



Susan Courtney
Director, Business Services
Glendale Community College
1500 N. Verdugo Road
Glendale, CA 91208

December 2, 2021

**Subject: Engineering Geology and Seismology Review for
Glendale Community College – Instructional Bldg & Conference Center
1500 N Verdugo Road, Glendale, CA
CGS Application No. 03-CGS5167**

Dear Mrs. Courtney:

In accordance with your request and transmittal of documents received on September 27, 2021, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting report prepared for the subject project at Glendale Community College. It is our understanding that this project involves construction of a new instructional building and conference center which contains a 3-story building (West Building) with an approximate building footprint of 18,500 sq ft. and a new single-story building (East Building) with an approximate building footprint of 14,675 sq. ft. We also understand the proposed buildings will require grading and construction of retaining walls and fill slopes ranging in height from 12 ft and 8 ft respectively. 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:

Revised Geotechnical Investigation Report, Proposed Instructional Conference Center, Glendale Community College, 1500 N Verdugo Road, Glendale, CA 91208:
Langan Engineering and Environmental Services, 18875 Jamboree Road, suite 150, Irvine, California 92612; company Project No. 700091001, report dated April 20, 2021, 25 pages, 13 figures, and 2 appendices.

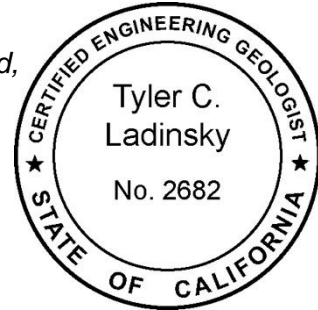
Based on our review, the consultants provide a well-documented assessment of engineering geology and seismology issues with respect to the proposed improvements. The principal concerns identified by the consultants are the potential for strong ground shaking, loose surficial soils, and dry seismically induced settlement. The consultants recommend design spectral acceleration parameter of $S_{DS} = 1.402g$, which is considered reasonable provided that the provisions of Exception 2 in ASCE 7, Section 11.4.8, are applied in structural design. Their evaluation indicates liquefaction and deep-seated slope instability are not design concerns for the project.

In conclusion, ***the engineering geology and seismology issues at this site are adequately assessed in the referenced reports, and no further information is requested.*** If you have any further questions about this review letter, please contact the primary reviewer at (650) 339-6460 or Tyler.Ladinsky@conservation.ca.gov.

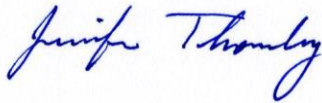
Respectfully submitted,



Tyler Ladinsky
Engineering Geologist
PG 9299, CEG 2682



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:

Shawn Wilkins, *Certified Engineering Geologist*, and Chris Zadoorian, *Registered Geotechnical Engineer*
Langan Engineering, 18875 Jamboree Road, suite 150, Irvine, California 92612

Kimberly Patten, *Architect*
Steinburg Hart, 818 W. 7th Street, Suite 1100, Los Angeles, CA 90017

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, 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: 34.1663°N, 118.2287°W

Engineering Geology/Site Characterization

4. Regional Geology and Regional Fault Maps: Adequately addressed.
5. Geologic Map of Site: Not addressed by consultants, and therefore not reviewed.
6. Geologic Hazard Zones: Adequately addressed. The consultants report the site is not located within an Alquist-Priolo Earthquake Fault zone or seismically induced landsliding zone. Additionally, they report the site is situated within a Zone of Required Investigation for liquefaction based on mapping by CGS of the Pasadena Quadrangle.
7. Subsurface Geology: Adequately addressed. The consultants report the onsite soils are composed of 1.5 to 10 feet of fill underlain by young (Holocene) alluvial fan deposits and older (Pleistocene) fan deposits, which are in turn underlain by biotite-hornblende monzodiorite bedrock. They report respective depths of the young alluvial fan deposits range between 7 to 33 feet below ground surface (bgs). Their subsurface investigation included 17 hollow-stem borings (B-1 to B-17) to a maximum depth of 60 feet below ground surface (bgs). Groundwater seepage was encountered in borings B-5 and B-8 at respective depths of 32 and 39 feet bgs, which the consultant's interpreted to be related to groundwater perching on the top of bedrock.
8. Geologic Cross Sections: Adequately addressed.
9. Geotechnical Testing of Representative Samples: Adequately addressed.
10. Consideration of Geology in Geotechnical Engineering Recommendations: Adequately addressed. **The consultants report soils susceptible to seismically-induced settlement are not suitable for foundation support**, which include the young loose alluvial fan soils encountered within the upper 20 feet. The consultants recommend the loose alluvial fan deposits can be mitigated with overexcavated and recompaction. **They also recommend a minimum of three feet of engineered fill should be placed beneath all new footings.**
 - East Building: The consultant report a fill pad is required to raise the finish floor elevation and both existing fill and loose native soils should be removed and replaced with recompacted fill.
 - West Building: The consultants recommend existing soils susceptible to seismically induced settlement should be removed and replaced with engineered fill as indicated on Figure 2. They recommend removal depths should be verified in the field.
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): Marginally addressed. The consultants classified the soil profile as Site Class D, Stiff Soil based on the variable thickness of the fill. However, the consultants' rationale is not consistent with Site Class determination methodology outlined in ASCE 7-16, 20.3.3. CGS accepts their site classification based on blow count data. In the future, the consultants should provide a rationale outlined in ASCE 7-16, chapter 20.
14. General Procedure Ground Motion Analysis: Adequately addressed. The consultants report the following parameters derived from a map-based analysis:
 $S_S = 2.103$ and $S_1 = 0.767$
 $S_{DS} = 1.402$ (and $S_{D1} = 0.869$, for the purpose of calculating T_s)
 T_s was not provided but can be calculated as S_{D1}/S_{DS}
These seismic parameters are accepted **provided that C_s is calculated as required in 11.4.8, Exception 2, and that $T < 1.5T_s$** . If otherwise, a site-specific ground motion hazard analysis should be prepared and submitted for CGS to review.
15. Site-Specific Ground Motion Hazard Analysis: Not applicable
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: Marginally addressed. The consultants report the potential for surface fault is considered low because the site is not located within an Alquist-Priolo Earthquake Fault zone. CGS notes a project site not located within the Alquist-Priolo Earthquake Fault zone does not preclude the possibility of an unmapped fault. In the future, CGS recommends the consultants perform a site reconnaissance, literature review and/or aerial photo review to assess the possibility of unknown faults in the site vicinity.

