

Date: February 3, 2017
Project No.: 946-1-1
Prepared For: Ms. Katherine Waugh, AICP
DUDEK
853 Lincoln Way, Suite 208
Auburn, California 95603
Re: Geotechnical Peer Review
Castilleja School Project
1310 Bryant Street
Palo Alto, California

Dear Ms. Waugh:

This letter provides our peer review comments and recommendations for the geotechnical report referenced herein. We have been provided with the following report:

Geotechnical Investigation report titled "Proposed Improvements, Castilleja School, 1310 Bryant Street, Palo Alto, California" prepared by Silicon Valley Soil Engineering, dated January 9, 2017

We understand the geotechnical report and our peer review letter are not required to meet current Division of the State Architect (DSA) or California Geological Survey (CGS) requirements for public school projects.

SUPPLEMENTAL RECOMMENDATIONS

Based on our review of the geotechnical report provided, we have the following comments and recommendations:

- Project Description and Site Location – adequately addressed and no exception taken.
- Field Investigation Method – adequately addressed and no exception taken.
- Exploratory Boring and Cone Penetration Test Logs – adequately addressed and no exception taken.
- Laboratory Test Program – adequately addressed and no exception taken.
- Subsurface Conditions and Ground Water –adequately addressed and no exception taken.
- Geological Setting – adequately addressed and no exception taken.

- Liquefaction Analysis, Ground Water – adequately addressed and no exception taken.
- Liquefaction Analysis, Suspected Liquefiable Soil Layers – liquefaction analysis was performed on three Cone Penetration Tests (CPTs), CPT B-1, CPT B-6, and CPT B-9. These CPT borings were performed to a minimum depth of 50 feet, as required by the State of California. Liquefaction analysis was not performed for the remaining three CPTs, CPT B-3, CPT B-4, and CPT B-8.

Though these CPTs were not advanced to a depth of 50 feet, we recommend they be evaluated and liquefaction analysis performed.

- Liquefaction Analysis, Peak Ground Acceleration – adequately addressed and no exception taken.
- Liquefaction Analysis Results – Silicon Valley Soil Engineering concluded soil liquefaction occurring at the site is low. However, their analysis indicated total liquefaction settlements range from 0.18 to 1.66 inches and differential settlements of 0.12 to greater than 1 inch.

We recommend Silicon Valley Soil Engineering further clarify the liquefaction potential and results for the site.

- Liquefaction-Induced Ground Damage – adequately addressed and no exception taken.
- Conclusions, Expansive Soil and Non-Expansive Fill – based on a Plasticity Index (PI) of 25 and a Liquid Limit (LL) of 40 for the near surface clayey soil, in our opinion, the recommended 12 inches of non-expansive fill beneath slab-on-grade is appropriate.

Adequately addressed and no exception taken.

- Recommendations, Grading – it was recommended the subgrade be compacted to not less than 90 percent relative maximum density per ASTM D1557-12 at a moisture content of 3 percent over the optimum moisture content.

We recommend Silicon Valley Soil Engineering also consider allowing for a moisture content greater than 3 percent above the optimum moisture provided the subgrade meets compaction and determined to be stable under construction equipment loading.

- Foundation Design Criteria (Above Grade) – settlement estimate was not provided.

We recommend Silicon Valley Soil Engineering (SVSE) provide both, total and differential, seismic and static settlement estimates.

- Foundation Design Criteria (Below Grade) – Silicon Valley Soil Engineering recommended a soil modulus of subgrade of reaction of 250 pci and a mat contact pressure of 2,000 psf.

Based on our reviewed, in our opinion, the recommended soil modulus of subgrade reaction appears to be high. We recommend SVSE confirm the recommended design value.

- 2016 CBC Seismic Values – adequately addressed and no exception taken.
- Basement Retaining Walls – SVSE recommended a pseudo-static pressure increase of 377 psf distributed as an inverted triangle (377 psf at the top and 0 psf at the bottom) for the basement wall.

In our opinion, the above method of analysis and recommendations may be outdated. Therefore, we recommend SVSE re-evaluate the recommended seismic earth pressures based on more current studies and standard of practice.

- Basement Retaining Walls – SVSE recommended the basement walls should be waterproofed with Bitumen Waterproof Membrane or Paraseal LG, or equivalent.

In our opinion, a waterproofing consultant should be retained to provide waterproofing recommendations.

- Site Retaining Walls – adequately addressed and no exception taken.
- Concrete Slab-on-Grade Construction (Above Grade) – we interpreted slab-on-grade floors are underlain by 12 inches of non-expansive fill plus and additional 6 inches of Class 2 aggregate baserock or $\frac{3}{4}$ inch clean crushed rock for a total of 18 inches.

We recommend SVSE also consider the 6 inches of Class 2 aggregate baserock or $\frac{3}{4}$ inch clean crushed rock as a part of the recommended non-expansive fill layer. If appropriate, the recommended non-expansive fill thickness can be reduced from 12 inches to 6 inches.

- Swimming Pool – adequately addressed and no exception taken.
- Excavation – adequately addressed and no exception taken.
- Dewatering – SVSE recommended dewatering is not expected for the basement excavation.

Based on our review of the ground water data, we concur full-time dewatering of free ground water may not be needed. However, we do recommend a contingency plan be considered for localized construction dewatering resulting from surface runoff, perched water or other sources.

- Drainage – adequately addressed and no exception taken.
- Abandonment of the Existing Utility Lines – adequately addressed and no exception taken.

- Onsite Utility Trenching – adequately addressed and no exception taken.
- Pavement Design and Table II – AC pavement for parking stalls corresponds to a Traffic Index of 4.5, and ranges from 3 to 4 inches of AC over 7 to 9 inches of Class 2 aggregate base.

We recommend the project civil engineer confirmed the Traffic Index (TI) used (TI of 4.5 and 5.5). In addition, we recommend SVSE confirm the AC pavement structural alternatives provided in Table II for a TI of 4.5. Based on our analysis, the Class 2 aggregate base section alternatives appear thicker than required.

- Corrosivity Analysis – based on the lab results, SVSE recommended that a Type V cement be used.

Based on our experience and review of the laboratory data, we recommend ACI 318 latest edition be referenced for the required cement type.

CLOSURE

We hope this provides the information you need at this time. The opinions and recommendations presented in this letter have been prepared for the sole use of DUDEK specifically for the Castilleja School project located in Palo Alto, California.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices at this time and location. No warranties are either expressed or implied. If you have any questions or need any additional information from us, please call and we will be glad to discuss them with you.

Sincerely,

Cornerstone Earth Group, Inc.



Danh T. Tran, P.E.
Senior Principal Engineer



CBB:dt

Copies: Addressee (by email)