive to failure in liquefaction. We feel that the potential for soil liquefaction at the subject site is low.

- **Flooding.** Given the topography of the site, flooding is not considered a hazard.

- **Landslide and Earth Movement.** Is not a potential hazard to the site. No visible evidence of earth movement was seen during the site inspection and field work conducted at the subject property. It is our opinion that the risk of failure in landslide at the subject property is low.

6.2 Geotechnical Investigation Conclusions

After reviewing the results of our geotechnical investigation Applied Consultants concludes that there are no significant geotechnical or geologic constraints that cannot be mitigated by proper planning, design, and the utilization of sound construction practices. Consequently, it is our opinion that the development of the site is feasible from a geotechnical standpoint.

Prior to construction of the new development all deleterious and oversized materials shall be screened and removed from the site soils. The upper thirty six inches of the proposed development shall be excavated, the upper 6" of the key scarified, and soils recompacted to greater than 90% of optimum compaction. The bottom of the excavations should be approved by our project geologist, engineer, or technician supervisor prior to placing fills or constructing improvements. If the subsoils are determined to be unsuitable when observed, they shall be removed to below the contact with the formational material. The removed fill materials may be stockpiled for reuse on the site as structural fill material, or be placed directly in areas approved by our representative to receive fill.

Design of the foundation of the proposed development shall be based on a 2,000 Pounds per Square Foot bearing capacity.

7.0 RECOMMENDATIONS

7.1 Grading

a. General

All earthwork should comply with the grading requirements of the City of San Diego, except where specifically superseded in this section. Prior to grading a representative of Applied Consultants should be present to discuss the current conditions of the site, grading guidelines and schedule of the earthwork to be completed.

b. Grubbing / Clearing

Grading should begin with the removal of all structures and improvements as well as all vegetation. These materials should be hauled off the site to a suitable location.

c. Site Preparation

Prior to construction of the new development all deleterious and oversized materials shall be screened and removed from the site soils. The upper thirty six inches of the proposed development shall be excavated, the upper 6" of the key scarified, and soils recompacted to greater than 90% of optimum compaction. The bottom of the excavations shall be approved by our project geologist, engineer, or technician supervisor prior to placing fills or constructing improvements. If the subsoils are determined to be unsuitable when observed, they shall be removed to below the contact with the formational material. The removed fill materials may be stockpiled for reuse on the site as structural fill material, or be placed directly in areas approved by our representative to receive fill.

d. Fill Material

The materials onsite may be used as compacted fill. If it is necessary to import fill material, the material should be approved by the geotechnical consultant. All fill material must be compacted uniformly to 90% of the maximum dry density (ASTM D1557).

e. Transition Pad Undercut

Support of structures partly on cut and partly on fill is not recommended. In order to provide uniform bearing conditions beneath the structures, the cut portion of cut/fill transition pads shall be undercut to three feet and be replaced as uniformly compacted, structural fill material. In this case, the overexcavated area shall be sloped at an inclination of at least two percent towards the fill side of the pad, in such a manner that the water does not become trapped in the overexcavated zone.

f. Processing of Fill Areas

Prior to placing any new fill soils or constructing any new improvements in areas that have been cleaned out to receive fill, the exposed soils shall be scarified to a depth of 6 inches, moisture conditioned, and compacted to at least 90 percent relative compaction. In areas to support fill slopes, keys shall be cut into the competent formational material. The keys shall be at least twelve feet wide and be sloped back into the hillside at least two percent. The keys shall extend at least one foot into the competent formational material. No other special ground preparation is anticipated at this time.

g. Compaction and Method of Filling

All structural fill placed at the site shall be compacted to a relative compaction of at least 90% of its maximum dry density as determined by ASTM Laboratory Test D1557. Fills shall be placed at or slightly above optimum moisture content, in lifts six inches thick, with each lift compacted by mechanical means. Fills shall consist of approved earth material, free of trash or debris, roots, vegetation, or other materials determined to be unsuitable by our soil technicians or project geologist. Fill material shall be free of rocks or lumps of soil in excess of 4 inches in maximum dimension.

Fills shall be benched into all temporary slopes and into competent natural soils when the natural slope is steeper than an inclination of 5:1 (horizontal to vertical). Keys shall be constructed at the toe of all fill slopes. The keys shall extend at least 12 inches into firm natural ground and shall be slope back at least two percent into the slope area. Slope keys shall have a minimum width of ten feet.

