

June 19, 2025

Project No. 2386-SZ69-B44

Mr. Larry Christen
Opal Cliff East Homeowners Association
Attention: Mr. Larry Christen
4820 Opal Cliff Drive
Capitola, CA 95010

Subject: Response to Review Comments
4820 Opal Cliff Drive Bluff Retreat Mitigation
A.P.N. 034-463-01, 02, 03 and 04
Capitola, California

Reference: Cotton, Shires and Associates, Inc.
Geologic and Geotechnical Peer Review
Project E6175, dated May 23, 2025

City of Capitola
4820 Opal Cliff Drive - #25-0231 – Project Deemed Incomplete
Dated May 28, 2025

Dear Mr. Christen,

As the project geotechnical consultant, we have prepared the following in response to the relevant comments as presented in the above referenced documents, and also to address feedback from the City's geotechnical consultant during a meeting on June 13, 2025.

City of Capitola Comments 5-28-25:

Comment #1. Tie backs that extend from the southeast corner of the project appear to intersect with tie backs that extend from the east side boundary of the property. This is a three-dimensional situation and the tie backs installed first could be impacted by later installed tie backs. Additionally, if there is no impact they will be in close proximity laterally stressing the marine deposit layer areas below the foundation in different directions. Please describe how the potential impact on installation will be avoided and how long-term performance and soil stability will be maintained by this design.

Pacific Crest Response: The angled section of pin pile wall at the southeast corner has been removed from the project, eliminating any potential overlap of tiebacks.

The tieback angle has been increased to 25 degrees and the unbonded zone has been increased from 12 to 20 feet. The bonded zone below the building will therefore lie below the influence zone of the

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building footings, subsequently the tiebacks as presently proposed are not expected to impact the building foundation.

Cotton, Shires Peer Review Comments 5-23-25

Comment #1. **Terrace Deposit Thickness** – *The previous Geotechnical Consultant, HKA, drilled the adjacent property and encountered 23.5 feet of terrace deposits. The current Geotechnical Consultant, PCE, reported 24 feet of terrace deposit material at the site. However, they recommend a retained height of 19 feet for design. The Geotechnical Consultant should clarify their recommended retained height, and justification if less than 24 feet, and their recommended depth to embedment material (Purisima Formation).*

Pacific Crest Response: A design retained height of 19 feet was determined by conservatively assuming 10 feet of bedrock loss with the subsequent laying back of the overlying terrace deposits at an angle of 34 degrees (1.5:1 horizontal to vertical). Based on our (considerable) experience with coastal bluff studies in the Santa Cruz County, 34 degrees is widely considered to be a stable gradient for the terrace deposit materials.

However, following a meeting on June 13 with the City and their 3rd party consultant, Pacific Crest Engineering and RI Engineering were asked to consider the peer review recommendation to increase the retained height to 24 feet and evaluate the resulting change to the pin pile wall design.

Please refer to Figure A for a revised schematic incorporating 24 feet of retained terrace deposit materials and the now proposed wall location of 11.5 feet from the building. The resulting pier depth has been increased from 43 feet to 47 feet, with tieback spacing reduced from 8 feet to 6 feet. In our opinion we find this to be a conservative change to the original design and therefore find it acceptable from a geotechnical standpoint.

Comment #2. **Purisima Formation** – *We note that this repair does not appear to address an apparent weak bedrock plane that the previous failure(s) mobilized on. The recommended 10-foot embedment depth into the Purisima formation may not intersect this weak plane. The current and previous Geotechnical Consultants both indicated that the initial bedrock failure occurred along bedrock discontinuities. The Geotechnical Consultant should discuss and consider the benefits of extending the pin piers below their projection of this weak bedrock plane.*

