Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

May 18, 2020

Ms. Bomee Yoon
Facilities Coordinator
Facilities Planning & Construction
Norwalk-La Mirada Unified School District
15711 Pioneer Boulevard, Building G
Norwalk, California 90650

Subject: **RESPONSE TO CGS ENGINEERING GEOLOGY AND SEISMOLOGY REVIEW FOR LA MIRADA HIGH SCHOOL, NEW FOOTBALL STADIUM PROJECT, DATED APRIL 29, 2020**
13520 Adelfa Drive, La Mirada, California 90638
Norwalk-La Mirada Unified School District
CGS Application No. 03-CGS4317
Converse Project No. 19-31-285-01

References: *Converse Consultants, Geotechnical Study Report, Proposed New Football Stadium Project, La Mirada High School,* 13520 Adelfa Drive, La Mirada, CA 90638*, dated October 24, 2019, Converse Project No. 19-31-285-01, 29 pages, 4 appendices.*

California Geologic Survey, Engineering Geology and Seismology Review for La Mirada High School – New Football Stadium Project, 13520 Adelfa Drive, La Mirada, CA 90638*, CGS Application No. 03-CGS4317, dated April 29, 2020.*

Dear Ms. Yoon:

Converse Consultants (Converse) has prepared this report to respond to California Geological Survey (CGS) Engineering Geology and Seismology review comments dated April 29, 2020 for the Proposed Football Stadium Project located at La Mirada High School in La Mirada, California. A copy of the April 29, 2020 CGS review comments is included in Appendix B.

CGS Engineering Geology and Seismology Review comment dated April 29, 2020 for the Geotechnical Study Report of the New Football Stadium Project is followed by our responses and are presented as follows:

REVIEW COMMENTS AND RESPONSES

ENGINEERING GEOLOGY/ SITE CHARACTERIZATION

CGS Comment No. 5: Geologic Map of site:
Not addressed by the consultants, and therefore not reviewed.

Converse Response to CGS Comment No. 5:
Acknowledged. Converse's October 24, 2019 Geotechnical Study Report presented Drawing No.3, Regional Geologic Map, on page 5 of the report. This geologic map is intended to present the general geologic conditions of the local site area and the project site. The project site has been previously graded and developed for the school site and is covered by fill soils as shown Drawing No.4a, Geologic Section A-A', Drawing No.4b, Geologic Section B-B' and Drawing No.4C, Geologic Section C-C'.

SEISMOLOGY & CALCULATION OF EARTHQUAKE GROUND MOTION

CGS Comment No. 14: General Procedure Seismic Parameters:
Additional Information requested*. The consultant's report the following parameters derived from a map-based analyses, S_S=1.64 and S_1 = 0.583 and S_{DS} = 1.094*
Ts is not reported by the consultants and the value reported for S_{D1} is erroneous. The consultants should provide updated parameters.

Converse Response to CGS Comment No. 16:
Acknowledged. Updated seismic parameters are attached in Appendix A, *Seismic Analysis*.

CGS Comment No. 16: Site Specific Ground Motion Analysis:
Additional Information requested*. The consultants classify the site soil profile as site class D and should therefore provide a site -specific ground motion hazard analysis as required in ASCE 7, 11.4.8. Alternatively, if the design team intends to use 2 of section 11.4.8, then a site-specific analysis may not be needed. See requirements in ASCE 7, 21.2 to 21.5 and supplement No.1 as well as in CBC 1803A.6*

Converse Response to CGS Comment No. 16:
Acknowledged. Updated site-specific ground motion analysis results are attached in Appendix A, *Seismic Analysis*.

