

February 4, 2018

Project No. 0922.1-M242-E12

Revised February 23, 2018

Mr. Steve Tanner, PE
Pueblo Water Resources
4478 Market Street, Suite 705
Ventura, CA 93003

Subject: **Update to Geotechnical Investigation Report**
MPWMD – ASR Site Expansion
Backflush Pit at Santa Margarita Well Site
1910 General Jim Moore Boulevard
Seaside, California

Reference: **Pacific Crest Engineering, Inc.**
Geotechnical Investigation For New Electrical & Chemical Feed Building
Project No. 0922-M242-E12
Dated April 30, 2009

Dear Mr. Tanner,

As requested, we are providing this addendum letter to the referenced geotechnical investigation report that was prepared by our firm in 2009. The purpose for this letter is to evaluate the planned improvements in order to develop geotechnical recommendations pertinent to the proposed pond expansion and update our 2009 report to include the most recent CBC design criteria. The recommendations outlined below are based on our review of the referenced soil report, preliminary grading and drainage plans provided by your firm, and a visit to the site on January 30, 2018.

Based on our review of Preliminary Grading and Drainage Plan and Cross Section sheets dated 4/17/17, it is our understanding that the proposed improvements will consist of expanding the existing backflush pit to the north, construction of a CMU wall adjacent to General Jim Moore Boulevard, and construction of a chemical loading rack along the northwest corner of the expanded pond. Also proposed are construction of two 30" treated water lines and

The north and west side of the expanded pond slopes will be constructed of cut and fill. The east side slopes will be comprised entirely of cuts up to 11 feet in height. The proposed pond slopes are currently designed at 1:1 horizontal to vertical.

The CMU wall will screen views from General Jim Moore Boulevard and will retain inboard fills generated as part of the pond expansion. The proposed chemical loading rack will be supported by a reinforced concrete slab and will be accessed by a new AC roadway the connects to the existing entry road. The

new road and chemical loading rack pad will be underlain by fill ranging from approximately one to five feet in depth.

UPDATED RECOMMENDATIONS

Based on our review of the proposed improvement plans, it is our opinion that, except as modified below, the recommendations of our 2009 geotechnical report continue to remain applicable to this project. All recommendations of the 2009 Geotechnical Report and this Update Report should be closely followed during the design and construction phases of the project. Any unexplained discrepancies between the original report and this update should be brought to the immediate attention of the Geotechnical Engineer for clarification.

In our opinion unreinforced 1:1 horizontal to vertical side slopes for the proposed backflush pit are too steep for long term stability under saturated conditions. Side slopes constructed to these gradients without slope reinforcement will be subject to erosion and sloughing, requiring continued maintenance over the lifetime of the project, and could potentially undermine improvements adjacent to the top of slope.

The proposed pond expansion will require raising existing grades along the north and west sides with up to 4 to 5 feet of fill. In addition, existing grades at the base of the expanded pond will be lowered by about 5 to 6 feet. This will create a condition where the pond slopes will be comprised of cut overlain by fill. As recommended in the soil report, fill slopes to be constructed above cut slopes should be set back a minimum of 8 feet horizontally from the top of the cut slope. This is especially important where structural improvements such as the chemical loading rack, new access roads or new utility corridors will come within close proximity to the pond slopes. Alternatively, the slope below the chemical loading rack pad may be constructed of engineered fill at a maximum gradient of 2:1 horizontal. The fill slope should be constructed in accordance with the recommendations of the 2009 geotechnical report and Figure No. 1 attached.

If space constraints preclude the construction of 2:1 fill slopes, the pond slope below the chemical loading rack area may be constructed at a maximum gradient of 1:1 horizontal to vertical provided the slope is designed and constructed as a reinforced soil slope (RSS) with geosynthetic reinforcing. Please refer to Figure No. 2 for a general schematic of a reinforced soil slope. The geosynthetic reinforcement layers should extend a minimum length of 1.0 times the total vertical height of the RSS system, with vertical spacing not exceeding 2 feet. The reinforcing should be wrapped at the slope face with a minimum 3-foot overlap as shown on Figure No. 2. Final spacing, reinforcing type and length should be determined by the project design professional. All engineered fill should be placed and compacted in accordance with the recommendations of our 2009 report. It is anticipated that the onsite soils will be suitable for use as engineered fill for this project.