Pacific Crest Response: It is important to note that the applicant does not own the bedrock portion of the coastal bluff that is the primary driver to long term retreat. The bluff is formed by the process of undermining within the bedrock at the base due to daily and episodic large storm wave abrasion. A notch forms in the bedrock and is driven back gradually until it intersects joint, fracture or fault planes that will allow for slabs of bedrock to peel off or fall or slide down. Presumably the reviewer is talking about the predominant bedrock subvertical jointing pattern that is bluff parallel on spacing between 6" and 5'. Since this current mitigation scheme is entirely focused on retaining the blanket of soil (the Marine Terrace Deposits), the process of bedrock retreat is immaterial to the short-term viability of the system. In the long term, the stability of the pin piers will be threatened as the rock retreats inland. The applicant will have the opportunity to construct something more extensive and robust in the future, stretching across both the soil and bedrock, once the bedrock has retreated more and lies entirely on



their property. Until that time comes, though, the applicant does not have permission to construct anything on the seaward property to arrest the failure of the bedrock.

*Comment #3. **Structural Design** - We have the following comments on the recommendations and structural design:*

- a. **Existing Foundations** - *The Geotechnical and Civil/Structural Consultants should evaluate if the proposed tiebacks will intersect or convey stresses to the existing condominium building foundation.*

Pacific Crest Response: The wall has been moved 6.5 feet landward of the property line, and the angled section of wall length at the south end has been removed. Based on the revised wall location and resulting proximity to the building, we have provided revised tieback design recommendations to RI Engineering as follows:

Tiebacks should be installed at an inclination of 25 degrees horizontal.

Minimum unbonded length of 20 feet.

Minimum bonded length of 38 feet, or as required to resist the design loads, whichever is greater.

Minimum overburden thickness of 15 feet above the center of the bonded zone.

This will result in a minimum of 5 feet (2.5 B) of overburden between the bottom of the perimeter building footing and the unbonded zone, and about 6 feet (minimum) between bottom of footing and the bonded zone. The tiebacks will therefore pass below the influence zone of the building footings and therefore the tiebacks as presently proposed are not expected to impact the building foundation.

The contractor should confirm that 6 feet of overburden below the footings is sufficient to resist impact on the foundation due to grouting pressures in the bonded zone.

- b. **Property Line Constraints** - *The Project Team should consider how the Contractor will access the site and building structure without impacting the adjacent property.*

Pacific Crest Response: Please refer to the June 18, 2025 letter from SEC for the contractor's response to this comment.

Pacific Crest Engineering has revised our Geologic Site Map to include a 34-degree failure line/zone of imminent threat to the building (see Figure B attached). The revised wall location as presently proposed is acceptable from a geotechnical standpoint, provided assumes Pacific Crest Engineering will be present during construction to provide additional recommendations as necessary.



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- c. **Tieback Overburden and Passive Capacity** - The Geotechnical and Civil/Structural Consultants should evaluate if the limited overburden (roughly 4 to 5 feet) is sufficient to develop full tieback capacity given the 12- foot unbonded length and the 10 degree declination. The Geotechnical and Civil/Structural Consultants should also evaluate if tie beam will have adequate passive resistance to resist the tieback.

Pacific Crest Response: See response to 3a above. RI should confirm passive resistance of the grade beam.

- d. **Drill Rig Surcharge** - The Geotechnical and Civil/Structural Consultants should also evaluate if the drill rig and tieback rig loads will trigger bluff failures during construction.

Pacific Crest Response: The evaluation of temporary construction conditions due to the loading, orientation and/or placement of equipment falls under the purview of the Contractor. Please refer to the June 18, 2025 letter from SEC for the contractor's response to this comment.

The opportunity to be of service is appreciated. If you have any questions concerning this response letter, please contact our office.

