

May 15, 2017

Alameda Unified School District

c/o Joe Keiser

Lum District Advisory Committee

resiek@mac.com

RE: Lum School Liquefaction & Settlement
1801 Sandcreek, Alameda, CA

Dear Mr. Keiser:

Per your request, I have prepared this letter as a follow up to our draft letter/report prepared by our firm on May 5, 2017. The May 5th letter was intended to provide the Lum District Advisory Committee and the AUSD with preliminary answers to specific questions, and to point out questions that the AUSD should be asking as it works toward deciding how to proceed with the soil liquefaction issues discovered at the Lum Elementary School site.

First, I would refer you to my updated final version of that letter/report dated May 14, 2017, provided herewith. This letter/report covers several topics that the Advisory Committee and AUSD should consider in addressing the liquefaction issues, including identifying certain questions that should be posed regarding the current structural findings, and what alternatives exist to the closure of Lum Elementary School. I would encourage the AUSD Board and the public to review that letter in detail. The following are a few highlights from that letter and some additional comments.

Basis for Closure Unclear:

It is not clear that there is any Code required basis for the immediate closure of Lum Elementary School at this time, regardless of the soil test results. The engineering letter from ZFA suggesting such action, and being relied upon by the District, appears to be an opinion letter. The idea that the engineering letter is an opinion is not merely semantics, but holds actual legal and professional relevance. Under California Business and Professions Code, preliminary findings (or opinions) from an engineer must clearly be labeled as such, which may be a source of confusion regarding the certainty of the findings presented. A true actionable report can take considerable time to prepare, involving analysis of conditions (for the buildings), applicable Codes, and feasibility studies if requested. Once at that level, report recommendations and/or design plans based upon facts and analysis need to be signed and stamped with the seal of the licensee as was done by the geotechnical engineers, Miller Pacific Engineering Group and RGH Consultants, in their reports. Just as our letter/report and this follow up letter are an opinion regarding the structural issues for Lum Elementary School,

so is the ZFA letter/report that does not contain any of the qualifying language required to designate it as such.

For our firm to determine that the school could not be feasibly strengthened to mitigate potential problems due to differential settlement would take some time and analysis to definitively reach that conclusion, more than just a couple of weeks prior to such a major decision.

It is also important for the AUSD to recognize that there is no Code provision I am aware of that “limits the work that can be performed to the existing buildings” as stated by ZFA. The California Building Code expressly allows for such improvements under Section 3404A and are recommended by FEMA, so it is our opinion that the retrofit feasibility question (as the basis for closing the school) should be fully understood before the decision is made.

Concepts Moving Forward:

In general, we feel a relatively straightforward and cost effective foundation retrofit is feasible, and can be done in a phased approach.

As a starting point, it is not clear that any significant analysis of the structures has been done to determine if the recent soil test results are cause for the degree of concern with regard to life-safety and survivability of the buildings. There are several standards that can be used to determine what level of performance buildings can be retrofitted to, based on desired performance and feasibility. ASCE 41-13 is often used as the basis to determine tiered retrofit levels for existing structures, which at a minimum for an elementary school, would require that students and staff either be able to exit in an emergency, or shelter in place. Based on our familiarity with the buildings at Lum, their basic hexagonal shape and wide footprint, and considering their steel-framed primary structural system, it appears this basic standard may already be generally satisfied for the above-grade portions of the structures. This conclusion would need to be verified with a formal analysis of the original construction plans and subsequent retrofit done years ago, and would be an integral part of any proposed retrofit design.

Considering the primary concern about the integrity of the existing shallow spread footing type foundations at Lum, it may be in AUSD’s interest to explore the option of strengthening the foundations with my recommendation of implementing a ‘raft’ (or mat) type foundation system around the perimeter. The result would be an increase in the overall seismic performance of the structures because the existing structural systems would not be additionally ‘stressed’ by differential settlement forces during a large earthquake, therefore mitigating the main issues presented by the geotechnical findings. In addition, this type of foundation system could be designed to current California Building Code standards without much impact on the overall cost.

As I detailed in my attached letter, such a retrofit can be implemented in a phased approach where the individual ‘pod’ buildings could be worked on one at a time, with minimal

disruption to the school and its overall operations. This system would prolong the service life of the existing structures and would cost much less than new construction and the cost of relocating hundreds of students. For initial budget purposes, each perimeter raft foundations could cost in the range of \$250-\$300k for the 5 main structure pods. This number may be conservative depending on what efficiencies the builder can bring to the project.

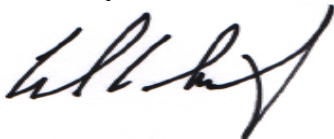
We feel phasing the work would cause the least disruption to the AUSD, Lum, and the City of Alameda communities. I would expect a project like this, once permitted and 'shovel-ready', could be completed in 8 months to a year using this approach; maybe faster depending on the builder and scheduling. Doing all the work at once (although preferable to most builders) may prove to be more that what can be reasonably done during the summer when the school is closed because construction issues always come up during retrofit projects that can delay a project. If the project runs long, phasing may have to be implemented anyway, so the overall schedule may only prove marginally faster than an intentional phased approach. The repetitive nature of the pods, limited staging areas, and required construction sequencing will also factor into the required timelines, even if well coordinated with summer and winter breaks to minimize disruption caused by some aspects of the work.

It is my professional opinion that an exterior 'raft' foundation retrofit approach would be the most cost effective, least disruptive, and fastest way to address the District's concerns regarding the soil test results, and would demonstrate the Board's responsiveness in prioritizing structural safety and stewardship of the District.

I understand Mr. Wong has already presented his thoughts regarding Lum Elementary School. I would also like to add that the AUSD should give serious deference to his opinion in this matter. Mr. Wong is well known in the Oakland (East Bay) engineering communities, and is highly respected in terms of his decades of experience and knowledge pertaining to seismic retrofits.

Please feel free to contact us if you have any questions or would like to discuss these ideas any further.

Sincerely,



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