Utility trench backfill within five feet of the proposed structures and beneath all pavements and concrete flatwork shall be compacted to a minimum of 90 percent of its maximum dry density The upper twelve inches of subgrade beneath paved areas shall be compacted to 95 percent of the materials maximum dry density. This compaction shall be obtained by the paving just prior to placing the aggregate base material and shall not be part of the mass grading requirements or operation.

h. Grading Observation

It is necessary for a soils engineer, or their representative, to be present and test the compaction during the basic grading operations and placement of fill material. The engineer will be able to confirm the conditions stated in this report and verify that the grading operations are in compliance with all plans and specifications.

i. Imported Fill Material:

At this time the need to import fill material is not anticipated. However, if imported fill is necessary, it shall be evaluated and approved by the Geotechnical Consultant prior to being imported. At least two working days notice of a potential import shall be given to the Geotechnical Consultant so that appropriate testing can be accomplished. The type of

material considered most desirable for import is a nondetrimentally expansive granular material with some silt or clay binder.

j. Select Grading

Cut slopes of 2:1 and fill slopes of 2:1 may be constructed (horizontal to vertical) compaction of fill slopes shall be performed by backrolling with a sheepsfoot compactor at vertical intervals of four feet or less as the fill is being placed, and track-walking the face of the slope when the slope is completed. As an alternative, the fill slopes may be overfilled by at least three feet and then cut back the compacted core at the design line and grade. Keys shall be made at the toe of fill slopes in accordance with the recommendations presented above under "Compaction and Method of Filling"

7.2 Foundations

a. General

Where foundations are to be located seven feet and further away from the top of slopes, standard design may take place in conformance with the recommended soil bearing value. In situations where foundations, footings, walls, etcetera, are located closer than seven feet from the top of slope they shall be deepened so that the bottom edge of the footing is 7 feet horizontally from daylight in the slope.

b. Dimensions and reinforcement

In our opinion the foundation design for this project may be conventional spread and/or continuous footings. The spread footings shall be embedded a minimum of 12 inches for a one-story structure and have a minimum width of 12 inches. The spread footings shall be embedded a minimum of 18 inches for a two-story structure and have a minimum width of 15 inches. The steel reinforcement for the spread footings shall consist of a minimum of two #4 rebar placed near the top and bottom of the footing with a minimum of 3" of concrete covering the top and bottom layers.

The continuous footings shall be embedded a minimum of 12 inches for a one story structure below the lowest grade of the finished pad and must have a width of at least 12 inches. The continuous footings shall be embedded a minimum of 18 inches for a two story structure below the lowest grade of the finished pad and must have a width of at least 15 inches. The steel reinforcement for the continuous footings shall consist of a minimum of two #4 rebar placed near the top and bottom of the footing with a minimum of 3" of concrete covering the top and bottom layers.

c. Bearing Capacity

A safe soil bearing capacity of 2,000 Pounds per Square Foot may be used in the design of these foundations.

7.3 Concrete Slabs On-Grade

a. Floor Slab-on-Grade

If any interior floor slabs are used for this project they should be no less than 4" inches (actual). For single-story structures, or greater, slab reinforcement should consist of #3 rebar placed at 16" inches on center. All slab reinforcement should rest on concrete chairs or a suitable substitute.

The surface soils are granular in nature and non-expansive. Slabs-on-grade may be used without special design consideration for expansive soils.

A moisture barrier shall be placed beneath the slab-on-grade consisting of at least two inches of clean sand overlain by a (10) mil Visqueen sheet covered with two inches of clean sand.

7.4 Earth Retaining Structures

a. Active Pressures

It is recommended that structures be able to withstand an active fluid pressure of 45.0 pcf for unrestrained walls. The retaining structure should have a granular backfill with a level surface and adequate drainage to prevent the build up of hydrostatic pressures. The architect should provide details for the drainage and waterproofing of the retaining structures.

Backfill should consist of clean sand and gravel. While all backfills should be compacted to the relative compaction directive, extra care should be taken when working close to walls to prevent excessive pressure buildup.

