



September 28, 2010
File No.: 112252/PWGEO

Mr. Burl Toler
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**SUBJECT: Preliminary Geotechnical Findings and Recommendations for the
Campus Center Project at Contra Costa College in San Pablo,
California**

Dear Mr. Toler:

As requested by the project architect, tBP Architecture, we have prepared this letter summarizing our preliminary findings and recommendations for the project. Because we have not completed our investigation and the project-specific geologic and seismic hazard study, some of the recommendations presented here may need to be modified when we issue our geotechnical report.

SUBSURFACE CONDITIONS

As we discussed previously, according to our current and previous investigations, we expect the eastern portion of the New Classroom Building to be founded on weathered bedrock and the western side on stiff alluvial or residual soils, which overly the rock. Shallow weathered bedrock was encountered at the Fireside Building and is expected to be present at footing grade. We expect the Student Activities Building to be founded on alluvial or residual soils.

FOUNDATION SETTLEMENTS

Based on the anticipated building loads provided by Thornton Tomasetti for the New Classroom Building, total and differential settlement due to static foundation loads are anticipated to be less than 1 inch over a horizontal distance of 70 feet provided the recommendations in our upcoming geotechnical investigation report are followed. Most of the static load settlements are anticipated to happen during construction.

If the anticipated building loads for the Fireside and Student Activities buildings are comparable or lower than those for the New Classroom Building, we expect these buildings to have total and differential static settlements of less than ½-inch over a horizontal distance of about 50 feet. However, this amount of settlement would be in addition to the potential liquefaction settlement (if any) that still needs to be evaluated along the south side of the Student Activities Building.

FOUNDATION RECOMMENDATIONS

At this time, we believe the proposed buildings can be supported on shallow spread footing foundations. These footings may be designed for an allowable bearing pressure of 3,000 psf, with a 1/3 increase for seismic and wind loads. Continuous perimeter footings should be used for the new buildings due to the moderate soil expansion potential of the surficial soils. The footings should be embedded at least 24 inches below the lowest adjacent grade (defined as top of the bottom of the slab on the interior or finished grade at the exterior, whichever is deeper). Continuous footings should be a minimum of 12 inches wide, while isolated footings should be a minimum of 18 inches wide.

If loose/soft soils or fill are encountered at the bottom of footing excavations, their suitability should be evaluated by our representatives, and if needed, these materials should be overexcavated and replaced with compacted engineered fill or lean concrete.

If a liquefaction concern is identified near the Student Activities Building, we can discuss foundation mitigation measures to address the potential impact to the structure, such as use of a mat foundation, ground improvement, construction of a stiffened lime-treated mat, and structurally connecting the footings.

According to a set of foundation plans provided to us by project structural engineer, Thornton Tomasetti, the existing southeastern addition to the Student Activities Building is supported on belled caissons extending about 10 to 15 feet below the floor level. We were not provided plans for the remainder of the building. Therefore, we do not know if the rest of the building is also supported on caissons or drilled piers. If the new Student Activities Building is supported on shallow footings, the upper portion of the existing deep foundations will need to be cutoff several feet below new footings to reduce the risk they will adversely impact the new footings and floor slabs above.

RESISTANCE TO LATERAL LOADS

Lateral loads applied against footings may be resisted by a combination of friction between the foundation bottoms and the supporting subgrade, and by passive resistance acting against the vertical faces of the foundation. The frictional and passive resistance may be assumed in design to act concurrently. An allowable friction coefficient of 0.3 between the foundations and supporting subgrade soils may be used. For passive resistance at this site, an allowable equivalent fluid pressure (unit weight) of 350 pounds per cubic foot (pcf) may be used against the sides of foundations. The friction and passive values include factors of safety of about 1-1/2.

Passive resistance in the upper foot of soil cover below finished grades should be neglected unless the ground surface is protected from erosion (or other disturbance that could remove this upper foot) by concrete slabs, pavements, or other such positive protection.

SLABS-ON-GRADE

Due to the moderate expansion potential of the near-surface soils, we recommend underlying interior slabs-on-grade with 18 inches of "non-expansive" fill. To enhance subgrade support, we recommend that the upper portion of the 18 inches of the "non-expansive" fill consist of 6 inches of 3/4-inch compacted crushed rock. If this layer is desired to also serve as a capillary break, it should contain less than 5 percent by weight of material passing the No. 4 sieve. If a layer of sand is desired within the capillary break, it may replace an equivalent thickness of crushed rock.

Exterior concrete flatwork should be underlain by 6 inches of "non-expansive" fill. Where exposed to vehicular traffic, the 6 inches of "non-expansive" fill below flatwork should consist of Class II aggregate baserock.

We define "non-expansive" fill as that having a plasticity index equal to or less than 15, a liquid limit less than 30 percent, and a gradation where between 8 and 40 percent by weight of the material passes the No. 200 sieve. This material should be free of organic matter, should not contain particles greater than 3 inches, and should have at least 90 percent by weight of the material passing the 1-inch sieve.

RETAINING WALLS

Cantilevered and restrained retaining walls up to about 15 feet high are planned at the east side of the New Classroom and Fireside Buildings. The foundation recommendations provided above may be used in the design of these walls, including resistance to lateral loads.