Reinforced soil slopes should be constructed where ever structural, roadway and/or pipelines will come within 20 feet of the adjacent slope face, or 10 feet beyond the perimeter of the chemical loading rack pad, whichever is greater. The RSS system should be faced with an erosion control blanket as determined by



the project civil engineer. The performance of erosion control measures should be routinely monitored and areas where the geosynthetic has been exposed should be repaired and replanted.

In other areas of the backflush pit expansion where there is low potential for undermining adjacent improvements consideration should be given to constructing side slopes at gradients no steeper than 2:1 horizontal to vertical. Where site constraints preclude these gradients the Owner should be made aware of the potential for erosion, sloughing and long term instability requiring continued maintenance. As a minimum, erosion control measures should be considered for oversteepened pond slopes.

Pipelines or other utility improvements should be setback a minimum of 15 feet horizontally from the outboard edge of all unreinforced slopes. We note that 30" RW line may be in close proximity to the backcut for a RSS slope below the chemical loading rack pad and this will need to be considered when planning backfill methods for the utility trench. Care should be taken not to damage the reinforcing layers when performing earthwork adjacent to RSS slopes.

The proposed CMU wall may be designed and constructed using the lateral earth pressures and foundation design criteria provided in the 2009 geotechnical report for fully drained conditions.

The following updated CBC design criteria should be used in the design of structural improvements for this project. Structural improvements should be designed and constructed in accordance with the recommendations of the 2009 geotechnical report and the most recent CBC requirements as outlined below.

Table No. 1 - 2016 CBC Seismic Design Parameters¹

Seismic Design Parameter	ASCE 7-10 Value
Site Class	D
Spectral Acceleration for Short Periods	$S_s = 1.471g$
Spectral Acceleration for 1-second Period	$S_1 = 0.529g$
Short Period Site Coefficient	$F_a = 1.0$
1-Second Period Site Coefficient	$F_v = 1.5$
MCE Spectral Response Acceleration for Short Period	$S_{MS} = 1.471g$
MCE Spectral Response Acceleration for 1-Second Period	$S_{M1} = 0.794g$
Design Spectral Response Acceleration for Short Period	$S_{DS} = 0.981g$
Design Spectral Response Acceleration for 1-Second Period	$S_{D1} = 0.529g$
Seismic Design Category ²	D

Note 1: Design values have been obtained by using the Ground Motion Parameter Calculator available on the USGS website at <http://earthquake.usgs.gov/hazards/designmaps/usdesign.php>.

Note 2: The Seismic Design Category assumes a structure with Risk Category I, II or III occupancy as defined by Table 1604.5 of the 2016 CBC. Pacific Crest Engineering Inc. should be contacted for revised Table 1 seismic design parameters if the proposed structure has a different occupancy rating than that assumed.



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This report is issued as an addendum to our April 30, 2009 geotechnical report and should be reviewed in conjunction with that document. Except as modified herein, all recommendations of the April 2009 geotechnical report remain applicable to the design and construction of the project.

We respectfully request an opportunity to review the project plans and specifications during preparation and before bidding to ensure that the recommendations of this report have been included and to provide additional recommendations, if needed. These plan review services are also typically required by the reviewing agency. Misinterpretation of our recommendations or omission of our requirements from the project plans and specifications may result in changes to the project design during the construction phase, with the potential for additional costs and delays in order to bring the project into conformance with the requirements outlined within this report. Services performed for review of the project plans and specifications are considered "post-report" services and billed on a "time and materials" fee basis in accordance with our latest Standard Fee Schedule.

We appreciate the opportunity to be of service. If you have any questions regarding this update letter, please contact our office.

