

Chad Pimentel, Legal Counsel for AUSD
Alameda Unified School District
2060 Challenger Drive
Alameda, California 94501

April 24, 2017

RE: Donald Lum Elementary School Liquefaction Settlement

Chad,

ZFA has reviewed the report titled "Geotechnical Engineering Investigation-Evaluation of Liquefaction Risk and Liquefaction Induced Settlement Potential at Donald D. Lum Elementary School Campus" written by Miller Pacific dated March 17, 2017. The significant findings of the report indicate that the site has earthquake induced settlement potential from 5 to 10 inches due to soil liquefaction with differential settlement of 3 to 7 inches. It should be noted that this is for a very large earthquake that would happen, on average, approximately every 2500 years. Additional analysis shows with even a smaller earthquake, which might occur approximately every 100 years, significant differential settlement of 3 to 5 inches could occur.

The existing buildings located on the Lum campus consist of shallow continuous spread footings. This foundation type is not appropriate for potential settlements of this magnitude. Typically, we would only use this foundation type if the total settlement was around 3" and if differential settlement was approximately 2" or less. The effects of liquefaction on lightly framed structures are not well studied; however at these levels the buildings will sustain more damage than they would otherwise be expected to during a large seismic event including partial building collapse and inoperable doors, thus severely limiting emergency exiting from the buildings. Both of these impacts are potential life-safety concerns. Unfortunately, given that the liquefiable soil occurs from near the surface down to approximately 50 feet, there does not appear to be a feasible mitigation technique for these existing buildings.

It should be noted that the California Building Code would not require that the buildings or site be vacated by the district. However, this new information will limit the work that can be performed to the existing buildings to that which is non-structural in nature. We recommend that the district develop a plan to provide suitable alternate facilities for students and staff as soon as feasible.

Should you have questions, please contact the undersigned.

Regards,



Chris Warner, SE
ZFA STRUCTURAL ENGINEERS
Senior Principal