PRELIMINARY GEOTECHNICAL
INTERPRETIVE REPORT
PROPOSED MURPHY RANCH LITTLE LEAGUE
BASEBALL FIELD LIGHTING
ASSESSOR'S PARCEL NUMBER 8291-005-900
7550 COLIMA ROAD, CITY OF WHITTIER
LOS ANGELES, COUNTY, CALIFORNIA

PROJECT NO. 22997-10
MAY 20, 2022

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May 20, 2022

Project No. 22997-10

Mr. Phil Martin
PHIL MARTIN & ASSOCIATES
1809 East Dyer Road, Suite 301
Santa Ana, CA 92705

Subject: **Preliminary Geotechnical Interpretive Report, Proposed Murphy Ranch Little League Baseball Field Lighting, Assessor's Parcel Number 8291-005-900, 7550 Colima Road, City of Whittier, Los Angeles County, California**

In accordance with your request, CW Soils is pleased to present our preliminary geotechnical interpretive report for the proposed Murphy Ranch Little League Baseball Field Lighting, Assessor's Parcel Number 8291-005-900, located at 7550 Colima Road, City of Whittier, Los Angeles County, California. Our services were completed in accordance with the scope of work described in our proposal, dated January 7, 2022. The purpose of our work was to evaluate the nature, distribution, and engineering properties of the geologic formations underlying the site with respect to the proposed improvements.

CW Soils appreciates the opportunity to offer our services on this project. If we can be of further assistance, please do not hesitate to contact the undersigned at your convenience.

Respectfully submitted,

CW Soils

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INTRODUCTION

This report prepared by CW Soils, presents the preliminary interpretive geotechnical evaluation for the proposed improvements. The purpose of our work was to evaluate the nature, distribution, and engineering properties of the geologic formations underlying the site with respect to the proposed improvements. Furthermore, we have included foundation design recommendations based on the information you provided.

SITE DESCRIPTION

The site is located at 7550 Colima Road, City of Whittier, Los Angeles County, California. The general location of the subject property is illustrated on Figure 1 – Vicinity Map.

The subject property consists of several acres of partially developed land with relatively flat terrain. Topographic relief at the subject project is relatively low. The site is currently includes two baseball diamonds.

PROPOSED DEVELOPMENT

Based on our understanding of the proposed project, a field lighting system is planned to facility baseball games at night for the two baseball diamonds.

Formal plans have not been prepared and await the conclusions and recommendations of this report.