Sincerely,

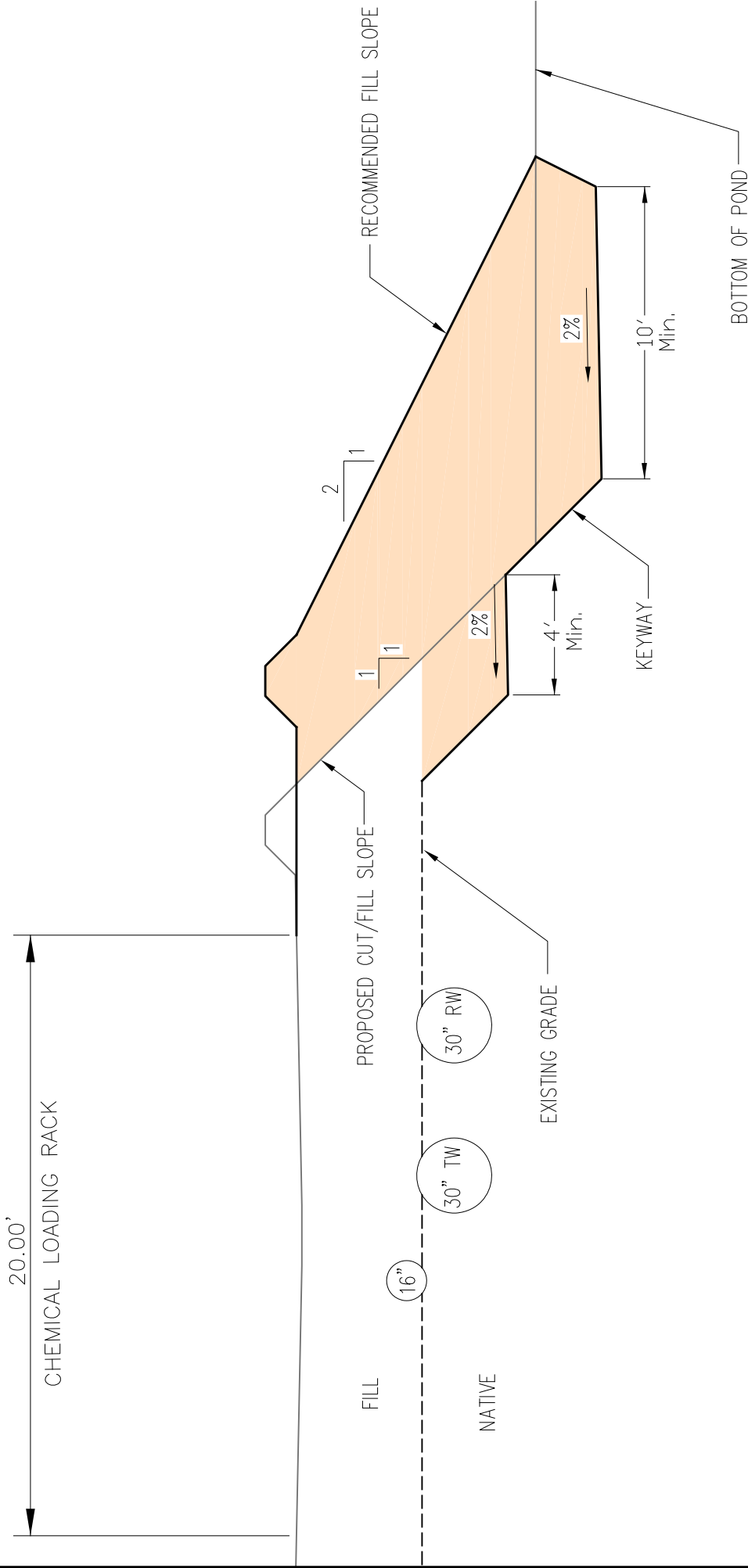
PACIFIC CREST ENGINEERING INC.



