

Project No. SC11778
23 June 2020

MR. DAVID MEWES
HOA Board President
4800 Opal Cliff
Capitola, CA

Subject: Inspection Monitoring & Maintenance Report

Reference: Blufftop Retaining Wall and Seawall
4800 Opal Cliff Drive
APN 34-251-05
Capitola, California

Dear Mr. Mewes:

This letter outlines our visit to the coastal bluff below the multi-residence structure at 4800 Opal Cliff Drive in Capitola, California. The purpose of our site visit was to observe the blufftop retaining wall system and the blufftoe seawall to monitor their conditions regarding needed maintenance.

We were onsite 26 May 2020 to rappel down the bluff face to examine the condition of the blufftop structural shotcrete wall and the blufftoe concrete gravity seawall.

Site Setting and Shoreline Protection Structures

The coastal bluff at the referenced site is approximately 65 feet high and consists of about 21 feet of easily eroded, blufftop terrace deposits (silty and clayey sands, gravels, and cobbles) overlying fractured and jointed siltstone/sandstone bedrock.

By the mid-1990's, wave action erosion and bluff face recession threatened to undermine the blufftop parking area on the seaward side of the condominium building. In late 1998 a blufftop retaining wall and a blufftoe seawall were continuously constructed at 4800 and 4820 Opal Cliff Drive to preserve the configuration of the bluff and protect the blufftop improvements, see Photos 1 & 4 attached to this letter.

The blufftop wall at 4800 Opal Cliff Drive is a structural shotcrete compression plate type retaining wall with post-tensioned tieback anchors. The retaining wall contains a drainage system consisting of vertical drainage panels connected to a horizontal drainage panel along the base of the wall with weep holes to dissipate collected seepage. The downcoast end of the blufftop wall is continuously

connected to the blufftop wall at 4820 Opal Cliff Drive; see Photo 4 attached to this letter. At the upcoast end of the blufftop wall, the bluff face at 4790 Opal Cliff Drive is not protected by a retaining wall system and is subject to ongoing blufftop recession; see Photo 1 attached to this letter.

The blufftoe seawall at 4800 Opal Cliff Drive is a concrete gravity type structure embedded into the sandstone bedrock underlying the beach sand. The purpose of the seawall is to armor or harden the blufftoe to mitigate wave action erosion. The seawall is connected to existing seawalls of similar construction at both the downcoast end at 4820 Opal Cliff Drive and on the upcoast end at 4790 Opal Cliff Drive; see Photos 1 and 4 attached to this letter.

The top of the coastal bluff at the referenced site is at approximately elevation 67 feet NGVD29 (NGVD29 \approx Mean Sea Level). The top of the seawall is at approximately elevation 21 feet NGVD29. The blufftop retaining wall and the blufftoe seawall structures are separated by about 22 feet of unsupported, fractured bedrock bluff face.

Parking Area Soil Pin Retaining Wall

The adjacent upcoast parcel at 4790 Opal Cliff Drive contains a blufftoe concrete gravity seawall but the blufftop is not retained and is receding landward. Construction of a soil pin type retaining wall was initiated in January 2013 to mitigate the outflanking of the upcoast perimeter of the blufftop wall at 4800 Opal Cliff Drive and protect the blufftop parking area. Four drilled piers were installed on the seaward side of the parcel line between 4790 and 4800 Opal Cliff Drive as the primary components of a soil pin retaining wall. The tops of the piers were structurally connected by a concrete grade beam. The grade beam was fitted with hollow sleeves to facilitate installation of a drilled tieback at each pier location.

The planned and permitted tieback anchors were not installed at that time nor have they been installed to date. We understand at the time of the soil pin wall construction, the adjacent neighbor at 4790 Opal Cliff Drive did not want their lawn disturbed and denied access to install the tiebacks until their blufftop yard receded to expose the grade beam tieback sleeve locations. The tiebacks are part of the retaining wall design and necessary to maintain the integrity of the soil pin retaining wall system as the adjacent blufftop recedes. The tieback anchors should be installed prior to the exposure of the bottom of the 3 feet deep grade beam.

