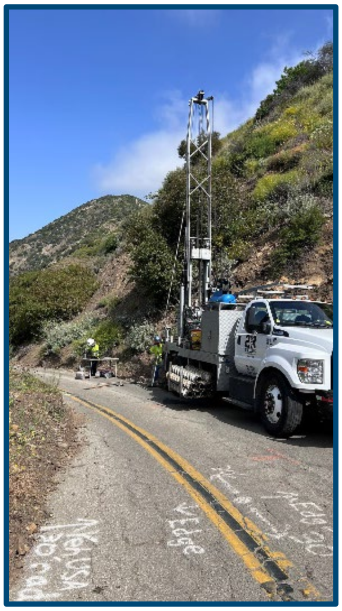
Preliminary Geotechnical Report

Matilija Canyon Road Storm Damage, Approximate Mile Post 0.3 to 0.7, Ojai (Ventura County), California

Yeh Project No.: 223-274

September 25, 2024



Prepared for:

Ventura County Public Works Agency
800 S. Victoria Avenue
Ventura, California 93009
Attn: Mr. Joshua Patricio

Prepared by:

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Attn: Mr. Joshua Patricio

Subject: **Preliminary Geotechnical Report, Matilija Canyon Road Storm Damage, Approximate Mile Post 0.3 to 0.7, Ojai (Ventura County), CA**

Dear Mr. Patricio:

Yeh and Associates, Inc. is pleased to submit this preliminary geotechnical report with recommendations for alternatives to improve and restore the roadway following storm damage along Matilija Canyon Road between approximately Mile Post 0.3 and 0.7 in Ojai, California. This report was prepared in accordance with our professional services agreement AE24-031, dated March 6, 2024.

The geotechnical evaluation consisted of a program of field exploration, review of available geotechnical data, laboratory testing, and preliminary analyses. Field and laboratory data collected for this study are attached to the report with a graphic showing the locations of the field explorations.

We appreciate the opportunity to be of service. Please contact Loree Berry at 805-440-0966 or Lberry@yeh-eng.com if you have questions or require additional information.

Sincerely,
YEH AND ASSOCIATES, INC.

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1. PURPOSE AND SCOPE OF WORK

Yeh and Associates was retained by Ventura County Public Works Agency (County) to provide geotechnical recommendations for the repair and restoration of an approximately 1/3-mile section of Matilija Canyon Road (MCR) in the Ojai area of Ventura County, California. The location of the site is shown on Figure 1.

The geotechnical evaluation consisted of project coordination, review of previous geotechnical data available for the project site, field exploration, laboratory testing, and preliminary engineering analyses as a basis for providing the recommendations in this report. This report provides preliminary alternative recommendations and management strategies to restore and protect a minimum 18-foot travel width of MCR, and corrosion data.

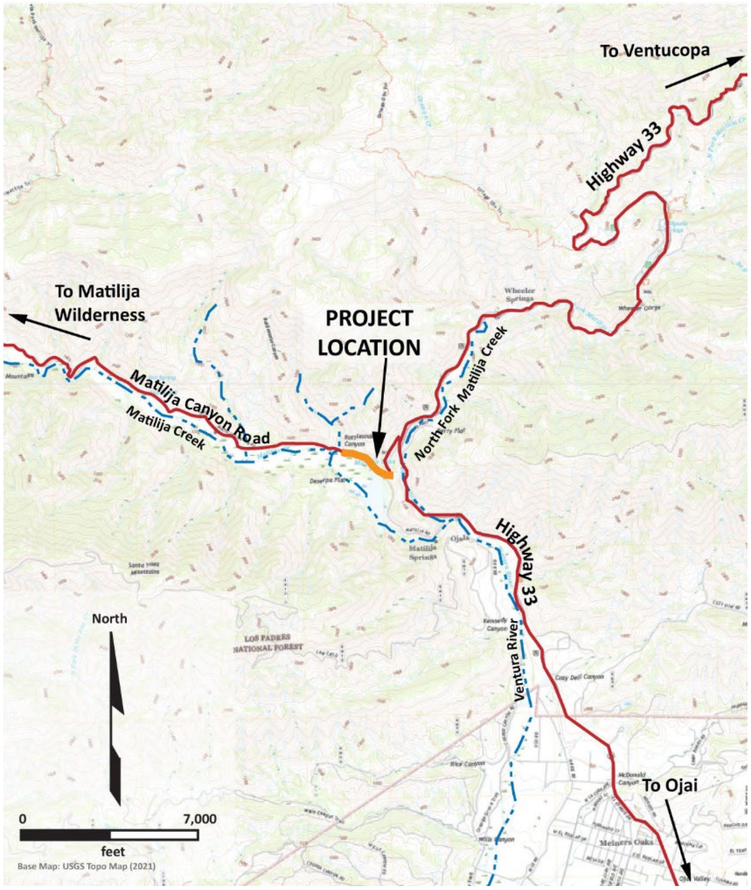


Figure 1: Vicinity Map

2. PROJECT UNDERSTANDING

MCR is a County maintained roadway that was constructed prior to 1947 and extends approximately 3.28 miles on the westerly side of State Highway 33. MCR services approximately 60 residences and ends in Los Padres National Forest wilderness. MCR is the only maintained roadway for the residents to reach the state highway and services. The maintained roadway width is 18 feet.

2.1 PROPOSED PROJECT

The County has requested that Yeh evaluate the site conditions and provides preliminary recommendations for mitigation alternatives to restore the roadway and management strategies to maintain it. This geotechnical report provides a description of and preliminary recommendations for the alternative options to improve the project alignment based on review of available geotechnical information and a limited geotechnical investigation. Final design of selected repair solutions may require additional exploration and testing, depending on the selected alternative and existing conditions at the time of final design.

The County is seeking FEMA emergency funding to finance the final design and construction for the project. The County will prepare plans to show site topography, drainage easements, and right of way.

2.2 EXISTING SITE DESCRIPTION

MCR was generally constructed by cutting into the hillside that extended from the existing ridgeline above MCR down to the northern bank of Matilija Creek. Segments of the existing road are also supported on previously placed fill built up from below the roadcut to create enough road width. The hillside cuts along the project segment generally resulted in “oversteepened” slope conditions that are typically prone to erosion, shallow slope instability, creep of fine-grained fill soil, and rockfall. Unstable areas within the fill slopes supporting MCR are generally related to deteriorated roads and associated adverse drainage conditions, poor fill placement and/or erosion of unvegetated rock faces. Two drain pipes are visible on the downhill slope with inlets along MCR. The County performs regular maintenance and repairs along MCR to mitigate and manage storm damage. The County’s maintenance program generally maintains two lanes of traffic for an approximately 18-foot-wide roadway to allow emergency access. Storm damage that occurred during the winters of 2023 and 2024 has eroded portions of the project segment such that a relatively narrow single lane exists in some areas. Continued erosion without additional mitigation or management could result in the loss of road supported by the descending slopes below the road and the accumulation of eroded material and landslide debris from the ascending slope above the road, that may become unmanageable for the County. Slopes susceptible to erosion and slope instability associated with landsliding, particularly during relatively intense storm events or strong seismic events, could result in impacts to the roadway that impede safe and reliable vehicular access along MCR. Appendix A presents selected aerial photos and unmanned aerial survey (aka drone) photos showing representative conditions along the project.

2.3 SUMMARY OF PROJECT SEGMENTS

The project is divided into five segments for this report, designated A through E, for the purposes of describing the geologic conditions and recommendations for the project. Table 1 summarizes the topographic and geologic characteristics of each segment and a brief description of the types of erosion observed within that segment. Figure 3 shows an annotated drone photograph of the project alignment (facing north) that depicts those segments by color.

