Atheria Smith
Director of Facilities Planning and Development
Peralta Community College District
333 East 8th Street
Oakland, CA 94606

May 6, 2020

Subject: **Second Engineering Geology and Seismology Review for Merritt College – New Child Development Center Building 12500 Campus Drive, Oakland, CA CGS Application No. 01-CGS4294**

Dear Ms. Smith:

In accordance with your request and transmittal of additional documents received on April 30, 2020, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting reports prepared for the subject project at Merritt College in Oakland. It is our understanding that this project involves construction of a new two-story Child Development Center building. 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 for this additional review of the project:

> **Response to CGS Review Comments; Geotechnical Design and Geological Hazards Evaluation Report, Proposed Child Development Center, Merritt College, 12500 Campus Drive, Oakland, California:** Terraphase Engineering, Inc., 1404 Franklin Street, Suite 600, Oakland, California 94612; company Project No. 0034.005.0003, report dated April 26, 2020, 12 pages.

In addition, we previously reviewed the following report:

> **Geotechnical Design and Geological Hazards Evaluation Report, Child Development Center, Merritt College, 12500 Campus Drive, Oakland, California:** Terraphase Engineering, Inc., 1404 Franklin Street, Suite 600, Oakland, California 94612; company Project No. 0034.005.0003, report dated December 22, 2019, 21 pages, 7 figures, 2 appendices.

CGS previously submitted our findings regarding this project in a review letter dated April 16, 2020, in which the consultants were requested to evaluate and discuss slope conditions and any potential surficial or gross stability hazards to the proposed building, and provide revised site-specific ground motion analysis considering ASCE 7-16 Supplement 1 if site-specific ground motion analysis will be utilized for the project.

Discussion of Ground Motion Analysis

In our initial review, CGS noted that the consultants' site-specific probabilistic spectrum appeared reasonable based on comparison with results from the National Seismic Hazard Model (from Petersen and others, 2014), but that development of their deterministic MCE_R, site-specific MCE_R, and site-specific design spectra did not appear to consider ASCE 7-16 Supplement 1. In their Response report, the consultants provide updated probabilistic spectra developed with the USGS's Open Source Seismic Hazard Analysis (OpenSHA) website and updated deterministic spectra calculated using the Pacific Earthquake Engineering Research (PEER) NGA West2 GMPE Spreadsheet. All probabilistic and deterministic MCE spectra appear reasonable based on comparison with results from the National Seismic Hazard Model (from Petersen and others, 2014), and their site-specific seismic design parameters appear to have been developed considering ASCE 7-16 Supplement 1. The consultants report their site-specific seismic design parameters are: **S_{DS} = 1.45g** and **S_{D1} = 0.65g**. Alternatively, Sa values presented in the column titled "Design Response Spectrum" on Table 1: Site Specific Seismic Hazard Assessment may be used with the equivalent lateral force procedure, per ASCE Section 21.4.

The site-specific ground motion analysis presented appears reasonable and in accordance with ASCE 7-16; however, we note the following corrections and exceptions which do not significantly affect the consultants' site-specific seismic design parameters and Design Response Spectrum, which are controlled entirely by the deterministic MCE_R spectrum. The consultants should consider these comments on future projects:

- The consultants utilized risk coefficient values C_{RS} = 0.90 and C_{R1} = 0.91 for development of the probabilistic MCE_R spectrum; however, we note that C_{RS} = 0.91 and C_{R1} = 0.90 according to results calculated with the SEAOC/OSHPD Seismic Design Maps Tool.
- The consultants utilized a moment magnitude (M_W) of 7.334 for development of deterministic spectra, which does not represent the largest characteristic magnitude for a multi-segment rupture on the Hayward and Rogers Creek Faults. We note that a M_W of 7.57 appears more appropriate based on the USGS Earthquake Hazards Program Building Seismic Safety Council (BSSC) 2014 scenario catalog. However, this difference does not appear to have a significant effect on the development of deterministic spectra considering a Vs30 of 760 m/s. Therefore, we do not request revised site-specific ground motion analysis in this case.
- The consultants report that ASCE 7 structural design parameter S_{DS} is equal to 90% of the spectral acceleration at any period between 0.2 and 0.5 seconds, and we note that S_{DS} shall be taken as 90% of the maximum spectral acceleration at any period within the range from 0.2 to *5 seconds* per ASCE 7-16 Section 21.4.

Discussion of Slope Stability

CGS previously requested the consultants evaluate and discuss slope conditions and any potential surficial or gross stability hazards to the proposed building. Based on additional reconnaissance field mapping of the site and more recent regional mapping by the USGS (1996), the consultants indicate the site is located entirely within a metavolcanics unit mapped by the USGS as Late Jurassic volcanic and intrusive igneous rock, and that Knoxville Formation sedimentary rocks were not observed within or near the area of the proposed building. They report that ascending slopes near the site are not mantled with clasts, which suggests that

gravity induced movement is not common, and that no visible erosion or mass wasting was observed on the bedrock knoll northeast of the site.

They also report the presence of a fill slope east of the site which is approximately 10 feet high with a gradient of 2.5:1 (h:v), and that the slope appeared stable with no visible signs of settlement or displacement. The consultants conclude that no potential surficial or gross slope stability hazards are present on or near the proposed building site.

Based on the discussions above, the consultants have addressed our earlier concerns regarding earthquake ground motion and slope stability for the site, and have now provided a thorough evaluation of engineering geology and seismology issues with respect to the proposed improvements.

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 michael.defrisco @conservation.ca.gov.

Respectfully submitted,

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Concur:

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