Liquefaction/Seismic Settlement Analysis

19. Geologic Setting for Occurrence of Liquefaction: Adequately addressed. As noted above (Item 9), the site is situated within a liquefaction susceptibility zone. The consultants report historic high groundwater level (HHGWL) to be 32 feet below lowest finished floor elevation based on historic high groundwater mapping by CGS, which appears reasonable. The consultants conclude the site is not subject to liquefaction based on the presence of dense soils below the HHGWL. CGS accepts the consultants' conclusion based on boring data presented and reported HHGWL.
20. Seismic Settlement Calculations: Marginally addressed. **The consultants report the young alluvial fan deposits within the upper 20 feet are susceptible to dry seismic settlement.** While the consultants did not perform a seismic settlement analysis, they report these young alluvial fan deposits are not suitable for foundation support. As noted above (Item 10), the consultants recommend the loose granular soils be overexcavated and recompaction, and a **minimum** of three feet of engineered fill be placed beneath all new footings. Additionally, they estimate total static settlement to be ≥ 1 inch and

differential settlement to be $\frac{1}{4}$ inch over a horizontal distance of 30 feet if the recommended fill overexcavation are followed per their geohazard report.

21. Other Liquefaction Effects: Not applicable.
22. Mitigation Options for Liquefaction/Seismic Settlement: Adequately addressed. The consultants note the southernly portion of the building footprint is underlain by young alluvial fan deposits, which are susceptible to seismically induced settlement. **The consultants conclude these soils are not suitable for foundation support and should be overexcavated and replaced with recompacted engineered fill.**

Slope Stability Analysis

23. Geologic Setting for Occurrence of Landslides: Adequately addressed. The consultants report the site is not located within a mapped zone of landsliding. Additionally, they did not observe evidence for deep-seated landsliding during their field exploration. Hence, they conclude the probability of earthquake-induced landsliding at the site is negligible. The data presented appears to support this conclusion.
The consultants also performed static and pseudo-static slope stability analyses for the proposed slope configurations of 2:1 and 1.5:1 (H:V). Based on cross section G-G' and the slope stability analysis model presented, it appears the existing young alluvial fan deposits are to be removed and replaced with recompacted fill up to approximately 17 feet thick.
24. Determination of Static and Dynamic Strength Parameters: Marginally adequate. The consultants performed three remolded direct shear tests (B-3, B-6, B-10) of the existing fill material to assess strength parameters for the proposed Compacted Fill. The consultants report they consider adequate strength values to be $\phi = 33^\circ$, and cohesion of 100 psf, which appears reasonable. The consultants also performed one direct shear test (B-5) to characterize strength parameters for the older alluvial fan deposits. **CGS notes their reported phi value for the older alluvium does not appear reasonable for any unconsolidated sedimentary materials.** However, since the modeled failure surfaces appear to be almost exclusively confined to the Compacted Fill unit, CGS does not consider the phi value to be critical to their analysis. Hence, CGS accepts their Compacted Fill strength parameters based on the results of their laboratory testing.
25. Determination of Pseudo-Static Coefficient (K_{eq}): Marginally addressed. The consultants report a pseudo-static coefficient of 0.67g, which appears reasonable. However, the consultants provided no rationale or discussion for determining the pseudo-static coefficient. In the future, CGS recommends the consultants provide a rationale or discussion explaining methodologies used to determine the pseudo-static coefficient.
26. Identify Critical Slip Surfaces for Static and Dynamic Analyses: Adequately addressed. The consultants calculated the dynamic critical slip surfaces for both 2:1 (H:V) and 1.5:1 (H:V) proposed slope configuration. They determined the minimum seismic factor of safety (FOS) to be 3.3.
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 the onsite soils are granular and have a very low expansion potential.

30. Corrosive/Reactive Geochemistry of the Geologic Subgrade: Adequately addressed. The consultants report that the onsite soils are mildly corrosive to ferrous metals based on laboratory testing.
31. Conditional Geologic Assessment: Selected geologic hazards addressed by the consultant are listed below:
 - C. Flooding: Adequately addressed. The consultants report that the majority of the project site is located outside the 0.2% annual chance floodplain. However, a portion of the project site is within Zone D, and area with flood hazards are undetermined, but possible. Overall, the consultants conclude classification of Zone D will not adversely impact foundation design.

Report Documentation

32. Geology, Seismology, and Geotechnical References: Adequately addressed.
33. Certified Engineering Geologist: Adequately addressed.
Shaun Wilkins, Certified Engineering Geologist #2665
34. Registered Geotechnical Engineer: Adequately addressed.
Christopher Zadoorian, Registered Geotechnical Engineer #2493