Table 1: Summary of Project Segments

Condition ID	Approx. County MP	Description of Existing Erosion/Unstable Condition
A	0.36 to 0.45	Several feet of outer shoulder/lane are undermined. Existing Fill slope. Roadway cracks show distress throughout the eastbound lane.
B	0.45 to 0.49	Several feet of outer lane are undermined. Existing Cut Slope. Roadway cracks show distress throughout the eastbound lane. Travelable lane width reduced .
C	0.49 to 0.55	Supported by steel crib wall on downslope side, construction date unknown. Less erosion than other segments, large void below the roadway (see Appendix A Photos)
C*	0.55 to 0.57	Supported by steel crib wall on downslope side, construction date unknown. Erosion above the road is depositing material on inside shoulder and lane.
D	0.57 to 0.60	Across natural drainage. Slope failure upslope and downslope of road. Area of concrete blocks visible below road and likely used for emergency fill repair.
E	0.60 to 0.68	Erosion of upslope cut depositing material onto road. Area of concrete blocks visible below road and likely used for emergency fill repair. Undermining of road in areas.

Figure 2: Project Segments

3. FIELD EXPLORATION AND TESTING

A subsurface investigation consisting of hollow-stem auger and rock coring was conducted on May 5 and 6, 2024. The boring locations are shown on Plate 1. The logs of the borings are presented in Appendix B.

3.1 DRILLING

The drilling subcontractor for this project was 2R Drilling of Chino, California. 2R used a CME75 track-mounted drill rig equipped for hollow-stem auger and rock coring. Five borings were drilled to depths of approximately 15 to 30 feet below the ground surface on May 5 and 6, 2024. The borings 23B-01 to 23B-03 were drilled through the existing pavement structural section and borings 23B-04 and 23B-5 were drilled through the existing ground surface. The sides of the borehole were then scraped by the Yeh field geologist, and the thickness of the existing asphalt pavement was measured and recorded on the logs. Yeh personnel logged the subsurface conditions encountered during the drilling, secured soil and rock samples for subsequent laboratory testing. The samples intervals, a description of the subsurface conditions encountered, field tests, blow counts (N-values) recorded during drive sampling, and percent recovery are presented on the logs.

Sampling within the borings was performed by driving either a modified California or standard penetration test (SPT) split spoon sampler at typical 5-foot intervals. The SPT sampler has a 2-inch outside diameter, 1-3/8-inch inside diameter and is equipped for but was used without liners. The modified California sampler has a 3-inch outside diameter, 2-3/8-inch inside diameter and was used with 1-inch-high brass liners. Drive samples were collected using a 140-pound automatic trip hammer in accordance with ASTM D-1586 (the Standard Penetration Test) procedures. The hammer had an assumed efficiency of 80 percent. Bulk samples of the subgrade soil were collected from the augers at the depth intervals noted on the logs.

Continuous coring using the CME Continuous Sample Tube system was performed in rock encountered in 24B-01, 24B-02 and 24B-05 once drive sampling met practical refusal. The CME coring system was used to collect approximately 3-inch diameter disturbed core samples. Core was collected in typical 5-foot runs and recovered from the hole using a hex rod retriever system. Select samples for laboratory tests were taken from recovered core.

Upon completion, the borings were backfilled with approved native fill material collected from the auger cuttings and mixed with cement. Road patches consisted of hand-mixed rapid set concrete dyed black.

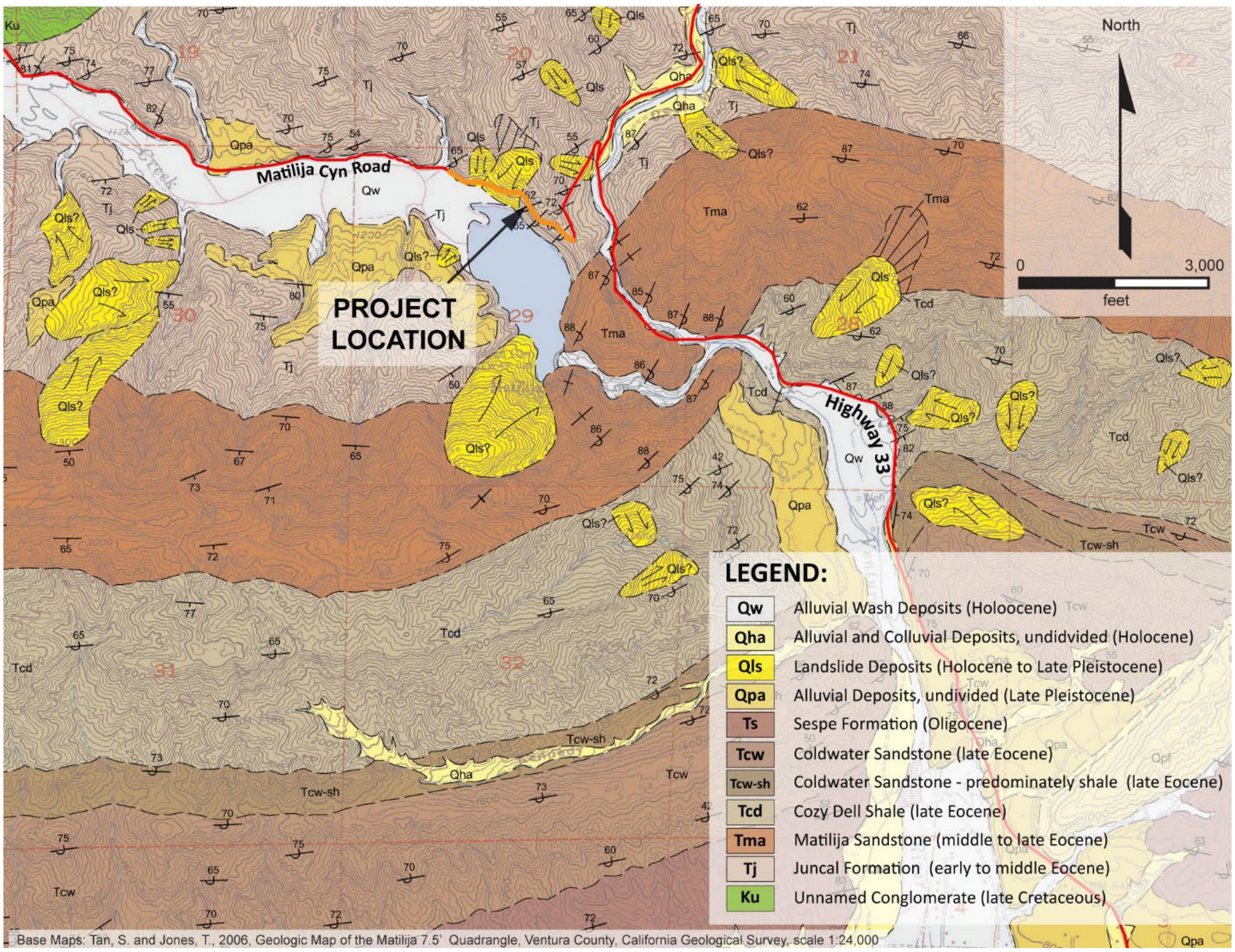
3.2 LABORATORY TESTING

Laboratory testing was performed on selected samples recovered from the field exploration program. Tests for moisture content, unit weight, particle size distribution by sieve analysis, Atterberg Limits, pH and resistivity were performed at our office and laboratory in Ventura, California. Laboratory tests for Proctor compaction, direct shear and unconfined uniaxial compressive strength test of rock were performed by the GEO-E lab at the Cal Poly Civil Engineering Department in San Luis Obispo, California. Sand equivalent testing was performed by Union Materials Testing (UMT) laboratory in

Oxnard, California. Tests for soluble sulfates, chlorides, and pH and resistivity were performed by Cooper Testing Laboratory in Palo Alto, California. The results of laboratory tests are presented in Appendix C. Testing was performed in accordance with ASTM and Caltrans test methods as noted on the lab reports. After the completion of the laboratory testing, the field descriptions were confirmed or modified as necessary on the boring logs.

