



November 7, 2022
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County of Marin
Department of Public Works
3501 Civic Center Drive, Room 404
San Rafael, California 94903

Re: Urgent Bluff Stabilization
8 Ocean Avenue
Bolinas, California

To Whom it may Concern,

Miller Pacific Engineering Group is providing geotechnical investigation and consultation services regarding mitigation measures to reduce movement of the bluff and yard at 8 Ocean Avenue in Bolinas, California. A landslide on the bluff slope below 105 Terrace and 8 Ocean has been active and progressing upslope over the last 10 years beginning with undermining of the residence at 105 Terrace in late 2012. A drilled pier retaining structure with tiebacks was constructed in 2013 in response to the undermining of the structure at 105 Terrace. In spring 2019, a landslide scarp (crack in the ground with vertical offset) developed across the southwest portion of the property at 8 Ocean. This scarp was noted to continue westward to the neighboring property at 105 Terrace which had developed ground and foundation cracking. A drilled pier retaining structure with tiebacks was constructed on the 8 Ocean property in 2019 in response to landslide encroachment on the western side of the property to within 45 to 50 feet of the residence. The wall was unpermitted and constructed based on estimated and interpreted geologic and geotechnical conditions by GeoEngineering. During construction, a couple tiebacks were eliminated and backfill material (addition weight and driving force) placed behind the wall.

In August of 2020, we first inspected the site and observed vertical and lateral movement of the western 3/4 of the wall and ground cracking with vertical scarps indicating landslide movement extends below existing wall piers and behind wall tiebacks. We installed three inclinometers in October 2020 to monitor ground movement at both ends of the wall and at the south corner of the residence. Our data from the two inclinometers placed at each end of the wall indicated movement along landslide planes at depths of 34-feet and at 64-feet. The inclinometer placed at the west end of the wall recorded up to 0.8-inches of movement during 4 months of monitoring before it sheared at a depth of 33-feet. Removal of the failed portion of the wall was performed in late 2021 and longer tiebacks added to support the remaining portion of the wall. We also recommended removal of the fill placed during the original wall plus some native soil to unload the upper portion of the landslide. This work was completed in early 2022. Considering the extent of the landslide and the movement in the past three years, we recommend constructing a drilled pier retaining structure across the southwest half of the property set behind the landslide scarp and connected to the remaining eastern 1/4 of the wall. Draft plans for this structure have been developed.

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It is important to implement the above recommendation to reduce potential for continued upslope progression of the landslide which could undermine the residences at 8 Ocean Avenue and 105 Terrace Avenue (founded on shallow foundations), and result in debris onto the bluff and beach below. Considering geologic and geotechnical site conditions, the recommended new retaining structure to provide stability for the existing residence is considered an emergency and should be implemented as soon as possible.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP



Scott Stephens
Geotechnical Engineer No. 2398
(Expires 6/30/23)