

May 5, 1999

Mr. George Ghiragosian, P.E.
TEAC Consulting Engineers
3160 Crow Canyon Place, Suite 105
San Ramon, CA 94583

RE: Supplemental Recommendations
Subgrade Preparation beneath thickened slabs
Greystone Ridge Estates, Subdivision 8123
Pleasant Hill, California

Dear Mr. Ghiragosian:

At your request, Geolith Consultants, Inc. is providing supplemental recommendations for subgrade preparation beneath the thickened slab-on-grade foundations for the eight single-family homes in Greystone Ridge Estates, Subdivision 8123, in Pleasant Hill. Our firm previously submitted a soils report for this project (to a prior owner) on March 11, 1998. In addition, we have provided ongoing plan review services and design consultations since the issuance of our report, including letters to TEAC regarding design of slabs-on-grade (dated April 7, 1999) and seismic loads (dated April 8, 1999).

Subgrade Preparation

After rough grading the lot pads should be sloped at least 2% away from the house footprint to drain, in accordance with UBC App. Ch. 33 Section 3315.4. When preparing the house footprint for slab-on-grade foundations, care should be taken to moisture condition the soils to between 2% and 5% over optimum moisture content, as determined by ASTM D-1557-91 (UBC Sec 3305) to a depth of at least 2-1/2 feet. This can usually be achieved through rippling or tilling of the footprint area, then watering. If tilled, the watered footprint area can then be proof rolled to between 80% and 85% relative compaction (ASTM D-1557-91). We would expect the soil moisture content to be between 17% and 20% moisture (by weight). An alternative to tilling would be daily watering or sprinkling of the footprint area for approximately 2 weeks. Perforated soaker lines tend to work best for this application of moisture directly to the soil.

Moisture Barrier and Capillary Break

10 mil polyethylene sheeting, such as "Visqueen" should be used as a vapor barrier beneath the slabs. This can be placed directly upon the rolled ground, after moisture conditioning. All perforations through the sheeting should be sealed with appropriate tape, intended for use in joining sheets. A 24-inch lap should be effected between sheets if the appropriate tape does not join them. 3/4" diameter form stakes or skret stakes may be punched through the sheeting at isolated locations.

A two-inch thick layer of clean sand should be placed over the polyethylene sheeting as a capillary break and as protection from puncturing or ripping the sheeting while placing reinforcing steel. The sand cushion should be terminated about 14 inches from the perimeter edge, to retard infiltration of seepage under the slab, as depicted in the accompanying sketch. In this transition, the slab should be thickened

about 2 inches to compensate for the elimination of the sand, and the polyethylene sheeting terminated about 12 inches inside the exterior side of the slab, to retard lateral moisture migration along the Visqueen barrier.

Moisture Testing of Slabs Prior to Placement of Flooring

Since thickened reinforced concrete slabs are being proposed for this site, considerable heat of hydration will be developed within the slabs during their curing period. This could lead to expulsion of moisture vapor of hydration, which could become trapped beneath impervious flooring elements, if they are placed before all the excess moisture has escaped from the slab. If the building is sealed up too quickly, more slab moisture tends to be trapped. We would recommend that the slabs be moisture tested prior to placement of impervious flooring materials, such as vinyl. Most floor contractors perform the ASTM-D 4263-83 *Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method*, sealing an 18-inch square 4 mil thickness clear polyethylene sheet over a portion of the floor for 16 hours and looking for evidence of moisture condensation. One test per 500 square feet of floor area is recommended.

Waterproofing and Dampproofing

Appendix Chapter 18 of the UBC contains requirements for waterproofing and dampproofing of foundations. TEAC Consulting Engineers should acknowledge these considerations, since you are designing the thickened slab-on-grade building foundations, and landscaped yards will likely be constructed adjacent to the foundations.

Soil Sulfate Testing of Graded Pads

Section 1904.3 of the Uniform Building Code requires that concrete exposed to sulfate-containing solutions or soils shall conform to the requirements of Table 19-A-4, or be constructed of sulfate-resistant concrete, or both. UBC Table 19-A-4 limits the water-cement ratio of various cement mixes. The Martinez formation is locally recognized to include numerous quantities of soluble gypsum ($\text{Ca}_2 \text{SO}_4 2 \text{H}_2 \text{O}$), as well as Sodium Sulfate, Magnesium Sulfate (Epsom salts) and Halotrychite. Upon completion of grading the house pads, samples of the near-surface soils should be collected by the Soils Engineer and tested for sulfate content, in accordance with Caltrans Test Method 417. Depending on the results of these tests, sulfate-resistant cements might be recommended for the site. We typically recommend water-cement ratios of either 0.50 or 0.45, in accordance with UBC Table 19-A-4. Corrosion protection of concrete reinforcement in such situations is addressed in UBC Section 1904.4 and Table 19-A-5.

Amended values for edge moisture variation

In our letter of April 7th addressed to Mr. Tabor, we provided additional recommendations for slabs-on-grade. Mr. Tabor noted a typographical error in regards to the specification of the edge moisture variation distances to be utilized for the slab design. The second to the last paragraph on page 2 should have read:

“Using these values, an edge moisture variation distance of 3 feet should be used for edge lift (controlled by drought or unirrigated conditions), while an edge moisture variation distance of 6 feet should be used for center lift (controlled by irrigated conditions).”

WARRANTY and CLOSURE

We have employed standard geotechnical engineering procedures, and our professional recommendations and opinions are made in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

We hope this letter provides you with the information which you require at this time. If you have any questions regarding the recommendations presented in this letter, please feel free to give us a call at your earliest convenience.

Very truly yours,

GEOLITH CONSULTANTS, INC.

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