

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS



Project No. W1547-06-01 *Revised May 8, 2023*

Chaminade College Preparatory 7500 Chaminade Avenue West Hills, CA 91304

Attention: Mr. Chris Landon

Subject: RESPONSE TO SOILS REPORT REVIEW LETTER

PROPOSED CHAMINADE HIGH SCHOOL IMPROVEMENTS 7500 N. CHAMINADE AVENUE, 23241 W. COHASSET STREET,

23260, 23217 & 23229-23255 W. SATICOY STREET, 7619-7621 & 7625-7629 N. WOODLAKE AVENUE

WEST HILLS NEIGHBORHOOD OF LOS ANGELES, CALIFORNIA

TRACT: 2607; LOT: LT1; TRACT: 2500; LOT: 19 & 35;

TRACT: 25733; LOT: LT1 (ARBS 2,3, & 4)

References: Geotechnical Investigation, prepared by Geocon West, Inc., dated January 12, 2023;

City of Los Angeles Geology and Soils Report Review Letter, Log No. 124921, dated

February 24, 2023.

Dear Mr. Landon:

This letter has been prepared in response to the referenced Geology and Soils Report Review Letter prepared by the City of Los Angeles, consisting of ten comments, dated February 24, 2023. A copy of the review letter is appended herein.

Based on discussions with the client and review of the conceptual project plans, the project scope has been revised and no longer includes the Main Campus gymnasium nor the North Campus parking structure. A revised project description is included below.

It is our understanding that the proposed improvements will include:

- Constructing a pedestrian bridge over Saticoy Street connecting the Main and North Campus
- North Campus:
 - Demolish the existing commercial structures and remove the existing paving.
 - o Construct a new outdoor pool and pool house.
 - o Construct new sports fields with associated ancillary structures.
 - o Construct an on-grade parking lot.

- Main Campus:
 - o Demolish 6 of the existing administrative and classroom structures.
 - o Construct a new 3-Story Main administrative/classroom structure.
 - o Repave and remodel existing surface parking areas and outdoor quad.

The locations of the proposed improvements are shown on the updated site plan (see Figure 1). The recommendations of the January 12, 2023, report remain applicable to the project as presently proposed. Where differing, recommendations in this response letter supersede those presented in the referenced report and should be utilized for design and construction.

- Comment 1: Verify the current legal description and addresses (for all lots part of the project site) with the Address Section of the Bureau of Engineering located on the Third Floor of the 201 N. Figueroa Street, City of Los Angeles offices.
- **Response 1:** Acknowledged. A part of the North Campus address was not included in the project description. Revised legal addresses of the Main Campus and North Campus are provided below.
- Main Campus: 7500 N. Chaminade Ave, 23241 W. Cohasset Street and 23260 W. Saticoy Street TRACT: 26072; LOT: FR LT 1
 TRACT: 2500; LOT: FR 19 & FR 35
- North Campus: 23217 & 23229-23255 W. Saticoy Street, 7619-7621 & 7625-7629 N. Woodlake Avenue TRACT: 25773; LOT: LT 1 ARB: 2, 3, 4
- Comment 2: Provide a geologic map that is based upon conceptual grading or site development plans, to illustrate all proposed and existing contours relative to the planned grading and/or construction, along with all off-site slopes and conditions that could adversely affect the stability or safety of the site (7006.3.2).
- Response 2: A Geologic Map of the Main and North Campus is provided on Figures 2A and 2B, respectively. Artificial fill is the surface material at the site and is underlain by either Holocene age alluvium or Tertiary age bedrock of the Monterey Formation. The geologic units are designated as artificial fill over alluvium (af/Qa) or artificial fill over shallow Monterey Formation (af/Tm).
- Comment 3: Show the location and height of all proposed retaining walls.

- Response 3: The Geologic Maps use the conceptual site grading plans as a background which indicate the proposed retaining wall locations and heights. The only proposed retaining wall will be the basement walls of the proposed Administration/Classroom Building where the northwest (southeast-facing excavation) may expose unsupported bedding in the lower 5 feet of the building excavation (see Figure 2). Temporary shoring and retaining wall recommendations to support adverse bedding conditions are provided in the January 12, 2023 report.
- Comment 4: Verify the location of the borings on the maps and cross sections, and revise accordingly.
- **Response 4:** Boring Locations have been reviewed and are correctly located on the Geologic maps and cross sections (see Figures 2A, 2B and 3).
- Comment 5: Provide slope stability analyses for all slopes steeper than 2H:1V to remain by the proposed improvements, such as the proposed bridge and administration building.
- **Response 5:** Based on correspondence with the project civil engineer and review of the conceptual grading plan, no slopes steeper than a 2H:1V are planned or will remain.
- Comment 6: In areas where the depth of bedrock exceeds 10 feet, submit justification in accordance with ASCE/SEI 7-16 (Chapter 20) and code section 1613.2.2 of the 2020 Los Angeles Building Code for the use of a Site Class C. Otherwise, the Site Class shall be D in those areas, and updated seismic design parameters shall be provided.

<u>Note</u>: The use of the Site Class C in the report does not appear justified due to the presence of up to 40 feet of fill and alluvium (North Campus), lack of shear wave velocities, SPT blow counts, or undrained shear strengths of the upper 100 fee of the site profile.

Response 6: Acknowledged. Site Class C seismic design criteria provided in the report may be used for the proposed Main Campus structure. Design of the North Campus structures should use the Site Class D design criteria provided below.

The following table summarizes the site-specific design criteria obtained from the 2022 California Building Code (CBC; Based on the 2021 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The data was calculated using the online application *U.S. Seismic Design Maps*, provided by the Structural Engineers Association of California (SEAOC). The short spectral response uses a period of 0.2 second. We evaluated the Site Class based on the discussion in Section 1613.2.2 of the 2022 CBC and Table 20.3-1 of ASCE 7-16. The values presented below are for the risk-targeted maximum considered earthquake (MCE_R).

2022 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2019 CBC Reference
Site Class	D	Section 1613.2.2
MCE _R Ground Motion Spectral Response Acceleration – Class B (short), S _S	1.5g	Figure 1613.2.1(1)
MCE _R Ground Motion Spectral Response Acceleration – Class B (1 sec), S ₁	0.6g	Figure 1613.2.1(3)
Site Coefficient, FA	1.0	Table 1613.2.3(1)
Site Coefficient, F _V	1.7	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.5g	Section 1613.2.3 (Eqn 16-20)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	1.02g*	Section 1613.2.3 (Eqn 16-21)
5% Damped Design Spectral Response Acceleration (short), S _{DS}	1.0g	Section 1613.2.4 (Eqn 16-22)
5% Damped Design Spectral Response Acceleration (1 sec), S _{D1}	0.68g*	Section 1613.2.4 (Eqn 16-23)

^{*}Per Supplement 3 of ASCE 7-16, a ground motion hazard analysis (GMHA) shall be performed for projects on Site Class "D" sites with 1-second spectral acceleration (S_1) greater than or equal to 0.2g, which is true for this site. However, Supplement 3 of ASCE 7-16 provides an exception stating that that the GMHA may be waived provided that the parameter S_{M1} is increased by 50% for all applications of S_{M1} . The values for parameters S_{M1} and S_{D1} presented above have **not** been increased in accordance with Supplement 3 of ASCE 7-16.

The table below presents the mapped maximum considered geometric mean (MCE_G) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-16.

ASCE 7-16 PEAK GROUND ACCELERATION (NORTH CAMPUS - SITE CLASS D)

Parameter	Value	ASCE 7-16 Reference
Mapped MCE _G Peak Ground Acceleration, PGA	0.544g	Figure 22-9
Site Coefficient, F _{PGA}	1.1	Table 11.8-1
Site Class Modified MCE _G Peak Ground Acceleration, PGA _M	0.598g	Section 11.8.3 (Eqn 11.8-1)

Comment 7: Historic High Groundwater is mapped as less than 10 feet bgs in the areas of the pool house, pool, and generally in the areas outside of the proposed administration building. As such, revise the liquefaction analyses using a historic high groundwater level of less than 10 feet.

Response 7: We agree that the historic high groundwater level is mapped as less than 10 feet in areas outside of the proposed administration building (CDMG, 1997; revised 2001).

To determine the appropriate historic high groundwater level depth for the liquefaction analysis, we reviewed available groundwater monitoring well data from the County of Los Angeles Department of Public Works. There are two active and five inactive groundwater monitoring wells within one mile of the site that provide groundwater level data for the time period between 1956 and 2022. Based on the monitoring data, the shallowest depth to groundwater documented in these wells was at a depth of 8.9 feet below the ground surface for the period between 1956 and 2022.

The North Campus is underlain by artificial fill, potentially liquefiable alluvium, further underlain by Monterey Formation bedrock. The depth of the bedrock ranges from 12 feet on the west portion of the property, to 42 feet on the east side of the property. It is anticipated that the proposed bridge and Main Campus structures can be founded on relatively shallow bedrock using deepened foundations extending through the potentially liquefiable materials. Since structures will be supported on bedrock, it is our opinion that the potential for liquefaction and associated ground deformations to impact the bridge and Main Campus structures is considered very low.

A revised liquefaction analysis for the North Campus structures has been performed using Site Class D seismic design criteria and a revised historic high groundwater level. The liquefaction analysis was performed for boring B1 to represent the worst-case liquefaction potential, and boring B3 to represent the lowest liquefaction potential for the North Campus.

The liquefaction analysis was performed for a Design Earthquake level by using a high groundwater table of 8 feet below the ground surface, a magnitude 6.58 earthquake, and a peak horizontal acceleration of 0.399g (2/3PGA_M). The groundwater level of 8 feet is considered conservative considering the shallowest groundwater level in nearby wells is 8.9 feet over the last 66 years. The enclosed liquefaction analyses included herein for borings B1 and B3 indicate that the alluvial soils below the proposed foundation level would be prone to approximately 2.9 and 0.4 inches of liquefaction settlement during a Design Earthquake ground motion (see enclosed calculation sheets, Figures 4 through 7). The resulting differential settlement at the foundation level is anticipated to be approximately 1½ inches over a distance of 20 feet.

It is our understanding that the intent of the Building Code is to maintain "Life Safety" during Maximum Considered Earthquake level events. Therefore, additional analysis was performed to evaluate the potential for liquefaction during a MCE event. The structural engineer should evaluate the proposed structure for the anticipated MCE liquefaction induced settlements and verify that anticipated deformations would not cause the foundation system to lose the ability to support the gravity loads and/or cause collapse of the structure.

The liquefaction analysis was also performed for Maximum Considered Earthquake levels by using a historic high groundwater table of 8 feet below the ground surface, a magnitude 6.66 earthquake, and a peak horizontal acceleration of 0.598g (PGA_M). The enclosed liquefaction analysis, included herein for borings B1 and B3 indicates that the alluvial soils below the proposed foundation would be prone to approximately 3.1 and 0.4 inches of liquefaction settlement during a Maximum Considered Earthquake ground motion (see enclosed calculation sheets, Figures 8 and 11). The resulting differential settlement at the foundation level is anticipated to be approximately 1½ inches over a distance of 20 feet.

Comment 8: For other than the Pool House, provide foundation recommendations for the proposed structures within the "North Campus" as shown on FIG. 2A, and for any proposed structures within the southern portion of the "Main Campus" (see FIG. 2A). Note: The foundation recommendations shall comply with the settlement thresholds for liquefaction based on P/BC 2020-151.