3.3 GEOLOGIC SETTING

The project site is located within the western portion of the Topa Topa Mountains, in the Western Transverse Ranges Geomorphic Province (WTR) of California. The WTR province is characterized by east-west trending reverse-faults and compressional folds resulting from ongoing north-south transpression. Regional surface geology, as mapped by Tan and Jones (2006), is shown on Figure 2. The surface geology at the project location is mapped as early to middle Eocene age Juncal Formation (Tj) and described by Tan and Jones (2006) as: “micaceous shale with arkosic sandstone interbeds; generally susceptible to landsliding”. Tan and Jones (2006) mapped Holocene to Late Pleistocene age landslide deposits along the western half of the project alignment.



Base Maps: Tan, S. and Jones, T., 2006, Geologic Map of the Matilija 7.5' Quadrangle, Ventura County, California Geological Survey, scale 1:24,000

Figure 3: Geologic Map

3.4 SUBSURFACE CONDITIONS

The borings encountered two predominant units: existing artificial fill (Af) and Juncal Formation bedrock. The approximate locations of the borings are shown on Plate 1. Descriptions of the units encountered are summarized below.

Artificial Fill (Af). Artificial fill was encountered in borings 23B-01 to 23B-03 at the site. Approximately 3 to 6 inches of asphalt pavement was encountered in borings 23B-01 to 23B-03. The pavement materials were underlain by embankment fill that was encountered to depths of approximately 6 feet below the road surface. The embankment fill consisted of very dense to medium dense silty, clayey gravel with sand. Juncal formation bedrock was encountered below the artificial fill.

Juncal Formation (Tj). Sedimentary bedrock of the Juncal Formation was encountered in borings 24B-01 through 24B-05 to the maximum depths explored, approximately 15 to 30 feet below the road or ground surface. The rock generally consisted of decomposed to slightly weathered, soft to hard, intensely to very intensely fractured shale with some interbeds of siltstone and hard to very hard sandstone.

A summary of the laboratory test results for the two geologic units encountered is presented in Table 2 below:

Table 2: Geotechnical Properties Test Summary[1]

Geologic Unit	Locations	Dry Unit Wt. (pcf) and Moisture	Particle Size Analyses	Atterberg Limits	Corrosion	Strength Parameters	Other
Artificial Fill (Af)	23B-01 23B-02 23B-03	γ_d: 109 w_o: 8%	43-80% G 6-30% S 14-18% F	22 LL 6 PI	pH = 7.58-7.87 ρ = 2001-2989 Ω-cm SO_4^{2-}= 13-29 mg/kg Cl^-= <2 mg/kg	ϕ'_{ds} = 43° c'_{ds}= 0 ksf (remolded)	$\gamma_{d,\,MAX}$: 131 w_{opt}: 12%
Juncal Formation (Tj) - Shale	23B-01 to 05	γ_d: 113 w_o: 6%	28% G 58% S 15% F	--	pH = 7.68 ρ = 1730 Ω-cm SO_4^{2-}= 25 mg/kg Cl^-= <2 mg/kg	ϕ'_{ds} = 43° c'_{ds}= 0.2 -0.3 ksf (remolded)	$\gamma_{d,\,MAX}$: 134 w_{opt}: 12%
Juncal Formation (Tj)	Loose Boulder		--	--	--	UC = 11.7-14.8 ksi	$\gamma_{d,\,Total}$: 151-158

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[1] Geotechnical properties are noted for dry unit weight (γ_d);moisture content (w_o); Maximum Dry Unit Weight ($\gamma_{d,\,MAX}$); Optimum Water Content (w_{opt}); particle size as percent gravel (G), sand size (S) and fines content (F); electrical resistivity (ρ) in ohm-centimeters (Ω-cm), soluble sulfates (SO_4^{2-}), soluble chlorides (Cl^-), Atterberg liquid limit (LL) and plasticity index (PI); friction angle (ϕ) or cohesion (c) in kips per square foot measured from direct shear (ds) in kip per square inch (ksi), unconfined uniaxial compression (UC) in kips per square inch, Sand Equivalent Value (SE)

Geologic Unit	Locations	Dry Unit Wt. (pcf) and Moisture	Particle Size Analyses	Atterberg Limits	Corrosion	Strength Parameters	Other
– Sandstone Boulder							

3.5 GROUNDWATER

Groundwater was not encountered in the borings to the maximum depths explored (approximately 30 feet below the ground surface) during the May 2024 field exploration program. The water surface elevation of the flow in Matilija Creek was approximately 1,100 feet along the project alignment in May 2024 (Ventura County Topography, June 7, 2024). We did not observe springs on the slopes during the field investigation. Water levels and soil moisture conditions will vary seasonally and in association with changes in precipitation, runoff, and other factors.

3.6 SELECT FILL BORROW SOURCE – RATTLESNAKE CANYON

A composite bulk sample was collected on the north side of MCR at Rattlesnake Canyon, as shown on Plate 1. The bulk sample consisted of alluvial soil and talus derived from the Juncal Formation exposed upslope. The material was collected from within an alluvial fan of sediment that is deposited at the bottom of the Rattlesnake Canyon drainage, approximately 400 feet west of the project alignment. Laboratory testing was performed on a the composite bulk sample to evaluate the potential borrow site's suitability as a fill source for reinforced embankment fill.

Table 3: Geotechnical Properties Test Summary (Rattlesnake Canyon Borrow Source)

Geologic Unit	Locations	Dry Unit Wt. (pcf) and Moisture	Particle Size Analyses	Atterberg Limits	Corrosion	Strength Parameters	Other
Borrow Source (Rattlesnake Canyon)	Composite Bulk (0-3')	--	52% G 35% S 5% F	--	pH = 7.62 ρ = 1540 Ω-cm SO_4^{2-}= 92 mg/kg Cl^-= <2 mg/kg	ϕ'_{ds} = 43° c'_{ds}= 0.3 ksf (remolded)	$\gamma_{d,\,MAX}$: 127 W_{opt}: 11% SE: 63

4. GEOTECHNICAL RECOMMENDATIONS

4.1 DESIGN CONCEPTS AND ALTERNATIVES

Yeh submitted a Preliminary Geotechnical Memorandum, dated June 24, 2024, that provided a summary of the site conditions and considerations for design alternatives along the project. Table 4 provides a summary of the anticipated mitigation strategies for each project segment based on the results of our field exploration program and discussions with the County. Descriptions and typical details for the alternatives are described below. Right of way limits shown on the figures below are estimated based on our review of the County's 2023 and 2024 project specific topography, site observations, and the requirement to a minimum road width of 18 feet. The improvements shown are conceptual and should be considered an example of a typical section for the proposed alternative.

These concepts are intended to repair, stabilize, and protect the existing roadway on its current alignment to establish a minimum road and shoulder width and reduce the potential for further erosion, creep, shallow slope instability, or rockfall. An avoidance strategy that typically consists of re-aligning the roadway to reduce the potential for geologic hazard impacts was not considered practical for the project. The alternatives presented are based on our experience and past road and highway projects where roadways have been impacted by similar conditions. It may be that a combination, modification, or alternative to those discussed is selected for design for reasons of cost, environmental impacts, right of way, scheduling or other design considerations. Yeh can evaluate other alternatives or provide additional evaluation of these alternatives for the project, if requested.

