

May 5, 2017 **DRAFT**

Facundo Del Pin
Lum District Advisory Committee
fdelpin@gmail.com

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

Dear Mr. Del Pin:

Per your request, our office has conducted a cursory review of information related to potential liquefaction of the above-mentioned property during a major Earthquake. The purpose of this review is to provide an overview and opinion of the structural condition and potential seismic performance of the subject commercial structure that may be used in determining the best course of action in addressing these issues moving forward, including ideas for seismic strengthening of the foundation system. Neither a specific Code evaluation of existing plans nor a seismic analysis of the structure is part of this review.

Our experience in this matter is based on our design and construction oversight of 100's of seismic retrofits over the past 2 decades for various Bay Areas communities, including Alameda. Due to the short timeline given, we can assist with introducing other concepts that may want to be considered before proceeding.

In general, we agree with the soils reports and the peer review in terms of anticipated differential settlement due to potential liquefaction. As most residents of Alameda already know, the South Shore area is a landfilled section of the previous San Francisco Bay.

Our concern is that a major decision to close the school is being made based on those reports, and a single page engineering recommendation prepared by ZFA Structural Engineers. At this point, it seems prudent that a 'second' opinion be sought for a structural engineer's report that includes ideas for what can be done to improve the condition in consideration of various code standards, constructability, and feasibility. Based on the information available, this appears to not have been done yet, so any decision to close the school without understanding this option may be premature.

The main (and only) question to ZFA Structural Engineers is why they state that 'only finishes can be touched' on these building moving forward (what Code provision is he referring too)? I'm unfamiliar with this requirement.

We propose that a fast-track approach be taken to preliminarily determine a retrofit approach that can be evaluated for feasibility, cost, and effectiveness. Then the Board can make decisions based on all relevant information. Expediting a design option would demonstrate the District's due-diligence in this matter.

Findings:

Basically, the general engineering premise is correct in that differential settlement can cause problems for buildings (even if not the primary life-safety issue). But for some building, it takes quite a bit of differential settlement to even be noticeable and/or cause severe structural problems, hence the discussion about inches of 'acceptable' settlement that most structures can withstand without further consideration of how the building is constructed. For buildings that are low, wide, light weight (and evenly distributed) and relatively flexible, the effects from differential settlement can be less severe.

Proposal:

Either way the concern of liquefaction needs to be addressed. If the District chooses to explore what it would take to design a retrofit for these buildings, I would focus on the reducing the potential for this differential settlement.

For soft-soil locations and lightweight structures, this is often accomplished with 'raft' or mat type foundations. Applying that concept to these buildings is rather straightforward. If the perimeter sidewalks were removed around each building unit (or pod), the exterior of the foundations could be excavated to their full depth and an adjacent perimeter concrete grade beam installed. The new grade beam would be connected to the existing foundations and heavily reinforced to resist potential bending and torsion from the differential settlement and building loading; a sort of circular raft. With each building similar, design and detailing could be standardized with all work performed from the exterior of the building, section-by-section to minimizing disruption. When the concrete is poured back in place of the sidewalk, it would look like nothing was done.

Overall site settlement will still occur in a big earthquake, but this kind of settlement would also be expected for surround areas, therefore the building may not necessarily sink significantly more than adjacent areas, including neighboring streets and homes. After a large magnitude earthquake, the buildings may not end up perfectly level, however the degree of residual 'global' differential settlement may be hardly noticeable because each building is symmetric in plan and loading. Because of the open nature of the campus and surrounding parks, the Lum campus area may be one of the safe places for people to gather after a major seismic event.

If the buildings are strengthened individually for each pod, only a few class rooms need to be displaced at any one time, and can be relocated to temporary portables in the rear area play ground area.

This approach should be cost effective, because of the repetitive and standardized nature of the work and materials. Materials and contractor know-how would be basic, allowing for more competitive bidding of the project as a shallow excavation foundation project. Because the work is done from the exterior, there would be minimal disruption to finishes and operations.

If the District and DSA can allow for fast-tracking a preliminary design, things could be done relatively quickly. But the District would need to slow the decision process and create an opportunity to design and study a viable retrofit solution that could be ready to build during the next school year. With proper fast tracking of the entire project, including financing and permit approval, work could start within the year (or sooner), which should satisfy any notion of responsive action.

Conclusion:

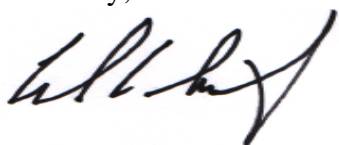
The District may want to consider a 3rd option in their decision process. Many buildings are retrofitted because of their inherent value and necessity to the communities they serve. The information so far presented the District tends to characterize this situation as a 'lost cause' concept. I would suggest that a more constructive approach be fully developed before closing the school. That may include new ideas from a different engineer.

Limitations:

This opinion letter has been prepared for Lum District Advisory Committee to be used solely for the consideration of the referenced property. The observations and summary represented herein are general and qualitative in nature and are intended as an aid in describing the overall structural systems of the subject building. The preliminary nature of these recommendations is not intended for construction. Our professional services have been performed with the degree of care and skill typical of the profession for similar circumstances, using reasonable diligence and judgment in the exercise of these professional services. The conclusions and recommendations as outlined above may be subject to revision as new information becomes available. Therefore, this report may contain insufficient information for the purpose of other parties or other uses. No warranties, expressed or implied, are made as to the professional assessment and/or opinions within this report.

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

Sincerely,



Calin C. Smith, P.E.

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