May 2, 2008
Project No. 401294002

Mr. Jeffrey Kingston
Chabot-Las Positas Community College District
5020 Franklin Drive
Pleasanton, California 94588

Subject: Preliminary Recommendations for Grading and Fill Placement
Athletic Complex Phase III
Las Positas College Campus, Livermore, California

Dear Mr. Kingston:

In accordance with your request, we are presenting our preliminary recommendations for grading and placement of fill material as engineered fill within the Athletic Complex Phase III area (Phase III) at the Las Positas College Campus in Livermore, California. The purpose of these preliminary recommendations is to assist the Phase III project design team, as well as design teams for other campus projects that will be generating excess soil, with placement of fill and exported soil in the Phase III project area. Ninyo & Moore (N&M) has been retained as geotechnical engineer for the Phase III project, and will be responsible for providing future observation and testing services for placement of engineered fills within the Phase III area. We would like to note that we have not yet started our evaluation of the subsurface conditions at the Phase III site; and therefore, these recommendations are considered preliminary.

BACKGROUND

Bohley Consulting (Bohley), the Civil Engineer for Phase III, prepared a grading plan for the Phase III development dated April 23, 2008. That grading plan balances site grades using earth material currently present within the Phase III area. The balance includes the approximately 53,000 cubic yards of fill recently placed within the project area that will eventually be reworked as an engineered fill. Moderate grading is anticipated to develop the proposed site grades.

Future plans for campus development currently call for fill materials to be imported to the Phase III site from other campus projects that will soon be undergoing construction. Preliminary export

fill volume estimates for these projects have been prepared by Sandis, the Civil Engineer for the campus development; some of which are presented on the figure titled, "Site Grading and Proposed Pad Elevations Exhibit," dated July 31, 2007. The volume estimate of about 55,000 cubic yards presented on that figure is currently undergoing revision.

The grading plan developed by Bohley for Phase III provides a location near the detention basin at the southeast corner of the project area for future placement of imported materials as engineered fill. Fill placement at this location will be conducted so as not to impact site grades intended to support the Phase III improvements. If Phase III grading occurs prior to import of materials from other campus projects, then future import materials can be placed as engineered fill that will ultimately blend into the perimeter engineered fill slope. If importing of fill material will take place prior to Phase III project grading, then some movement of recently placed fill material considered "defective" may be needed to accommodate engineered fill placement within the designated area.

Planning by the geotechnical and civil engineers will be needed prior to placement of imported material as engineered fill at the designated area within Phase III. The approximate overall volume of material to be imported should be known for planning purposes; although the full volume of fill may not be imported and placed at one time. A known fill volume will facilitate design of the keyway and benches, subdrain system with clean-outs, outer slope benches, and erosion protection measures.

TREATMENT OF "DEFECTIVE" FILL

We understand that approximately 53,000 cubic yards of fill materials exported from the ongoing Soccer Field and Aquatic Center projects, that includes a stockpile located on that site prior to onset of grading, have been placed within the Phase III project footprint. This material was intended to be placed as an engineered fill; but it has since been discovered that portions of this material were not placed under engineering observation; and thus, the fill is now considered "defective" fill. The material is to be reworked and placed within the current location as an engineered fill.

Due to the inclination of the original ground surface; that is, the ground surface present prior to placement of the "defective" fill, a keyway and series of benches (as discussed below) were not excavated for this fill. A "valley" drain was installed within the swale onto which the fill material was placed, and lateral drains were not provided. With the anticipated depth and lateral extent of the engineered fill proposed for this area of the Phase III development, we recommend that a key-way and series of benches, as well as subdrain provisions, be installed behind the reconstructed fill.

SITE PREPARATION AND GRADING

Fill placement on the Phase III site undertaken as part of the mass grading operation should be performed in accordance with the following recommendations. The fill materials include on-site soils, the "defective" fill, and other materials imported to the site from other grading operations taking place on the Las Positas College Campus.

Site Preparation

Prior to placement of compacted engineered fill, the site should be cleared of obstructions including undocumented fill piles, trees and associated root systems, and debris. Holes resulting from removal of underground obstructions should be cleared and backfilled with suitable material compacted to the requirements provided below. We recommend backfilling operations for any excavations to remove deleterious material be carried out under the observation of the geotechnical engineer.