Table 4: Summary of Recommended Mitigation Strategies

Segment	Avoid	Stabilize	Protect – ascending slope	Protect – descending slope	Manage
A	n/a	Geosynthetic Reinforced Embankment (GRE)	Anchored mesh	Erosion control matting/re-vegetation	Rigid barrier with rockfall fencing
B	n/a	Soldier Pile and Lagging Wall	Anchored mesh	Anchored mesh	Rigid barrier with rockfall fencing
C	n/a	Repair void below pavement	Anchored mesh	Erosion control matting/re-vegetation	Rigid barrier with rockfall fencing
C*	n/a	n/a	Anchored mesh	Erosion control matting/re-vegetation	Rigid barrier with rockfall fencing
D	n/a	Soldier Pile and Lagging Wall	n/a	Erosion control matting/re-vegetation	Rigid barrier with rockfall fencing
E	n/a	Geosynthetic Reinforced Embankment (GRE)	n/a	Erosion control matting/re-vegetation	Rigid barrier with rockfall fencing

4.2 GEOSYNTHETIC REINFORCED EMBANKMENT (SEGMENTS A AND E)

A geosynthetic reinforced embankment (GRE) is recommended along the eastbound side of the existing roadway for Segments A and E to restore the fill slope supporting the road and shoulder. Figure 4 presents a concept for a geosynthetic reinforced embankment relative to the existing slope cross section through Segment A. Construction of the GRE would include removal of the existing embankment material that is susceptible to creep-type movement and underlying soil susceptible to erosion and slope instability associated with landsliding.

The GRE embankment would be constructed on a firm or stable base within the existing fill or Juncal Formation bedrock. The new slope would be reconstructed using a non-plastic import fill with geosynthetic reinforcement and subsurface drainage to improve slope stability and reduce the potential for post-construction creep of the embankment. The excavation should remove at least the outer 6 feet from the slope face. Geogrid reinforcement is typically placed in layers extending a minimum of 5 feet from the slope face to reduce the potential for surficial instability. Additionally, the finished slope face should be covered with a minimum 3-year-life erosion control matting and should be planted with plants and/or grasses that have deep rooting and will help resist surface erosion. The embankment can be designed to conform to existing slopes. The geosynthetic reinforced embankment backfill should be drained as shown on Figure 4 and connected to an outlet that drains downslope of the GRE.

The GRE solution is typically the least expensive alternative of those presented in this report; however, construction of a GRE is an earthwork operation that typically involves ramping down into the area of the excavation limits shown in Figure 4. The construction typically requires 24-hour closure of the work area that includes at least the existing shoulder and a portion of the eastbound

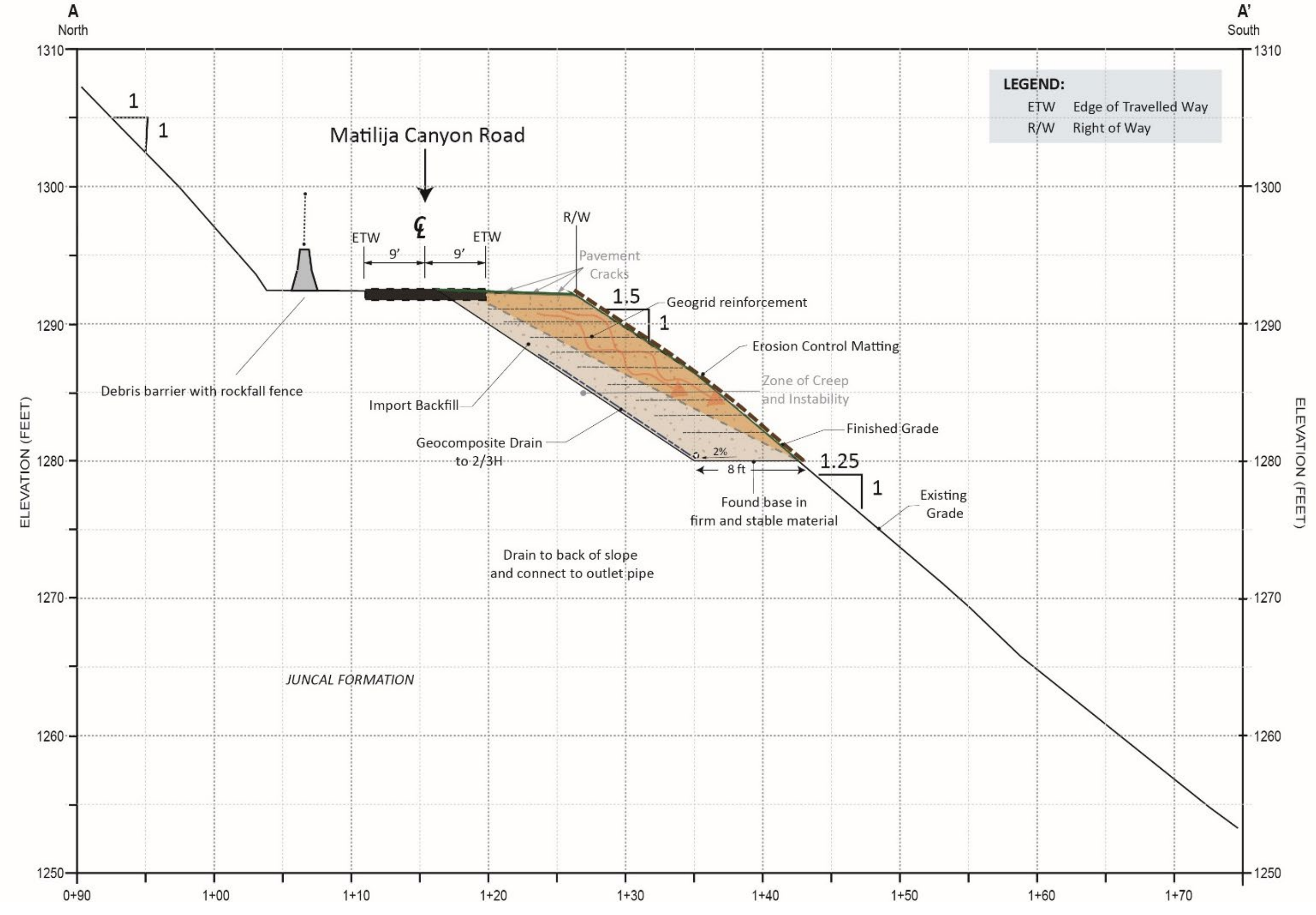

Figure 4: Geosynthetic Reinforced Embankment (GRE) Concept

lane for the duration of construction (likely on the order of 15 to 30 working days). The exact limits of the excavation will vary based on existing right of way width, the estimated depth of unstable material, and slope stability analyses to estimate reinforcement length, spacing, and strength that should be performed for design of the improvements.

4.3 SOLDIER PILE AND LAGGING WALL (SEGMENTS B AND D)

An unanchored, soldier pile and lagging retaining wall could be designed along the eastbound side of the existing roadway to restore the slope along Segments B and D. Figure 5 presents a concept for the soldier pile wall relative to the existing slope cross section through Segment B. Construction of the soldier pile wall would consist of top-down construction methods that would support the roadway during construction. Construction would include drilling vertical holes along the shoulder or eastbound lane (typically 6 to 8 feet on center), placing steel H-piles in the holes, backfilling the holes with concrete, and excavating the outer portion of the slope from the top down to place lagging between the H-piles. Treated timber lagging is typically used as lagging elements; however, concrete lagging elements could also be used to provide additional fire resistance. Alternatively, reinforced formed concrete or shotcrete could be used to face the timber lagging.

