



Andrea McNeill
Assistant Superintendent, Business Services
Fillmore Unified School District
627 Sespe Avenue,
Fillmore, CA 93015

December 21, 2023

**Subject: Engineering Geology and Seismology Review for
Fillmore High School – New Athletic Complex
555 Central Avenue, Fillmore, CA
CGS Application No. 03-CGS6144**

Dear Ms. McNeill:

In accordance with your request and transmittal of documents received on October 24, 2023, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting report prepared for the subject project at Fillmore High School. It is our understanding that this project involves construction of a new one-story 45,000 square foot building with a gymnasium and supporting locker and team spaces. This review was performed in accordance with Title 24, California Code of Regulations, 2022 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

Geotechnical Site Evaluation, Fillmore High School Sports Complex, 555 Central Avenue, Fillmore, California: Gorian and Associates, Inc., 3595 Old Conejo Road, Thousand Oaks, CA 91320; company Project No. 3242-0-0-100, report dated August 24, 2023, 18 pages, 4 figures, 3 appendices, 3 plates.

Based on our review, the consultants provide an incomplete assessment of engineering geology and seismology issues with respect to the proposed improvements. The principal concerns identified by the consultants are the potential for strong ground shaking and dry seismic settlement. The consultants recommend design spectral acceleration parameters of $S_{DS} = 1.626$ and $S_{D1} = 1.747$. Their evaluation indicates surface fault rupture and deep-seated slope instability are not design concerns for the project. However, **CGS requests the consultants to reassess their characterization of liquefaction and related surface manifestation hazards.** Additional information is provided in the attached checklist comments.

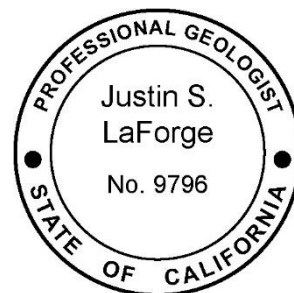
December 21, 2023

In conclusion, ***the engineering geology and seismology issues at this site are not adequately assessed in the referenced reports.*** 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 one copy of all supplemental documents should be submitted, 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 Justin.LaForge@conservation.ca.gov.

Respectfully submitted,

Justin LaForge

Justin LaForge
Engineering Geologist
PG 9796



Concur:

Jennifer Thornburg

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:

William F. Cavan, Jr., *Certified Engineering Geologist*, and Jerome J. Blunck, *Registered Geotechnical Engineer*

Gorian and Associates, Inc., 3595 Old Conejo Road, Thousand Oaks, CA 91320

Joshua Smith, *Architect*

Westgroup Designs, 19900 MacArthur Blvd #1000, Irvine, CA 92612

Douglas Humphrey, *Regional Manager*

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 2022 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 and Building Footprint: Adequately addressed.
3. Site Coordinates: Adequately addressed. Latitude and Longitude provided in report: 34.4031°N, 118.9160°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: Adequately addressed. The consultants report the school site is within an area shown to have a potential for liquefaction on the Earthquake Zones of Required Investigation Map, Fillmore Quadrangle (CGS, 2002).
7. Subsurface Geology: Adequately addressed. The consultants report the site is underlain by alluvium to the maximum depth explored. The consultants utilized subsurface data from four geotechnical borings drilled to a maximum depth of 51.5 feet below ground surface (BGS) and six Cone Penetrometer Tests (CPTs) advanced to a maximum depth of 69 feet BGS. The consultants report that groundwater was not encountered during their subsurface investigation.
8. Geologic Cross Sections: Adequately addressed.
9. Geotechnical Testing of Representative Samples: Adequately addressed.
10. Consideration of Geology in Geotechnical Engineering Recommendations: **Additional information is requested.** If the consultants' conclusions are updated regarding liquefaction hazards at this site, the engineering recommendations should be updated accordingly (see Checklist Items 19 – 22).
11. Conditional Geotechnical Topics: Not applicable.

Seismology & Calculation of Earthquake Ground Motion

12. Evaluation of Historic Seismicity: Adequately addressed. The consultants provide a summary of historical seismicity in the region.
13. Classify the Geologic Subgrade (Site Class): Adequately addressed. The consultants classify the site soil profile as Site Class D, Stiff Soil, based on shear wave velocities measured by two CPTs.