After clearing, portions of the site containing surface vegetation or organic laden topsoil should be stripped to an appropriate depth to remove these materials. The amount of actual stripping should be assessed in the field by the geotechnical engineer at the time of construction. Stripped materials should be removed from the site, or stockpiled for later use in landscaping, if permitted by the landscape architect and the owner. Clearing should extend to the proposed limits of project grading.

Subgrade Preparation

Following site preparation, the resulting surface should be evaluated by the geotechnical engineer prior to the placement of engineered fills. Deeper removal may be needed if unsuitable materials are exposed during grading. Soil subgrade in areas to receive engineered fill, slabs-on-grade, or pavements should be scarified to a depth of 8 inches; moisture conditioned to achieve moisture contents generally 3 to 5 percent above the laboratory optimum moisture content, and compacted to 90 percent relative compaction as evaluated by American Society of Testing and Materials (ASTM) D 1557. The top 6 inches of subgrade in areas to receive pavements should be moisture conditioned and compacted to 95 percent relative compaction. Weak soils, if encountered, should be excavated and replaced, or otherwise stabilized as recommended by the geotechnical engineer at the time of construction. The compacted surface should be firm and unyielding and should be protected from damage caused by traffic or weather. Soil subgrade should be kept moist during construction. If the subgrade is allowed to become dry, it should be moisture conditioned to repair shrinkage cracks.

In order to achieve satisfactory compaction of the subgrade and fill materials, adjustment of the water content may be needed at the time of construction. This may indicate that water should be added to soils that are too dry, or that scarification and aeration be performed in any soils that are too wet.

Fill Materials

Fill placed in the Phase III area should be engineered fill meeting the description presented here, except for landscaping materials that are placed on level ground. The upper, approximately 30 inches of surface soil encountered at other locations within the campus has been considered suitable for use as topsoil, and has often been stockpiled for later use in landscaping. We recommend that the project landscape architect assess the adequacy of the on-site soil for future use in landscaped areas.

On-site soil below the stripped layer and having an organic content of less that 3 percent by volume (or 1 percent be weight) can be used as fill. Engineered fill placed at the site,

including on-site soils, and soils brought in from other sites on the campus, should not contain rocks or lumps larger than 6 inches in dimension and contain no more than 15 percent larger than 2.5 inches.

Should importing of materials from an off-site source be needed, these materials should have a low corrosion potential (chloride content less than 500 parts per million [ppm], soluble sulfate content less than 0.2 percent, and a pH of 5.5 or more). Materials for use as fill should be evaluated by the geotechnical engineer prior to importing. When constructing deeper fills, rocks or lumps larger than 6 inches in diameter can be placed in the fill if positioned so that nesting does not occur. In addition, the oversize material should not be placed within 15 feet of a finished slope face or within the upper 10 feet of a structural fill.

Fill Placement and Compaction

Engineered fill, less than 5 feet thick, should be compacted to 90 percent relative compaction as per ASTM Designation D1557. The upper 6 inches of subgrade soils beneath pavements should be compacted to 95 percent relative compaction. Engineered fill or wall backfill deeper than 5 feet deep should be compacted to 95 percent relative compaction. Fill material should be spread and compacted in lifts not exceeding 8 inches in pre-compacted thickness. The moisture content of the natural on site, potentially expansive clayey soils to be used as fill should be 2 to 5 percent above the optimum moisture content for the soil at the time of compaction. In order to achieve satisfactory compaction of the fill materials, adjustment of the water content may be needed at the time of construction. This means that water should be added to soils that are too dry, or that scarification and aeration be performed in any soils that are too wet.