A proper drainage system should be utilized to prevent hydrostatic pressures behind any retaining wall.

b. Passive Pressures

Passive pressures for the soil conditions at the subject site should be 350 pounds per square foot per foot of depth. The pressure may be increased by .25 for seismic loading. The coefficient of friction for concrete against soil should be .35 for the lateral resistance.

7.5 Temporary Shoring Design

Temporary shoring support of vertical cut slopes may be needed during construction. Support may be incorporated into permanent foundations. Shoring systems are installed for temporary and permanent earth retention. In addition to traditional shoring methods

such as soldier piles with lagging and tieback anchors, ground improvements are also utilized routinely for earth retention.

Shoring is typically installed from top to bottom; a typical sequence would include installation of vertical structural members from the existing ground surface followed by the installation of anchors as excavations proceed downwards.

7.6 Temporary Excavation Slopes

Temporary excavation slopes in the existing subsurface soils and or bedrock may be made vertical for cuts less than five (4) feet. Additionally, a combination of a 1:1 cut slope with vertical cut less than 4' is acceptable; provided, that the given condition is inspected immediately by the geotechnical engineer of record to verify that the soils present verify our logs.

For deeper cuts, temporary excavation slopes shall be made no steeper than 1:1 (horizontal to vertical). In areas where soils with little or no binder (cohesion) are encountered, shoring or flatter excavation slopes shall be made.

Your attention is directed to the fact that while caving was not encountered in the test excavations, it is possible that a trench or excavation could react in an altogether different manner.

All excavations shall be made in accordance with the governing regulations of the State of California Division of Industrial Safety. These recommended temporary slopes do not preclude local raveling and sloughing.

7.7 Temporary Excavations

(a) Based on the results of our exploration, it is our opinion that the site soils can be excavated using conventional earth-moving equipment.

(b) Excavations in site soils should be temporarily shored or sloped in accordance with Cal-OSHA requirements. Temporary excavation slopes in site soils, where utilized, should be no steeper than 1:1, to a maximum height of 10 feet.

(c) Stockpiled materials and excavating/grading equipment should not be permitted within a minimum distance from the top of slope equal to the slope height. Soil conditions should be reviewed by this office during excavations to verify the acceptability of temporary slopes. Final temporary excavation slope design will be dependent on actual soil conditions encountered, construction procedures and schedule.

7.8 Site Drainage

(a) Surface grades adjacent to buildings should be designed and constructed to direct and facilitate drainage away from structures to approved drainage facilities. Recommended minimum grade in unpaved soil areas around buildings and asphalt-paved areas is 2 percent, and in concrete paved areas is 1 percent. Accumulation of water around buildings should be avoided. Concentrations of surface run-off should be collected and drained to suitable discharge outlets.

(c) Approved drainage patterns should be installed and maintained throughout the life of structures. The building and surface drainage facilities should not be altered without the prior review and approval of the Project Civil Engineer.

7.9 Preliminary Pavement Section Recommendations

Based on the R-value test results and the referenced traffic indexes, the following preliminary pavement section was obtained in conformance with Caltrans Standard Flexible Pavement Design Procedures and the City of San Diego's Standard Drawing SDG-113.

Sample	R-Value	Traffic Index	Pavement Section
B-2B @ 24"-36"	21	6.0	3.0" AC over 8.0" CTB

The upper 12 inches of the subgrade soils and the aggregate base shall be compacted to a minimum of 95 percent relative compaction (ASTM D1557) and shall be in conformance with the Standard Specifications for Public Works Construction.

Prior to commencement of the pavement works, additional R-value tests shall be performed on the soils that will underlie the new pavement sections for geotechnical consultant's approval.

8.0 REVIEW, OBSERVATIONS, AND TESTING

(a) The final grading plans should be provided to our office for review in order to evaluate the acceptability of the recommendations presented herein, and provide additional recommendations, as appropriate.

(b) All construction activities during grading and foundation excavations should be continuously monitored and observed by the Geotechnical Engineer and Engineering Geologist of Record.

(c) All grading and foundation excavations on-site should be observed and tested as required, by a representative of the Geotechnical Engineer and or Engineering Geologist to verify conformance with the intent of the geotechnical/geological recommendations provided herein and to evaluate the acceptability of these recommendations for the actual site conditions.