As side yard area blufftop recession continues, the soil bays between the soil pin piers will become exposed and need to be maintained. The exposed soils will be subject to the effects of long-term weathering and seasonal saturation. If left unprotected, the exposed soils will deteriorate and erode over time thereby

eliminating the soil arching between the piers. To protect the exposed soils and maintain the integrity of the soil arching system, it will be necessary to apply a structural shotcrete section between the soil pin piers as the soil is exposed. No soil pins were observed during our observations therefore no maintenance on the soil pin system is needed at this time. The owner should inform HKA immediately when the soil pins are observed and maintenance (i.e., tiebacks and shotcrete) should be scheduled.

Maintenance Monitoring Observations – 26 May 2020

Our last maintenance monitoring visit was on 24 April 2015. The last repair to the blufftop retaining wall was in December 2015 at the base of the wall. An approximately 3.5 feet high by 7 feet wide, reinforced structural shotcrete section was tied to the bluff face using three, 8 feet long, 1 inch diameter, grouted rock dowels by Soil Engineering Construction. Refer to our Geotechnical Construction Observation letter dated 7 January 2016 (Project No. SC5802 & SC10100) for more details. No repairs to the blufftop seawall have been necessary to date.

On 26 May 2020 we rappelled down the bluff face to examine the current condition of blufftop shotcrete retaining wall and the blufftop concrete gravity seawall.

For the blufftop, structural shotcrete compression plate type retaining wall with tiebacks, the primary monitoring considerations are: undermining of the wall base due to loss of the fractured bedrock leading to the exposure of the retained terrace or soil deposits; and outflanking of the upcoast perimeter of the blufftop wall due to the ongoing recession of the adjacent unprotected bluff face at 4790 Opal Cliff Drive.

The exposed, fractured bedrock bluff face between the blufftop shotcrete wall and the blufftop concrete seawall is receding due to weathering processes. The base or bottom of the blufftop wall along most of its entire length is slowly being undermined by loss of the exposed, fractured bedrock. With time the loss of bedrock can expose the bedrock/terrace deposit contact as well as the bottom of the wall drainage system. Exposure of the terrace deposits will allow loss of the compression plate bearing soils and compromise the integrity of the retaining wall system.

Weathering processes and the rate of recession of the exposed, fractured bedrock bluff face are exacerbated by: long duration rainfall; seismic shaking; and dislodgement of the fractured bedrock by vegetation. Plant roots growing in fractures on the bluff face slowly force open the fractures as they grow and eventually dislodge the fractured bedrock blocks. Pampas grass is the primary

plant growing upon the fractured bedrock bluff face. Grasses and shrubs were also observed growing during our inspection.

For the blufftoe concrete gravity seawall, the primary monitoring considerations are undermining of the seaward toe of the gravity structure and the connection to the adjacent seawalls at either end. At the time of our site visit, 26 May 2020, the sand level was at about +5 feet NGVD with nine (9) of the lower row of weep pipes showing above the sand. The exposed weep pipes were discharging drainage at the time of our inspection. There was no exposure of the bedrock beach platform adjacent to the toe of the seawall at the time of our site visit. The upcoast and downcoast ends of the blufftoe seawall is continuously joined to a similar gravity walls at 4970 Opal Cliff Drive and 4820 Opal Cliff Drive, with no apparent differential erosion at the exposed wall junctions (see Photo 1 and 4). We recommend contacting HKA for a follow up inspection when the sand level has decreased and the bedrock platform is exposed. This will most likely occur in the high scour months of November to February. This will allow us to inspect whether the toe and keyway of the seawall has become undermined from vertical erosion of the bedrock platform and provide maintenance recommendations if necessary.