Fill Placement on Slopes

The geotechnical engineer should be consulted as to site preparation for fill placement on slopes. Generally, the geotechnical engineer will recommend a keyway and intermediate benches be constructed for engineered fills being placed on grades steeper than about 5:1

(horizontal to vertical). Due to the depth and lateral extent of the fill to be placed for Phase III, a keyway, a series of intermediate benches and subdrains will be recommended for the deeper fill. Design of the keyway and benches will generally consider the proposed depth of the fill, inclination of the ground surface, physical constraints of the site, nature of the underlying materials, and presence of groundwater. A keyway would be constructed along the toe of proposed fill slopes. The keyway should extend 3 to 5 feet into competent materials along the downslope side of the keyway as assessed in the field by the geotechnical engineer. The keyway base should be between 10 and 15 feet in width, and should be inclined toward the slope at a 2 percent, or steeper, gradient. Intermediate benches of a similar width and inclination would be excavated at a vertical interval of about 10 feet, or as designed in the field by the geotechnical engineer.

Subsurface Drainage

Subdrains should be placed behind fills constructed on grades where a keyway and series of benches are prepared. Subdrains may be needed for fills placed without a keyway and benches at the discretion of the geotechnical engineer. Fill slope stability can be impacted by the presence of water within the fill, and the fill slope stability evaluation performed by the geotechnical engineer should consider this factor. The subdrain system should be designed by the geotechnical engineer, in conjunction with the civil engineer and earthwork contractor, based on factors specific to the individual fill slope and site constraints.

A subdrain is typically installed at the back of the base of the keyway excavation, except in those situations where the subdrain outfall elevation is dictated by other site constraints (i.e., detention basin elevation, presence of wetland environment, etc.). A subdrain should be installed behind the fill at as low an elevation as permitted by the site constraints. Subdrain laterals should be constructed along intermediate benches as assessed in the field by the geotechnical engineer. Subdrains should be surveyed by a licensed land surveyor for line and grade after installation.

Subdrains should be constructed of 4-inch to 6-inch diameter, Schedule 40, perforated, PVC pipe enclosed in ¾-inch, clean, crushed, drainrock surrounded by filter fabric (Mirafi 140N, or equivalent). Approximately 9 cubic feet of drain rock should be provided for every linear foot of perforated subdrain pipe. Filter fabric should overlap 2 feet forming a "burrito wrap" to provide protection to the drainrock. Caltrans Class 2 permeable material may be used instead of drainrock and filter fabric, if desired. Subdrain laterals should be provided with clean-outs consisting of solid PVC pipe extending above the finished grade. Protective caps should be provided for subdrain cleanouts. The perforated subdrains should be connected to solid cleanout pipes and outfall collector pipes using multiple 45-degree and Y-connectors, as needed. T-connectors should not be used in subdrain systems since cleanout equipment cannot negotiate 90-degree turns.

The outfall pipe from the subdrain collector pipes should be routed to an appropriate discharge facility designed by the project civil engineer. The end of the outfall pipe should be equipped with an energy dissipater that is fitted with rodent screens.

Fill Slope Inclination

Recent experience at the Las Positas College campus suggests that the on-site moderate to highly expansive native materials can be utilized to construct fill slopes with an inclination of no steeper than 3:1 (horizontal to vertical). If materials possessing a plasticity index of less than 25, as established by the geotechnical engineer from laboratory testing, are used to construct fill slopes, these slopes can be constructed at an inclination as steep as 2:1 (horizontal to vertical).

Fill slopes should be over-built laterally by about 2 feet and then cut back to expose compacted fill at the desired finished slope face. Over-building and trimming back of the fill slope is intended to remove the loose, uncontrolled, outer surface of the fill slope. Track-walking and wheel-rolling are not acceptable methods for compaction of the outer face of fill slopes and should not be permitted.

Benches, between 10 and 15 feet in width, should be incorporated along the outer face of fill slopes at 30-foot vertical intervals, or less. If the fill slope is less than 60 feet high, the bench can be located at mid-slope.

Surface drainage, consisting of V-ditches located at the fill slope crest and at the back of intermediate benches, should be provided. V-ditches trending down the transition between the fill slope and the native materials may be recommended by the geotechnical engineer based on the individual situation. Sizing of the V-ditches should be performed by the project civil engineer.

LIMITATIONS

The geotechnical recommendations presented in this letter have been prepared in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this letter.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This letter is intended to provide information for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors.

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Respectfully submitted,
NINYO & MOORE

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