CONSTRUCTION INSPECTION AND LIMITATIONS

The recommendations contained within this report are based upon Applied Consultants' field investigation. The interpolated subsurface conditions should be checked during construction by a representative of Applied Consultants. We recommend that all grading operations be observed by a representative of this firm.

The recommendations contained within this report are based upon our field study, laboratory analyses, and our understanding of the proposed construction. If any soil conditions are encountered differing from those assumed in this report, Applied Consultants should be immediately notified so that we can review the situation and make supplementary recommendations. Additionally, if the scope of proposed work changes from that described in this report, Applied Consultants should be notified.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices within the greater San Diego area. Professional judgments contained herein are based upon our evaluation of the technical information gathered, our understanding of the proposed work, and our general experience in the geotechnical field. Our engineering work and judgments rendered meet current professional standards. We do not guarantee the performance of the project in any respect.

We do not direct the contractor's operations and we cannot be responsible for the safety of field personnel on the site; therefore, the safety of field personnel during construction is the responsibility of the contractor. The contractor shall notify the owner if he considers any of the recommended actions contained herein to be unsafe.

It is a pleasure to be of service to you. Should any questions arise, please contact our office at

619-258-9000.

REFERENCES

1. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) Standard 7-10.

2. Bearing Capacity for Shallow Foundations -T. William Lambe & Robert V. Whitman, "Soil Mechanics", John Wiley & Sons, 1969.

3. California Building Code (CBC 2016), 2016

4. California Mines and Geology Division (DMG), 1974, "Maximum Credible Rock Acceleration From Earthquakes in California", Roger W. Greensfelder.

5. California Department of Conservation, Division of Mines and Geology (CDMG), 1987. "CSMIP Strong-Motion Records from the Whittier, California Earthquake of 1 October, 1987", OMS Report 87-05.

6. Geology of the San Diego 7.5' Quadrangle, California Division of Mines and Geology, Michael P. Kennedy and Siang S. Tan, 2005.

7. TOPO! [Computer Software] 1997wildflower productions (www.topo.com) San Francisco, CA: ESRI

8. 2008 USGS National Seismic Hazards Maps – Fault parameters http://earthquake.usgs.gov/hazards/

9. USGS Seismic Design Maps for Engineers – Buildings Pre 2009 – Java Ground Motion Parameter Calculator; http://earthquake.usgs.gov/hazards/designmaps/javacalc.php

FIGURES

APPLIED CONSULTANTS
environmental geology & engineering

GEOLOGIC / GEOTECHNICAL MAP
EUCLID AVENUE PROJECT
LOCATED BETWEEN TRINIDAD WAY AND LA PAZ DRIVE
SAN DIEGO, CA 92114 APN: 548-430-28-00

Date : 9/17/18
Drawn by: JLVG

EXPLORATORY TEST PIT LOGS

Project Name: EUCLID PROJECT
Address: APN: 548-430-28-00
SAN DIEGO, CA
Location: UPPER FLAT BENCH (EL. 165 AMSL)

Date: 8/31/2018
Logged By: JLVG
Reviewed By: BJL
Footing Thickness (in.):

Test Pit/Test Boring ID: TP-1

Excavation Method: BACKHOE
Sample Type: Bulk
Total Depth (FT): 8.0

Depth to Water (FT): N.A.
Caving: NO
Depth of Footing: N.A.

Depth (FT)	Soil Description	Sample Type	Sample ID	Sample MC%	Discrete Sample Interval	Bulk Sample Interval	BLOW COUNTS	FEET
Grade								
	Poorly graded sand w/ silt (SP-SM): fine to medium grained, reddish light brown poorly graded sand with silt and concretions.		T-1 3'-4'	5.6%				
5	Qvop (Very old paralic deposits undivided)							5
	Transition to denser layer							
	END OF EXCAVATION @ 8'							
10								10
15								15
								20

APPLIED CONSULTANTS
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TEST PIT LOG: TEST PIT 1
EUCLID PROJECT
SAN DIEGO, CA

DATE: 8/31/2018
Drawn By: JLVG

Project Name: EUCLID PROJECT	Date: 8/31/2018
Address: APN: 548-430-28-00	Logged By: JLVG
SAN DIEGO, CA	Reviewed By: BJL
Location: EASTERN PORTION (EL. 150 AMSL)	Footing Thickness (in.):

Test Pit/Test Boring ID: TP-2	Excavation Method: BACKHOE	Depth to Water (FT): N.A.
	Sample Type: Bulk	Caving: NO
	Total Depth (FT): 13.0	Depth of Footing: N.A.

