



Atheria Smith
Director of Facilities Planning and Development
Peralta Community College District
Attn Dept of General Services
333 E. 8th Street
Oakland, CA 94606

April 25, 2023

**Subject: Fourth Engineering Geology and Seismology Review for
Laney College – Laney Library & Learning Resource Center
900 Fallon Street, Oakland, CA
CGS Application No. 01-CGS4416**

Dear Atheria Smith:

In accordance with your request and transmittal of documents received on April 13, 2023, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting reports and associated design documents prepared for the subject project at Laney College in Oakland. It is our understanding that this project involves construction of a new three-story Library & Learning Resource Center (LLRC) building. This fourth 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 documents for this fourth review of the project:

- (8) Geotechnical Investigation and Geologic Hazards Evaluation, Laney College, Library Learning Resource Center, Oakland, California:** Fugro USA Land Inc., 1777 Botelho Drive, Suite 262, Walnut Creek, CA 94596; company Project No. 04.72190021, document No. 04.72190021-PR-001, Issue No. 03, report dated March 31, 2023, 61 pages, 22 tables, 10 appendices (including the DMM Design and Recommendations Report listed below).
- (9) DMM Design and Recommendations, Laney College, Library Learning Resource Center, Oakland, California:** Fugro USA Land Inc., 1777 Botelho Drive, Suite 262, Walnut Creek, CA 94596; company Project No. 04.72190021, document No. 04.72190021-PR-001 (02) ADD-001, report dated March 31, 2023, 22 pages, 7 tables, 16 plates, 1 appendix.
- (10) Deep Mixing Method (DMM) Ground Improvement Example Layouts and Plans, Laney College, Library & Learning Resource Center, Oakland, California:** Fugro USA Land Inc., 1777 Botelho Drive, Suite 262, Walnut Creek, CA 94596; company Project No. 04.72190021, plans dated March 31, 2023, 6 pages.

In addition, we previously reviewed the following reports:

- (1) **Geotechnical Investigation and Geologic Hazards Evaluation, Laney College, Library Learning Resource Center, Oakland, California:** Fugro USA Land Inc., 1777 Botelho Drive, Suite 262, Walnut Creek, CA 94596; company Project No. 04.72190021, document No. 04.72190021-PR-001, Issue No. 02, report dated February 28, 2020, 56 pages, 21 tables, 8 appendices.
- (2) **Peralta Community College District, Laney Library & Learning Resource Center (Building 100 Replacement):** Noll & Tam Architects, 729 Heinz Avenue #7, Berkeley CA 94710; company project No. 21942, issue for permit structural/foundation plans dated November 2, 2020, 16 sheets.
- (3) **Laney College Learning Resource Center Foundation Calculations:** Thornton Tomasetti, 301 Howard Street, Suite 1030, San Francisco, CA 94105, company project No. U20005.00, structural design and calculation package dated December 14, 2021, 92 pages.
- (4) **Response to CGS Review Comments (CGS Application No. 01-CGS4416):** Fugro USA Land Inc., 1777 Botelho Drive, Suite 262, Walnut Creek, CA 94596; company Project No. 04.72190021, document No. 04.72190021-PR-002, Issue No. 02, report dated December 22, 2021, 18 pages, 6 tables, 3 figures, 40 plates, 1 appendix.
- (5) **Geotechnical Engineering Civil Plans Review for Laney College Learning & Library Resource Center Project, Oakland, California:** Fugro USA Land Inc., 1777 Botelho Drive, Suite 262, Walnut Creek, CA 94596; company document No. 04.72190021-L-001, Issue No. 01, letter report dated January 7, 2022, 2 pages.
- (6) **Peralta Community College District, Laney Library & Learning Resource Center (Building 100 Replacement):** Noll & Tam Architects, 729 Heinz Avenue #7, Berkeley CA 94710; company project No. 21942, issue for bid civil design plans dated January 13, 2022, 12 sheets.
- (7) **DMM Design and Recommendations, Laney College, Library Learning Resource Center, Oakland, California:** Fugro USA Land Inc., 1777 Botelho Drive, Suite 262, Walnut Creek, CA 94596; company Project No. 04.72190021, document No. 04.72190021-PR-001 (02) ADD-001, report dated June 22, 2022, 22 pages, 6 tables, 10 plates, 1 appendix.

CGS previously documented our third review and submitted our findings regarding this project in a letter dated July 22, 2022, in which we indicated our provisional acceptance of the project subject to review of additional information relative to the ground improvement to be performed at the site.