Geocomposite drain strips should be placed behind the lagging and connected to an outlet pipe that drains downslope of the wall. A guardrail could also be incorporated in this alternative. The soldier pile wall alternative is typically more expensive than a geosynthetic reinforced embankment ; however, the soldier pile wall would not require a 24-hour lane closure for the eastbound lane of MCR. The road could be open to traffic outside of working hours. This alternative would also reduce the required amount of excavation and import material compared to the GRE alternative. Soldier pile wall construction would likely result in less potential impacts to the existing utilities and existing drainpipes. A portion of the eastbound side of the road would be needed for construction access.

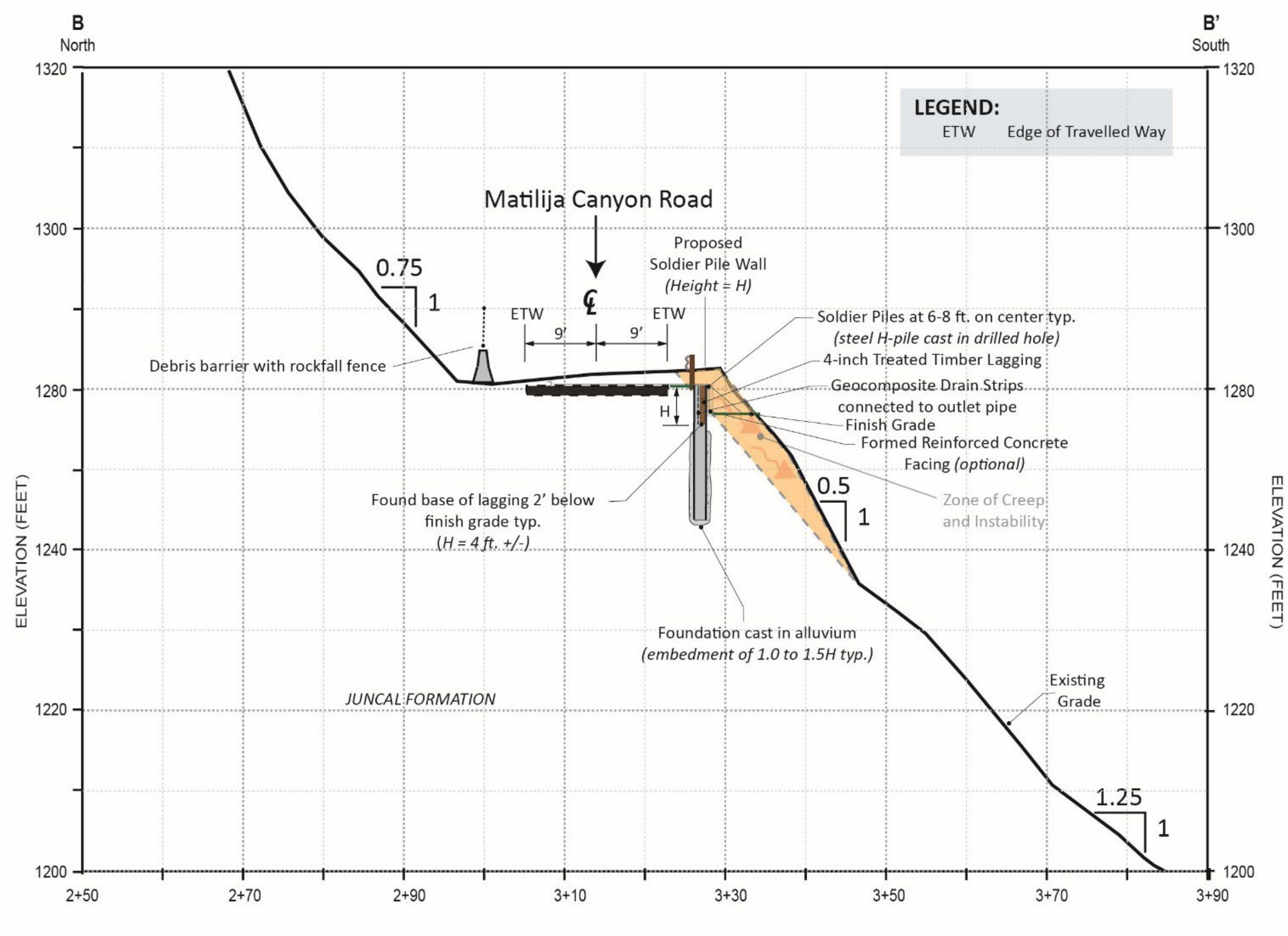

Figure 5: Soldier Pile Wall Concept

4.4 ANCHORED MESH

Anchored mesh slope facing is proposed to reduce erosion and maintenance associated with the cut slopes upslope of MCR that deposit slide debris and rockfall on the road along most of the project alignment. Anchored mesh is also recommended below the soldier pile wall along Segment B, where unvegetated bedrock is exposed below MCR.

Figure 6: Example of Anchored mesh slope facing prior to hydroseeding

Anchored wire mesh is a flexible slope facing that provides passive slope stabilization. The mesh typically improves surficial stability and reduces the potential for erosion. The mesh system consists of steel wire mesh anchored to the slope using ground anchors, erosion control matting placed beneath the wire mesh, and seeding. Anchor plates are secured to the mesh at the head of the ground anchors. Figure 6 shows a newly installed anchored mesh system prior to hydroseeding. Loose and unstable soil is removed, and existing vegetation pruned before placing the mesh.

The most effective system will have maximum contact between the ground and mesh. That ground contact is established with gravity grouted ground anchors that extend beyond the weathered outer zone of the slope and are embedded within competent material.

4.5 ROCKFALL FENCING

Rockfall consisting of sliding talus and rolling or bouncing cobbles and boulders is common upslope of MCR. The County typically maintains this condition by removing rockfall debris from the roadway and by placing rigid concrete barriers (i.e. K-rail) in some areas along the westbound shoulder. Rockfall fencing is recommended along the westbound shoulder of the project alignment to reduce the potential for rockfall to impact the roadway and facilitate the County's management program, which would likely consist of periodic removal of debris that will accumulate behind the barrier, particularly following relatively intense storm events.

There are a wide variety of rigid and flexible rockfall fencing systems available and commonly used along transportation corridors. It is anticipated that the County prefers to utilize a rigid barrier system due to cost and ease to replace, when damaged. A flexible rockfall fence embedded in the barrier would add height to the system and would likely result in less impacts associated with rockfall and lower long-term roadway maintenance costs. The barrier should be set back from the toe of the slope, if possible, to provide a rockfall catchment and clean out area. Figure 7 shows an example of a common temporary rockfall barrier system consisting of both a rigid barrier and flexible rockfall fence.

Figure 7: Example of temporary rockfall fence consisting of a debris fence panel embedded into a concrete barrier (credit: Geobrugg)

4.6 EROSION CONTROL MATTING AND RE-VEGETATION

Erosion control matting and seeding is recommended to re-establish vegetation along unvegetated soil slopes and newly graded cut or GRE fill slopes to reduce the potential for surface erosion.

4.7 SURFACE DRAINAGE IMPROVEMENTS

Final design of the project improvements should include a review of the current surface drainage, and measures for improved drainage provisions on MCR that will reduce the potential for stormwater to overtop the existing shoulder berms or runoff on the slopes below the road. Additional geotechnical evaluation will be needed to develop recommendations for design.

4.8 EXISTING UTILITIES AND DRAINS

Existing water, gas, and communication utility lines may be present along the project alignment. Additionally, buried storm drainpipes cross MCR, roughly perpendicular to the project alignment. Design of the final selected alternatives will need to consider the presence of and potential impacts to the existing utilities and buried drainpipes.