Depth (FT)	Soil Description	Sample Type	Sample ID	Sample MC%	Discrete Sample Interval	Bulk Sample Interval	BLOW COUNTS	FEET
Grade								
	Poorly graded sand w/ silt (SP-SM): fine to medium grained, reddish light brown poorly graded sand with silt and concretions.							
5	Qvop (Very old paralic deposits undivided)		T-2 5'-6'					5
	Clayey layer transition		T-2 7'-8'	9.6%				
10	Poorly graded sand w/ silt (SP-SM): fine to medium grained, reddish brown poorly graded sand with silt and concretions with iron deposits.							10
	END OF EXCAVATION @ 13'							15
15								20

APPLIED CONSULTANTS
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TEST PIT LOG: TEST PIT 2
EUCLID PROJECT
SAN DIEGO, CA

DATE: 8/31/2018
Drawn By: JLVG

Project Name: EUCLID PROJECT	Date: 8/31/2018
Address: APN: 548-430-28-00	Logged By: JLVG
SAN DIEGO, CA	Reviewed By: BJL
Location: MIDDLE NORTH PORTION (EL. 140 AMSL)	Footing Thickness (in.):

Test Pit/Test Boring ID: TP-3	Excavation Method: BACKHOE	Depth to Water (FT): N.A.
	Sample Type: Bulk	Caving: NO
	Total Depth (FT): 14.0	Depth of Footing: N.A.

Depth (FT)	Soil Description	Sample Type	Sample ID	Sample MC%	Discrete Sample Interval	Bulk Sample Interval	BLOW COUNTS	FEET
Grade	Silty Sand (SM): fine to medium grained, reddish dark brown silty sand. (Topsoil)		T-3 0.5'-1.5'	5.2%				
	Poorly graded sand w/ silt (SP-SM): fine to medium grained, reddish light brown poorly graded sand with silt and concretions. Qvop (Very old paralic deposits undivided)							
5	Moisture increase		T-3 5'-6'	10.1%				5
	Poorly graded sand w/ silt (SP-SM): fine to medium grained, moist orangish light brown poorly graded sand with silt and concretions.							10
15	END OF EXCAVATION @ 14'							15
								20

APPLIED CONSULTANTS
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TEST PIT LOG: TEST PIT 3
EUCLID PROJECT
SAN DIEGO, CA

DATE: 8/31/2018
Drawn By: JLVG

Project Name: EUCLID PROJECT	Date: 8/31/2018
Address: APN: 548-430-28-00	Logged By: JLVG
SAN DIEGO, CA	Reviewed By: BJL
Location: WESTERN PORTION (EL. 145 AMSL)	Footing Thickness (in.):

Test Pit/Test Boring ID: TP-4	Excavation Method: BACKHOE	Depth to Water (FT): N.A.
	Sample Type: Bulk	Caving: NO
	Total Depth (FT): 8.0	Depth of Footing: N.A.

Depth (FT)	Soil Description	Sample Type	Sample ID	Sample MC%	Discrete Sample Interval	Bulk Sample Interval	BLOW COUNTS	FEET
Grade	Silty Sand (SM): fine to medium grained, reddish dark brown silty sand. (Topsoil)		T-4 0.5'-1.5'					
	Poorly graded sand w/ silt (SP-SM): fine to medium grained, reddish light brown poorly graded sand with silt and concretions.		T-4 3'-4'	4.9%				
5	Qvop (Very old paralic deposits undivided)							5
	END OF EXCAVATION @ 8'							
10								10
15								15
								20

APPLIED CONSULTANTS
environmental geology & engineering

TEST PIT LOG: TEST PIT 4
EUCLID PROJECT
SAN DIEGO, CA

DATE: 8/31/2018
Drawn By: JLVG

Project Name: EUCLID PROJECT	Date: 8/31/2018
Address: APN: 548-430-28-00	Logged By: JLVG
SAN DIEGO, CA	Reviewed By: BJL
Location: ADJACENT TO CREEK (EL. 125 AMSL)	Footing Thickness (in.):

Test Pit/Test Boring ID: TP-5	Excavation Method: BACKHOE	Depth to Water (FT): N.A.
	Sample Type: Bulk	Caving: NO
	Total Depth (FT): 15.0	Depth of Footing: N.A.