Response 8: A summary of the proposed structures, recommended foundation system and recommended bearing materials is provided in the table below. Revised recommendations for the North Campus structures based on the results of the revised liquefaction analysis are also provided below.

Campus Location	Structure Name Recommended Foundation Type		Recommended Slab	Recommended Bearing Material	
Main Campus	New	Conventional Spread	Conventional Slab-	Bedrock	
	Administration/Classroom	Foundations ¹	on-Grade		
	Building				
North/Main	Pedestrian Bridge	Deepened Foundations (Piles) ²	NA	Bedrock	
Campus					
North	Pool House	Mat Foundation ³	Mat Foundation ³	Engineered Fill	
Campus					
North	Miscellaneous accessory	Mat Foundation ³	Mat Foundation ³	Engineered Fill	
Campus	structures (Locker rooms,				
	concessions stand, etc.)				

- 1. See Section 8.7 and 8.9 of January 12, 2023 report for Conventional Foundation Recommendations
- 2. See Sections 8.10 through 8.12 of January 12, 2023 report for Deepened Foundations Recommendations
- 3. See below for Mat Foundation Recommendations

At a minimum, it is recommended that the upper 5 feet of existing earth materials within the proposed structures footprint be excavated and properly compacted for support of a reinforced concrete mat foundation system. Deeper excavations should be conducted as necessary to remove any existing deeper artificial fill or soft alluvial soil at the direction of the Geotechnical Engineer (a representative of Geocon). The excavation should extend laterally a minimum distance of 3 feet beyond the building footprint area, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft alluvial soils removal will be verified by the Geocon representative during site grading activities.

Prior to placement of new engineered fill, all building pad excavation bottoms shall be proof rolled with heavy equipment in the presence of the Geotechnical Engineer.

Once the recommended grading has been completed, the proposed North Campus structures may be supported by a reinforced mat foundation system deriving support in newly placed engineered fill. The mat foundation system allows for more efficient construction and is better at distributing loads to minimize the effect of potential settlement.

The recommended allowable bearing pressure is 3,000 pounds per square foot (psf). The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

It is recommended that a modulus of subgrade reaction of 100 pounds per cubic inch (pci) be utilized for the design of the mat foundation bearing in the engineered fill. The modulus should be reduced in accordance with the following equation when used with larger foundations:

$$K_R = K \left[\frac{B+1}{2B} \right]^2$$

where: K_R = reduced subgrade modulus

K = unit subgrade modulus B = foundation width (in feet)

The thickness of and reinforcement for the mat foundation should be designed by the project structural engineer.

For seismic design purposes, a coefficient of friction of 0.40 may be utilized between the concrete mat and bedrock without a moisture barrier, and 0.15 for slabs underlain by a moisture barrier.

Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

This office should be provided a copy of the final construction plans so that the recommendations presented herein could be properly reviewed and revised if necessary.

The maximum static settlement for a reinforced mat foundation system deriving support in the newly placed engineered fill with a maximum allowable bearing value of 3,000 psf is expected to be less than 1 inch and occur below the heaviest loaded structural element. Static differential settlement over a distance of 20 feet, is expected to be less than ½ inch. Based on seismic considerations, the proposed North Campus structures should be designed for a combined static and seismically induced differential settlement of 2 inches over a distance of 20 feet.

Comment 9: Provide recommendations for the proposed swimming pool.

Response 9: Acknowledged. Swimming pool recommendations are provided below.

The proposed North Campus swimming pool should be designed as a free-standing structure deriving support in newly placed engineered fill and/or competent alluvial soils found at or below a depth of 5 feet. If the alluvial soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative. Swimming pool foundations and walls may be designed in accordance with the Mat Foundation Design and Retaining Wall Design sections of the referenced January 12, 2023 report.

The proposed pool should be constructed utilizing an expansive soils design, and a hydrostatic relief valve should be considered as part of the swimming pool design unless a gravity drain system can be placed beneath the pool shell.

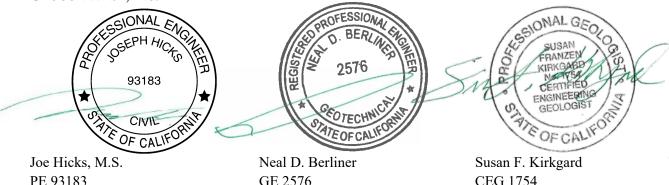
Comment 10: Revise the recommendations in the report based on the above items.

Response 10: Acknowledged. Revised recommendations have been provided in response to the comments above.

If you have any questions regarding this letter, or if we may be of further service, please contact the undersigned.

Very truly yours,





Enclosures: Fi

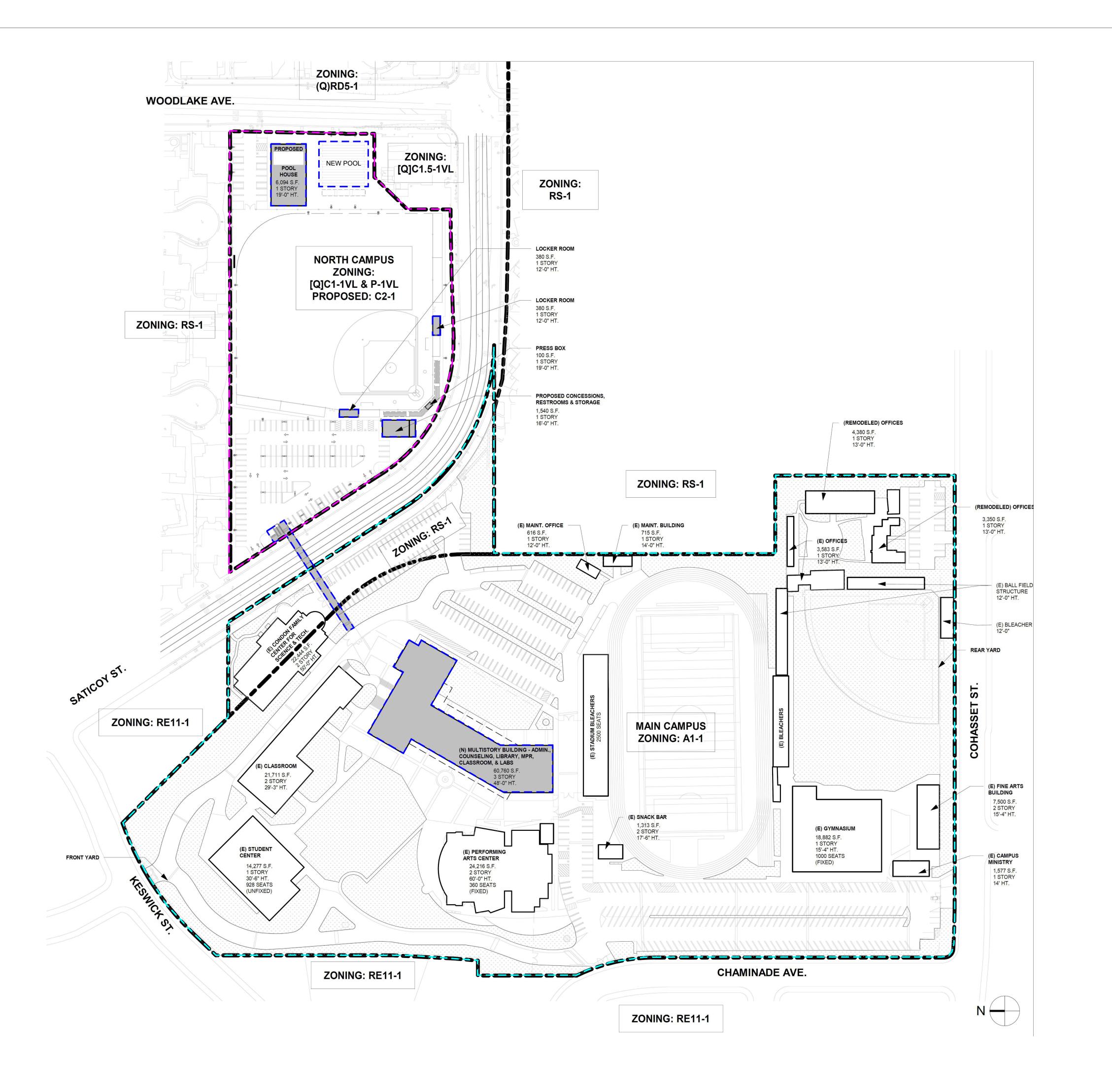
Figure 1, Site Plan

Figures 2A and 2B, Geologic Maps

Figure 3, Geologic Section

Figures 4 through 7, Liquefaction Analysis (DE Ground Motion)
Figures 8 through 11, Liquefaction Analysis (MCE Ground Motion)

Copy of Soils Report Correction Letter

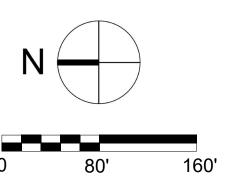


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Limits of Main Campus

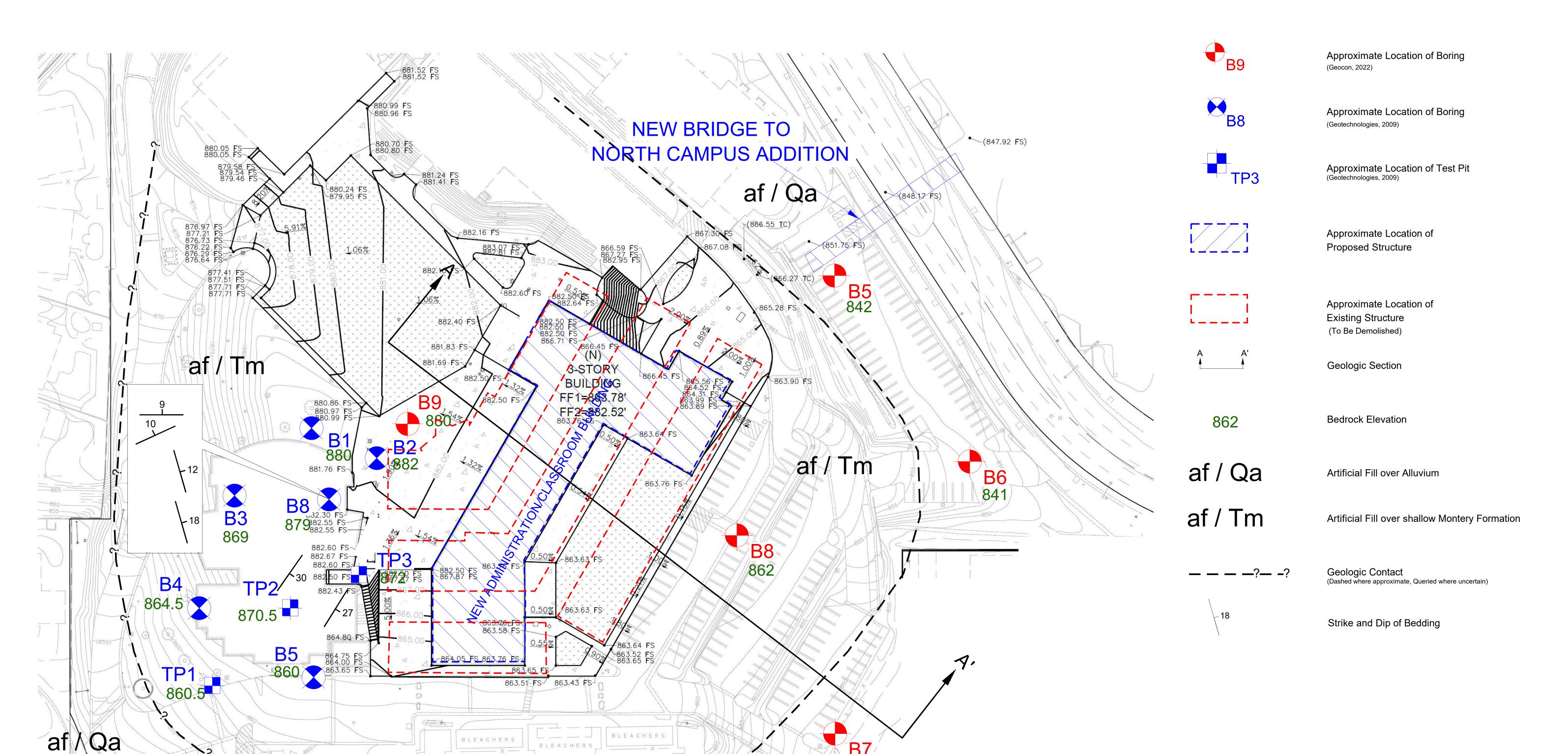
Limits of North Campus Addition

Location of Proposed Structure



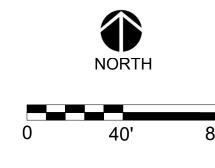


LEGEND



af / Times

BLEACHERS



GEOLOGIC MAP (MAIN CAMPUS)

