



April 22, 2013
4953-12-1321

Ms. Ruby Lynn Carr
EwingCole
15231 Laguna Canyon Road, Suite 200
Irvine, California 92618

Subject: **Supplemental Geotechnical Consultation – Retaining Walls
Proposed Emergency Department and Police Department Expansion
Jerry L. Pettis Memorial Veterans Medical Center
11201 Benton Street
Loma Linda, California**

Dear Ms. Carr:

This letter presents the results of our supplemental geotechnical consultation regarding retaining walls to be constructed as part of the proposed Emergency Department and Police Department Expansion on the campus of the Jerry L. Pettis Memorial Veterans Medical Center (VA Loma Linda Healthcare System) in Loma Linda, California. We previously performed a geotechnical investigation for the project and presented the results in a report dated January 11, 2013 (AMEC Job No. 4953-12-1321).

Mr. Vahid Tavakoulania of your firm has provided us with civil drawings and asked us to provide geotechnical recommendations for retaining wall design for the proposed project. The civil drawings depict two retaining walls, each approximately 70 feet long, with a maximum retained height of 3½ feet. In addition, a slope with an inclination of 2:1 (horizontal to vertical) will extend downward from the base of the wall toward the nearby pond. The finished grade at the base of the walls varies from Elevation 1148 to Elevation 1152 and the water level of the pond is at approximately Elevation 1142 (as measured on April 7, 1997).

Recommendations

The existing fill soils, which were 10 to 11 feet thick at the locations of our prior borings at the site, are not considered suitable for support of the proposed retaining walls on conventional shallow foundations. If all existing fill soils are removed and replaced as properly compacted fill, the proposed retaining walls may be supported on conventional spread/continuous footings established in the properly compacted fill. The removal of the existing fill should extend at least 5 feet laterally beyond the edges of the retaining wall

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footings. As an alternative to removing and recompacting the existing fill, conventional spread/continuous footings could be deepened to extend into the underlying natural soils. This could be accomplished by excavating the footing excavation to a greater depth than designed and backfilling the deepened portion of the excavation with structural concrete or sand-cement slurry consisting of at least 3 sacks of cement per cubic yard up to the design bottom of footing elevation. Such an excavation need not extend beyond the footprint of the overlying footing.

Conventional spread/continuous footings established in properly compacted fill and/or undisturbed natural soil and extending at least 2 feet below the lowest adjacent grade may be designed to impose a net dead-plus-live load pressure of 2,500 pounds per square foot. A one-third increase may be used for wind or seismic loads. The recommended bearing value is a net value, and weight of concrete in the footings may be taken as 50 pounds per cubic foot.

We estimate the settlement of proposed retaining wall footings in the manner recommended to be less than ½ inch. Differential settlement is expected to be about ¼ inch.

Lateral loads may be resisted by soil friction and by the passive resistance of the soil wedge placed in front of the proposed retaining wall. A coefficient of friction of 0.4 may be used between the bottom of the footings and the supporting soils. The passive resistance of the properly compacted fill soils may be assumed to be equal to the pressure developed by a fluid with a density of 150 pounds per cubic foot. The passive value accounts for the presence of the descending slope at the bases of the retaining walls. A one-third increase in the passive value may be used for wind or seismic loads. The frictional resistance and the passive resistance of the soils may be combined without reduction in determining the total lateral resistance.

For design of cantilevered retaining walls, up to 10 feet in height where the surface of the backfill is level, it may be assumed that drained soils will exert a lateral pressure equal to that developed by a fluid with a density of 30 pounds per cubic foot. In addition to the recommended earth pressure, the walls should be designed to resist any applicable surcharges due to construction or storage loads.

In addition to the recommended earth pressures above, retaining walls adjacent to areas subject to vehicular traffic should be designed to resist a uniform lateral pressure of 100 pounds per square foot, acting as a result of an assumed 300 pounds per square foot surcharge behind the walls due to normal vehicular traffic. If the traffic is kept back at least 10 feet from the walls, the traffic surcharge may be neglected.

Based on the cohesive nature of the upper soils, the height of the walls, and the anticipated level of ground shaking in the event of the design earthquake, we estimate that the seismic lateral earth pressure will be negligible.

Retaining walls should be designed to resist hydrostatic pressures or be provided with a drain pipe or weepholes. The drain could consist of a 4-inch-diameter perforated pipe placed at the base of the wall. The pipe should be sloped at least 2 inches in 100 feet and surrounded by ¾-inch crushed rock or gravel separated from the on-site soils by an appropriate filter fabric. The crushed rock or gravel should have less than 5% passing a No. 200 sieve. The perforated pipe should be connected to a solid discharge pipe, which may

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drain by gravity into the nearest storm drain or into a sump-pump system that drains into the storm drain. Weepholes, if used, should be placed at the base of the wall at horizontal spacings of 6 feet or less.

The professional opinions presented in this letter have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this letter.

It has been a pleasure to be of continuing professional service to you. Please contact us if you have any questions or if we can be of further assistance.


Sincerely,

AMEC Environment & Infrastructure, Inc.


Alek Harounian
Project Engineer



Reviewed By:


Mark A. Murphy
Associate Geotechnical Engineer
Project Manager



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(2 copies submitted)

cc: (1) EwingCole
Mr. Vahid Tavakoulania