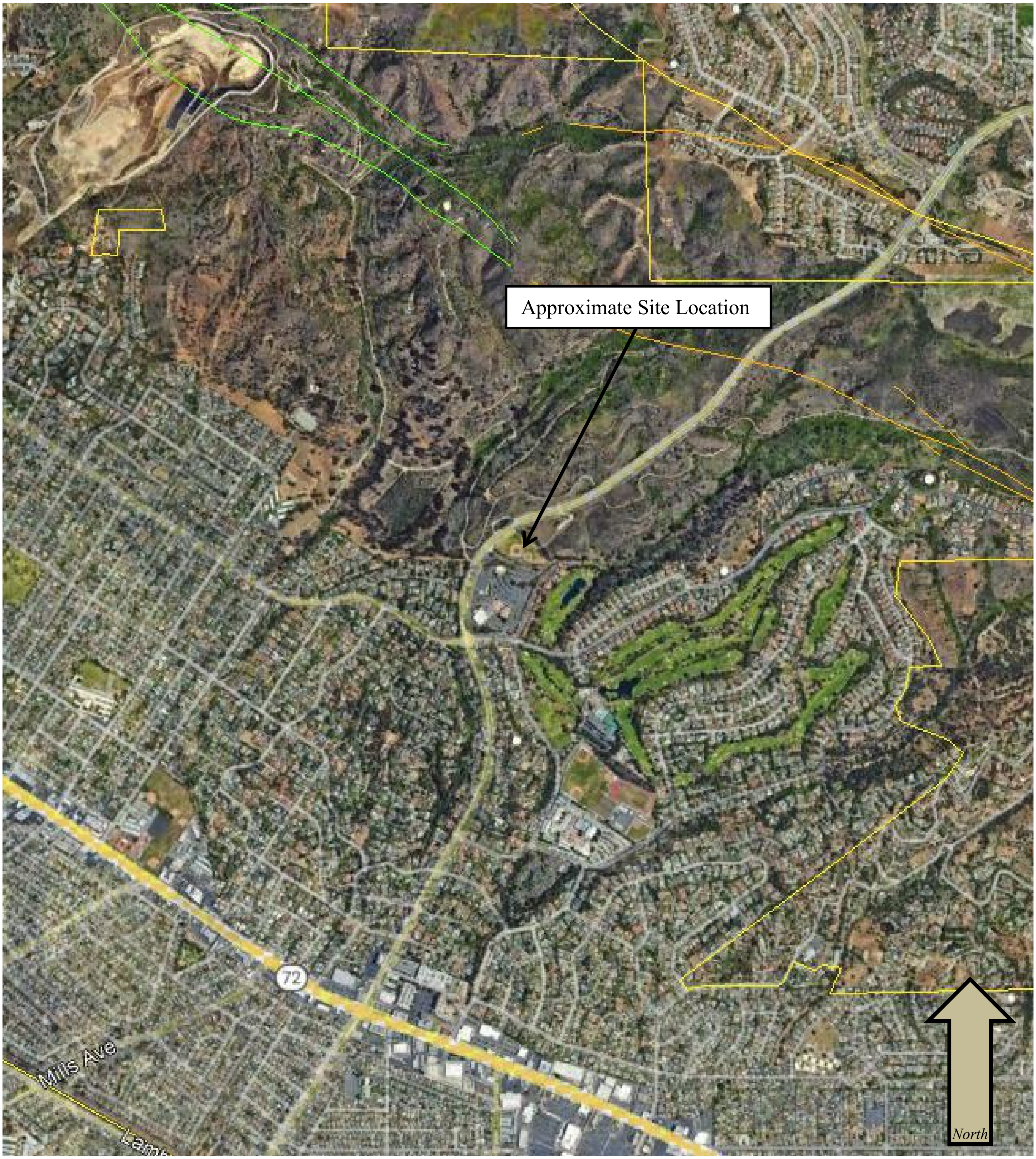
FIELD EXPLORATION AND LABORATORY TESTING

Field Exploration

Subsurface exploration at the subject property was performed on April 27, 2022. A truck mounted hollow-stem-auger drill rig was mobilized to advance four (4) borings throughout the project area to a maximum depth of 21.5 feet.

Classification and logging of the soils encountered during the field exploration were performed in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) of ASTM D 2488. Earth material descriptions may have been reconciled to reflect laboratory test results with regard to ASTM D 2487 or re-examination in the laboratory. Descriptive logs and the Log Symbols & Terms explanation sheet are presented in Appendix B.

Associated with the subsurface exploration was the collection of disturbed bulk samples and/or relatively undisturbed samples of soils for laboratory testing and analysis. A Standard Penetration Test (N) split-spoon sampler was utilized to obtain penetration resistance and samples as needed. Samples obtained using a hollow stem auger drill rig, were mechanically driven with successive 30 inch drops of a 140-pound automatic trip safety hammer. The blow counts required to drive the sampler the final 12 inches of an 18 inch drive were recorded in the boring logs. The deepest recovered portion of the driven samples were placed in sealed containers and transported to the laboratory for testing and analysis. The exploratory locations and geologic conditions at the subject property are illustrated on Plate 1 – Geotechnical Map.



REFERENCE: Google Earth (Version 7.1.5.1557) [Software]. Mountain View, CA: Google Inc. (2015).

CW SOILS	VICINTY MAP	22997-10
		FIGURE 1

Laboratory Testing

Resistivity, pH, sulfate content, chloride content, and in-situ density/moisture content were determined for selected samples of soils, considered representative of those noted during the field exploration. The laboratory test results are reflected throughout the Conclusions and Recommendations of this report. Summaries of the test results and brief descriptions of laboratory test criteria are presented in Appendix C.

FINDINGS

Regional Geology

Regionally, the project is located in the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are characterized by northwest trending sediment filled elongated valleys divided by steep mountain ranges. Associated with and subparallel to the northwest trending San Andreas Fault, are the San Jacinto Fault, Newport-Inglewood Fault, and the Whittier-Elsinore Fault zones. The northwest trend of the province has played a major role in shaping the dominant structural geologic features in the region as well. The Perris Block forms the eastern boundary of the Elsinore Fault, while the west side is comprised of the Santa Ana Mountains. The Perris Block is in turn bounded to the east by the San Jacinto Fault. The Peninsular Ranges Province and the Transverse Range Province are separated by the northern perimeter of the Los Angeles basin, which is formed by a northerly dipping blind thrust fault.

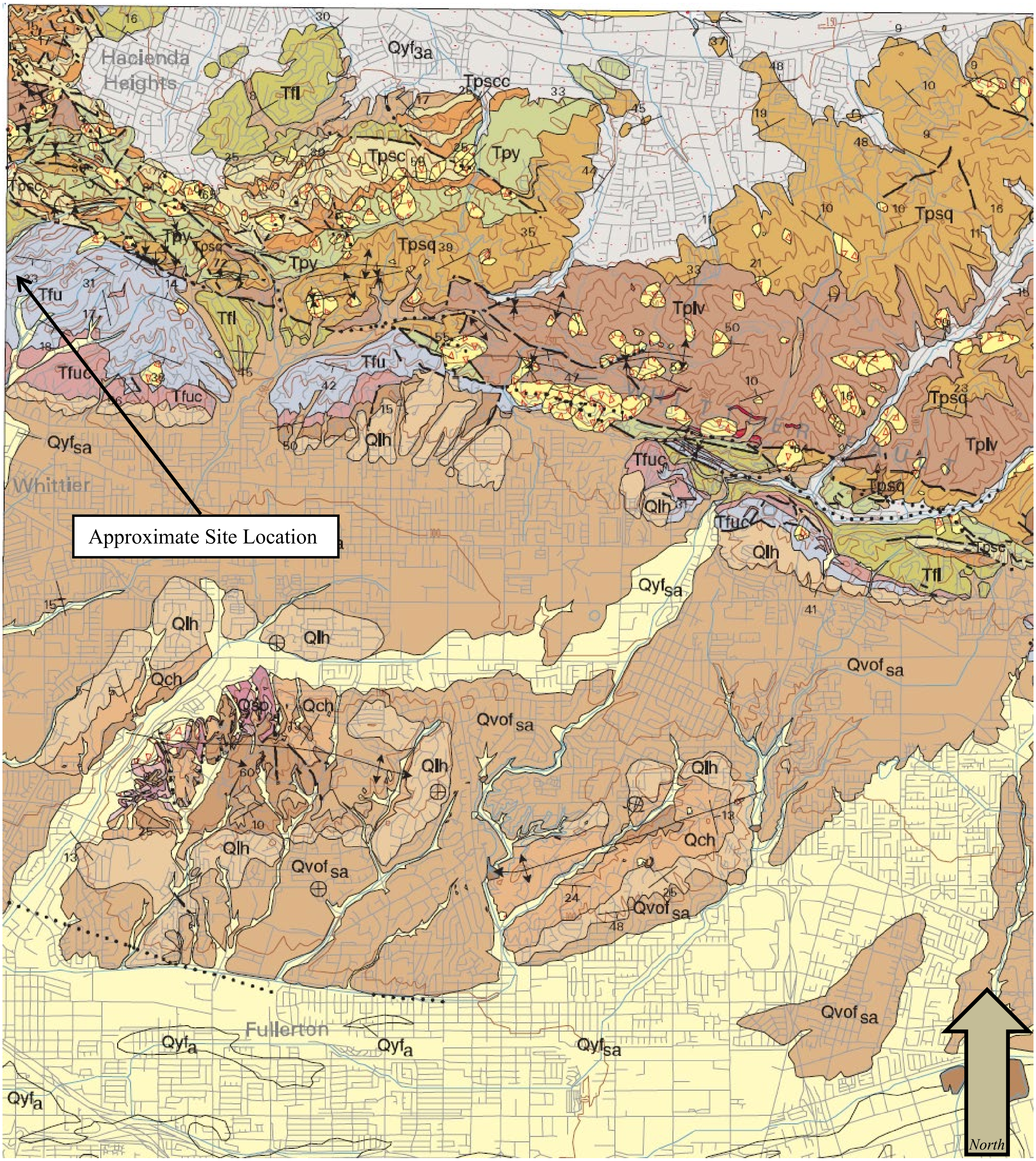
The low lying areas within the Peninsular Ranges Province are principally made up of Tertiary and Quaternary non-marine alluvial sediments consisting of alluvial deposits, sandstones, claystones, siltstones, conglomerates, and occasional volcanic units. The mountainous regions are primarily made up of Pre-Cretaceous, metasedimentary, and metavolcanic rocks along with Cretaceous plutonic rocks of the Southern California Batholith. A map illustrating the regional geology is presented on Figure 2 – Regional Geologic Map.