CHAMINADE HIGH SCHOOL 7500 CHAMINADE AVENUE

WEST HILLS, CALIFORNIA

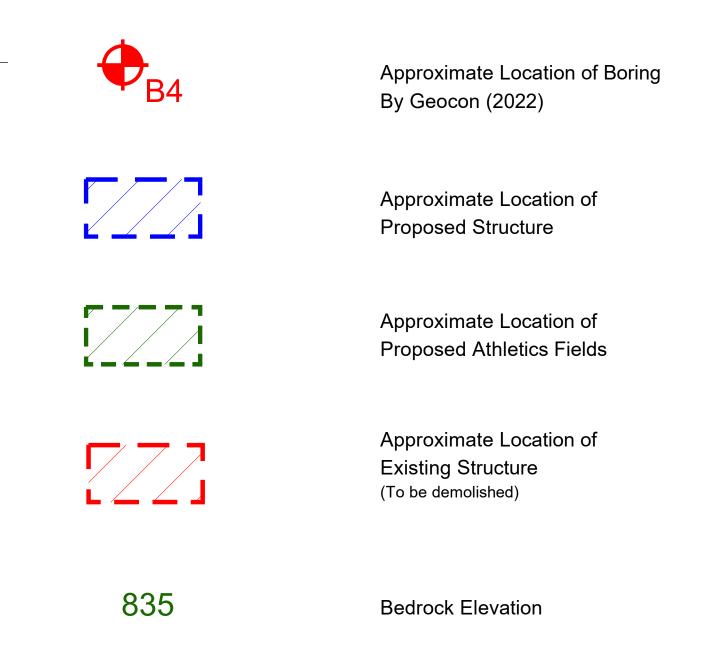
APR. 2023 PROJECT NO. W1547-06-01 FIGURE 2A

WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

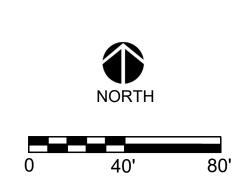
DRAFTED BY: CB CHECKED BY: SFK

LEGEND



Artificial Fill / Alluvium

af / Qa



WEST, INC.

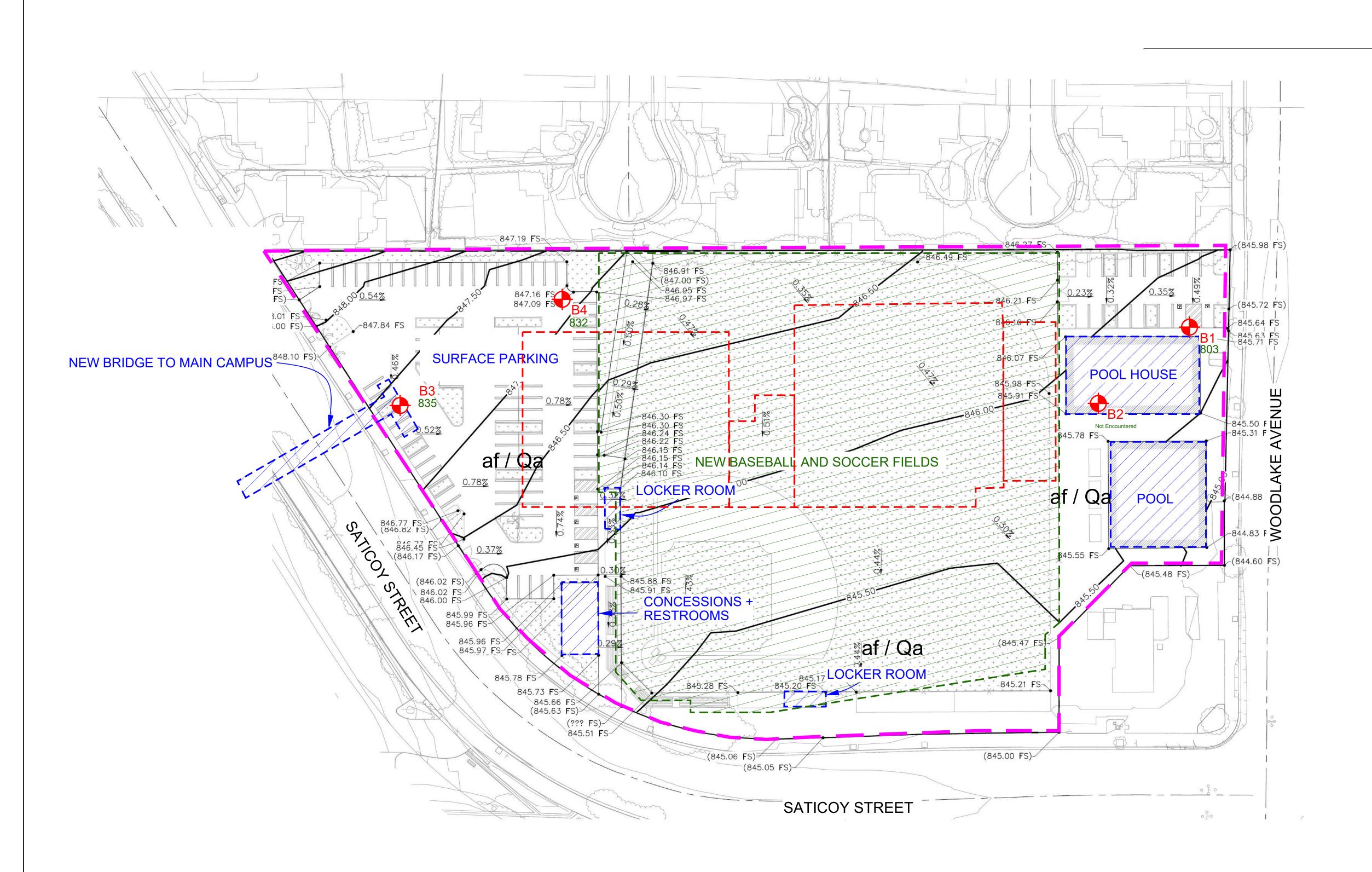
ENVIRONMENTAL GEOTECHNICAL MATERIALS
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

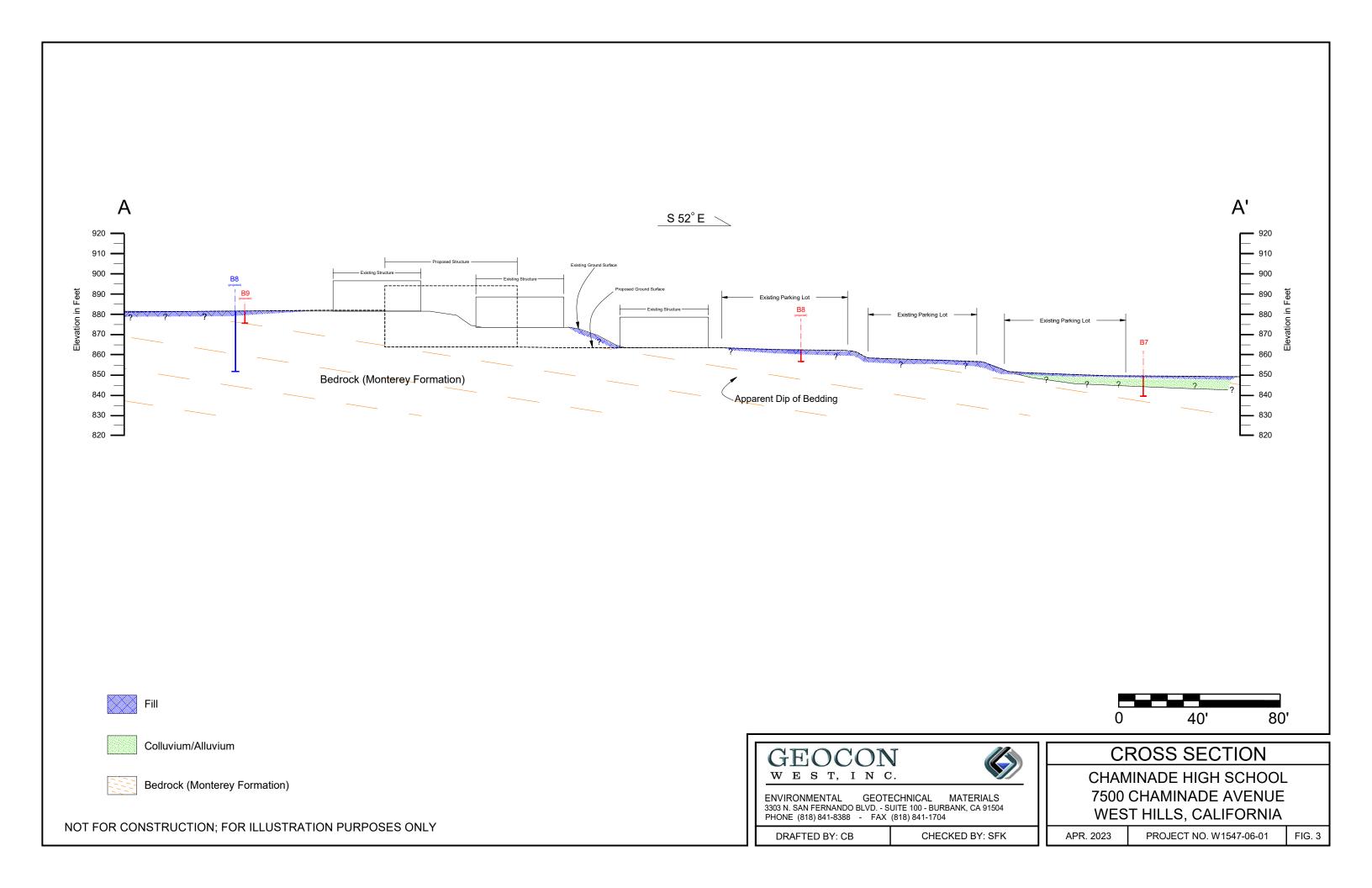
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GEOLOGIC MAP (NORTH CAMPUS)

