August 15, 1996

Mr. Mike Temps
Castle Construction Company, Inc.
2291 Via De Mercados, Suite E
Concord, California 94520

RE: Supplemental Recommendations
Blackwood Drive - Subdivision 7916
Walnut Creek, California

Dear Mr. Temps:

At your request, Rogers/Pacific, Inc. is providing supplemental grading and foundation recommendations to accomodate the use of post-tensioned slab foundations for the eight single-family homes to be constructed for the subject project. Our firm previously submitted a soils report for this project (to a prior owner) on September 22, 1995. In addition, we have provided ongoing plan review services and design consultations since the issuance of our report, and have observed the grading operations at the site completed thus far. The results of these additional services will be documented seperately.

As outlined in the soil report, we originally recommended pier-and-grade beam foundations for homes at this site due to the sloping terrain, the presence of moderately expansive soils, and to account for differential fill thicknesses on the building pads. Since the final grading plans indicated relatively level building pads for each lot, you requested our opinion regarding the suitability of post-tensioned slab foundations for the proposed homes. It is our opinion that this type of foundation system is appropriate for the proposed construction provided the following supplemental grading and foundation recommendations presented in the following paragraphs are included in the design and construction of the project. The recommendations from the original report remain valid unless specifically modified herein.

Post-tensioned slab foundations are acceptable for homes located on relatively level building pads with the foundations setback at least 10 feet from any descending slope steeper than 5:1 (horizontal to vertical). The setback is increased to 20 feet on Lot 2 due to the height and steepness of the slope between Lots 1 and 2.

1. Grading

In order to minimize differential fill thickness beneath the building pads, the areas to receive fill on Lots 1, 2, 3 and 5 have been over-excavated to provide a uniform fill thickness under the foundation. The sub-excavation has been extended to at least 5 feet beyond the building perimeter with the bottom of the excavations compacted and proof-rolled prior to fill placement. Subdrains have also been placed around the limits of the excavation, as recommended in the field at the time of construction. The more expansive surface soils have been mixed with the sandy subsoils and weathered bedrock materials to reduce the expansion potential of the fill soils.

After the completion of the rough grading, all of the building pads should be periodically soaked to reduce dessication and promote hydro-compression of the fill and natural soils prior to foundation construction. When foundation construction is ready to proceed, the subgrade in the areas to receive foundations should be moisture-conditioned to at least 2 percent above optimum moisture and compacted to at least 95 percent relative compaction.

The building pads for Lots 4, 6, 7 and 8 are in areas of cut with predominantly bedrock exposed at the foundation level so no additional grading recommendations are required for these areas.

2. Foundations

Due to variable conditions, it has been assumed that moderately expansive soil or bedrock materials may be present at the foundation level in some areas. The following parameters were used in developing appropriate foundation recommendations for post-tensioned slab foundations at this site in accordance with the Post-Tensioning Institute (PTI):

Plasticity Index (from laboratory tests) = 25%

Clay Fraction (assumed worst case) = 30%

Depth to Constant Soil Suction (from soil moisture profiles on boring logs) = 7 feet

Thornthwaite Moisture Index (per UBC/PTI) = -20

It should be noted that the Thornthwaite Moisture Index given above is negative to account for the typically dry summers under natural conditions. However, when year-round or summer landscaping irrigation is anticipated, a positive Thornthwaite Moisture Index of at least 10 is considered appropriate.

Using these values, an edge moisture variation distance of 5 feet should be used for center lift

(controlled by drought or unirrigated conditions), while an edge moisture variation distance of 5 feet should be used for center lift (controlled by irrigated conditions).

Constant soil suction (pF) has been taken as 3.6 for a Thornthwaite Moisture Index of -20 and at 3.4 for a Thornthwaite Moisture Index of 10. The resulting values for diffential movement are 0.712 inches for center lift and 0.261 inches for edge lift.

The slab foundations should be designed for a soil bearing capacity of 1000 pounds per square foot (psf) for dead loads, 1200 psf for dead plus live loads, and 1500 psf for all loads including wind and seismic. A friction coefficient of about 0.35 should be used for the portions of the slab in direct contact with the subgrade.

The slab foundations should have a minimum edge thickness of at least 12 inches and a minimum center thickness of at least 10 inches. The slabs should bear on a prepared subgrade of firmly compacted material at least 6 inches below the lowest adjacent finished grade.

To reduce the likelihood of moisture infiltration through the slab, a heavy plastic vapor barrier consisting of 10mil Visqueen (or an approved equivalent) should be placed directly on the prepared subgrade. The plastic should be protected during construction by a layer of at least 2 inches of clean sand. The sand should be thoroughly moistened prior to concrete placement.

All appropriate requirements of the latest edition of the UBC and the Post-Tensioning Institute should be followed in the design and construction of post-tensioned slab foundations at this site.

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,

ROGERS/PACIFIC, INC.

William K. Langbehn, C.E., G.E.
Senior Geotechnical Engineer

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Copies: Addressee (2)
Terry Fatehi/CEC Engineering (1)