Recommended Maintenance

We identified two areas along the base of the blufftop retaining wall that are undermined and in need of immediate maintenance and repair. The two areas are located at the (1) upcoast end of the wall and (2) approximately 15 feet from the downcoast property line between 4800 and 4820 Opal Cliff Drive. See Photos 1 and 4 attached to this letter for the locations. The undermined areas consist of a shotcrete shell covering unsupported, bedrock blocks ranging in size from less than an inch to approximately 1.5 feet thick.

At location 1, a large mass of shotcrete, bedrock, and rebar dislodged and fell to the beach as shown in Photos 2 and 3. The void left by the mass measures approximately 11' wide x 2' tall x 1.5' deep, which matches the debris mass on the beach. The exposed bedrock/terrace contact is visible along with the existing Miradrain panels and pvc pipes. Active seepage was observed at the bedrock/terrace contact.

At location 2, blocks of bedrock have been broken off leaving a void measuring approximately 6' wide x 5' tall x 1' deep. Loss of these unsupported, bedrock blocks will expose the base of wall drainage system and the easily eroded terrace deposits, exacerbating the scope of the repair.

To facilitate the repair in these two locations, the overhanging shotcrete shell should be trimmed and vegetation cleared. Shallow rock dowels (1 inch diameter min.) should be installed at least 8 feet into the bedrock bluff face below the base

of the wall. The repair shotcrete should incorporate steel reinforcement tied to the steel rock dowels to minimize shrinkage crack widths. The repair shotcrete should match the existing shotcrete texture and color. Miradrain panels connected to the existing drainage system and weep holes should be installed prior to shotcrete. All work should be done to conform with HKA's recommendations for this project site and confirmed by HKA in the field. The specific extent of the repair should be confirmed by HKA in the field during construction. For cost estimate purposes the contractor should assume a repair area for location 1 of 13' wide x 6' tall x 1.5' deep and a repair area for location 2 of 6' wide x 5' tall x 1' deep.

The repaired section of the blufftop retaining wall should be constructed following the same details from the original design. If a more robust repair is desired contact HKA for geotechnical design criteria.

A small section of the blufftop shotcrete wall is outflanked along the 4800/4790 Opal Cliff Drive property line. The shotcrete is the result of overspray from construction and is not a structural component of the blufftop wall. It measures approximately 6' tall x 2' wide. It should be sawcut and removed so the shotcrete is flush with the terrace deposit. Photo 1 shows the location of this overspray shotcrete. Do not disturb the adjacent property terrace deposits during removal of the overspray.

There are multiple instances of concrete spalling along the blufftoe gravity seawall, as shown in Photo 6. The spalled concrete should be patched with similar colored and textured concrete as the existing blufftoe seawall. The materials used to patch the spalled section of the seawall should be of marine environment quality. If a concrete mixture is used it should have a maximum water to cement ratio of 0.40. The spalled area should be properly prepared by cleaning and roughing surface prior to placement of concrete patch.

The blufftop wall drain system collects and concentrates water along the bottom of the wall between the blufftop and blufftoe walls. This zone has abundant pampas grass and various shrub and grass growth. We recommend the plants currently growing in this zone be removed to minimize future repairs caused by the roots seeking water and dislodging the fractured bedrock; see Photos 1, 3, 4 & 5 attached to this letter. Removal of the vegetation should be limited to cutting off the plant to the top of the root ball and painting the root ball with undiluted herbicide. The exposed root ball should be left in place to minimize disturbance of the fractured rock.

The neighboring parcel at 4790 Opal Cliff has a blufftoe concrete gravity seawall. Their seawall is currently outflanked approximately 8 feet on the upcoast end. This is far enough away from the 4800 Opal Cliff blufftoe seawall that it is not of

concern for 4800 Opal Cliff Drive at present. However, this area should be continued to be monitored. HKA recommends contacting the owner of 4790 Opal Cliff Drive and informing them of their outflanked bluff toe seawall. The outflanked portion of the seawall should be plugged flush with the bluff face. The governing permit agency should be notified and authorization in writing obtained by property owner prior to any repair work taking place.