CHAMINADE HIGH SCHOOL
7500 CHAMINADE AVENUE
WEST HILLS, CALIFORNIA

APR. 2023 PROJECT NO. W1547-06-01 FIG 2B









File No.: W1547-06-01

Boring: B1

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL DESIGN EARTHQUAKE

NCEER (1996) METHOD EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.58
Peak Horiz. Acceleration PGA _M (g):	0.598
2/3 PGA _M (g):	0.399
Calculated Mag.Wtg.Factor:	0.719
Historic High Groundwater:	8.0
Groundwater Depth During Exploration:	32.0

By Thomas F. Blake (1994-1996) ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.29
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

LIQUEFACTION CALCULATIONS:

Unit Wt. Wate	er (pcf):	62.4	7											
Depth to	Total Unit	Water	FIELD	Depth of	Lig.Sus.	-200	Est. Dr	CN	Corrected	Eff. Unit	Resist.	rd	Induced	Liquefac.
Base (ft)	Wt. (pcf)	(0 or 1)	SPT (N)	SPT (ft)	(0 or 1)	(%)	(%)	Factor	(N1)60	Wt. (psf)	CRR	Factor	CSR	Safe.Fact.
1.0	120.0	0	2.0	5.0	1	30	31	1.700	9.8	120.0	0.108	0.998	0.186	
2.0	120.0	0	2.0	5.0	1	30	31	1.700	9.8	120.0	0.108	0.993	0.185	
3.0	120.0	0	2.0	5.0	1	30	31	1.700	9.8	120.0	0.108	0.989	0.184	
4.0	120.0	0	2.0	5.0	1	30	31	1.700	9.8	120.0	0.108	0.984	0.183	
5.0	95.5	0	2.0	5.0	1	30	31	1.700	9.8	95.5	0.108	0.979	0.183	
6.0	95.5	0	2.0	5.0	1	30	31	1.700	9.8	95.5	0.108	0.975	0.182	
7.0	95.5	0	2.0	5.0	1	30	31	1.700	9.8	95.5	0.108	0.970	0.181	
8.0	95.5	0	2.0	5.0	1	30	31	1.601	9.6	95.5	0.105	0.966	0.180	
9.0	95.5	1	2.0	5.0	1	30	31	1.515	9.4	33.1	0.103	0.961	0.185	0.56
10.0	95.5	1	2.0	5.0	1	30	31	1.441	9.2	33.1	0.102	0.957	0.197	0.52
11.0	95.5	1	4.0	10.0	0	79		1.377	13.4	33.1	~	0.952	0.207	~
12.0	95.5	1	4.0	10.0	0	79		1.321	13.1	33.1	~	0.947	0.216	~
13.0	120.1	1	7.0	15.0	0	56		1.265	18.1	57.7	~	0.943	0.224	~
14.0	120.1	1	7.0	15.0	0	56		1.211	17.6	57.7	~	0.938	0.230	~
15.0	120.1	1	7.0	15.0	0	56		1.163	17.2	57.7	~	0.934	0.236	~
16.0	120.1	1	7.0	15.0	0	56		1.120	16.8	57.7	~	0.929	0.241	~
17.0	120.1	1	7.0	15.0	0	56		1.082	16.5	57.7	~	0.925	0.245	~
18.0	120.1	1	7.0	15.0	0	56		1.047	16.2	57.7	~	0.920	0.249	~
19.0	120.1	1	7.0	15.0	0	56		1.016	15.9	57.7	~	0.915	0.252	~
20.0	129.4	1	14.0	20.0	1	38	71	0.986	26.1	67.0	0.306	0.911	0.255	1.20
21.0	129.4	1	14.0	20.0	1	38	71	0.957	25.6	67.0	0.295	0.906	0.257	1.15
22.0	129.4	1	10.0	25.0	1	57	58	0.931	20.8	67.0	0.227	0.902	0.258	0.88
23.0	129.4	1	10.0	25.0	1	57	58	0.907	20.4	67.0	0.223	0.897	0.260	0.86
24.0	129.4	1	10.0	25.0	1	57	58	0.885	20.1	67.0	0.219	0.893	0.261	0.84
25.0	129.4	1	10.0	25.0	1	57	58	0.864	19.8	67.0	0.215	0.888	0.262	0.82
26.0	129.4	1	10.0	25.0	1	57	58	0.845	19.5	67.0	0.212	0.883	0.263	0.81
27.0	129.4	1	10.0	25.0	1	57	58	0.827	19.2	67.0	0.209	0.879	0.263	0.79
28.0	129.4	1	10.0	25.0	1	57	58	0.810	19.0	67.0	0.206	0.874	0.264	0.78
29.0	129.4	1	10.0	25.0	1	57	58	0.794	18.7	67.0	0.204	0.870	0.264	0.77
30.0	129.1	1	11.0	30.0	0	86		0.779	20.3	66.7	~	0.865	0.264	~
31.0	129.1	1	11.0	30.0	0	86		0.765	20.0	66.7	~	0.861	0.264	~
32.0	129.1	1	11.0	30.0	0	86		0.754	19.8	66.7	~	0.856	0.264	~
33.0	129.1	1	22.0	32.5	1		80	0.747	25.5	66.7	0.290	0.851	0.264	1.10
34.0	129.1	1	22.0	32.5	1		80	0.741	25.2	66.7	0.286	0.847	0.264	1.08
35.0	129.1	1	8.0	35.0	0	93		0.734	16.1	66.7	~	0.842	0.264	~
36.0	129.1	1	8.0	35.0	0	93		0.728	16.0	66.7	~	0.838	0.263	~
37.0	129.1	1	8.0	35.0	0	93		0.722	15.9	66.7	~	0.833	0.263	~
38.0	135.5	1	19.0	37.5	1		71	0.716	21.1	73.1	0.223	0.829	0.262	0.85
39.0	135.5	1	19.0	37.5	1		71	0.710	20.9	73.1	0.221	0.824	0.261	0.85
40.0	135.5	1	19.0	37.5	1		71	0.703	20.7	73.1	0.219	0.819	0.260	0.84
41.0	128.3	1	12.0	40.0	0	62		0.698	20.0	65.9	~	0.815	0.260	~
42.0	128.3	1	12.0	40.0	0	62		0.692	19.9	65.9	~	0.810	0.259	~
43.0	128.3	1	31.0	45.0	0	73		0.687	40.0	65.9	~	0.806	0.258	~
44.0	128.3	1	31.0	45.0	0	73		0.682	39.7	65.9	~	0.801	0.258	~
45.0	128.3	1	31.0	45.0	0	73		0.677	39.5	65.9	~	0.797	0.257	~
46.0	128.3	1	31.0	45.0	0	73		0.672	39.3	65.9	~	0.792	0.256	~
47.0	128.3	1	31.0	50.0	0	73		0.668	39.0	65.9	~	0.787	0.255	~
48.0	128.3	1	31.0	50.0	0	73		0.663	38.8	65.9	~	0.783	0.254	~
49.0	128.3	1	31.0	50.0	0	73		0.658	38.6	65.9	~	0.778	0.253	~
50.0	128.3	11	31.0	50.0	0	73		0.654	38.4	65.9	~	0.774	0.252	~



Project: Chaminade N Campus Extens

File No.: W1547-06-01

Boring : B1

LIQUEFACTION SETTLEMENT ANALYSIS DESIGN EARTHQUAKE

(SATURATED SAND AT INITIAL LIQUEFACTION CONDITION)

NCEER (1996) METHOD

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.58
PGAM (g):	0.598
2/3 PGAM (g):	0.40
Calculated Mag.Wtg.Factor:	0.719
Historic High Groundwater:	8.0
Groundwater @ Exploration:	32.0

DEPTH	BLOW	WET	TOTAL	EFFECT	REL.	ADJUST		LIQUEFACTION	Volumetric	EQ.
TO	COUNT	DENSITY	STRESS	STRESS	DEN.	BLOWS		SAFETY	Strain	SETTLE.
BASE	N	(PCF)	O (TSF)	O' (TSF)	Dr (%)	(N1)60	Tav/σ' _o	FACTOR	[e ₁₅] (%)	Pe (in.)
1.0	2	120.0	0.030	0.030	31	10	0.259		0.00	Grading
2.0	2	120.0	0.090	0.090	31	10	0.259		0.00	Grading
3.0	2	120.0	0.150	0.150	31	10	0.259		0.00	Grading
4.0	2	120.0	0.210	0.210	31	10	0.259		0.00	Grading
5.0	2	95.5	0.264	0.264	31	10	0.259		0.00	Grading
6.0	2	95.5	0.312	0.312	31	10	0.259		0.00	0.00
7.0	2	95.5	0.359	0.359	31	10	0.259		0.00	0.00
8.0	2	95.5	0.407	0.407	31	10	0.259		0.00	0.00
9.0	2	95.5	0.455	0.439	31	9	0.268	0.56	2.70	0.32
10.0	2	95.5	0.503	0.456	31	9	0.286	0.52	2.70	0.32
11.0	4	95.5	0.550	0.472	<u> </u>	13	0.302	~	0.00	0.00
12.0	4	95.5	0.598	0.489		13	0.317	~	0.00	0.00
13.0		120.1	0.652	0.512		18	0.330	~	0.00	0.00
14.0	7	120.1	0.712	0.540		18	0.342	~	0.00	0.00
15.0	7	120.1	0.772	0.569		17	0.352	~	0.00	0.00
16.0	7	120.1	0.832	0.598		17	0.361	~	0.00	0.00
17.0	7	120.1	0.892	0.627		16	0.369	~	0.00	0.00
18.0	7	120.1	0.952	0.656		16	0.376	~	0.00	0.00
19.0	7	120.1	1.012	0.685		16	0.383	~	0.00	0.00
20.0	14	129.4	1.075	0.716	71	26	0.389	1.20	0.00	0.00
21.0	14	129.4	1.139	0.749	71	26	0.394	1.15	0.00	0.00
22.0	10	129.4	1.204	0.783	58	21	0.399	0.88	1.40	0.17
23.0	10	129.4	1.269	0.763	58	20	0.399	0.86	1.40	0.17
24.0	10	129.4	1.334	0.850	58	20	0.407	0.84	1.40	0.17
25.0	10	129.4	1.398	0.883	58	20	0.410	0.82	1.60	0.17
26.0	10	129.4	1.463	0.663	58 58	19	0.410	0.81	1.60	0.19
27.0	10	129.4	1.528	0.950	58	19	0.417	0.79	1.60	0.19
28.0	10	129.4	1.592	0.984	58	19	0.417	0.79	1.60	0.19
					58	19				
29.0	10	129.4	1.657	1.017	36	20	0.422 0.425	0.77	1.60	0.19 0.00
30.0	11 11	129.1 129.1	1.722 1.786	1.051 1.084		20	0.425	~	0.00	0.00
31.0							0.427	~		0.00
32.0	11	129.1	1.851	1.118	00	20			0.00	
33.0	22	129.1	1.915	1.151	80	25	0.431	1.10	1.00	0.12
34.0	22	129.1	1.980	1.184	80	25	0.433	1.08	1.00	0.12
35.0	8	129.1	2.044	1.218		16	0.435		0.00	0.00
36.0	8	129.1	2.109	1.251		16	0.437	~	0.00	0.00
37.0	8	129.1	2.173	1.284	74	16	0.439		0.00	0.00
38.0	19	135.5	2.240	1.319	71	21	0.440	0.85	1.40	0.17
39.0	19	135.5	2.307	1.356	71	21	0.441	0.85	1.40	0.17
40.0	19	135.5	2.375	1.392	71	21	0.442	0.84	1.40	0.17
41.0	12	128.3	2.441	1.427		20	0.443	~	0.00	0.00
42.0	12	128.3	2.505	1.460		20	0.445	~	0.00	0.00
43.0	31	128.3	2.569	1.493		40	0.446	~	0.00	0.00
44.0	31	128.3	2.634	1.526		40	0.447	~	0.00	0.00
45.0	31	128.3	2.698	1.559		39	0.449	~	0.00	0.00
46.0	31	128.3	2.762	1.592		39	0.450	~	0.00	0.00
47.0	31	128.3	2.826	1.625		39	0.451	~	0.00	0.00
48.0	31	128.3	2.890	1.658		39	0.452	~	0.00	0.00
49.0	31	128.3	2.954	1.691		39	0.453	~	0.00	0.00
50.0	31	128.3	3.018	1.724		38	0.454	~	0.00	0.00
								TOTAL SETTLE	MENT =	2.9 IN