In addition to the anticipated surcharge loads, the cantilevered walls should be designed to resist the following active lateral earth pressures (expressed as equivalent fluid pressures, or unit weights, with a triangular pressure distribution):

- 45 pcf (for backfill slopes less than 6H:1V)
- 50 pcf (for backfill slopes inclined at 3H:1V)
- 60 pcf (for backfill slopes inclined at 2H:1V)

If imported "non-expansive" fill is used to backfill behind the walls, the following active lateral earth pressures may be used instead:

- 35 pcf (for backfill slopes less than 6H:1V)
- 40 pcf (for backfill slopes inclined at 3H:1V)
- 50 pcf (for backfill slopes inclined at 2H:1V)

The above pressures for "non-expansive" fill are only valid if the imported backfill material behind the wall extends to or beyond a 1:1 line projected from the base of the walls. Restrained walls should be designed for an at-rest pressure of 55 pcf. These lateral earth pressures are unfactored values and do not include hydrostatic pressures. An appropriate factor of safety should be included in the overall design.

Walls higher than 12 feet in height are required by the 2007¹ California Building Code (CBC) to be designed to resist lateral seismic loads. We recommend using a lateral soil pressure of 15H psf (where H is the height of the wall in feet). A uniform rectangular pressure distribution with the resultant force acting at the mid-height of the wall may be used.

GEOLOGIC HAZARDS

We issued a campus-wide geologic and seismic hazard report for the Contra Costa College in 2005². In that report, we indicated that project-specific geologic and seismic hazard evaluations would be required for future projects at the college campus. This included further characterizing the liquefaction and lateral spreading potential where future campus structures are proposed as part of the geotechnical engineering studies. We are currently in the process of performing a project-specific geologic and seismic hazards evaluation, but we have provided a brief summary below of some of the hazards encountered at the site.

Faulting

The Hayward fault passes through the college campus about 275 feet to the southwest of the edge of the new Student Activities building. For this reason, we have compiled the data from several previous fault studies within the vicinity of the project site. In 2009, we issued a master plan seismic study report³ for the college campus summarizing the previous fault studies and we delineated habitable zones, areas not cleared of secondary fault traces, and building exclusions and setback zones. We provided the building exclusions and setback zones to the Campus Center project design team so they could situate the proposed buildings outside these zones and in habitable zones.

¹ Based on our discussions with tBP Architecture, the 2007 CBC applies to this project.

² Kleinfelder (2005), Campus-Wide Geologic and Seismic Hazards Assessment for the Contra Costa College Campus, San Pablo, California, dated October 7, 2005 (File No. 60116/GEOHAZ).

³ Kleinfelder (2009), Master Plan Seismic Study, Contra Costa College Campus, San Pablo, California, dated July 15, 2009 (File No. 80412/Report).

Seismic Shaking

We expect the college campus will be exposed to strong ground motions in the near future due to a seismic event. Our upcoming geotechnical report will provide seismic design parameters based on the 2007 CBC, including estimated peak horizontal ground surface accelerations and ground motion parameters for the Maximum Considered Earthquake (MCE) and the Design Earthquake (DE).

Liquefaction and Lateral Spreading

Based on our visual interpretation of the subsurface data available at the time, our 2005 geologic and seismic hazard report concluded that the potential for liquefaction and associated lateral spreading to impact the college campus was low east of Rheem Creek and east of the main trace of the Hayward fault. West of Rheem Creek the potential was considered to be higher based on a map by Knudsen et al. (1997)⁴, but we did not have subsurface data in the western portion of the campus to quantify this potential. We also concluded that lateral spreading may occur along the margins of Rheem Creek during an earthquake event if liquefaction occurred along its boundaries.

Submerged sand and gravel layers were encountered along the south side of the Student Activities Building during our current investigation. For this reason, we have recommended performing Cone Penetration Tests (CPTs) in this area to properly evaluate liquefaction and lateral spreading potential and, if present, estimate liquefaction-induced settlements. As a result, issuance of our geotechnical report will be delayed and will likely not occur until sometime at the end of October or later depending when we receive approval to proceed with the CPTs.

Flood Hazard

Our 2005 report concluded that the potential for seismically induced waves (tsunami or seiche) flooding to impact the college campus is low. Based on available information on the ESRI/FEMA awareness website and FEMA insurance rate maps at the time, our 2005 report indicated that flooding associated with 100-year storm events was not shown to intrude onto the college campus. We are still evaluating whether updated FEMA maps are available for the site that could possibly change this conclusion. Our 2005 report concluded that the college campus could be affected by flooding caused by the failure of the Briones, San Pablo, and North Dam located upstream of the site.

⁴ Knudsen, K.L., Noller, J.S., Sowers, J.M., and Lettis, W.R. (1997), Quaternary geology and liquefaction susceptibility, San Francisco, California 1:100,000 quadrangle: a digital database: U.S. Geological Survey, Open-File Report OF-97-715, Plate 1 of 2 – Liquefaction Map, Plate 2 of 2 – Geologic Map, scale 1:100000.

LIMITATIONS

The information presented in this letter is preliminary in nature and could be subjected to change when we issue our geotechnical report. The services provided as described in this letter, including preliminary professional opinions and judgments, were based on our current investigation findings, our observations in the field, our laboratory test results, our previous studies at college campus, and our experience with the site and similar projects. These services have been performed according to generally accepted geotechnical engineering practices that exist in the San Francisco Bay Area at the time this letter was written. No warranty is expressed or implied.

CLOSURE

We appreciate the opportunity to be of continued service to the Contra Costa Community College District on this project. Please call us at (925) 484-1700 if you have any questions regarding the information presented herein.

Sincerely,

KLEINFELDER WEST, INC.



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