5. CORROSION TEST RESULTS

Selected samples from the field exploration programs were tested for pH, resistivity, soluble sulfates and soluble chlorides. Results are presented in Appendix C. The results of the testing of four soil samples collected from the borings at depths ranging from approximately 0 to 5 feet below the ground surface are summarized as follows:

- pH: 7.58 to 7.87
- Resistivity: 1,540 to 2,989 ohm-centimeters
- Soluble sulfates: 13 to 92 ppm
- Soluble chlorides: <2 ppm

Caltrans Amendments (2019) state that "a site is considered to be corrosive if one or more of the following conditions exist for the representative soil and/or water samples taken at the site: chloride concentration is 500 ppm or greater, sulfate concentration is 1,500 ppm or greater, or the pH is 5.5 or less." The Caltrans Amendments (2019) also state that "soil, water, or site conditions that have a minimum resistivity equal or less than 1,100 ohm-cm shall be considered as indicators of potential pile corrosion or deterioration." Based on Caltrans test methods and standards, the soil samples tested are not considered corrosive towards concrete. Final design of the project should consider corrosivity test results using appropriate design standards Caltrans and the California Building Code.

6. LIMITATIONS

Yeh prepared this report for <CLIENT> and their authorized agents only. It is not intended to address issues or conditions pertinent to other parties, projects or for other uses. This report is for preliminary planning purposes only and is not intended for use in final design or construction. The results of this study are preliminary and subject to change pending the results of our design-level field exploration and geotechnical evaluation. No services have been performed to evaluate environmental impacts, or the presence of hazardous or toxic materials.

Site conditions will vary between points of observation or sampling, seasonally, and with time. The nature and extent of subsurface variations across the site may not become evident until excavation is performed. If during construction, fill, soil, or water conditions appear to be different from those described herein, Yeh should be advised and provided the opportunity to evaluate those conditions and provide additional recommendations, if necessary.

7. REFERENCES

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Borrow Site: From slope on North side of Matilija Road in Rattle Snake Canyon.

Segment ID	Approx. Length (feet)	Approx. County MP	Description of Existing Erosion/Unstable Condition
A	460	0.36 - 0.45	Several feet of outer shoulder/lane is undermined. Existing Fill slope. Roadway cracks show distress throughout the eastbound lane.
B	160	0.45 - 0.49	Several feet of outer lane is undermined. Existing Cut Slope. Roadway cracks show distress throughout the eastbound lane. Lane width compromised.
C	355	0.49 - 0.55	Supported by steel crib wall on downslope side, construction date unknown. Less erosion than other segments, large void below the roadway (see Appendix A Photos)
C*	105	0.55 - 0.57	Supported by steel crib wall on downslope side, construction date unknown. Material from slope above the road is depositing material on inside shoulder and lane.
D	150	0.57 - 0.60	Across natural drainage. Slope failure on upslope and downslope of road. Area of concrete blocks visible below road and likely used for emergency fill repair.
E	330	0.60 - 0.68	Upslope cut slope eroding onto road. Area of concrete blocks visible below road and likely used for emergency fill repair. Undermining of road in areas.

LEGEND:

⊕	Boring Location (May 21-22, 2024)
▚	Borrow Site

Base Map: Google Earth, 2021

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FIELD EXPLORATION PLAN

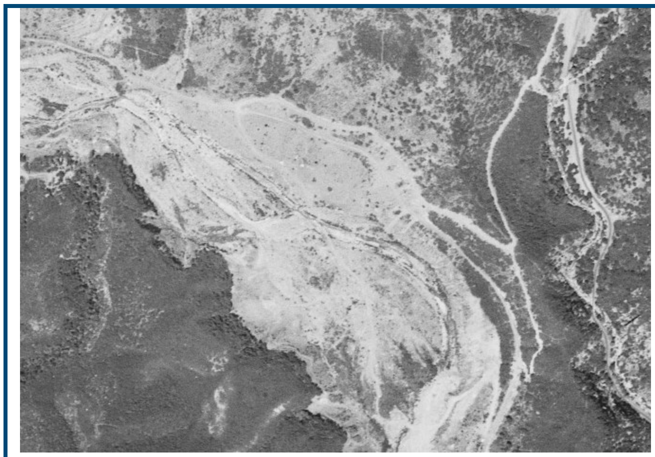
PROJECT NAME:
MATILIJA CANYON STORM DAMAGE
Ojai, CA

PLATE
1

PROJECT NUMBER:
223-274

REVISION DATE:
9.18.2024

APPENDIX A - SITE PHOTOGRAPHS



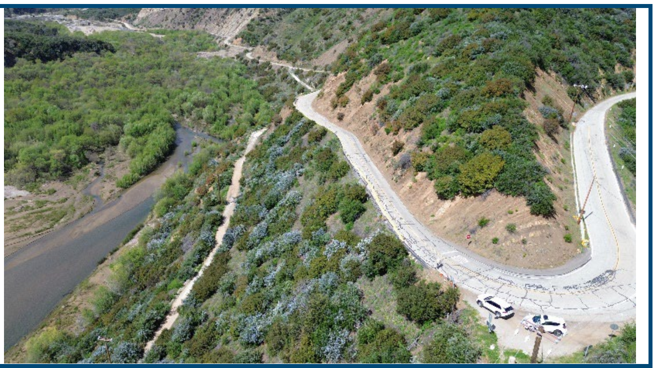
Matilija Canyon Road 1947 Aerial Photo

Matilija Canyon Road 2020 Aerial Photo

Matilija Canyon Road ~MP 0.5 to 0.7 facing northeasterly

Matilija Canyon Road ~MP 0.3 to 0.5 facing northeasterly

Matilija Canyon Road from ~MP 0.6 looking southeast

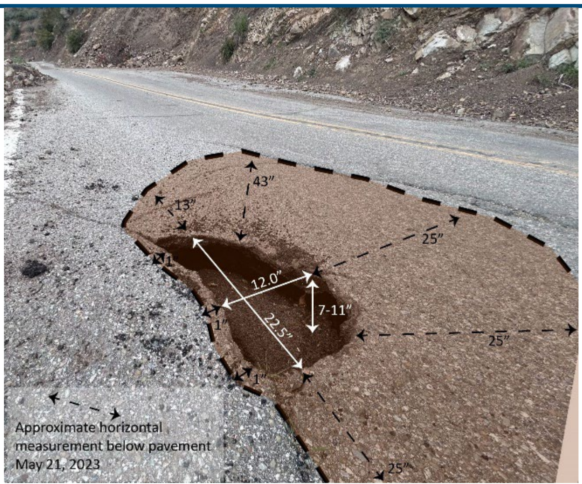


Matilija Canyon Road from ~MP 0.3 looking northwest

Undermined Matilija Canyon Road ~MP 0.42

Undermined Matilija Canyon Road ~MP 0.42

Existing Void, Matilija Canyon Road ~MP 0.53



Existing Void with 5/21/24 Measurements , Matilija Canyon Road ~MP 0.53

Undermined Matilija Canyon Road and Erosion and Rockfall from above, ~MP 0.58

Undermined Matilija Canyon Road ~MP 0.63, looking up from lower access road

APPENDIX B - BORING LOGS

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D2435)
CP	Compaction Curve (ASTM D1557)
CR	Corrosion, Sulfates, Chlorides (CTM 643; ASTM D4972, ASTM G187, ASTM D4327)
CU	Consolidated Undrained Triaxial (ASTM D4767)
DS	Direct Shear (ASTM D3080)
EI	Expansion Index (ASTM D4829)
M	Moisture Content (ASTM D2216)
P	Permeability (ASTM 5084)
PA	Particle Size Analysis (ASTM D422-63 [2007])
PI	Liquid Limit, Plastic Limit, Plasticity Index (ASTM D4318)
PL	Point Load Index (ASTM D5731)
PP	Pocket Penetrometer
R	R-Value (CTM 301)
RS	Torsional Ring Shear (ASTM D6467)
SE	Sand Equivalent (CTM 217)
SW	Swell Potential (ASTM D4546)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D2166) Unconfined Compression - Rock (ASTM D7012)
UU	Unconsolidated Undrained Triaxial (ASTM D2850)
UW	Unit Weight (ASTM D4767, ASTM D7263)
VS	Vane Shear (AASHTO T 223-96 [2004])
-200	200 Wash (ASTM D1140)