Sincerely,

CONVERSE CONSULTANTS

Mark B. Schluter, PG, CEG, CHG
Senior Engineering Geologist

Siva K. Sivathasan, PhD, PE, GE, DGE, QSD, F. ASCE
Senior Vice President / Principal Engineer

Dist: 1/ Addressee via Email
3/ Addressee via USPS Mail
Encl: Appendix A, Seismic Analysis
Appendix B, CGS Review Comments dated April 29, 2020

PA/SKS:jjl

Appendix A

Seismic Analysis

APPENDIX A: SEISMIC ANALYSIS

A.1 CBC Seismic Design Parameters

General seismic parameters based on the 2019 California Building Code and ASCE 7-16 with Supplement 1 are calculated using the ATC hazard, *Seismic Design by location* website application and the site coordinates (33.9082 degrees North Latitude, -118.00309 degrees West Longitude). The seismic parameters are presented below.

Table No. A-1, CBC Seismic Design Parameters

Seismic Parameter	Value
Site Class	D
Mapped Short period (0.2-sec) Spectral Response Acceleration, S_S	1.640 g
Mapped 1-second Spectral Response Acceleration, S_1	0.583 g
Site Coefficient, F_a	1.0
Site Coefficient, F_v*	1.720
MCE 0.2-sec period Spectral Response Acceleration, S_{MS}	1.640 g
MCE 1-second period Spectral Response Acceleration, S_{M1}*	1.002 g
Design Spectral Response Acceleration for short period, S_{DS}	1.093 g
Design Spectral Response Acceleration for 1-second period, S_{D1}*	0.669 g

*ASCE 7-16 section 21.3, for the site-specific ground motion these values are used: F_v=2.5, S_{M1}=1.458, and S_{D1}=0.972, See Table A-2

A.2 Site-Specific Response Spectra

A site-specific response spectrum was developed for the project for a Maximum Considered Earthquake (MCE), defined as a horizontal peak ground acceleration that has a 2 percent probability of being exceeded in 50 years (return period of approximately 2,475 years).

In accordance with ASCE 7-16, Section 21.2 the site-specific response spectra can be taken as the lesser of the probabilistic maximum rotated component of MCE ground motion and the 84th percentile of deterministic maximum rotated component of MCE ground motion response spectra. The design response spectra can be taken as 2/3 of site-specific MCE response spectra but should not be lower than 80 percent of CBC general response spectra. The risk coefficient C_R has been incorporated at each spectral response period for which the acceleration was computed in accordance with ASCE 7-16, Section 21.2.1.1.

The 2019 CBC mapped acceleration parameters are provided in the following table. These parameters were determined using the *ATC hazard by location Seismic Design Maps* website application, and in accordance with ASCE 7-16 Sections 11.4, 11.6, 11.8, 21.2, and 21.3.

Table No. A-2, 2019 CBC Mapped Acceleration Parameters

Site Class	D	Seismic Design Category	D
S_S	1.640	C_{RS}	0.907
S_1	0.583	C_{R1}	0.904
F_a	1	**0.08 F_v/F_a**	0.200
F_v	2.5	**0.4 F_v/F_a**	1.000
S_{MS}	1.640	T_0	0.178
S_{M1}	1.458	T_S	0.889
S_{DS}	1.093	T_L	8
S_{D1}	0.972		

A site-specific response analysis, using faults within 200 kilometers of the sites, was developed using the computer program EZ-FRISK Version 8.06 (Fugro, 2019).

The weighted mean maximum-rotated horizontal spectral acceleration values were computed by multiplying the weighted mean geometric spectral values derived from four next-generation attenuation (NGA) West 2 ground motion attenuation models by Abrahamson et al. (2014), Boore et al. (2014), Campbell and Bozorgnia (2014), and Chiou and Youngs (2014) with the scale factors provided in ASCE 7-16 Section 21.2. An average shear wave velocity at upper 30 meters of soil profile (V_{s30}) of 270 meters per second, depth to bedrock of with a shear wave velocity 1,000 meters per second at 150 meters below grade, and depth of bedrock where the shear wave velocity is 2,500 meters per second at 3,000 meters below grade were selected for EZ-Frisk Analysis.

The probabilistic response spectrum results and peak ground acceleration for each attenuation relationship are presented in the following table.