Depth (FT)	Soil Description	Sample Type	Sample ID	Sample MC%	Discrete Sample Interval	Bulk Sample Interval	BLOW COUNTS	FEET
Grade								
	Silty Sand (SM): fine to medium grained, reddish dark brown silty sand with organics.							
			T-5 3'-4'					
5								5
			T-5 6'-7'	13.3%				
	Silty Sand (SM): fine to medium grained, moist orangish brown silty sand.							
10								10
			T-5 11'-12'	16.3%				
	Poorly graded Sand (SP): fine to medium grained, moist brown poorly graded sand.							
								15
15	END OF EXCAVATION @ 15'							
	NO GROUNDWATER ENCOUNTERED							
								20

APPLIED CONSULTANTS
environmental geology & engineering

TEST PIT LOG: TEST PIT 5
EUCLID PROJECT
SAN DIEGO, CA

DATE: 8/31/2018
Drawn By: JLVG

GENERAL EARTHWORK AND GRADING GUIDELINES

GENERAL EARTHWORK AND GRADING GUIDELINES

I. EARTHWORK OBSERVATION AND TESTING

Prior to commencement of grading, a qualified geotechnical consultant should be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report and these specifications. The consultant is to provide adequate testing and observation so that he may determine that the work was accomplished as specified. It should be the responsibility of the contractor to assist the consultant and keep him apprised of work schedules and changes so that the consultant may schedule his personnel accordingly.

The contractor is to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications, and the approved grading plans. If in the opinion of the consultant, unsatisfactory conditions are resulting in a quality of work less than required in these specifications, the consultant may reject the work and recommend that construction be stopped until the conditions are rectified.

Maximum dry density tests used to determine the degree of compaction should be performed in accordance with the American Society for Testing and Materials Test Method ASTM: D 1557-82.

II. PREPARATION OF AREAS TO BE FILLED

1. Clearing and Grubbing: All brush, vegetation, and debris shall be removed and properly disposed of.

The Geotechnical Consultant shall evaluate the extent of removal of these items depending on site conditions. Fill material shall not contain more than 1 percent of organic material by volume. No fill should contain more than 5 percent organic matter.

No fill shall contain hazardous materials or asphalt pavement. If asphalt pavement is removed, it should be disposed of at an appropriate location. Concrete fragments which are free of reinforcing steel may be placed in the fills.

2. Processing: the existing ground which is evaluated to be satisfactory for support of fill shall be scarified to a minimum depth of 6 inches. Existing ground which is not satisfactory shall be over-excavated as specified in the following section. Scarification shall continue until the soils are broken down and free of large clay lumps or clods and until the working surface is reasonably uniform and free of uneven features which would inhibit uniform compaction.

3. Overexcavation: Soft, dry, spongy, or otherwise unsuitable ground, extending to such a depth that surface processing cannot adequately improve the condition, shall be over-excavated down to firm ground as approved by the consultant.

4. Moisture Conditioning: Over-excavated and processed soils shall be watered, dried-back, blended, and/or mixed, as necessary to attain a uniform moisture content approximately 2 percent over optimum.

5. Recompaction: Over-excavated and processed soils which have been properly mixed and moisture-conditioned shall be compacted to a minimum relative compaction of 90 percent according to ASTM: D1557-82.

6. Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be benched. The lowest bench shall be: a minimum of 15 feet wide, at least 2 feet deep with a minimum 2% slope into the fill bank for horizontal stability, expose firm materials, and be approved by the consultant. Other benches shall excavate into firm material for a minimum width of 4 feet. Ground sloping flatter than 5:1 shall be benched or otherwise over-excavated when considered necessary by the consultant.

7. Approval: All areas to receive fill, including processed areas, removal areas, and toe-of-fill benches shall be approved by the consultant prior to fill placement.

III. FILL MATERIAL

1. General: Material to be placed as fill shall be free of organic matter and other deleterious substances, and shall be approved by the consultant. Soils of poor gradation, expansion, or strength characteristics shall be placed in areas designated by the consultant or mixed with other soils until suitable to serve as satisfactory fill material.