Very truly yours,

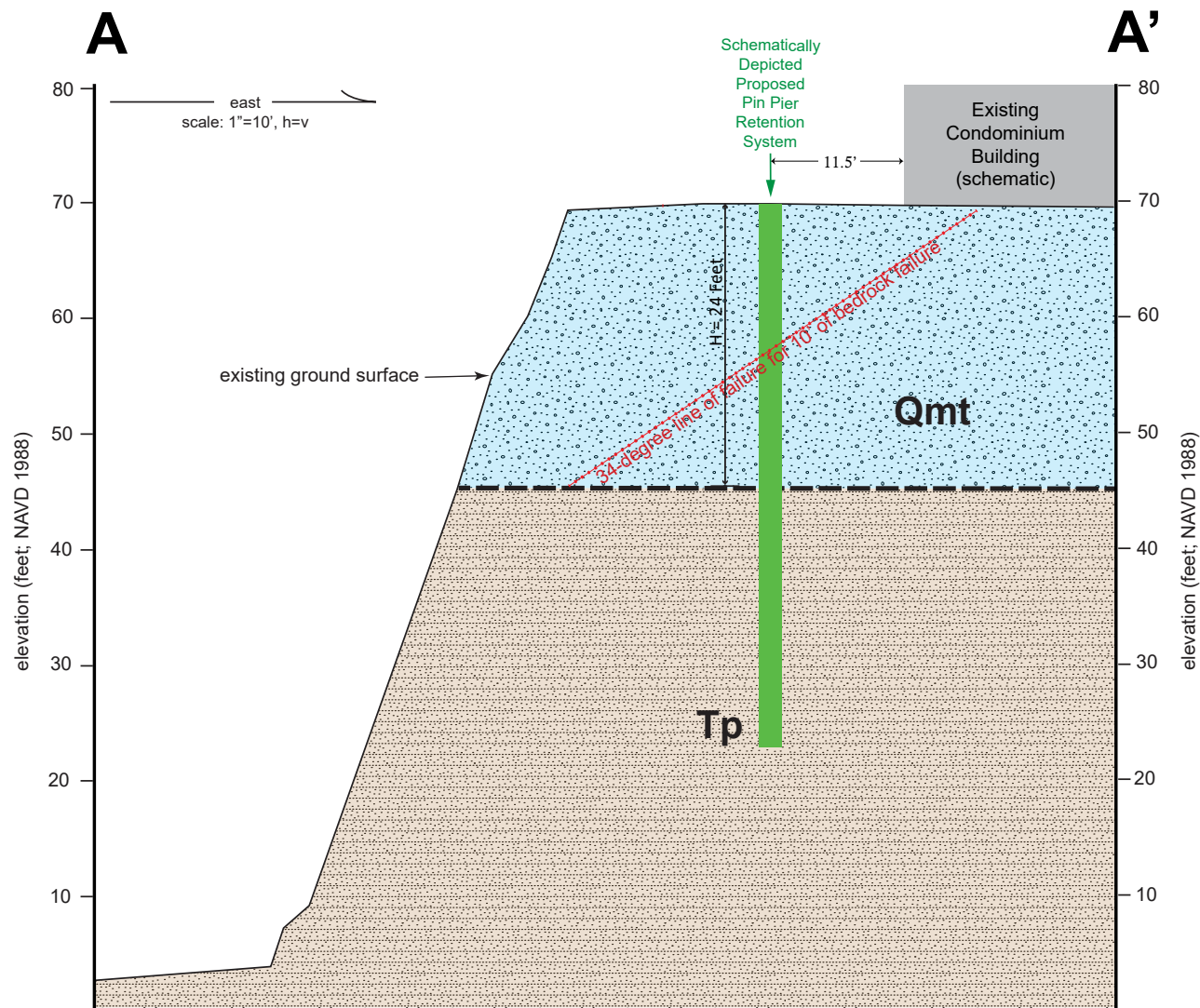
PACIFIC CREST ENGINEERING INC.