Table No. A-3, Probabilistic Response Spectrum Data

Attenuation Relationship	Probabilistic Mean	Abrahamson et al. (2014)	Boore et al. (2014)	Campbell-Bozorgnia (2014)	Chiou-Youngs (2014)
Peak Ground Acceleration (g)	0.848	0.843	0.961	0.689	0.879

Spectral Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)				
0.050	0.977	0.846	1.138	0.853	1.019
0.100	1.392	1.160	1.772	1.207	1.356
0.200	1.884	2.005	2.082	1.383	1.946
0.300	2.222	2.432	2.212	1.756	2.350
0.400	2.210	2.430	2.078	1.901	2.352
0.500	2.099	2.191	1.998	1.882	2.271
0.750	1.617	1.540	1.491	1.629	1.800
1.000	1.254	1.178	1.135	1.353	1.342

Spectral Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)				
2.000	0.613	0.598	0.503	0.766	0.544
3.000	0.396	0.377	0.321	0.534	0.296
4.000	0.282	0.281	0.240	0.375	0.180
5.000	0.204	0.215	0.180	0.265	0.109

Applicable response spectra data are presented in the table below and on Drawing No. A-1, *Site-Specific Design Response Spectrum.* These curves correspond to response values obtained from above attenuation relations for horizontal elastic single-degree-of-freedom systems with equivalent viscous damping of 5 percent of critical damping.

Table No. A-4, Probabilistic MCE_R Spectral Acceleration (g)

Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g) Geometric Mean	Risk Coefficient C_R	Scale Factors for MCE_R	Probabilistic MCE_R Spectral Acceleration (g)
0.05	0.98	0.907	1.100	0.975
0.10	1.39	0.907	1.100	1.389
0.20	1.88	0.907	1.100	1.880
0.30	2.22	0.907	1.125	2.266
0.40	2.21	0.906	1.150	2.303
0.50	2.10	0.906	1.175	2.234
0.75	1.62	0.905	1.238	1.811
1.00	1.25	0.904	1.300	1.474
2.00	0.61	0.904	1.350	0.748
3.00	0.40	0.904	1.400	0.501
4.00	0.28	0.904	1.450	0.369
5.00	0.20	0.904	1.500	0.276

Table No. A-5, Site-Specific Response Spectrum Data

Period (sec)	84th Percentile Deterministic Response Spectrum, (g) Geometric Mean	Scale Factors for MCE_R	84th Percentile Deterministic MCE Response Spectrum, (g)	Site Specific MCE_R Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site Specific Design Spectral Acceleration (g)
0.05	1.208	1.100	1.329	0.975	0.497	0.65
0.10	1.639	1.100	1.803	1.389	0.645	0.93
0.20	2.168	1.100	2.385	1.880	0.875	1.25

Period (sec)	84th Percentile Deterministic Response Spectrum, (g) Geometric Mean	Scale Factors for MCE_R	84th Percentile Deterministic MCE Response Spectrum, (g)	Site Specific MCE_R Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site Specific Design Spectral Acceleration (g)
0.30	2.758	1.125	3.103	2.266	0.875	1.51
0.40	2.904	1.150	3.340	2.303	0.875	1.54
0.50	2.803	1.175	3.294	2.234	0.875	1.49
0.75	2.249	1.238	2.783	1.811	0.875	1.21
1.00	1.753	1.300	2.279	1.474	0.777	0.98
2.00	1.055	1.350	1.424	0.748	0.389	0.50
3.00	0.893	1.400	1.250	0.501	0.259	0.33
4.00	0.784	1.450	1.137	0.369	0.194	0.25
5.00	0.594	1.500	0.891	0.276	0.155	0.18

The site-specific design response parameters are provided in the following table. These parameters were determined from Design Response Spectra presented in table above and following guidelines of ASCE Section 21.4.

