

Project No. SC9395
25 February 2010

STARKER SERVICES
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Subject: Geotechnical Feasibility Plan Review

Reference: Proposed Multiple Unit Housing Development
APN 088-044-01 & 02
Ocean Street Extension
Santa Cruz, California

Dear Mr. Moe:

As requested by you, we have reviewed the preliminary grading and drainage plan for the referenced project. The plan reviewed is by Bowman and Williams Consulting Civil Engineers and is dated 13 January 2010. Our feasibility-level Geotechnical Investigation for project is dated 5 April 2007. Geotechnical aspects of construction reviewed include grading for building pads and access roads, retaining walls, and drainage.

The project consists of 10 structures which are approximately 35 feet wide and from 55 to 60 feet long; 3 structures approximately 24 feet wide and 40 feet long; one swimming pool and adjacent pool house; and roadways and paths connecting and providing vehicle and pedestrian access to the structures. In addition, Ocean Street Extension will be widened and improved along the project frontage.

Units labeled on the plan as 4B, 5C, 6C, 7C, 8C, 9B, and 10B will be cut into the hillside with the cuts retained by walls which will also support the buildings and which are presumably of concrete masonry unit or reinforced concrete construction. These units will be supported entirely on cuts. Unit 1A will be supported by engineered fill. Units 2A and 3A will apparently be supported by stepped foundations founded in native soils. The three smaller units (unnumbered) will be constructed entirely on fill. The pool and associated decking will be constructed on fill adjacent to Unit 1A. Roadways and parking will be on cut and fill.

Borings for our feasibility-level report were completed in mid-winter 2006 and were confined to areas accessible to our drilling equipment. Therefore no borings were advanced at the south end of the site due to saturated soil conditions. The nearest borings indicate liquefaction potential exists in the upper 15 feet of native soils and possibly deeper. We recommend additional borings in the vicinity of Units 1A, 6C, and 7C so that we can perform formal liquefaction analysis for this area and quantitatively estimate the settlement potential of in-situ soils. Structures located elsewhere on site which are supported by cuts (i.e. in Zones A and B) may be supported by conventional spread footings or pier and grade beam foundation systems. Some redensification of building pad soils may be required if cuts do not penetrate loose surficial soils. Alternately pier and grade beam foundations may be designed to penetrate loose soils and bear on underlying medium dense sands or hard non-expansive clays.

In addition to the aforementioned retaining walls associated with structures, additional site retaining walls will be constructed. The most significant of these is a wall at the base of steep slopes on the east side of the site in the area identified in our report as Zone D. This "buttress wall" will be approximately 360 feet long and up to 9 feet high. Cuts for Units 7C, 8C, 9B, and 10B will be approximately 5 feet downslope from this retaining wall. Retaining walls supporting structures should be designed for a surcharge from the buttress wall. The surcharge can be reduced by deepening the footing for the buttress wall which will result in significantly increased retained heights. Alternately, the walls may be tied back with helical or grouted anchors. Again, no preliminary borings were done in this area so depth of surface soils and density of the underlying bedrock are unknown. If the underlying bedrock is very dense, helical anchors may not be feasible. We recommend additional borings in this area to determine retaining wall design criteria.

The drainage plan as indicated is to collect runoff in area drains and curb inlets and conduct it to a discharge point to be determined. If on-site retention is considered, the area at the south end of the site should be avoided due to saturated winter conditions unless the area can be effectively drained. While no phreatic groundwater surface was identified in our investigation, perched water was encountered at several locations and wet near surface conditions in others. We recommend open pipe piezometers be installed during design-level subsurface exploration in areas considered for retention so that percolation tests can be performed.

Haro Kasunich & Associates has reviewed only the geotechnical aspects of these plans. We are not the Civil or Structural Engineers of Record for this project. We provide no warranties, either expressed or implied, concerning the dimensions or accuracy of the plans and analysis.

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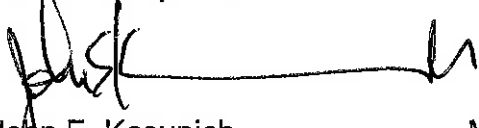
Based on our review of the preliminary grading plan for this project, it is our opinion that, provided the additional investigation and resulting recommendations included in this letter are incorporated into project plans, the project is in general conformance with our geotechnical recommendations.

If you have any questions, please call our office at (831) 722-4175.

Very truly yours,

Reviewed By:

HARO, KASUNICH AND ASSOCIATES, INC.



John E. Kasunich
G.E. 455

Mike Hopper
Staff Engineer

JEK/mh/dk

Copies: 2 to Addressee
1 to Bowman and Williams, Attention: Joel Ricca