Elizabeth M. Mitchell, GE
President/Principal Geotechnical Engineer
GE 2718, Expires 12/13/18

Copies: 2 to Client





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SANTA MARGARITA WELL SITE
 ASR SITE EXPANSION

CROSS SECTION A-A'

Scale:
 1"=5'

Drawn By:
 MJM 2/5/18

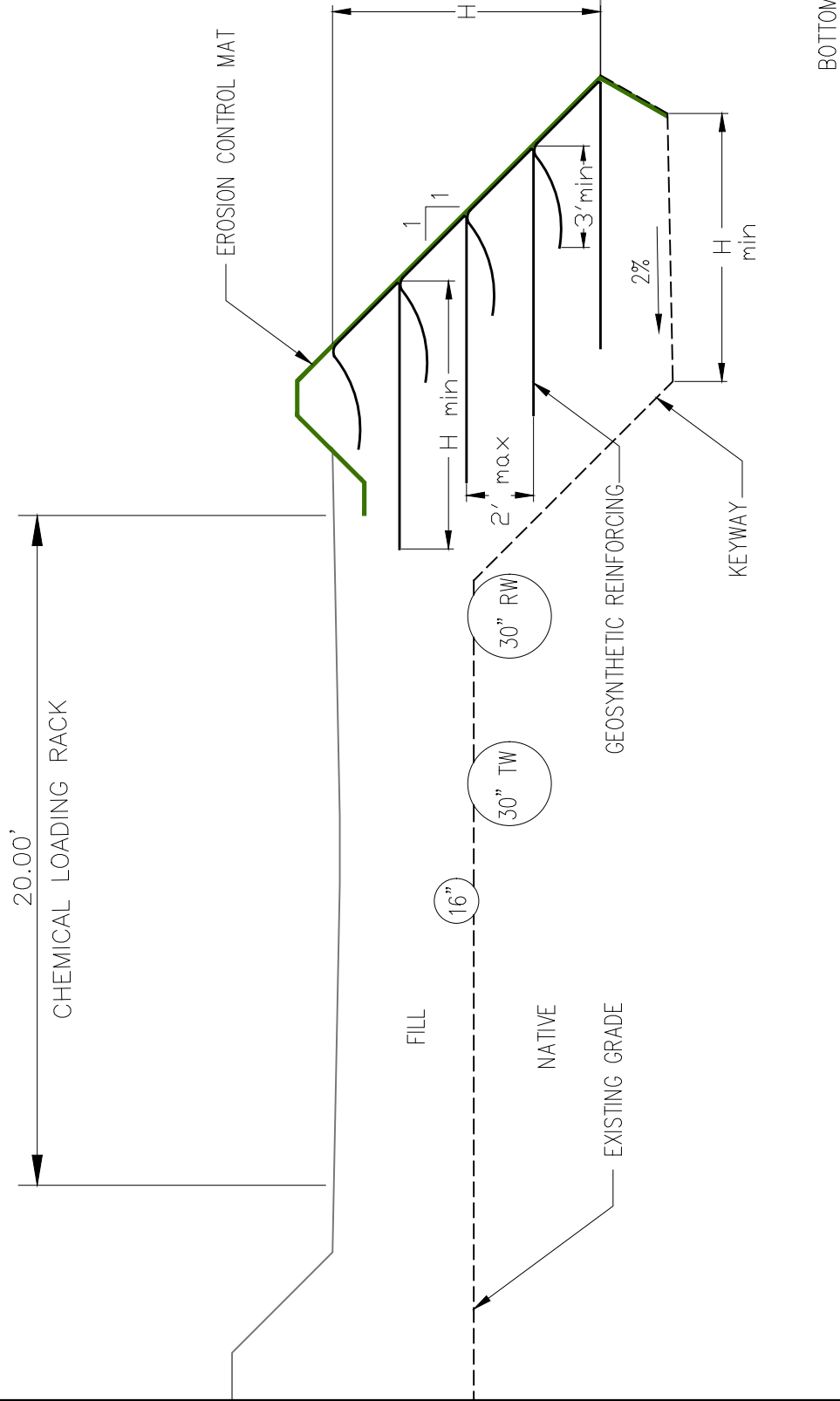
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FIGURE 1



Pacific Crest Engineering Inc.

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SANTA MARGARITA WELL SITE
 ASR SITE EXPANSION

CROSS SECTION A-A'

Scale:
 1"=5'

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FIGURE 2