Figure 5





File No.: W1547-06-01

Boring: B3

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL DESIGN EARTHQUAKE

NCEER (1996) METHOD EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.58
Peak Horiz. Acceleration PGA _M (g):	0.598
2/3 PGA _M (g):	0.399
Calculated Mag.Wtg.Factor:	0.719
Historic High Groundwater:	8.0
Groundwater Depth During Exploration:	100.0

By Thomas F. Blake (1994-1996) ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.29
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

LIQUEFACTION CALCULATIONS:

Base (ft) Wt. (pcf) (0 or 1) SPT (N) SPT (ft) (0 or 1) (%) (%) Factor (N1)60 Wt. (psf) CRR Factor 1.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.998 0 2.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.993 0 3.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.993 0 4.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0 5.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0 6.0 126.8 0 4.0 5.0	Notice Liquefar
Base (ft) Wt. (pcf) (0 or 1) SPT (N) SPT (ft) (0 or 1) (%) (%) Factor (N1)60 Wt. (psf) CRR Factor 1.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.998 0 2.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.993 0 3.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.993 0 4.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0 5.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0 6.0 126.8 0 4.0 5.0	CSR Safe.Fac 0.186 0.185 0.188 0.183 0.183 0.183 0.180 0.180 0.184 0.193 0.201 0.70 0.207 0.66 0.213 0.218 0.218
1.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.998 0 2.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.993 0 3.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.989 0 4.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.989 0 5.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.989 0 6.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0 7.0 126.8 0 4.0 5.0 1 49<	0.186 0.185 0.184 0.183 0.183 0.182 0.181 0.180 ~ 0.184 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
2.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.993 0.993 3.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.989 0.0 4.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0.0 5.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0.0 6.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0.0 7.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0.0 8.0 131.9 0 8.0 7.5 0	0.185 0.184 0.183 0.183 0.182 0.181 0.180 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
2.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.993 0.993 3.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.989 0.0 4.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0.0 5.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0.0 6.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0.0 7.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0.0 8.0 131.9 0 8.0 7.5 0	0.184 0.183 0.183 0.182 0.181 0.180 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
3.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.989 0 4.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0 5.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0 6.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0 7.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0 7.0 126.8 0 4.0 5.0 1 49 44 1.592 14.4 126.8 0.157 0.970 0 8.0 131.9 0 8.0 7.5 0 49<	0.184 0.183 0.183 0.182 0.181 0.180 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
4.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.984 0 5.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0 6.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0 7.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0 7.0 126.8 0 4.0 5.0 1 49 44 1.592 14.4 126.8 0.162 0.975 0 8.0 131.9 0 8.0 7.5 0 49 1.480 20.7 131.9 ~ 0.966 0 10.0 131.9 1 8.0 7.5 0 49 1.310<	0.183 0.183 0.182 0.181 0.180 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
5.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.979 0.0 6.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0.0 7.0 126.8 0 4.0 5.0 1 49 44 1.592 14.4 126.8 0.157 0.970 0.0 8.0 131.9 0 8.0 7.5 0 49 1.480 20.7 131.9 ~ 0.966 0.961 0.961 0.961 0.962 0.961 0.961 0.962 0.961 0.962 0.963 0.966 0.966 0.965 ~ 0.961 0.966 0.967 0.966 0.966 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967 0.967	0.183 0.182 0.181 0.180 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
6.0 126.8 0 4.0 5.0 1 49 44 1.700 14.9 126.8 0.162 0.975 0 7.0 126.8 0 4.0 5.0 1 49 44 1.592 14.4 126.8 0.157 0.970 0 8.0 131.9 0 8.0 7.5 0 49 1.480 20.7 131.9 ~ 0.966 0 9.0 131.9 1 8.0 7.5 0 49 1.387 19.9 69.5 ~ 0.961 0 10.0 131.9 1 8.0 7.5 0 49 1.310 19.2 69.5 ~ 0.957 0 11.0 131.9 1 4.0 10.0 1 49 40 1.244 12.8 69.5 0.140 0.952 0 12.0 131.9 1 4.0 10.0 1 49 40 1.187 12.5	0.182 0.181 0.180 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
7.0 126.8 0 4.0 5.0 1 49 44 1.592 14.4 126.8 0.157 0.970 0 8.0 131.9 0 8.0 7.5 0 49 1.480 20.7 131.9 ~ 0.966 0 9.0 131.9 1 8.0 7.5 0 49 1.387 19.9 69.5 ~ 0.961 10.0 131.9 1 8.0 7.5 0 49 1.310 19.2 69.5 ~ 0.957 0 11.0 131.9 1 4.0 10.0 1 49 40 1.244 12.8 69.5 0.140 0.952 0 12.0 131.9 1 4.0 10.0 1 49 40 1.187 12.5 69.5 0.137 0.947 13.0 130.0 1 30.0 15.0 0 44 1.138 49.6 67.6 ~ 0.9	0.181 0.180 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
8.0 131.9 0 8.0 7.5 0 49 1.480 20.7 131.9 ~ 0.966 0 9.0 131.9 1 8.0 7.5 0 49 1.387 19.9 69.5 ~ 0.961 0 10.0 131.9 1 8.0 7.5 0 49 1.310 19.2 69.5 ~ 0.957 0 11.0 131.9 1 4.0 10.0 1 49 40 1.244 12.8 69.5 0.140 0.952 0 12.0 131.9 1 4.0 10.0 1 49 40 1.187 12.5 69.5 0.137 0.947 13.0 130.0 1 30.0 15.0 0 44 1.138 49.6 67.6 ~ 0.943	0.180 ~ 0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
9.0 131.9 1 8.0 7.5 0 49 1.387 19.9 69.5 ~ 0.961 0 10.0 131.9 1 8.0 7.5 0 49 1.310 19.2 69.5 ~ 0.957 0 11.0 131.9 1 4.0 10.0 1 49 40 1.244 12.8 69.5 0.140 0.952 0 12.0 131.9 1 4.0 10.0 1 49 40 1.187 12.5 69.5 0.137 0.947 0 13.0 130.0 1 30.0 15.0 0 44 1.138 49.6 67.6 ~ 0.943 0	0.184 ~ 0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
10.0 131.9 1 8.0 7.5 0 49 1.310 19.2 69.5 ~ 0.957 0 11.0 131.9 1 4.0 10.0 1 49 40 1.244 12.8 69.5 0.140 0.952 0 12.0 131.9 1 4.0 10.0 1 49 40 1.187 12.5 69.5 0.137 0.947 0 13.0 130.0 1 30.0 15.0 0 44 1.138 49.6 67.6 ~ 0.943 0	0.193 ~ 0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
11.0 131.9 1 4.0 10.0 1 49 40 1.244 12.8 69.5 0.140 0.952 0 12.0 131.9 1 4.0 10.0 1 49 40 1.187 12.5 69.5 0.137 0.947 0 13.0 130.0 1 30.0 15.0 0 44 1.138 49.6 67.6 ~ 0.943 0	0.201 0.70 0.207 0.66 0.213 ~ 0.218 ~
12.0 131.9 1 4.0 10.0 1 49 40 1.187 12.5 69.5 0.137 0.947 (13.0 130.0 1 30.0 15.0 0 44 1.138 49.6 67.6 ~ 0.943 (0.207 0.66 0.213 ~ 0.218 ~
13.0 130.0 1 30.0 15.0 0 44 1.138 49.6 67.6 ~ 0.943 (0.213 ~ 0.218 ~
	0.218 ~
	0.222 ~
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	0.232 ~
	0.235 ~
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	0.244 Non-Lic
	0.243 Non-Lic
	0.242 Non-Lic
50.0 130.0 1 30.0 20.0 1 34 99 0.570 30.4 67.6 Infin. 0.774 (0.242 Non-Lic



Project: Chaminade N Campus Extens

File No.: W1547-06-01

Boring: B3

LIQUEFACTION SETTLEMENT ANALYSIS DESIGN EARTHQUAKE

(SATURATED SAND AT INITIAL LIQUEFACTION CONDITION)

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Groundwater @ Exploration:	100.0