The existing pvc weep holes for the bluff top shotcrete seawall back drainage system were observed to be plugged with shotcrete in multiple locations. All weep holes should be drilled out and cleared of shotcrete or debris. The build-up of hydrostatic pressure behind the seawall will lead to increased forces on the seawalls and potential failure of the seawall.

The handrail and pedestrian guard at the upcoast corner of the parking lot area is not to code and currently poses a significant threat to pedestrian safety. The guard should be raised to a minimum of 42 inches and fully enclose the top of the bluff. A permit may be needed to commence with this work check with local building department.

The current condition (26 May 2020) of the bluff top retaining wall and bluff toe seawall is chronicled in the site inspection photos attached in Appendix A:

Photo 1: 4800/4790 Opal Cliff Drive Property Line View

Photo 2: Close up of shotcrete, bedrock, rebar debris to be removed

Photo 3: Close up of undermined area in need of repair

Photo 4: 4800/4820 Opal Cliff Drive Property Line View

Photo 5: Close up of undermined area in need of repair

Photo 6: Close up of concrete spalling on bluff toe concrete gravity seawall

We recommend the outlined repair areas along the base of the bluff top wall (locations 1 and 2), the shotcrete overspray, the various areas of spalled concrete along the bluff toe seawall, the plugged weep holes, and the vegetation growing at the base of the bluff top wall be addressed in order to maintain the structural integrity of the bluff top retaining wall system. Additionally, the guardrail for the bluff top wall should be raised and extended and the adjacent outflanked bluff toe wall at 4790 Opal Cliff Drive should be monitored and/or fixed. The project designer/builder, Soil Engineering Construction, Inc. should examine the structural integrity of the bluff top wall system and be contacted to schedule the repair. A point of contact will be George Drew, PE at 408-812-4355. We will be available to work with Soil Engineering Construction to develop an efficient repair solution as well as observe the geotechnical aspects of the repair.

We also recommend that the Santa Cruz County and/or California Coastal Commission permit conditions and compliance for the bluff top retaining wall and bluff toe seawall be fully understood before conducting any maintenance work. It

Project No. SC11778
4800 Opal Cliff Drive
23 June 2020
Page 7

would be prudent to consult with a land use planner or counsel with experience in coastal development permits if any of this is unclear.

If you have any questions concerning this letter, please call our office.

Respectfully Submitted,

HARO, KASUNICH AND ASSOCIATES, INC

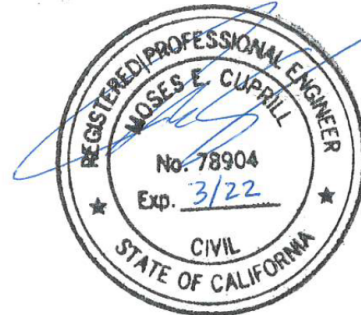
Brian Shedden, P.E.
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Attachments: Appendix A: Site Inspection Photos

Copies: 3 to Addressee (+ pdf to David Mewes <dmewes1@yahoo.com>)
1 to Soil Engineering Construction, Inc (electronic copy only)



Project No. SC11778
4800 Opal Cliff Drive
23 June 2020
Page 8

APPENDIX A
Site Inspection Photos



Photo 1: 4800/4790 Opal Cliff Drive Property Line View - 26 May 2020



Photo 2: Close up of shotcrete, bedrock, rebar debris to be removed - 26 May 2020



Photo 3: Close up of undermined area in need of repair - 26 May 2020



Photo 4: 4800/4820 Opal Cliff Drive Property Line View - 26 May 2020



Photo 5: Close up of undermined area in need of repair - 26 May 2020



Photo 6: Close up of concrete spalling on bluff toe concrete gravity seawall - 26 May 2020