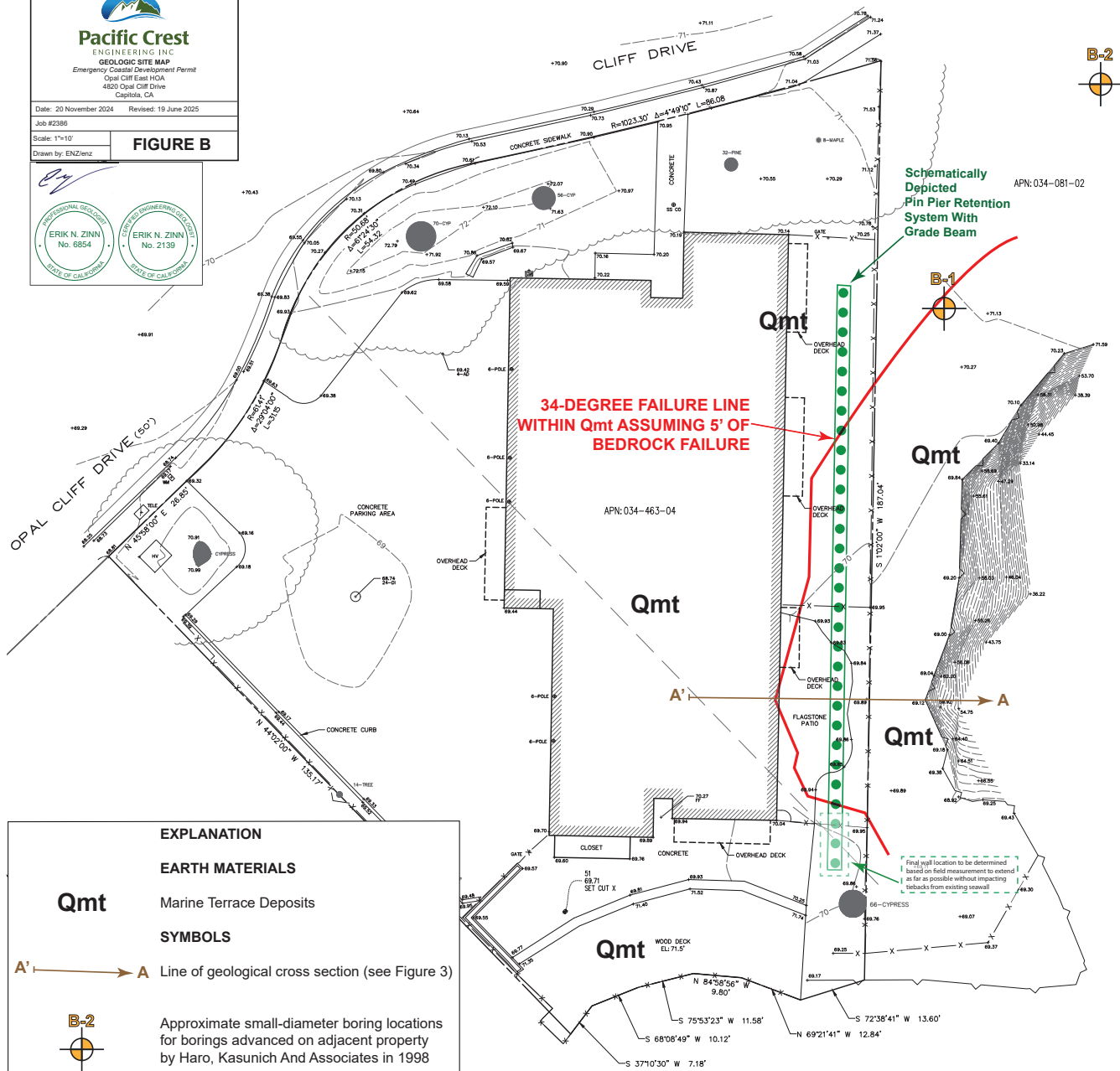


Elizabeth M. Mitchell, GE
Associate Geotechnical Engineer
GE 2718, Expires 12/31/26

Enclosures: Figure A - Cross Section A-A'
Figure B - Revised Geologic Site Map







A graphic scale bar and a compass rose. The scale bar is marked from 0 to 40 feet, with a legend indicating that 1 inch equals 10 feet. The compass rose shows the cardinal directions: North (N), South (S), East (E), and West (W).

BASE MAP: Digitally excerpted from "Topographic Map - 4820 Opal Cliff Drive - City of Capitola - County of Santa Cruz" by Alpha Land Surveys, dated 6-16/2025, intended publication scale 1"=10'