DEPTH	BLOW	WET	TOTAL	EFFECT	REL.	ADJUST		LIQUEFACTION	Volumetric	EQ.
то	COUNT	DENSITY	STRESS	STRESS	DEN.	BLOWS		SAFETY	Strain	SETTLE.
BASE	N	(PCF)	O (TSF)	O' (TSF)	Dr (%)	(N1)60	Tav/σ' _o	FACTOR	[e ₁₅] (%)	Pe (in.)
1.0	4	126.8	0.032	0.032	44	15	0.259		0.00	Grading
2.0	4	126.8	0.095	0.095	44	15	0.259		0.00	Grading
3.0	4	126.8	0.159	0.159	44	15	0.259		0.00	Grading
4.0	4	126.8	0.222	0.222	44	15	0.259		0.00	Grading
5.0	4	126.8	0.285	0.285	44	15	0.259		0.00	Grading
6.0	4	126.8	0.349	0.349	44	15	0.259		0.00	0.00
7.0	4	126.8	0.412	0.412	44	14	0.259		0.00	0.00
8.0	8	131.9	0.477	0.477		21	0.259	~	0.00	0.00
9.0	8	131.9	0.543	0.527		20	0.267	~	0.00	0.00
10.0	8	131.9	0.609	0.562		19	0.281	~	0.00	0.00
11.0	4	131.9	0.675	0.597	40	13	0.293	0.70	1.80	0.22
12.0	4	131.9	0.741	0.631	40	13	0.304	0.66	1.80	0.22
13.0	30	130.0	0.806	0.666	70	50	0.314	~	0.00	0.00
14.0	30	130.0	0.871	0.699		48	0.323	~	0.00	0.00
15.0	30	130.0	0.936	0.733		47	0.331	~	0.00	0.00
16.0	30	130.0	1.001	0.767		45	0.338	~	0.00	0.00
17.0	30	130.0	1.066	0.707		44	0.345	~	0.00	0.00
18.0	30	130.0	1.131	0.835		43	0.351	~	0.00	0.00
19.0	30	130.0	1.196	0.868		42	0.357	~	0.00	0.00
20.0	30	130.0	1.261	0.902	99	45	0.362	Non-Liq.	0.00	0.00
21.0	30	130.0	1.326	0.936	99	44	0.367	Non-Liq.	0.00	0.00
22.0	30	130.0	1.391	0.970	99	43	0.372		0.00	0.00
23.0	30	130.0	1.456	1.004	99	43	0.372	Non-Liq.	0.00	0.00
					99	42		Non-Liq.		
24.0 25.0	30 30	130.0 130.0	1.521 1.586	1.037 1.071	99	40	0.380 0.384	Non-Liq.	0.00	0.00
26.0	30	130.0	1.651	1.105	99	40	0.384	Non-Liq. Non-Liq.	0.00	0.00
27.0 28.0	30 30	130.0 130.0	1.716 1.781	1.139	99 99	39 39	0.391	Non-Liq.	0.00	0.00
				1.173	99	38	0.394	Non-Liq.	0.00	
29.0 30.0	30 30	130.0	1.846	1.206 1.240	99	38	0.397 0.399	Non-Liq.	0.00	0.00
31.0	30	130.0 130.0	1.911 1.976	1.240	99	37	0.399	Non-Liq.	0.00	0.00
	30							Non-Liq.		
32.0	30	130.0	2.041	1.308	99	36	0.405	Non-Liq.	0.00	0.00
33.0	30	130.0 130.0	2.106 2.171	1.342	99 99	36 36	0.407 0.409	Non-Liq.	0.00	0.00
34.0				1.375				Non-Liq.		
35.0	30 30	130.0	2.236	1.409	99 99	35 35	0.411	Non-Liq.	0.00	0.00
36.0 37.0	30	130.0 130.0	2.301 2.366	1.443 1.477	99	35	0.413 0.415	Non-Liq. Non-Liq.	0.00	0.00
	30				99	34				
38.0	30	130.0	2.431	1.511			0.417	Non-Liq.	0.00	0.00
39.0 40.0	30	130.0 130.0	2.496 2.561	1.544 1.578	99 99	34 33	0.419 0.421	Non-Liq. Non-Liq.	0.00	0.00
	30									
41.0		130.0	2.626	1.612	99	33	0.422	Non-Liq.	0.00	0.00
42.0	30	130.0	2.691	1.646	99	33	0.424	Non-Liq.	0.00	0.00
43.0	30	130.0	2.756	1.680	99	32	0.425	Non-Liq.	0.00	0.00
44.0	30	130.0	2.821	1.713	99	32	0.427	Non-Liq.	0.00	0.00
45.0	30	130.0	2.886	1.747	99	32	0.428	Non-Liq.	0.00	0.00
46.0	30	130.0	2.951	1.781	99	31	0.430	Non-Liq.	0.00	0.00
47.0	30	130.0	3.016	1.815	99	31	0.431	Non-Liq.	0.00	0.00
48.0	30	130.0	3.081	1.849	99	31	0.432	Non-Liq.	0.00	0.00
	30	130.0	3.146	1.882	99	31	0.433	Non-Liq.	0.00	0.00
49.0 50.0	30	130.0	3.211	1.916	99	30	0.434	Non-Liq.	0.00	0.00



File No.: W1547-06-01 Boring : B1

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL MAXIMUM CONSIDERED EARTHQUAKE

NCEER (1996) METHOD EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.66
Peak Horiz. Acceleration PGA _M (g):	0.598
Calculated Mag.Wtg.Factor:	0.741
Historic High Groundwater:	8.0
Groundwater Depth During Exploration:	32.0

By Thomas F. Blake (1994-1996) ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.29
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

LIQUEFACTION CALCULATIONS:

Jnit Wt. Wate	\' /	62.4					lues are pre							
Depth to	Total Unit	Water	FIELD	Depth of	Liq.Sus.	-200	Est. Dr	CN	Corrected	Eff. Unit	Resist.	rd	Induced	Liquefac.
Base (ft)	Wt. (pcf)	(0 or 1)	SPT (N)	SPT (ft)	(0 or 1)	(%)	(%)	Factor	(N1)60	Wt. (psf)	CRR	Factor	CSR	Safe.Fac
1.0	120.0	0	2.0	5.0	1	30	31	1.700	9.8	120.0	0.108	0.998	0.288	
2.0	120.0	0	2.0	5.0	1	30	31	1.700	9.8	120.0	0.108	0.993	0.286	
3.0	120.0	0	2.0	5.0	1	30	31	1.700	9.8	120.0	0.108	0.989	0.285	
4.0	120.0	0	2.0	5.0	1	30	31	1.700	9.8	120.0	0.108	0.984	0.284	
5.0	95.5	0	2.0	5.0	1	30	31	1.700	9.8	95.5	0.108	0.979	0.282	
6.0	95.5	0	2.0	5.0	1	30	31	1.700	9.8	95.5	0.108	0.975	0.281	
7.0	95.5	0	2.0	5.0	1	30	31	1.700	9.8	95.5	0.108	0.970	0.280	
8.0	95.5	0	2.0	5.0	1	30	31	1.601	9.6	95.5	0.105	0.966	0.278	
9.0	95.5	1	2.0	5.0	1	30	31	1.515	9.4	33.1	0.103	0.961	0.287	0.36
10.0	95.5	1	2.0	5.0	1	30	31	1.441	9.2	33.1	0.102	0.957	0.304	0.33
11.0	95.5	1	4.0	10.0	0	79		1.377	13.4	33.1	~	0.952	0.320	~
12.0	95.5	1	4.0	10.0	0	79		1.321	13.1	33.1	~	0.947	0.334	~
13.0	120.1	1	7.0	15.0	0	56		1.265	18.1	57.7	~	0.943	0.346	~
14.0	120.1	1	7.0	15.0	0	56		1.211	17.6	57.7	~	0.938	0.356	~
15.0	120.1	1	7.0	15.0	0	56		1.163	17.2	57.7	~	0.934	0.365	~
16.0	120.1	1	7.0	15.0	0	56		1.120	16.8	57.7	~	0.929	0.373	~
17.0	120.1	1	7.0	15.0	0	56		1.082	16.5	57.7	~	0.925	0.379	~
18.0	120.1	1	7.0	15.0	0	56		1.047	16.2	57.7	~	0.920	0.385	~
19.0	120.1	1	7.0	15.0	0	56		1.016	15.9	57.7	~	0.915	0.390	~
20.0	129.4	1	14.0	20.0	1	38	71	0.986	26.1	67.0	0.306	0.911	0.394	0.78
21.0	129.4	1	14.0	20.0	1	38	71	0.957	25.6	67.0	0.295	0.906	0.397	0.74
22.0	129.4	1	10.0	25.0	1	57	58	0.931	20.8	67.0	0.227	0.902	0.400	0.57
23.0	129.4	1	10.0	25.0	1	57	58	0.907	20.4	67.0	0.223	0.897	0.402	0.55
24.0	129.4	1	10.0	25.0	1	57	58	0.885	20.1	67.0	0.219	0.893	0.404	0.54
25.0	129.4	1	10.0	25.0	1	57	58	0.864	19.8	67.0	0.215	0.888	0.405	0.53
26.0	129.4	1	10.0	25.0	1	57	58	0.845	19.5	67.0	0.212	0.883	0.406	0.52
27.0	129.4	1	10.0	25.0	1	57	58	0.827	19.2	67.0	0.209	0.879	0.407	0.51
28.0	129.4	1	10.0	25.0	1	57	58	0.810	19.0	67.0	0.206	0.874	0.408	0.51
29.0	129.4	1	10.0	25.0	1	57	58	0.794	18.7	67.0	0.204	0.870	0.408	0.50
30.0	129.1	1	11.0	30.0	0	86		0.779	20.3	66.7	~	0.865	0.408	~
31.0	129.1	1	11.0	30.0	0	86		0.765	20.0	66.7	~	0.861	0.409	~
32.0	129.1	1	11.0	30.0	0	86		0.754	19.8	66.7	~	0.856	0.409	~
33.0	129.1	1	22.0	32.5	1		80	0.747	25.5	66.7	0.290	0.851	0.408	0.71
34.0	129.1	1	22.0	32.5	1		80	0.741	25.2	66.7	0.286	0.847	0.408	0.70
35.0	129.1	1	8.0	35.0	0	93		0.734	16.1	66.7	~	0.842	0.408	~
36.0	129.1	1	8.0	35.0	0	93		0.728	16.0	66.7	~	0.838	0.407	~
37.0	129.1	1	8.0	35.0	0	93		0.722	15.9	66.7	~	0.833	0.406	~
38.0	135.5	1	19.0	37.5	1		71	0.716	21.1	73.1	0.223	0.829	0.405	0.55
39.0	135.5	1	19.0	37.5	1		71	0.710	20.9	73.1	0.221	0.824	0.404	0.55
40.0	135.5	1	19.0	37.5	1		71	0.703	20.7	73.1	0.219	0.819	0.403	0.54
41.0	128.3	1	12.0	40.0	0	62		0.698	20.0	65.9	~	0.815	0.402	~
42.0	128.3	1	12.0	40.0	0	62		0.692	19.9	65.9	~	0.810	0.401	~
43.0	128.3	1	31.0	45.0	0	73		0.687	40.0	65.9	~	0.806	0.400	~
44.0	128.3	1	31.0	45.0	0	73		0.682	39.7	65.9	~	0.801	0.398	~
45.0	128.3	1	31.0	45.0	0	73		0.677	39.5	65.9	~	0.797	0.397	~
46.0	128.3	1	31.0	45.0	0	73		0.672	39.3	65.9	~	0.792	0.396	~
47.0	128.3	1	31.0	50.0	0	73		0.668	39.0	65.9	~	0.787	0.395	~
48.0	128.3	1	31.0	50.0	0	73		0.663	38.8	65.9	~	0.783	0.393	~
49.0	128.3	1	31.0	50.0	0	73		0.658	38.6	65.9	~	0.778	0.392	~
50.0	128.3	1	31.0	50.0	0	73		0.654	38.4	65.9	~	0.774	0.390	~



Project: Chaminade N Campus Extensi

File No.: W1547-06-01

Boring: B1

LIQUEFACTION SETTLEMENT ANALYSIS MAXIMUM CONSIDERED EARTHQUAKE

(SATURATED SAND AT INITIAL LIQUEFACTION CONDITION)

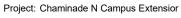
NCEER (1996) METHOD

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.66
PGA _M (g):	0.598
Calculated Mag.Wtg.Factor:	0.741
Historic High Groundwater:	8.0
Groundwater @ Exploration:	100.0

