



Erin Garcia
Assistant Superintendent
Lakeside Union School District
12335 Woodside Ave
Lakeside, CA 92040

July 06, 2020

**Subject: Engineering Geology and Seismology Review for
Tierra Del Sol Middle School – New Gymnasium
9611 Petite Lane, Lakeside, CA
CGS Application No. 04-CGS4421**

Dear Ms. Garcia:

In accordance with your request and transmittal of documents received on May 11, 2020, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting report prepared for the subject project at Tierra del Sol Middle School in Lakeside. It is our understanding that this project involves construction of a new gymnasium building to be located on the north side of campus. 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 Evaluation, Tierra Del Sol Middle School Gymnasium Facility, 9611 Petite Lane, Lakeside, California: Ninyo & Moore, 5710 Ruffin Road, San Diego, California 92123; company Project No. 108850003, report dated March 9, 2020, 25 pages, 4 tables, 8 figures, 4 appendices.

Based on our review, the consultants provide a thorough and 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**. The consultants recommend design spectral acceleration parameters of **$S_{DS} = 0.616g$** and **$S_{D1} = 0.283g$** , which are considered reasonable. Their evaluation indicates liquefaction, deep-seated slope instability, and surface fault rupture 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 Eleanor.Spangler@conservation.ca.gov.



Respectfully submitted,

A handwritten signature in blue ink that reads "Eleanor R. Spangler".

Eleanor R. Spangler
Engineering Geologist
PG 9440

Concur:

A handwritten signature in blue ink that reads "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:

Nissa M. Morton, *Certified Engineering Geologist*, and Jeffrey T. Kent, *Registered Geotechnical Engineer*
Ninyo and Moore, 5710 Ruffin Rd., San Diego, CA 92123

Robert Webb, *Architect*
StudioWC, 515 Encinitas Blvd., Suite 201, Encinitas, CA 92024

Geoffrey Chan, *Senior Structural Engineer*
Division of State Architect, 10920 Via Frontera, Suite 300, San Diego, CA 92127

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: 32.8545°N, 116.9103°W

Engineering Geology/Site Characterization

4. Regional Geology and Regional Fault Maps: Adequately addressed.
5. Geologic Map of Site: Not provided, but not considered critical for this project.
6. Geologic Hazard Zones: Not addressed by the consultants. The consultants did not address the state of liquefaction or landslide hazard zoning for the project area. CGS notes that the state that the California Geological Survey has not yet prepared Seismic Hazard Zone Maps for the quadrangle in which the project area is located. In the future, the consultants should indicate whether or not the site lies within a state-, county-, city-, or other locally defined liquefaction or landslide hazard zone.
7. Subsurface Geology: Adequately addressed. The consultants report the project site is underlain by 9 to 18 feet of fill overlying Cretaceous-aged granitic rock. Their subsurface investigation consisted of drilling three boreholes to a maximum depth of 25 feet below ground surface. Groundwater was reportedly not encountered in their borings during drilling.
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 recommend the existing fill materials within the proposed building pad be over-excavated to a depth of 5 feet below existing grades, or 2 feet below the bottom of foundations, whichever is greater.
11. Conditional Geotechnical Topics: Not applicable.

Seismology & Calculation of Earthquake Ground Motion

12. Evaluation of Historic Seismicity: Adequately addressed.
13. Classify the Geologic Subgrade (Site Class): Adequately addressed. The consultants classify the site soil profile as Site Class C, Very Dense Soil and Soft Rock, based on the results from a passive Microtremor Array Measurements seismic survey. The survey determined the shear-wave velocity in the upper 100 feet of 2072 to 2089 feet per second.
14. General Procedure Ground Motion Analysis: Adequately addressed. The consultants report the following parameters derived from a map-based analysis:
 $S_S = 0.771g$ and $S_1 = 0.283g$
 $S_{DS} = 0.616g$ and $S_{D1} = 0.283g$
 T_s = not reported by the consultants, but can be taken as S_{D1}/S_{DS} .

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: Adequately addressed. The consultants report that based on a review of geologic maps, aerial photos, and their geologic field mapping, the subject site is not underlain by known active or potentially active faults. They note that the nearest known active fault is the Rose Canyon fault, located approximately 17.5 miles west of the site. The consultants conclude that the potential for ground rupture due to faulting at the project site is considered low, which appears reasonable.

Liquefaction/Seismic Settlement Analysis

19. Geologic Setting for Occurrence of Liquefaction: Adequately addressed. Based on the absence of a shallow groundwater table, and the relatively dense nature of the granitic rock along with portions of existing fill materials encountered in their borings, the consultants conclude that the potential for liquefaction to occur at the site is not a design consideration. The data presented appear to support this conclusion.
20. Seismic Settlement Calculations: Adequately addressed.
21. Other Liquefaction Effects: Not applicable.
22. Mitigation Options for Liquefaction/Seismic Settlement: Not applicable.

Slope Stability Analysis

23. Geologic Setting for Occurrence of Landslides: Adequately addressed. The consultants report that based on a review of geologic maps, literature, topographic maps, and aerial photographs, no landslides or indications of deep-seated landsliding were observed at the subject site. In addition, they state that no indications of landsliding were observed during our site reconnaissance or subsurface exploration. They consultants conclude that the potential for significant large-scale slope instability at the site is not a design consideration, which appears reasonable.
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 results of testing indicate the near-surface soils have a very low expansion potential (EI of 2), which appears reasonable.
30. Corrosive/Reactive Geochemistry of the Geologic Subgrade: Adequately addressed. The consultants report that the results of testing indicate the near-surface soils are not considered corrosive to buried metal objects, which appears reasonable.
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.
Nissa M. Morton, Certified Engineering Geologist #2655
34. Registered Geotechnical Engineer: Adequately addressed.
Jeffrey T. Kent, Registered Geotechnical Engineer #2817