Local Geology

The most relevant local geologic units expected to be present at the site are summarized in this section. A general description of the dominant soils that form the geologic units is provided below:

- Artificial Fill, Undocumented (map symbol Afu): Undocumented artificial fill materials were encountered throughout much of the site during exploration. These materials are typically locally derived from the native materials and consist generally of light brown to light yellowish brown sandy clay in a slightly moist to very moist, and soft to very stiff state.

- Pliocene Fernando Formation Upper Member (Tfu): Sandstone of the Fernando Formation were encountered in Borings B-3 and B-4. This formation was generally noted to be light yellowish brown to olive brown, slightly moist to very moist, and moderately soft to hard.



Reference: Morton, D.M., Hauser, Rachel M., and Ruppert, Kelly R., 2004, ***Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California, Version 2.0***: U.S. Geological Survey Open-File Report 99-0172

CW SOILS	REGIONAL GEOLOGIC MAP	22997-10
		1:100,000
		FIGURE 2

Aerial Photographs

A review of aerial photographs was performed during our geotechnical evaluation. While conducting our interpretive analysis of the site, no geomorphic evidence of recently active landsliding was found. Aerial photographs from different time periods and various scales that were utilized in our geomorphic interpretations include the following from Google Earth dated May 1994, December 2003, April 2013, and August 2021.

Faulting

Significant ground shaking will likely impact the site within the design life of the proposed project, due to the project being located in a seismically active region. The geologic structure of the entire southern California area is dominated by northwest-trending faults associated with the San Andreas Fault system. The San Andreas Fault system accommodates for most of the right lateral movement associated with the relative motion between the Pacific and North American tectonic plates.

The subject property is not located within an Alquist-Priolo Fault Rupture Hazard Study Zone, established by the State of California to restrict the construction of habitable structures across identifiable traces of known active faults. No active faults are known to project through the proposed project. As defined by the State of California, an active fault has undergone surface displacement within the past 11,700 years or during the Holocene epoch.

The nearest known "active faults" are part of the Whittier Alt 1 system about ~1.9 kilometers distant (USGS Earthquake Hazards Program, Unified Hazard Tool for Conterminous U.S. 2014 (v4.1.1) Deaggregation), capable of producing horizontal ground accelerations of ~6.6 (USGS, 2002*)*.

CONCLUSIONS AND RECOMMENDATIONS

General

From a soils engineering and engineering geologic point of view, the subject property is considered suitable for the proposed improvements, provided the conclusions and recommendations herein are incorporated into the plans and are implemented during construction.

Earthwork

Groundwater

Groundwater was not observed during the field exploration conducted to a maximum depth of 21.5 feet in each of the borings. It should be noted that localized groundwater or variations in the level of groundwater could be discovered during grading due to the limited number of exploratory locations or other factors.

Geotechnical Observations

The project soils consultant or his representative should be present to observe foundation excavations to check that the minimum requirements are being obtained.

SEISMIC DESIGN PARAMETERS

Ground Motions

To resist the effects of design level seismic ground motions in order to prevent collapse (1% probability of collapse in 50 years), structures are required to be designed and constructed in accordance with the 2019 California Building Code Section 1613. The design is reliant on the site class, risk category (I, II, III, or IV), and mapped spectral accelerations for short periods (S_s) and a 1-second period (S_1).

Based on data and maps jointly compiled by the United States Geological Survey (USGS) and the California Geological Survey (CGS), spectral accelerations for the subject property were generated via software applications utilizing the USGS *US Seismic Design Maps*. The data summarized in the following table is based on the Maximum Considered Earthquake Geometric Mean (MCE_G) with 5% damped ground motions having a 2% probability of being exceeded in 50 years (2,475-year return period).

The seismic design parameters were determined by a combination of the site class, mapped spectral accelerations, on site soil/rock conditions, and risk category. The compilation of seismic design parameters found below are considered appropriate for implementation during structural design. Summaries of the *Seismic Hazard Deaggregation* and site data is included in Appendix D.