Additional Subsurface Characterization

In Report 8, The consultants report that 10 additional Cone Penetration Tests (CPTs) were performed at the site in 2022. They further report that information from these additional CPTs along with information from the previous site investigation performed in 2021 was used to validate and revise the subsurface characterization of the site and to design the liquefaction and lateral spreading mitigation system. Based on the available explorations (old and new), the consultants report that Young Bay Mud was encountered to a depth of about 30 feet (Elevation of about -10 feet) at the northwest side of the proposed building location and about 50 feet (Elevation of about -30 feet) at the southeast side of the proposed building location. Additionally, liquefiable layers were encountered above Elevation of about -15 feet. CGS notes based on provided information such conclusions appear to be reasonable and no further information is requested.

Discussion of Liquefaction and Lateral Spreading Mitigation

As discussed in our third review letter, in Report 7, the consultants provide reasonable recommendations for design of **ground improvement by the deep mixing method (DMM) to mitigate liquefaction beneath the building footprint and to mitigate lateral spreading toward the Lake Merritt channel**. They recommend varying depths and area replacement ratios for DMM elements be installed beneath the building footprint to provide adequate resistance to lateral spreading and they provide a detailed slope stability analysis considering the proposed DMM system.

In Report 8, they provide **revised recommendations regarding the depths of DMM elements following their additional subsurface explorations performed at the site**. Based on the provided information, they divide the building footprint into three zones. They recommend DMM elements be installed to minimum depth of 33 feet (extended below Elevation -15 feet) within the defined zone A1 and minimum depth of 55 feet (extended below Elevation -35 feet) within the defined zones A2 and B. They report that the DMM system is designed as grids of overlapping mixed soil-cement columns installed using DMM equipment and methods and with a **design minimum unconfined compressive strength (UCS) of 125 psi and minimum area replacement ratio (ARR) of 50%**. The design indicates the DMM columns will be comprised of 3- to 6-foot diameter soil-cement columns with minimum overlap of 30% of the column diameter between adjacent columns. Based on recommended minimum depths of DMM elements, the **total seismic and static settlements are anticipated to be less than 2-inches, and 3/4-inch, respectively**. They provide recommended ultimate shallow foundation bearing capacity beneath footings. We understand **the DMM system is designed to reduce lateral spreading displacement of the building to 4 inches or less**.

Altogether and based on the information provided, the geotechnical design and conceptual plans for the proposed mitigation method and the recommendations for construction by means of DMM appear to be reasonable and appropriate for the reported site conditions. The DMM system design appears to adequately address the seismic hazards to be mitigated for this project. The consultants have also provided specifications for the installation of the DMM columns that include well-defined acceptance criteria based on geometric tolerances and demonstration of strength and uniformity of mixed soil-cement materials. Therefore, **no further information regarding the DMM ground improvement design is requested by CGS at this time**.

The design team is advised that the Division of the State Architect (DSA) may have separate comments and/or require additional information regarding specifications for the ground improvement and/or the structural design of the classroom building to be supported by improved site soils as part of their plan check review.

The geotechnical consultants should be engaged to provide monitoring of the DMM ground improvement program, including all DMM installation, verification testing, and required special inspections, under their authority as the Geotechnical Engineer of Record (GEOR) for the project. **After completion of the recommended and accepted final ground improvement program, the consultants should provide a comprehensive final report for CGS review.**

The report should document their observations, testing, and analysis, including the data collected to satisfy the specified acceptance criteria. The report should include (at minimum):

- All DMM installation logs/records, field testing records, as-built plan and record of installed DMM elements, and daily field reports from both contractor and consultants' field representative(s).
- All equipment calibration reports, QA/QC data and records of DMM installation data.
- All DMM coring logs, any downhole televiewer logs, and laboratory test results, including summary and calculations of the UCS values of the DMM materials.
- Any other pertinent data gathered and/or observations made during the performance of the ground improvement program that are considered in assessing the satisfaction of the design objectives.
- Discussion and conclusion(s) regarding satisfaction of the DMM design and performance requirements for the project.

Conclusion

In conclusion, *the engineering geology and seismology issues at this site are adequately assessed in the referenced reports. **The project is provisionally accepted***, as we request additional documentation the consultants following the completion of the ground improvement program, as discussed further above. 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 reviewing engineer at Farshid.Ghazavi@conservation.ca.gov

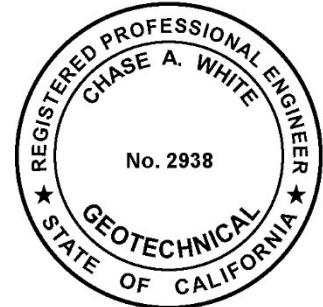
Respectfully submitted,

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Concur:

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Copies to:

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Chris Noll, *Architect*
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