14. General Procedure Ground Motion Analysis: Adequately addressed. The consultants report the following parameters derived from a map-based analysis:
 $S_S = 1.935$ and $S_1 = 0.734$
 $S_{DS} = 1.29$ and $S_{D1} = 0.832$
 T_s = Not provided by the consultants, but may be taken as S_{D1}/S_{DS} .
These seismic parameters are acceptable **provided that the value of the parameters S_{M1} and S_{D1} are increased by 50% as required in ASCE 7-16 Supplement 3, Section 11.4.8, Item 1 Exception.**
15. Site-Specific Ground Motion Hazard Analysis: Adequately addressed. The consultants report seismic parameters as calculated by the Southern California Earthquake Center (SCEC) online tool in Appendix A. The consultants report site-specific seismic design parameters of $S_{DS} = 1.626$ and $S_{D1} = 1.747$, which appear acceptable. CGS notes the spectrum included in Appendix A represents the MCE_R Response Spectrum and should be translated into the design response spectrum, per ASCE 7, Section 21.3 for use with the equivalent lateral force procedure, per ASCE 7, Section 21.4. The site-specific ground motion analysis presented appears to be reasonable and in accordance with ASCE 7-16.
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: Adequately addressed. The consultants report that Holocene-active faults are not known to cross the site nor is the site currently within an Alquist-Priolo Earthquake Fault Zone. The consultants note the school site is within ½ mile from the inferred surficial trace of the Holocene-Active San Cayetano fault. The consultants report the potential for surface ground rupture due to faulting onsite during the project lifetime is considered remote, which appears reasonable.

Liquefaction/Seismic Settlement Analysis

19. Geologic Setting for Occurrence of Liquefaction: **Additional information is requested.** The consultants note the Seismic Hazard Zone (SHZ) Report for the Fillmore Quadrangle (CGS, 2002) indicates a historical high groundwater depth at approximately 34 feet BGS at the project site. However, the consultants characterize the groundwater to be below a depth of 50 feet BGS based on basin-wide reports and well data. CGS notes that **the cited references map groundwater depths at a regional scale when compared to the CGS SHZ Report and/or are indicative of single year data rather than known historical groundwater depths, which can lead to a mischaracterization of groundwater conditions.** CGS notes that there may be potential for liquefaction given the presence of low blow-count granular soils below the historical high depth to groundwater. The consultants are requested to revise their screening analysis of liquefaction using the historical-high depth to groundwater.
20. Seismic Settlement Calculations: **Additional information is requested.** The consultants are requested to revise their settlement calculations of liquefaction using the historical-high depth to groundwater. Additionally, the maximum differential settlement within the site should be defined by the maximum difference found in total settlement between any two of the borings or CPTs over their distance apart.
21. Other Liquefaction Effects: **Additional information is requested.** The consultants report that minor fissuring of the ground surface consisting of **ground fissures and sand boils**

may occur during a design level seismic event. The consultants are requested to clarify the basis for this conclusion and characterize the extent and potential impact to the proposed structures.

22. Mitigation Options for Liquefaction/Seismic Settlement: **Additional information is requested.** The consultants are requested to provide appropriate mitigation recommendations for any identified liquefaction hazards at the site.

Slope Stability Analysis

23. Geologic Setting for Occurrence of Landslides: Adequately addressed. The consultants report that landslides are not present within or near the site and the site is not prone to earthquake triggered landslides due to the low relief in the alluvial valley. The data presented appear to support this conclusion.
24. Determination of Static and Dynamic Strength Parameters: Not applicable.
25. Determination of Pseudo-Static Coefficient (K_{eq}): Not applicable.
26. Identify Critical Slip Surfaces for Static and Dynamic Analyses: Not applicable.
27. Dynamic Site Conditions: Not applicable.
28. Mitigation Options for Landsliding/Other Slope Failure: Not applicable.

Other Geologic Hazards or Adverse Site Conditions

29. Expansive Soils: Adequately addressed. The consultants report that the upper soils within the site are non-expansive.
30. Corrosive/Reactive Geochemistry of the Geologic Subgrade: Adequately addressed. The consultants report that site soils are moderately corrosive to metal. The consultants note that for specific recommendations, a corrosion engineer should be consulted.
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.
William F. Cavan, Jr., Certified Engineering Geologist #1161
34. Registered Geotechnical Engineer: Adequately addressed.
Jerome J. Blunck, Registered Geotechnical Engineer #151