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT) (2" O.D.)
- Standard California Sampler (2.5" O.D.)
- Modified California Sampler (3" O.D.)
- Thin-Walled Tube
- Piston Sampler
- Rock Core
- Grab Sample
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- ▽ First Water Level Reading (during drilling)
- ▼ Static Water Level Reading (short-term)
- ▼ Static Water Level Reading (long-term)

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REPORT TITLE
LEGEND FOR SOIL CLASSIFICATION

PROJECT NAME
Matilija Canyon Storm Damage

DATE
7/12/2024

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ROCK GRAPHIC SYMBOLS

⊠	IGNEOUS ROCK
☰	SEDIMENTARY ROCK
▧	METAMORPHIC ROCK

BEDDING SPACING

Descriptor	Thickness or Spacing
Massive	> 10 ft
Very thickly bedded	3 to 10 ft
Thickly bedded	1 to 3 ft
Moderately bedded	3-5/8 inches to 1 ft
Thinly bedded	1-1/4 to 3-5/8 inches
Very thinly bedded	3/8 inch to 1-1/4 inches
Laminated	< 3/8 inch

WEATHERING DESCRIPTORS FOR INTACT ROCK

	Diagnostic Features					
	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Solutioning		
Descriptor	Body of Rock	Fracture Surfaces		Texture	Solutioning	General Characteristics
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No solutioning	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals may be noted	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation (refer to grain boundary conditions)	All fracture surfaces are discolored or oxidized; surfaces are friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Altered by chemical disintegration such as via hydration or argillation	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened.
Decomposed	Discolored of oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".

Note: Combination descriptors (such as "slightly weathered to fresh") are used where equal distribution of both weathering characteristics is present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, combination descriptors should not be used where significant identifiable zones can be delineated. Only two adjacent descriptors shall be combined. "Very intensely weathered" is the combination descriptor for "decomposed to intensely weathered".

CORE RECOVERY CALCULATION (%)

$$\frac{\Sigma \text{ Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \text{ x } 100$$

RQD CALCULATION (%)

$$\frac{\Sigma \text{ Length of intact core pieces} > 4 \text{ in.}}{\text{Total length of core run (in.)}} \text{ x } 100$$

ROCK HARDNESS

Descriptor	Criteria
Extremely Hard	Specimen cannot be scratched with pocket knife or sharp pick; can only be chipped with repeated heavy hammer blows
Very hard	Specimen cannot be scratched with pocket knife or sharp pick; breaks with repeated heavy hammer blows
Hard	Specimen can be scratched with pocket knife or sharp pick with heavy pressure; heavy hammer blows required to break specimen
Moderately Hard	Specimen can be scratched with pocket knife or sharp pick with light or moderate pressure; breaks with moderate hammer blows
Moderately Soft	Specimen can be grooved 1/6 in. with pocket knife or sharp pick with moderate or heavy pressure; breaks with light hammer blow or heavy hand pressure
Soft	Specimen can be grooved or gouged with pocket knife or sharp pick with light pressure, breaks with light to moderate hand pressure
Very Soft	Specimen can be readily indented, grooved, or gouged with fingernail, or carved with pocket knife; breaks with light hand pressure

FRACTURE DENSITY

Descriptor	Criteria
Unfractured	No fractures
Very Slightly Fractured	Lengths greater 3 ft
Slightly Fractured	Lengths from 1 to 3 ft, few lengths outside that range
Moderately Fractured	Lengths mostly in range of 4 in. to 1 ft, with most lengths about 8 in.
Intensely Fractured	Lengths average from 1 in. to 4 in. with scattered fragmented intervals with lengths less than 4 in.
Very Intensely Fractured	Mostly chips and fragments with few scattered short core lengths

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REPORT TITLE
LEGEND FOR ROCK CLASSIFICATION

PROJECT NAME
Matilija Canyon Storm Damage

DATE
7/12/2024

SHEET
2 of 2

LOGGED BY **E. Patel**
BEGIN DATE **5-21-24**
COMPLETION DATE **5-21-24**
HAMMER TYPE auto-trip
BORING NUMBER **24B-01**
FINAL BY **L. Berry**
BOREHOLE LOCATION (Lat/Long or North/East and Datum) **34.9011°/-119.3085°**
SURFACE ELEVATION **1284.0 ft**
DRILLING METHOD **8-inch Hollow-Stem Auger**
BOREHOLE LOCATION (Offset, Station, Line) **--**
WEATHER NOTES **cloudy, windy**
DRILLER **2R Driller**
LOCATION DESCRIPTION 0.46 PM from the begining of Matilija Canyon Road
BACKFILLED WITH Cement grouting
DRILL RIG **CME 750**
GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE) **not encountered**
TOTAL DEPTH OF BORING **25.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		4" ASPHALT CONCRETE. SILTY, CLAYEY GRAVEL with SAND (GC-GM); medium dense; brown; (Artificial Fill).		C			100							PA (43% G, 30% S, 18% F) PI (22 LL, 16 PL, 6 PI)
	1														
1282	2														
	3				1	10 14 15	29	100							CR (pH = 7.58, r = 2,001 ohm-cm, SO_4^{2-} = 29 mg/kg, Cl^- = <2 mg/kg)
1280	4														
	5				2	7 9 9	18	100							
1278	6		SEDIMENTARY ROCK (SHALE); (SILTY, CLAYEY GRAVEL with SAND (GC-GM)); brown, soft, slightly to moderately weathered, intensely to very intensely fractured; (JUNCAL FORMATION).												
	7														
1276	8														
	9														
1274	10				3	24 34 47	81	100							
	11														
1272	12														
	13														
1270	14														
	15		Gray to black.		R1			100							
1268	16														
	17														
1266	18														
	19														
1264	20				R2			100							
	21														
1262	22														
	23														
1260	24														
	25														

Bottom of borehole at 25.0 ft bgs

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PROJECT NAME **Matilija Canyon Storm Damage**
PROJECT NUMBER **223-274**
BORING NUMBER **24B-01**
REVISION DATE **7/12/2024**
SHEET **1 of 1**

