



Beach Homes Aptos, California

Civil and Structural Engineering



Client Reference:

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Budget: \$5.5 Million

We produced the structural engineering design for two 3,300 square foot three-story residences. The building site for both residences consists of a steep coastal bluff which has experienced numerous landslides and remains a landslide hazard. The site is also situated over a geologic transition area including beach sands, loose talus deposits and dense purisima bedrock. Because both residences are just 250 feet from the Pacific Ocean, the ground floor-level of the buildings are subject to wave impact flooding and are four feet below the 100 year FEMA flood elevation.

Among the design challenges presented by the project site were the impact loads from potential landslides, flood hazards and site topography. The structures are designed to resist a debris slide impact equivalent to 600 tons. To minimize the need to cut into the cliff wall while still creating a suitable building site on the steeply sloping bluff, we developed a structural design which stair-steps up the hillside. The stair- step design minimizes the amount of earthwork and retaining structures required and created an elevated view of the surroundings at all floor levels.

Due to the extreme environment presented by the building site and magnitude of the environmental design forces, a steel frame building system was selected for use on this project. Roof and floors were constructed with concrete filled metal deck, and the exterior walls of the house were designed as concrete shear walls to resist the tremendous landslide design forces. A pier and grade beam foundation system was selected to support the building on the dense native bedrock fifteen feet below pad grade. Creating a building site at the toe of the bluff required a thirty foot high, tiered concrete retaining wall in conjunction with the installation of thirty five 100 kip tieback anchors.