Table No. A-6, Site-Specific Seismic Design Parameters

Parameter	Value (5% Damping)	Lower Limit, 80% of CBC Design Spectra
Site-Specific 0.2-second period Spectral Response Acceleration, S_{MS}	2.073	1.312
Site-Specific1-second period Spectral Response Acceleration, S_{M1}	1.504	0.801
Site-Specific Design Spectral Response Acceleration for short period S_{DS}	1.382	0.875
Site-Specific Design Spectral Response Acceleration for 1-second period, S_{D1}	1.003	0.777

Appendix B

CGS Review Comments dated April 29, 2020

Edith C. Florence
Director of Facilities Planning & Construction
Norwalk La Mirada Unified School District
15711 Pioneer Boulevard, Building G,
Norwalk, CA 90650

April 29, 2020

Subject: **Engineering Geology and Seismology Review for**
La Mirada High School – New Football Stadium Project
13520 Adelfa Drive, La Mirada, CA 90638
CGS Application No. 03-CGS4317

Dear Ms. Florence:

In accordance with your request and transmittal of documents received on February 13, 2020, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting report prepared for the subject project at La Mirada High School. It is our understanding that this project involves construction of new football stadium amenities including two field house buildings, a ticket booth, an electrical room, bleachers and light fixtures. This review was performed in accordance with Title 24, California Code of Regulations, 2019 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

> **Geotechnical Study Report, Proposed New Football Stadium Project, La Mirada High School, 13520 Adelfa Drive, La Mirada, California:** Converse Consultants, 717 South Myrtle Avenue, Monrovia, California 91016; company Project No. 19-31-285-01, report dated October 24, 2019, 29 pages, 4 appendices.

Based on our review, the consultants have not adequately addressed the engineering geology and seismology issues with respect to the proposed improvements. Specifically, it appears a site-specific ground motion hazard analysis is required for the project in accordance with ASCE 7-16. Additional information is provided in the attached Checklist Comments.

In conclusion, ***the engineering geology and seismology issues at this site are not adequately assessed in the referenced report***. It is recommended that additional information be provided as requested in the attached Note 48 Checklist Review Comments portion of this letter. The consultants are reminded that all supplemental documents should include the CGS application number, and should be uploaded directly to CGS at this link: https://www.conservation.ca.gov/cgs/upload-school. If you have any further questions about this review letter, please contact the primary reviewer at (650) 350-7308 or maxime.mareschal@conservation.ca.gov.

Respectfully submitted,

Maxime Mareschal
Engineering Geologist
PG 9495

Concur:

Jennifer Thornburg
Senior Engineering Geologist
PG 5476, CEG 2240

Enclosures:

Note 48 Checklist Review Comments
Keyed to: *Note 48 - Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings*

Copies to:

Mark B. Schluter, *Certified Engineering Geologist*, and Siva K. Sivathasan, *Registered Geotechnical Engineer*
Converse Consultants, 717 South Myrtle Avenue, Monrovia, CA 91016

Helena Jubany, *Architect*
NAC Architecture, 837 North Springs Street, Suite 300, Los Angeles, CA 90012

Ted Beckwith, *Senior Structural Engineer*
Division of State Architect, 355 South Grand Avenue, Suite 2100, Los Angeles, CA 90071

Note 48 Checklist Review Comments

In the numbered paragraphs below, this review is keyed to the paragraph numbers of California Geological Survey Note 48 (November, 2019 edition), *Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings.*

Project Location

1. Site Location Map, Street Address, County Name: Adequately addressed.
2. Plot Plan with Exploration Data with Building Footprint: Adequately addressed.
3. Site Coordinates: Adequately addressed. Latitude and Longitude provided in report: 33.90820°N, 118.00309°W

Engineering Geology/Site Characterization

4. Regional Geology and Regional Fault Maps: Adequately addressed.
5. Geologic Map of Site: Not addressed by the consultants, and therefore not reviewed.
6. Geologic Hazard Zones (Liquefaction & Landslides): Adequately addressed. The consultants report the project site is not located in a Alquist-Priolo (AP) Zone and is not mapped within a Seismic Hazard Zone for liquefaction.
7. Subsurface Geology: Adequately addressed. The consultants report the project site is underlain by 4 to 5 feet of fill soils over old alluvial deposits. Groundwater was encountered at a depth of 48 feet during their investigation.
8. Geologic Cross Sections: Adequately addressed.
9. Geotechnical Testing of Representative Samples: Adequately addressed.
10. Consideration of Geology in Geotechnical Engineering Recommendations: Adequately addressed.
11. Conditional Geotechnical Topics: Not applicable.