PARAMETER		FACTOR
Site Location		Latitude: 33.9650 Longitude: -117.9998
Site Class (1613.3.2 of 2019 CBC, Chapter 20 of ASCE 7)		C
Mapped Spectral Accelerations for short periods	S_s (g)	1.826
Mapped Spectral Accelerations for 1-Second Period	S_1 (g)	0.649
Maximum Considered Earthquake Spectral Response Acceleration for Short Periods	S_{ms} (g)	2.192
Maximum Considered Earthquake Spectral Response Acceleration for 1-Second Period	S_{m1} (g)	0.909
Design Spectral Response Acceleration for Short Periods	S_{DS} (g)	1.461
Design Spectral Response Acceleration for 1-Second Period	S_{D1} (g)	0.606
Seismic Design Category	SDC	D
Importance Factor Based on Risk Category		II

Probabilistic seismic hazard assessment, and in some cases deterministic seismic hazard assessments, for the site were conducted in accordance with the 2019 CBC, Section 1803.5.11 and 1803.5.12. The probabilistic seismic hazard maps and data files were jointly prepared by the United States Geological Survey (USGS) and the California Geological Survey (CGS). Actual ground shaking intensities at the subject property may be substantially higher or lower based on complex variables such as the near source directivity effects, depth and consistency of soils, topography, geologic structure, direction of fault rupture, seismic wave reflection, refraction, and attenuation rates. The mapped peak ground acceleration adjusted for Site Class effects (PGA_M) is 0.954g.

PRELIMINARY FOUNDATION DESIGN RECOMMENDATIONS

General

Deep foundations are considered feasible for support of the proposed light stands, provided construction is performed in accordance with the recommendations of this report. Foundation recommendations are provided in the following sections.

Settlement

We estimate that the maximum total settlement of the footings will be less than approximately ¾ inch, based on the anticipated loading and the settlement characteristics of the underling earth materials. Differential settlement is expected to be about ½ inch over a horizontal distance of approximately 20 feet, for an angular distortion ratio of 1:480. The majority of the settlement is anticipated to occur during construction or shortly after the initial application of loading.

The above settlement estimates are based on the assumption that the construction is performed in accordance with the recommendations presented in this report. Additionally, the project soils consultant or his representative will be provided the opportunity to observe the foundation excavations prior to the placement of concrete or steel.

Deepened Foundations – Friction Piles

Drilled, cast in place concrete friction piles are recommended to support the proposed light stands. For light poles up to 60 feet high, piles should be a minimum of 30 inches in diameter and a minimum of 15 feet below existing grades. For light poles up to 90 feet high, piles should be a minimum of 42 inches in diameter and a minimum of 20 feet below existing grades. The end bearing component was neglected from the capacities. The piles may be designed for a skin friction of 400 pounds per square foot for that portion of pile in contact with the earth materials. The allowable tension capacities can be taken as one-half of the allowable compression capacities.

Deepened Foundations – Lateral Resistance

An allowable passive earth pressure of 300 pounds per square foot per foot of embedment depth. The maximum allowable passive pressure shall not exceed 3,000 pounds per square foot. If there is no slab adjacent to the pile, the allowable passive pressure should be neglected in the upper 12 inches.

Foundation Observations

Prior to the placement of forms, concrete, or steel, all foundation excavations should be observed by the geologist, engineer, or his representative to verify that they have been excavated into competent bearing materials, in accordance with the 2019 CBC. The foundations should be excavated per the approved plans, moistened, cleaned of all loose materials, trimmed neat, level, and square. Moisture softened soils should be removed prior to steel or concrete placement. Soils from foundation excavations should be removed from slab on grade areas, unless they have been properly compacted and tested.

Corrosivity

Corrosion is defined by the National Association of Corrosion Engineers (NACE) as “a deterioration of a substance or its properties because of a reaction with its environment.” From a soils engineering point of view, the “substances” are the reinforced concrete foundations or buried metallic elements (not surrounded by concrete) and the “environment” is the prevailing soils in contact with them. Many factors can contribute to corrosivity, including the presence of chlorides, sulfates, salts, organic materials, different oxygen levels, poor drainage, varying soils consistencies, and moisture content. It is not considered practical or realistic to test for all of the factors which may contribute to corrosivity.

The level of chlorides considered to be significantly detrimental to concrete is based upon the industry recognized Caltrans standard “Bridge Design Specifications”. Under subsection 8.22.1 of that document, Caltrans established that “Corrosive water or soil contains more than 500 parts per million (ppm) of chlorides”. Based on limited testing, the onsite soils tested have chloride contents *less* than 500 ppm. Therefore, specific requirements resulting from elevated chloride contents are not required.

When the soluble sulfate content of soils exceeds 0.1 percent by weight, specific guidelines for concrete mix design are provided in the 2016 CBC Section 1904 and in ACI 318, Section 4.3 Table 4.3.1. Based on limited testing, the onsite soils are classified as having a *negligible (less than 0.10 % by weight)* sulfate exposure condition, in accordance with Table 4.3.1. Therefore, structural concrete in contact with onsite soils should utilize Type I or II.

The onsite soils in contact with buried steel should be considered *moderately corrosive (1,000 to 2,000 Ohms-cm)* based on our laboratory testing of resistivity. Additionally, pH values below 9.7 are recognized as being corrosive to most common metallic components including, copper, steel, iron, and aluminum. The pH values for the soils tested were *lower* than 9.7. Therefore, any steel or metallic materials that are exposed to the soils should be encased in concrete or other remedies applied to provide corrosion protection.