DEPTH	BLOW	WET	TOTAL	EFFECT	REL.	ADJUST		LIQUEFACTION	Volumetric	EQ.
						1				
TO	COUNT	DENSITY	STRESS	STRESS	DEN.	BLOWS	Tov/-!	SAFETY	Strain	SETTLE.
BASE	N	(PCF)	O (TSF)	O' (TSF)	Dr (%)	(N1)60	Tav/σ' _o	FACTOR	[e ₁₅] (%)	Pe (in.)
1.0	2	120.0	0.030	0.030	31	10	0.389		0.00	Grading
2.0	2	120.0	0.090	0.090	31	10	0.389		0.00	Grading
3.0	2	120.0	0.150	0.150	31	10	0.389		0.00	Grading
4.0	2	120.0	0.210	0.210	31	10	0.389		0.00	Grading
5.0	2	95.5	0.264	0.264	31	10	0.389		0.00	Grading
6.0	2	95.5	0.312	0.312	31	10	0.389		0.00	0.00
7.0	2	95.5	0.359	0.359	31	10	0.389		0.00	0.00
8.0	2	95.5	0.407 0.455	0.407 0.439	31	10	0.389 0.403		0.00	0.00
9.0 10.0	2	95.5 95.5	0.455	0.439	31 31	9	0.403	0.36 0.33	2.70 2.70	0.32 0.32
11.0	2 4	95.5	0.503	0.456	31	13	0.429	0.33	0.00	0.32
12.0	4	95.5	0.550	0.472		13	0.455	~	0.00	0.00
13.0	7	120.1	0.652	0.469		18	0.476	~	0.00	0.00
14.0	7	120.1	0.032	0.512		18	0.493	~	0.00	0.00
15.0	7	120.1	0.772	0.569		17	0.512	~	0.00	0.00
16.0	7	120.1	0.832	0.598		17	0.541	~	0.00	0.00
17.0	7	120.1	0.892	0.627		16	0.553	~	0.00	0.00
18.0	7	120.1	0.952	0.656		16	0.564	~	0.00	0.00
19.0	7	120.1	1.012	0.685		16	0.575	~	0.00	0.00
20.0	14	129.4	1.075	0.716	71	26	0.584	0.78	1.10	0.13
21.0	14	129.4	1.139	0.749	71	26	0.591	0.74	1.10	0.13
22.0	10	129.4	1.204	0.783	58	21	0.598	0.57	1.40	0.17
23.0	10	129.4	1.269	0.816	58	20	0.604	0.55	1.40	0.17
24.0	10	129.4	1.334	0.850	58	20	0.610	0.54	1.40	0.17
25.0	10	129.4	1.398	0.883	58	20	0.615	0.53	1.60	0.19
26.0	10	129.4	1.463	0.917	58	19	0.620	0.52	1.60	0.19
27.0	10	129.4	1.528	0.950	58	19	0.625	0.51	1.60	0.19
28.0	10	129.4	1.592	0.984	58	19	0.629	0.51	1.60	0.19
29.0	10	129.4	1.657	1.017	58	19	0.633	0.50	1.60	0.19
30.0	11	129.1	1.722	1.051		20	0.637	~	0.00	0.00
31.0	11	129.1	1.786	1.084		20	0.640	~	0.00	0.00
32.0	11	129.1	1.851	1.118		20	0.644	~	0.00	0.00
33.0	22	129.1	1.915	1.151	80	25	0.647	0.71	1.10	0.13
34.0	22	129.1	1.980	1.184	80	25	0.650	0.70	1.10	0.13
35.0	8	129.1	2.044	1.218		16	0.653	~	0.00	0.00
36.0 37.0	8 8	129.1 129.1	2.109 2.173	1.251 1.284		16 16	0.655 0.658	~ ~	0.00	0.00
	8 19			-	71	16 21				
38.0 39.0	19	135.5 135.5	2.240 2.307	1.319 1.356	71	21	0.660 0.662	0.55 0.55	1.40 1.40	0.17 0.17
40.0	19	135.5	2.307	1.392	71	21	0.663	0.55	1.40	0.17
41.0	12	128.3	2.373	1.427	/ 1	20	0.665	0.54	0.00	0.17
42.0	12	128.3	2.505	1.460		20	0.667	~	0.00	0.00
43.0	31	128.3	2.569	1.493		40	0.669	~	0.00	0.00
44.0	31	128.3	2.634	1.526		40	0.671	~	0.00	0.00
45.0	31	128.3	2.698	1.559		39	0.673	~	0.00	0.00
46.0	31	128.3	2.762	1.592		39	0.674	~	0.00	0.00
47.0	31	128.3	2.826	1.625		39	0.676	~	0.00	0.00
48.0	31	128.3	2.890	1.658		39	0.678	~	0.00	0.00
49.0	31	128.3	2.954	1.691		39	0.679	~	0.00	0.00
50.0	31	128.3	3.018	1.724		38	0.681	~	0.00	0.00
		0.0		· · · · - ·				TOTAL CETTLE		2.00

TOTAL SETTLEMENT = 3.1 INCHES





File No.: W1547-06-01 Boring: B3

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL MAXIMUM CONSIDERED EARTHQUAKE

NCEER (1996) METHOD EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.66
Peak Horiz. Acceleration PGA _M (g):	0.598
Calculated Mag.Wtg.Factor:	0.741
Historic High Groundwater:	8.0
Groundwater Depth During Exploration:	100.0

By Thomas F. Blake (1994-1996) ENERGY & ROD CORRECTIONS:

ENERGY & ROD CORRECTIONS.	
Energy Correction (CE) for N60: Rod Len.Corr.(CR)(0-no or 1-yes):	1.29
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

LIQUEFACTION CALCULATIONS:

	ON CALCULATIO		_											
Unit Wt. Wate	er (pcf):	62.4												
Depth to	Total Unit	Water	FIELD	Depth of	Lig.Sus.	-200	Est. Dr	CN	Corrected	Eff. Unit	Resist.	rd	Induced	Liquefac.
Base (ft)	Wt. (pcf)	(0 or 1)	SPT (N)	SPT (ft)	(0 or 1)	(%)	(%)	Factor	(N1)60	Wt. (psf)	CRR	Factor	CSR	Safe.Fact.
1.0	126.8	0	4.0	5.0	1	49	44	1.700	14.9	126.8	0.162	0.998	0.288	
2.0	126.8	0	4.0	5.0	1	49	44	1.700	14.9	126.8	0.162	0.993	0.286	
3.0	126.8	0	4.0	5.0	1	49	44	1.700	14.9	126.8	0.162	0.989	0.285	
4.0	126.8	Ö	4.0	5.0	1	49	44	1.700	14.9	126.8	0.162	0.984	0.284	
5.0	126.8	0	4.0	5.0	1	49	44	1.700	14.9	126.8	0.162	0.979	0.282	
6.0	126.8	0	4.0	5.0	1	49	44	1.700	14.9	126.8	0.162	0.975	0.281	
7.0	126.8	0	4.0	5.0	1	49	44	1.592	14.4	126.8	0.157	0.970	0.280	
8.0	131.9	0	8.0	7.5	0	49		1.480	20.7	131.9	~	0.966	0.278	~
9.0	131.9	1	8.0	7.5	0	49		1.387	19.9	69.5	~	0.961	0.285	~
10.0	131.9	1	8.0	7.5	0	49		1.310	19.2	69.5	~	0.957	0.299	~
11.0	131.9	1	4.0	10.0	1	49	40	1.244	12.8	69.5	0.140	0.952	0.310	0.45
12.0	131.9	1	4.0	10.0	1	49	40	1.187	12.5	69.5	0.137	0.947	0.320	0.43
13.0	130.0	1	30.0	15.0	0	44		1.138	49.6	67.6	~	0.943	0.329	~
14.0	130.0	1	30.0	15.0	0	44		1.095	48.0	67.6	~	0.938	0.337	~
15.0	130.0	1	30.0	15.0	0	44		1.056	46.6	67.6	~	0.934	0.343	~
16.0	130.0	1	30.0	15.0	0	44		1.021	45.3	67.6	~	0.929	0.349	~
17.0	130.0	<u>i</u>	30.0	15.0	0	44		0.990	44.1	67.6	~	0.925	0.355	~
18.0	130.0	1	30.0	15.0	0	44		0.961	43.0	67.6	~	0.920	0.359	~
19.0	130.0	1	30.0	15.0	0	44		0.934	42.0	67.6	~	0.915	0.363	~
20.0	130.0	1	30.0	20.0	1	34	99	0.910	44.6	67.6	Infin.	0.911	0.367	Non-Liq.
21.0	130.0	1	30.0	20.0	i	34	99	0.887	43.6	67.6	Infin.	0.906	0.370	Non-Lig.
22.0	130.0	1	30.0	20.0	i	34	99	0.866	42.7	67.6	Infin.	0.902	0.373	Non-Liq.
23.0	130.0	i	30.0	20.0	1	34	99	0.847	41.9	67.6	Infin.	0.897	0.375	Non-Liq.
24.0	130.0	i	30.0	20.0	 i	34	99	0.828	41.2	67.6	Infin.	0.893	0.377	Non-Liq.
25.0	130.0	1	30.0	20.0	1	34	99	0.811	40.5	67.6	Infin.	0.888	0.379	Non-Liq.
26.0	130.0	1	30.0	20.0	1	34	99	0.795	39.8	67.6	Infin.	0.883	0.380	Non-Liq.
27.0	130.0	1	30.0	20.0	1	34	99	0.780	39.2	67.6	Infin.	0.879	0.382	Non-Liq.
28.0	130.0	1	30.0	20.0	1	34	99	0.766	38.6	67.6	Infin.	0.874	0.383	Non-Liq.
29.0	130.0	1	30.0	20.0	1	34	99	0.752	38.0	67.6	Infin.	0.870	0.384	Non-Liq.
30.0	130.0	1	30.0	20.0	1	34	99	0.732	37.5	67.6	Infin.	0.865	0.384	Non-Lig.
31.0	130.0	1	30.0	20.0	1	34	99	0.733	37.0	67.6	Infin.	0.861	0.385	Non-Liq.
32.0	130.0	1	30.0	20.0	1	34	99	0.715	36.5	67.6	Infin.	0.856	0.385	Non-Liq.
33.0	130.0	1	30.0	20.0	1	34	99	0.713	36.0	67.6	Infin.	0.851	0.385	Non-Liq.
34.0	130.0	1	30.0	20.0	1	34	99	0.693	35.6	67.6	Infin.	0.847	0.385	Non-Lig.
35.0	130.0	1	30.0	20.0	1	34	99	0.683	35.1	67.6	Infin.	0.842	0.385	Non-Liq.
36.0	130.0	1	30.0	20.0	1	34	99	0.674	34.7	67.6	Infin.	0.838	0.385	Non-Liq.
37.0	130.0	1	30.0	20.0	1	34	99	0.664	34.4	67.6	Infin.	0.833	0.385	Non-Liq.
38.0	130.0	1	30.0	20.0	i i	34	99	0.655	34.0	67.6	Infin.	0.829	0.384	Non-Liq.
39.0	130.0	1	30.0	20.0	1	34	99	0.647	33.6	67.6	Infin.	0.824	0.384	Non-Liq.
40.0	130.0	1	30.0	20.0	1	34	99	0.638	33.3	67.6	Infin.	0.819	0.383	Non-Liq.
41.0	130.0	1	30.0	20.0	1	34	99	0.631	32.9	67.6	Infin.	0.815	0.383	Non-Liq.
42.0	130.0	1	30.0	20.0	1	34	99	0.623	32.6	67.6	Infin.	0.810	0.382	Non-Liq.
43.0	130.0	1	30.0	20.0	1	34	99	0.623	32.3	67.6	Infin.	0.806	0.381	Non-Liq.
44.0	130.0	1	30.0	20.0	1	34	99	0.608	32.0	67.6	Infin.	0.801	0.380	Non-Liq.
45.0	130.0	1	30.0	20.0	1	34	99	0.601	31.7	67.6	Infin.	0.801	0.379	Non-Liq.
46.0	130.0	1	30.0	20.0	1	34	99	0.595	31.7	67.6	Infin.	0.797	0.379	Non-Liq.
46.0	130.0	1	30.0	20.0	1	34	99	0.588	31.2	67.6	Iniin.	0.792	0.376	Non-Liq.
48.0	130.0		30.0	20.0	1	34	99	0.582	30.9	67.6	Infin.	0.787	0.376	Non-Liq.
49.0	130.0	1	30.0	20.0	1	34	99	0.562	30.9	67.6	Infin.	0.763	0.375	Non-Liq.
50.0	130.0	1	30.0	20.0	1	34	99	0.576	30.7	67.6		0.774	0.375	
0.00	130.0		JU.U	20.0		34	99	0.570	30.4	07.0	Infin.	0.774	0.374	Non-Liq.