2. Oversize: Oversize material defined as rock, or other irreducible material, with a maximum dimension of greater than 12 inches, shall not be buried or placed in fill unless the location, materials, and disposal methods are specifically approved by the consultant. Oversize disposal operations shall be such that nesting of oversized material does not occur, and such that the oversized material is completed surrounded by compacted or densified fill. Oversize material shall not be placed within the range of future utilities or underground construction, unless specifically approved by the consultant.

3. Import: If import fill is necessary for grading, the import material shall be approved by the geotechnical consultant.

IV. FILL PLACEMENT AND COMPACTION

1. Fill Lifts: Approved fill material shall be placed in areas prepared to receive fill in near-horizontal layers not exceeding 6 to 8 inches in compacted thickness. The consultant may approve thicker lifts if testing indicates that the grading procedures are such that adequate compaction is being achieved with lifts of greater thickness. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to attain uniformity of material and moisture in each layer.

2. Fill Moisture: Fill layers at a moisture content less than optimum shall be watered and mixed, and wet fill layers shall be aerated by scarification or blended with drier materials.

Moisture conditioning and mixing of fill layers shall continue until the fill material is at a uniform moisture content at or near two percent over optimum.

3. Compaction of Fill: After each layer has been evenly spread, moisture conditioned and mixed, it shall be uniformly compacted to not less than 90 percent of maximum dry density in accordance with ASTM: D1557-82. Compaction equipment shall be adequately sized and either specifically designed for soil compaction or of proven reliability, to efficiently achieve the specified degree of compaction.

4. Fill Slopes: Compacting of slopes shall be accomplished, in addition to normal compaction procedures, by backrolling of slopes with sheepsfoot rollers at frequent intervals of 2 to 3 feet in fill elevation gain, or by other methods producing satisfactory results. At the completion of grading, the relative compaction of the slope out to the slope face shall be at least 90 percent.

5. Compaction Testing: Field tests to check the fill moisture and degree of compaction will be performed by the consultant. The location and frequency of tests shall be at the consultant's discretion. In general, the tests shall be taken at an interval not exceeding 2 feet in vertical rise and/or every 1000 cubic yards of embankment.

V. SUBDRAIN INSTALLATION

Subdrain systems, if required, shall be installed in approved ground to conform to the approximate alignment and details shown on the plans or shown herein. The subdrain location or materials should not be changed or modified without the approval of the consultant. The consultant, however, may recommend and upon approval, direct changes in subdrain line, grade or material. All subdrains shall be surveyed for line and grade after installation and sufficient time allowed for surveys, prior to commencement of filling over the subdrains.

VI. EXCAVATIONS

Excavations and cut slopes shall be examined during grading. If directed by the consultant, further excavation or overexcavation and refilling of cut areas shall be performed, and/or remedial grading of cut slopes performed. Where fill-over-cut slopes are to be graded, unless otherwise approved, the cut portion of the slope shall be made and approved by the consultant prior to placement of the fill portion of the slope. Excavations may require the consultant to produce an alternate sloping plan if the excavation

VII. TRENCH BACKFILL

1. The Contractor shall follow all OSHA and CAL/OSHA requirements for maintaining safety of trench excavations.

2. The bedding and backfill of utility trenches should be done with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material should have a sand equivalent of (SE ›30). Bedding should be placed 1 foot above the top of pipe. All backfill should be compacted to 90 percent from 1 foot above the pipe to the surface.

3. The geotechnical consultant should test the trench backfill for relative compaction. At least one test should be performed for every 300 feet of trench and every two feet of trench fill.

4. The lift thickness of the trench backfill shall not exceed what is allowed in the Specifications of Public Works Construction unless the contractor can demonstrate that the fill can be compacted by an alternative means to the minimum relative compaction.

5. All work associated with trenches, excavations and shoring must conform to the local regulatory requirements, State of California Division of Industrial Safety Codes, and Federal OSHA requirements.

VIII. FOUNDATIONS NEAR TOP OF SLOPES

Where foundations, footings, walls and other similar proposed structures are to be located seven feet and further away from the top of slopes, standard design may take place in conformance with the recommended soil bearing value. In situations where foundations, footings, walls, et cetera, are located closer than seven feet from the top of slope they shall be deepened so that the bottom edge of the footing is 7 feet horizontally from daylight in the slope.