It should be noted that CW Soils are not corrosion engineers and the test results for corrosivity are based on limited samples thought to be representative. The grading operations may blend various soils together and/or unveil soils with higher corrosive properties. This blending or imported material could alter and increase the detrimental properties of the onsite soils. Thus, it is important that additional testing near final grades for chlorides and sulfates along with testing for pH and resistivity be performed upon completion of the grading operations. Laboratory test results are presented in Appendix C.

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **PHIL MARTIN & ASSOCIATES** and their authorized representative. It is unlikely to contain sufficient information for other parties or other uses. CW Soils should be provided the opportunity to review the final design plans and specifications prior to construction, in order to verify that the recommendations have been properly incorporated into the project plans and specifications. If CW Soils is not accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

We recommend that CW Soils be retained to provide soils engineering and engineering geologic services during the grading and foundation excavation phases of work, in order to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

CW Soils should review any changes in the project and modify the conclusions and recommendations of this report in writing. This report along with the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the event that conditions during grading or construction operations appear to differ from those indicated in this report, our office should be notified immediately, as appropriate revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Soils vary in type, strength, and other engineering properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the proposed project. No practical study can completely eliminate uncertainty with regard to the anticipated geologic and soils engineering conditions in connection with a proposed project. The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by CW Soils based on the conditions revealed during grading and construction operations.

This report was prepared with the understanding that it is the responsibility of the owner, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should implement the recommendations in this report and notify the owner as well as our office if they consider any of the recommendations presented herein to be unsafe or unsuitable.

APPENDIX A

REFERENCES

APPENDIX A

References

California Building Standards Commission, 2019, *2019 California Building Code, California Code of Regulations Title 24, Part 2, Volume 2 of 2,* Based on 2018 International Building Code.

California Geological Survey, 2008, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, Special Publication 117A, September 11, 2008.

Morton, D.M., Hauser, Rachel M., and Ruppert, Kelly R., 2004, *Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California, Version 2.0*: U.S. Geological Survey Open-File Report 99-0172.

National Association of Corrosion Engineers, 1984, *Corrosion Basics An Introduction*, page 191.

Southern California Earthquake Center (SCEC), 1999, *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California,* March.

USGS Earthquake Hazards Program, Unified Hazard Tool for Conterminous U.S. 2014 (v4.1.1) Deaggregation Program.

APPENDIX B

FIELD EXPLORATION

LOG SYMBOLS & TERMS

The No. 200 Standard Sieve is about the smallest particle visible to the naked eye.					
Coarse-grained Soils >½ of materials larger than #200 sieve	**GRAVELS** Higher percentage of coarse fraction is larger than #4 sieve	Clean Gravels (less than 5% fines)		**GW**	Well-graded gravels, little or no fines
				GP	Poorly-graded gravels, little or no fines
		5 – 12% fines		**GW-GM**	Well-graded gravel with silt
				GW-GC	Well-graded gravel with clay
				GP-GM	Poorly-graded gravel with silt
				GP-GC	Poorly-graded gravel with clay
		Gravels with fines	PI < 4	**GM**	Silty Gravels
			PI > 7	**GC**	Clayey Gravels
	SANDS Higher percentage of coarse fraction is smaller than #4 sieve	Clean Sands (less than 5% fines)		**SW**	Well-graded sands, little or no fines
				SP	Poorly-graded sands, little or no fines
		5 – 12% fines		**SW-SM**	Well-graded sand with silt
				SW-SC	Well-graded sand with clay
				SP-SM	Poorly-graded sand with silt
				SP-SC	Poorly-graded sand with clay
		Sands with fines	PI < 4	**SM**	Silty Sands
			PI > 7	**SC**	Clayey Sands
			PI 4-7	**SC-SM**	Silty clayey sands
Fine-grained Soils ≥½ of materials smaller than #200 sieve	**SILTS & CLAYS** Liquid Limit Less Than 50		PI < 4	**ML**	Inorganic silts & sandy silts
			PI > 7	**CL**	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			PI 4-7	**ML-CL**	Silts & clays of low plasticity, sandy silty clay, silty clay
	SILTS & CLAYS Liquid Limit Greater Than 50			**MH**	Inorganic silts, micaceous or diatomaceous silt, sandy silt
				CH	Inorganic clays of high plasticity, fat clays, sandy clays, gravelly clays
				OH	Organic silts and clays of medium-to-high plasticity
Highly Organic Soils				**PT**	Peat, humus swamp soils with higher organic content

Symbols	
	Ring Sample
	SPT Sample
NR	No Recovery
▽	Groundwater

Grain Size				
Description		Sieve Size	Grain Size	Approximate Size
Boulders		>12"	>12"	Larger than basketball-sized
Cobbles		3-12"	3-12"	Fist-sized to basketball-sized
Gravel	Coarse	¾-3"	¾-3"	Thumb-sized to fist-sized
	Fine	#4-¾"	0.19-0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10-#4	0.079-0.19"	Rock salt-sized to pea-sized
	Medium	#40-#10	0.017-0.079"	Sugar-sized to rock salt-sized
	Fine	#200-#40	0.0029-0.017"	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029"	Flour-sized and smaller

Moisture Content
Slightly Moist
Moist
Very Moist
Wet

Consistency – Fine Grained Soils			
Apparent Density	SPT (# blows/foot)	Modified CA Sampler (# blows/foot)	Field Test
Very Soft	<1	<2	Easily penetrated by thumb; exudes between thumb and fingers when squeezed in hand
Soft	2-3	3-6	Easily penetrated one inch by thumb; molded by light finger pressure
Medium Stiff	4-6	7-12	Penetrated over ½ inch by thumb with moderate effort; molded by strong finger pressure
Stiff	7-10	13-15	Indented about ½ inch by thumb but penetrated only with great effort
Very Stiff	11-20	16-30	Readily indented thumbnail
Hard	>20	>30	Indented with difficulty by thumbnail