Project: Chaminade N Campus Extensi

File No.: W1547-06-01

Boring: B3

LIQUEFACTION SETTLEMENT ANALYSIS MAXIMUM CONSIDERED EARTHQUAKE

(SATURATED SAND AT INITIAL LIQUEFACTION CONDITION)

NCEER (1996) METHOD

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.66
PGA _M (g): Calculated Mag.Wtg.Factor:	0.598
Calculated Mag.Wtg.Factor:	0.741
Historic High Groundwater:	8.0
Groundwater @ Exploration:	100.0

DEPTH	BLOW	WET	TOTAL	EFFECT	REL.	ADJUST		LIQUEFACTION	Volumetric	EQ.
TO	COUNT	DENSITY	STRESS	STRESS	DEN.	BLOWS		SAFETY	Strain	SETTLE.
							Tav/σ' _o		Strain [e ₁₅] (%)	
BASE	N	(PCF)	O (TSF)	O' (TSF)	Dr (%)	(N1)60		FACTOR		Pe (in.)
1.0	4	126.8	0.032	0.032	44	15	0.389		0.00	Grading
2.0	4	126.8	0.095	0.095	44	15	0.389		0.00	Grading
3.0	4	126.8	0.159	0.159	44	15	0.389		0.00	Grading
4.0	4	126.8	0.222	0.222	44	15	0.389		0.00	Grading
5.0	4	126.8	0.285	0.285	44	15	0.389		0.00	Grading
6.0	4	126.8	0.349	0.349	44	15	0.389		0.00	0.00
7.0 8.0	<u>4</u> 8	126.8 131.9	0.412 0.477	0.412 0.477	44	14 21	0.389 0.389	~	0.00	0.00
9.0	8	131.9	0.477	0.477		20	0.389	~	0.00	0.00
10.0	8	131.9	0.609	0.562		19	0.400	~	0.00	0.00
11.0	4	131.9	0.675	0.597	40	13	0.421	0.45	1.80	0.00
12.0	4	131.9	0.741	0.631	40	13	0.456	0.43	1.80	0.22
13.0	30	130.0	0.806	0.666	40	50	0.471	~	0.00	0.00
14.0	30	130.0	0.871	0.699		48	0.484	~	0.00	0.00
15.0	30	130.0	0.936	0.733		47	0.496	~	0.00	0.00
16.0	30	130.0	1.001	0.767		45	0.507	~	0.00	0.00
17.0	30	130.0	1.066	0.801		44	0.517	~	0.00	0.00
18.0	30	130.0	1.131	0.835		43	0.527	~	0.00	0.00
19.0	30	130.0	1.196	0.868		42	0.535	~	0.00	0.00
20.0	30	130.0	1.261	0.902	99	45	0.543	Non-Liq.	0.00	0.00
21.0	30	130.0	1.326	0.936	99	44	0.551	Non-Liq.	0.00	0.00
22.0	30	130.0	1.391	0.970	99	43	0.558	Non-Liq.	0.00	0.00
23.0	30	130.0	1.456	1.004	99	42	0.564	Non-Liq.	0.00	0.00
24.0	30	130.0	1.521	1.037	99	41	0.570	Non-Liq.	0.00	0.00
25.0	30	130.0	1.586	1.071	99	40	0.575	Non-Liq.	0.00	0.00
26.0	30	130.0	1.651	1.105	99	40	0.581	Non-Liq.	0.00	0.00
27.0	30	130.0	1.716	1.139	99	39	0.586	Non-Liq.	0.00	0.00
28.0	30	130.0	1.781	1.173	99	39	0.590	Non-Liq.	0.00	0.00
29.0	30	130.0	1.846	1.206	99	38	0.595	Non-Liq.	0.00	0.00
30.0	30	130.0	1.911	1.240	99	37	0.599	Non-Liq.	0.00	0.00
31.0	30	130.0	1.976	1.274	99	37	0.603	Non-Liq.	0.00	0.00
32.0	30	130.0	2.041	1.308	99	36	0.607	Non-Liq.	0.00	0.00
33.0	30 30	130.0 130.0	2.106	1.342 1.375	99 99	36	0.610	Non-Liq. Non-Liq.	0.00	0.00
34.0 35.0	30	130.0	2.171 2.236	1.409	99	36 35	0.614 0.617	Non-Liq. Non-Liq.	0.00	0.00
36.0	30	130.0	2.230	1.443	99	35	0.620	Non-Liq.	0.00	0.00
37.0	30	130.0	2.366	1.443	99	34	0.623	Non-Liq.	0.00	0.00
38.0	30	130.0	2.431	1.511	99	34	0.626	Non-Liq.	0.00	0.00
39.0	30	130.0	2.496	1.544	99	34	0.628	Non-Liq.	0.00	0.00
40.0	30	130.0	2.561	1.578	99	33	0.631	Non-Liq.	0.00	0.00
41.0	30	130.0	2.626	1.612	99	33	0.633	Non-Liq.	0.00	0.00
42.0	30	130.0	2.691	1.646	99	33	0.636	Non-Lig.	0.00	0.00
43.0	30	130.0	2.756	1.680	99	32	0.638	Non-Liq.	0.00	0.00
44.0	30	130.0	2.821	1.713	99	32	0.640	Non-Liq.	0.00	0.00
45.0	30	130.0	2.886	1.747	99	32	0.642	Non-Liq.	0.00	0.00
46.0	30	130.0	2.951	1.781	99	31	0.644	Non-Liq.	0.00	0.00
47.0	30	130.0	3.016	1.815	99	31	0.646	Non-Liq.	0.00	0.00
48.0	30	130.0	3.081	1.849	99	31	0.648	Non-Liq.	0.00	0.00
49.0	30	130.0	3.146	1.882	99	31	0.650	Non-Liq.	0.00	0.00
50.0	30	130.0	3.211	1.916	99	30	0.651	Non-Liq.	0.00	0.00
	·		·					TOTAL SETTLE	EMENT =	0.4

TOTAL SETTLEMENT = 0.4 INCHES

BOARD OF **BUILDING AND SAFETY**

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OSAMA YOUNAN, P.E. GENERAL MANAGER SUPERINTENDENT OF BUILDING

> JOHN WEIGHT EXECUTIVE OFFICER

GEOLOGY AND SOILS REPORT REVIEW LETTER

February 24, 2023

LOG # 124921 SOILS/GEOLOGY FILE - 2 LIQ

Jenson Capital Group, Inc. 822 S. Robertson Boulevard, Suite 303 Los Angeles, CA 90035

TRACTS:

26072 // 2500

// 25773

LOTS:

// 19 & 35

// 1 (Arbs. 2, 3 & 4)

LOCATION:

7500 N. Chaminade Avenue, 23241 W. Cohasset Street // 23260 W. Saticoy Street

// 23217-23255 W. Saticoy Street, 7619-7629 N. Woodlake Avenue

CURRENT REFERENCE

REPORT

DATE OF

REPORT/LETTER

No.

DOCUMENT

PREPARED BY

Geology/Soils Report

W1547-06-01

01/12/2023

Geocon West, Inc.

The Grading Division of the Department of Building and Safety has reviewed the referenced report that provides recommendations for the proposed demolition of existing site improvements and construction of a 3-level administrative/classroom structure, accessory structures, pedestrian bridge, pool house, pool and retaining walls.

The earth materials at the subsurface exploration locations consist of up to 7 feet of uncertified fill underlain by up to 3 feet of colluvium, up to 40 feet of alluvium and Monterey Formation siltstone and sandstone bedrock that dips 10 degrees to the northeast and 12 to 30 degrees to the southeast. According to the consultants, groundwater was encountered at a depth of 14.6 feet in boring 12 and 32 feet in boring 1. Historic High Groundwater is mapped as less than 10 feet bgs in the areas of the pool house, pool, and generally in the areas outside of the proposed administration building.

The consultants recommend to support the proposed structures on conventional and/or drilled-pile foundations bearing in competent bedrock or on mat foundations bearing on a blanket of properly placed fill. According to the consultants, the upper 5 feet in the area of the pool house footprint is recommended to be excavated and compacted for support of the mat foundation.

The site is located in a designated liquefaction hazard zone as shown on the Seismic Hazard Zones map issued by the State of California.

The review of the subject report cannot be completed at this time and will be continued upon submittal of an addendum to the report which shall include, but not be limited to, the following:

(Note: Numbers in parenthesis () refer to applicable sections of the 2023 City of LA Building Code. P/BC numbers refer the applicable Information Bulletin. Information Bulletins can be accessed on the internet at LADBS.ORG.)

7500 N. Chaminade Avenue, 23241 W. Cohasset Street // 23260 W. Saticoy Street // 23217-23255 W. Saticoy Street, 7619-7629 N. Woodlake Avenue

- Verify the current legal description and addresses (for all lots part of the project site) with the Address Section of the Bureau of Engineering located on the Third Floor of the 201 N. Figueroa Street, City of Los Angeles offices.
- Provide a geologic map that is based upon conceptual grading or site development plans, to illustrate all proposed and existing contours relative to the planned grading and/or construction, along with all off-site slopes and conditions that could adversely affect the stability or safety of the site (7006.3.2).
- 3. Show the location and height of all proposed retaining walls.
- 4. Verify the location of the borings on the maps and cross sections, and revise accordingly.
- 5. Provide slope stability analyses for all slopes steeper than 2H:1V to remain by the proposed improvements, such as the proposed bridge and administration building.
- 6. In areas where the depth to bedrock exceeds 10 feet, submit justification in accordance with ASCE/SEI 7-16 (Chapter 20) and code section 1613.2.2 of the 2020 Los Angeles Building Code for the use of a Site Class C. Otherwise, the Site Class shall be D in those areas, and updated seismic design parameters shall be provided.

<u>Note</u>: The use of the Site Class C in the report does not appear justified due to the presence of up to 40 feet of fill and alluvium (North Campus), lack of shear wave velocities, SPT blow counts, or undrained shear strengths of the upper 100 feet of the site profile.

- 7. Historic High Groundwater is mapped as less than 10 feet bgs in the areas of the pool house, pool, and generally in the areas outside of the proposed administration building. As such, revise the liquefaction analyses using a historic high groundwater level of less than 10 feet.
- 8. For other than the Pool House, provide foundation recommendations for the proposed structures within the "North Campus" as shown on FIG. 2A, and for any proposed structures within the southern portion of the "Main Campus" (see FIG.2A). Note: The foundation recommendations shall comply with the settlement thresholds for liquefaction based on P/BC 2020-151.
- 9. Provide recommendations for the proposed swimming pool.
- 10. Revise the recommendations in the report based on the above items.

The geologist and soils engineer shall prepare a report containing an itemized response to the review items indicated in this letter. If clarification concerning the review letter is necessary, the report review engineer and/or geologist may be contacted. Two copies of the response report, including one unbound wet-signed original for archiving purposes, a pdf-copy of the complete report in a flash drive, and the appropriate fees will be required for submittal.

CASEY LEE JENSEN

Engineering Geologist Associate III

GLEN RAAD

Geotechnical Engineer I

CLJ/GR:clj/gr Log No. 124921 213-482-0480

ce: Geocon West, Inc., Project Consultant

VN District Office