Seismology & Calculation of Earthquake Ground Motion

12. Evaluation of Historic Seismicity: Not addressed by the consultants, and therefore not reviewed.
13. Classify the Geologic Subgrade (Site Class): Adequately addressed. The consultants classify the site soil profile as Site Class D, Stiff Soil. This designation appears reasonable based on data provided in the boring logs.
14. General Procedure Seismic Parameters: : **Additional information is requested.** The consultants report the following parameters derived from a map-based analysis:
    S_S = 1.640 and S_1 = 0.583
    S_{DS} = 1.094
    T_s is not reported by the consultants and the value reported for S_{D1} is erroneous. The consultants should provide updated parameters.
15. Site-Specific Ground Motion Analysis: **Additional information is requested**. The consultants classify the site soil profile as Site Class D and should therefore **provide a site-specific ground motion hazard analysis as required in ASCE 7, §11.4.8**. Alternatively, if the design team intends to use 2 of section 11.4.8, then a site-specific analysis may not be needed. See requirements in ASCE 7, §21.2 to §21.5, and Supplement No.1, as well as in CBC §1803A.6.

16. Deaggregated Seismic Source Parameters: Not applicable.
17. Time-Histories of Earthquake Ground Motion: Not applicable.

Fault Rupture Hazard Evaluation

18. Active Faulting & Coseismic Deformation Across Site: Not applicable.

Liquefaction/Seismic Settlement Analysis

19. Geologic Setting for Occurrence of Seismically Induced Liquefaction: Adequately addressed. The consultants report the project site is comprised of dense granular materials and stiff fine-grained soil. They also report the absence of shallow groundwater. As a result, they anticipate the liquefaction potential to be very low. The data presented appear to support this conclusion.
20. Seismic Settlement Calculations: Not applicable
21. Other Liquefaction Effects: Not applicable.
22. Mitigation Options for Liquefaction: Not applicable.

Slope Stability Analysis

23. Geologic Setting for Occurrence of Landslides: Adequately addressed. The consultants report the project site is flat to gently sloping and not adjacent to any steep slopes. They conclude the potential for seismically induced landslides to affect the proposed improvements is very low. The data presented appear to support this conclusion.
24. Determination of Static and Dynamic Strength Parameters: Not applicable.
25. Determination of Pseudo-Static Coefficient (Keq): Not applicable.
26. Identify Critical Slip Surfaces for Static and Dynamic Analyses: Not applicable.
27. Dynamic Site Conditions: Not applicable.
28. Mitigation Options/Other Slope Failure: Not applicable.

Other Geologic Hazards or Adverse Site Conditions

29. Expansive Soils: Adequately addressed. The consultants report the site's surficial soils are moderately expansive.
30. Corrosive/Reactive Geochemistry of the Geologic Subgrade: Adequately addressed. The consultants report the soluble sulfate concentration, pH and chloride content are not in the corrosive range to concrete in accordance with the Caltrans corrosive guidelines.
31. Conditional Geologic Assessment: Adequately addressed. No significant conditional hazards of potential concern were identified by the consultants.

Report Documentation

32. Geology, Seismology, and Geotechnical References: Adequately addressed.
33. Certified Engineering Geologist: Adequately addressed.
    Mark B. Schluter, Certified Engineering Geologist #1415
34. Registered Geotechnical Engineer: Adequately addressed.
    Siva K. Sivathasan, Registered Geotechnical Engineer #2708