Relative Density – Coarse Grained Soils			
Apparent Density	SPT (# blows/foot)	Modified CA Sampler (# blows/foot)	Field Test
Very Loose	<2	<4	Easily penetrated with ½ inch reinforcing rod pushed by hand
Loose	3-5	4-10	Easily penetrated with ½ inch reinforcing rod pushed by hand
Medium Dense	6-15	11-30	Easily penetrated 1-foot with ½ inch reinforcing rod driven with a 5-lb hammer
Dense	16-25	31-50	Difficult to penetrate 1-foot with ½ inch reinforcing rod driven with a 5-lb hammer
Very Dense	>25	>50	Penetrated only a few inches with ½ inch reinforcing rod driven with a 5-lb hammer

Geotechnical Boring Log B-1

Date: April 27, 2022	**Project Name: Whittier - Baseball Field Lighting** **Page: 1 of 1**
Project Number: 22997-10	**Logged By: CW**
Drilling Company: California Pacific	**Type of Rig: Mobile B61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): NA	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0		Bag 1 @ 0-5'				**Artificial Fill, Undocumented (Afu):**
					CL	**Sandy CLAY;** light brown, moist to very moist, soft
5	7	N-1	-	28.2		very moist, stiff
10	10	N-2	-	26.5		thin layer of dusky yellowish brown
15	9	N-3	-	26.2		medium to dark brown
20	9	N-4	-	21.0		
						Total Depth: 21.5 Feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-2

Date: April 27, 2022	**Project Name: Whittier - Baseball Field Lighting** **Page: 1 of 1**
Project Number: 22997-10	**Logged By: CW**
Drilling Company: California Pacific	**Type of Rig: Mobile B61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): NA	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					CL	**Sandy CLAY;** moderate yellowish brown, slightly moist, medium stiff
5	15	N-1	-	14.7		moist, very stiff
10	14	N-2	-	19.5		moist to very moist
						dusky yellowish brown
15	14	N-3	-	19.7		
						medium to dark brown, stiff
20	9	N-4	-	18.8		
						Total Depth: 21.5 Feet
						No Groundwater
25						
30						

Geotechnical Boring Log B-3

Date: April 27, 2022	**Project Name: Whittier - Baseball Field Lighting** **Page: 1 of 1**
Project Number: 22997-10	**Logged By: CW**
Drilling Company: California Pacific	**Type of Rig: Mobile B61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): NA	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Pliocene Fernando Formation Upper Member (Tfu):**
						SANDSTONE; olive brown, slightly moist to moist, moderately soft to moderately hard
5	30	N-1	-	15.7		moist, moderately hard to hard, fine grained
10	33	N-2	-	18.3		moist to very moist
15	22	N-3	-	24.6		very moist, moderately hard
20	23	N-4	-	25.6		gypsum filled fractures
						Total Depth: 21.5 Feet
						No Groundwater
25						
30						

Geotechnical Boring Log B-4

Date: April 27, 2022	**Project Name: Whittier - Baseball Field Lighting** **Page: 1 of 1**
Project Number: 22997-10	**Logged By: CW**
Drilling Company: California Pacific	**Type of Rig: Mobile B61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): NA	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					CL	**Sandy CLAY;** moderate yellowish brown, slightly moist, medium stiff
5	14	N-1	-	13.6		slightly moist to moist, very stiff
10	13	N-2	-	14.7		
15	21	N-3	-	17.4		**Pliocene Fernando Formation Upper Member (Tfu):**
						SANDSTONE; light yellowish brown, slightly moist to moist, moderately hard
20	37	N-4	-	15.5		hard
						Total Depth: 21.5 Feet
						No Groundwater
25						
30						

APPENDIX C

LABORATORY PROCEDURES AND TEST RESULTS

APPENDIX C

Laboratory Procedures and Test Results

Our laboratory testing has provided quantitative and qualitative data involving the relevant engineering properties of the representative soils selected for testing. Representative samples were tested using the guidelines of the American Society for Testing and Materials (ASTM) procedures or California Test Methods (CTM).

Soil Classification: The soils observed during exploration were classified and logged in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) of ASTM D 2488. Upon completion of laboratory testing, exploratory logs and sample descriptions may have been reconciled to reflect laboratory test results with regard to ASTM D 2487.

Moisture and Density Tests: For select samples, moisture content and dry density determinations were obtained using the guidelines of ASTM D 2216 and ASTM D 2937, respectively. These tests were performed on relatively undisturbed samples and the test results are presented on the exploratory logs.

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests of select samples were performed using the guidelines of CTM 643. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	pH	MINIMUM RESISTIVITY (ohm-cm)
B-1 @ 0-5 feet	Sandy CLAY	7.4	1,050

Soluble Sulfate: The soluble sulfate content of select samples was determined using the guidelines of CTM 417. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	SULFATE CONTENT (% by weight)	SULFATE EXPOSURE
B-1 @ 0-5 feet	Sandy CLAY	0.002	Negligible

Chloride Content: Chloride content of select samples was determined using the guidelines of CTM 422. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	CHLORIDE CONTENT (ppm)
B-1 @ 0-5 feet	Sandy CLAY	160

APPENDIX D

SEISMICITY

Latitude, Longitude: 33.965, -117.9998

Date	5/19/2022, 5:42:36 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.826	MCE_R ground motion. (for 0.2 second period)
S_1	0.649	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.192	Site-modified spectral acceleration value
S_{M1}	0.909	Site-modified spectral acceleration value
S_{DS}	1.461	Numeric seismic design value at 0.2 second SA
S_{D1}	0.606	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.4	Site amplification factor at 1.0 second
PGA	0.795	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.954	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.826	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.034	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.373	Factored deterministic acceleration value. (0.2 second)
S1RT	0.649	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.721	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.943	Factored deterministic acceleration value. (1.0 second)
PGAd	0.996	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.898	Mapped value of the risk coefficient at short periods
C_{R1}	0.9	Mapped value of the risk coefficient at a period of 1 s

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (u...

Latitude

Decimal degrees

33.965

Longitude

Decimal degrees, negative values for western longitudes

-117.9998

Site Class

360 m/s (C/D boundary)

Spectral Period

Peak Ground Acceleration

Time Horizon

Return period in years

2475

Hazard Curve

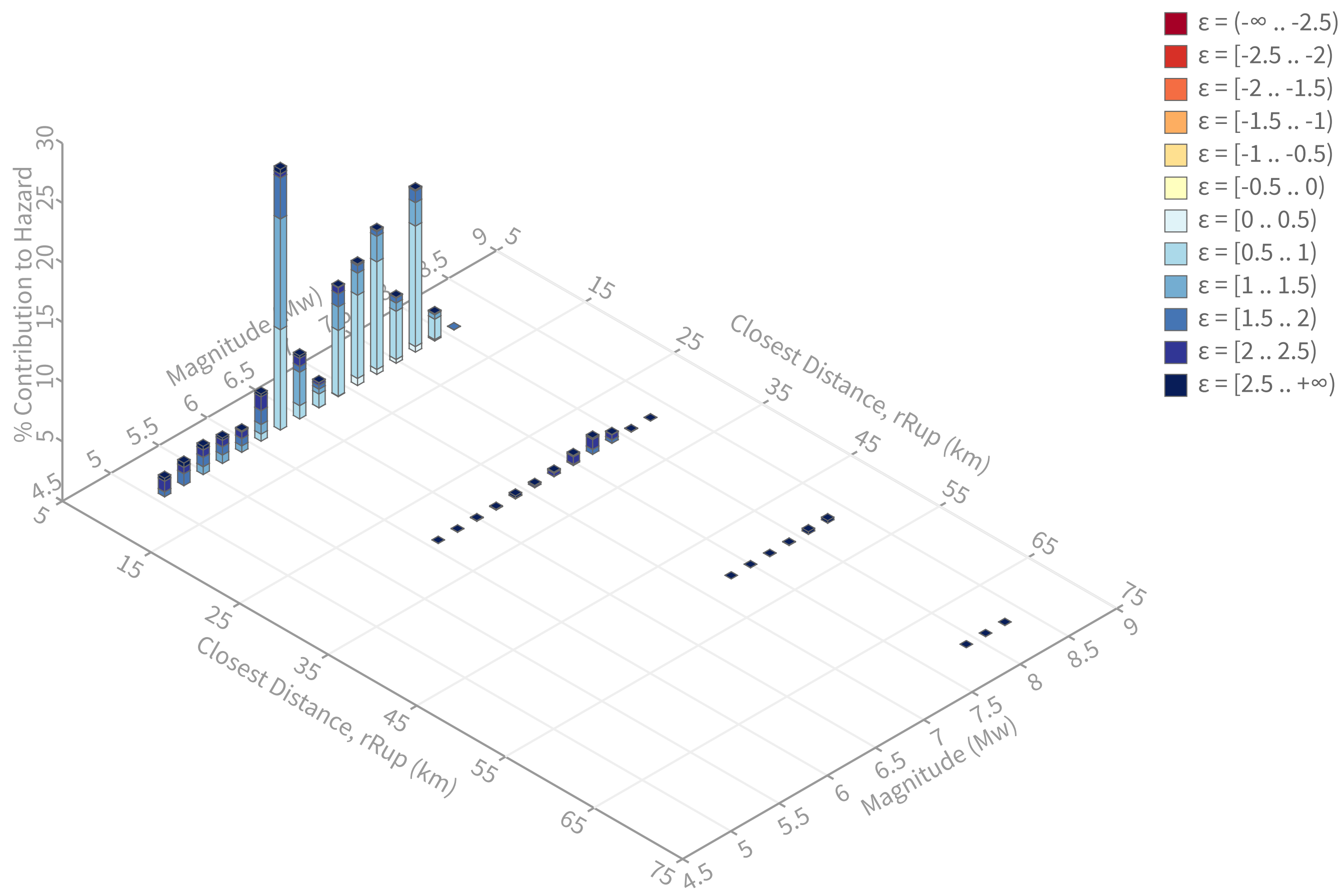
Please select “Edition”, “Location” & “Site Class” above to compute a hazard curve.

Compute Hazard Curve

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.89621984 g

Recovered targets

Return period: 2808.0642 yrs
Exceedance rate: 0.00035611721 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.03 %

Mean (over all sources)

m: 6.84
r: 7.4 km
ε_0: 1.19 σ

Mode (largest m-r bin)

m: 6.26
r: 2.86 km
ε_0: 1.18 σ
Contribution: 21.84 %

Mode (largest m-r-ε_0 bin)

m: 7.73
r: 3.79 km
ε_0: 0.69 σ
Contribution: 10.1 %

Discretization

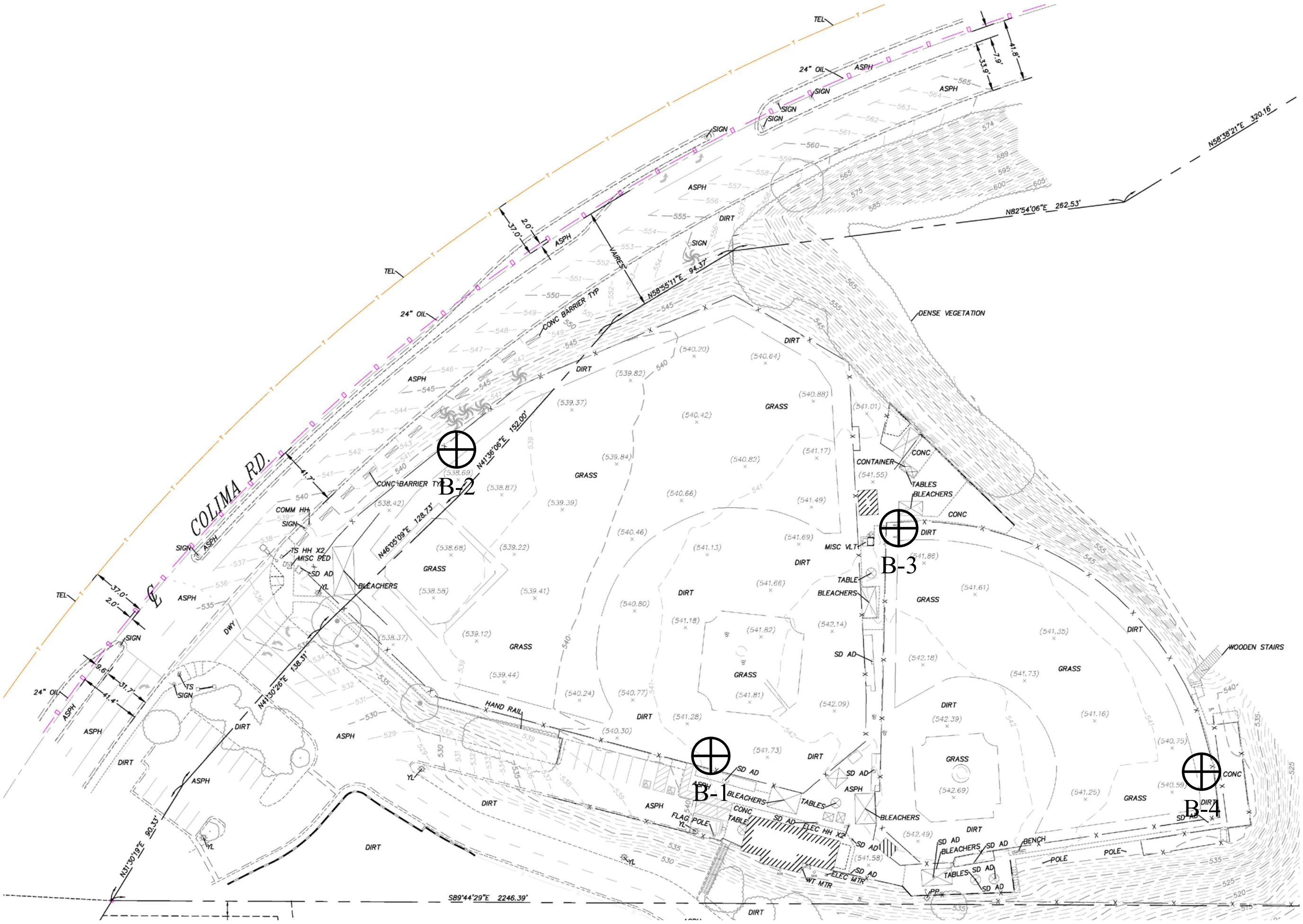
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							44.15
Whittier alt 1 [6]		1.89	6.57	1.01	117.990°W	33.975°N	38.51	20.50
Puente Hills [1]		6.21	7.33	0.84	117.999°W	33.945°N	178.25	9.66
Compton [0]		15.05	7.26	0.91	118.122°W	33.750°N	205.20	4.73
Anaheim [2]		12.05	7.21	1.00	118.063°W	33.881°N	211.66	1.24
UC33brAvg_FM32	System							40.94
Whittier alt 2 [6]		1.94	7.13	0.84	117.992°W	33.975°N	34.31	12.83
Whittier alt 2 [5]		2.29	7.08	0.86	117.982°W	33.972°N	64.90	6.57
Puente Hills (Santa Fe Springs) [0]		4.85	6.93	0.93	118.023°W	33.950°N	233.12	5.30
Compton [0]		15.05	7.31	0.90	118.122°W	33.750°N	205.20	4.75
Puente Hills (Coyote Hills) [1]		6.55	7.08	0.78	118.024°W	33.910°N	200.18	2.91
Puente Hills (LA) [0]		11.62	7.19	1.66	118.116°W	33.990°N	284.70	1.48
Anaheim [2]		12.05	7.28	0.93	118.063°W	33.881°N	211.66	1.35
UC33brAvg_FM32 (opt)	Grid							7.74
PointSourceFinite: -118.000, 33.996		6.23	5.65	1.65	118.000°W	33.996°N	0.00	1.96
PointSourceFinite: -118.000, 33.996		6.23	5.65	1.65	118.000°W	33.996°N	0.00	1.96
UC33brAvg_FM31 (opt)	Grid							7.17
PointSourceFinite: -118.000, 33.996		6.28	5.60	1.68	118.000°W	33.996°N	0.00	1.89
PointSourceFinite: -118.000, 33.996		6.28	5.60	1.68	118.000°W	33.996°N	0.00	1.89

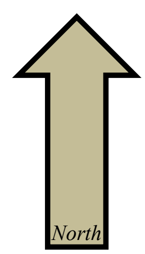


LEGEND

Locations are Approximate

Symbols

B-4 – Exploratory Boring



REFERENCE: PBLA Surveying, Inc., 2022, *Topographic Survey*, dated 3/22/2022.

Proposed Whittier - Baseball Field Lighting		22997-10
GEOTECHNICAL MAP	1" ≈ 120 '	
	2022	PLATE 1