5 BR - STANDARD 223-274 MATILIJA CANYON STORM DAMAGE.GPJ CALIFORNIA YEH LIBRARY (YEH V4 JANUARY 2024).GLB 9/18/24

LOGGED BY **E. Patel**	BEGIN DATE **5-22-24**	COMPLETION DATE **5-22-24**	HAMMER TYPE auto-trip	BORING NUMBER **24B-02**
FINAL BY **L. Berry**			BOREHOLE LOCATION (Lat/Long or North/East and Datum) **35.4904°/-119.3092°**	SURFACE ELEVATION **1260.0 ft**
DRILLING METHOD **8-inch Hollow-Stem Auger**			BOREHOLE LOCATION (Offset, Station, Line) **--**	WEATHER NOTES **cloudy, windy**
DRILLER **2R Driller**			LOCATION DESCRIPTION 0.49 PM from the begining of the Matilija Canyon Road	BACKFILLED WITH Cement grouting
DRILL RIG **CME 750**			GROUNDWATER READINGS — DURING DRILLING **not encountered** — AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING **25.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		6" ASPHALT CONCRETE.												DS
	1		SILTY, CLAYEY SAND with GRAVEL (SC-SM); very dense; brown; (Artificial Fill).		D			100							
1258	2														
	3				1		50/5"	100		8	109				CR (pH = 7.87, r = 2,989 ohm-cm, SO$_4^{2-}$ = 13 mg/kg, Cl$^-$ = <2 mg/kg) CP ($\gamma_{D, MAX}$ = 131 pcf, w_{OPT} = 12%) DS
1256	4														
	5		Brown to gray.		2	16 31 35	66	100							
1254	6		SEDIMENTARY ROCK (SHALE); (SILTY, CLAYEY GRAVEL with SAND (GC-GM)); brown, slightly to moderately weathered, intensely to very intensely fractured; (JUNCAL FORMATION).												
	7														
1252	8														
	9														
1250	10				R1			100							
	11														
1248	12														
	13														
1246	14														
	15		Red to dark brown.		R2			100							
1244	16														
	17														
1242	18														
	19														
1240	20				R3			100							
	21														
1238	22														
	23														
1236	24														
	25		Bottom of borehole at 25.0 ft bgs												

5 BR - STANDARD 223-274 MATILIJA CANYON STORM DAMAGE.GPJ CALIFORNIA YEH LIBRARY (YEH V4 JANUARY 2024).GLB 9/18/24

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PROJECT NAME
Matilija Canyon Storm Damage

PROJECT NUMBER
223-274

BORING NUMBER
24B-02

REVISION DATE
7/12/2024

SHEET
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LOGGED BY **E. Patel**	BEGIN DATE **5-22-24**	COMPLETION DATE **5-22-24**	HAMMER TYPE auto-trip	BORING NUMBER **24B-03**
FINAL BY **L. Berry**			BOREHOLE LOCATION (Lat/Long or North/East and Datum) **34.941°/-119.3105°**	SURFACE ELEVATION **1214.0 ft**
DRILLING METHOD **8-inch Hollow-Stem Auger**			BOREHOLE LOCATION (Offset, Station, Line) **--**	WEATHER NOTES **cloudy, windy**
DRILLER **2R Driller**			LOCATION DESCRIPTION 0.57 PM from the begining of the Matilija Canyon Road	BACKFILLED WITH Cement grouting
DRILL RIG **CME 750**			GROUNDWATER READINGS — DURING DRILLING **not encountered** — AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING **30.0 ft**

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Remarks
	0	3" ASPHALT CONCRETE. SILTY, CLAYEY GRAVEL with SAND (GC-GM); dense; brown; (Artificial Fill).	B			100					
	1										
1212	2										
	3		1	13 23 23	46	100		4			-200 (80% G, 6% S, 14% F)
1210	4										
	5		2	50/5"	50/5"	100					
1208	6	Thinly bedded sandstone. SEDIMENTARY ROCK (SHALE); (SILTY GRAVEL with SAND (GM)); brown, slightly weathered, intensely to very intensely fractured; (JUNCAL FORMATION).									
	7										
1206	8										
	9										
1204	10		3	50/5"	50/5"	100					
	11										
1202	12										
	13										
1200	14										
	15	Dark brown.	4	50/3"	50/3"	100					
1198	16										
	17										
1196	18										
	19										
1194	20		5	50/5"	50/5"	100					
	21										
1192	22										
	23										
1190	24										
	25										

(continued)

5 BR - STANDARD 223-274 MATILIJA CANYON STORM DAMAGE.GPJ CALIFORNIA YEH LIBRARY (YEH V4 JANUARY 2024).GLB 9/18/24

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PROJECT NAME **Matilija Canyon Storm Damage**	
PROJECT NUMBER **223-274**	
BORING NUMBER **24B-03**	
REVISION DATE **7/12/2024**	SHEET **1 of 2**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	25		SEDIMENTARY ROCK (Shale) *(continued)*.	☒	6	50/5"	50/5"	100							
1188	26														
	27														
1186	28														
	29														
1184	30		Bottom of borehole at 30.0 ft bgs												
	31														
1182	32		This Boring Record was developed in accordance with the FHWA Description and Identification Guidelines (2017) and FHWA Rock Characterization Guidelines (2017) except as noted on the Soil or Rock Legend or below.												
	33														
1180	34														
	35														
1178	36														
	37														
1176	38														
	39														
1174	40														
	41														
1172	42														
	43														
1170	44														
	45														
1168	46														
	47														
1166	48														
	49														
1164	50														
	51														
1162	52														
	53														
1160	54														
	55														

5 BR - STANDARD 223-274 MATILIJA CANYON STORM DAMAGE.GPJ CALIFORNIA YEH LIBRARY (YEH V4 JANUARY 2024).GLB 9/18/24

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PROJECT NAME **Matilija Canyon Storm Damage**	
PROJECT NUMBER **223-274**	
BORING NUMBER **24B-03**	
REVISION DATE **7/12/2024**	SHEET **2 of 2**

LOGGED BY **E. Patel**	BEGIN DATE **5-21-24**	COMPLETION DATE **5-21-24**	HAMMER TYPE auto-trip	BORING NUMBER **24B-04**
FINAL BY **L. Berry**			BOREHOLE LOCATION (Lat/Long or North/East and Datum) **34.4918°/-119.3109°**	SURFACE ELEVATION **1197.0 ft**
DRILLING METHOD **8-inch Hollow-Stem Auger**			BOREHOLE LOCATION (Offset, Station, Line) **--**	WEATHER NOTES **cloudy, windy**
DRILLER **2R Driller**			LOCATION DESCRIPTION 0.60 PM from the begining of the Matilija Canyon Road	BACKFILLED WITH Cement grouting
DRILL RIG **CME 750**			GROUNDWATER READINGS — DURING DRILLING: **not encountered** — AFTER DRILLING (DATE):	TOTAL DEPTH OF BORING **30.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		SEDIMENTARY ROCK (SILTSTONE); (SILTY, CLAYEY GRAVEL with SAND (GC-GM); brown); regraded crushed native shale, intensely to very intensely fractured; (JUNCAL FORMATION).	▨	A			100							CP ($\gamma_{D, MAX}$ = 134 pcf, w_{OPT} = 12%) DS
	1														
1195	2														
	3			⊠	1	14 18 24	42	100							CR (pH = 7.68, r = 1,730 ohm-cm, SO_4^{2-} = 25 mg/kg, Cl^- = <2 mg/kg)
1193	4														
	5			⊠	2	50/3"	50/3"	100		1					
1191	6		SEDIMENTARY ROCK (SHALE); brown, thinly bedded sandstone.												
	7														
1189	8														
	9														
1187	10			⊠	3	50/5"	50/5"	100							
	11														
1185	12														
	13														
1183	14														
	15		Dark brown.	⊠	4	50/5"	50/5"	100							
1181	16														
	17														
1179	18														
	19														
1177	20			⊠	5	50/2"	50/2"	100							
	21														
1175	22														
	23														
1173	24														
	25														

(continued)

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PROJECT NAME **Matilija Canyon Storm Damage**	
PROJECT NUMBER **223-274**	
BORING NUMBER **24B-04**	
REVISION DATE **7/12/2024**	SHEET **1 of 2**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	25		SEDIMENTARY ROCK (Shale) *(continued)*.		6	50/1"	50/1"	100							
1171	26														
	27														
1169	28														
	29														
1167	30		Bottom of borehole at 30.0 ft bgs												
	31														
1165	32		This Boring Record was developed in accordance with the FHWA Description and Identification Guidelines (2017) and FHWA Rock Characterization Guidelines (2017) except as noted on the Soil or Rock Legend or below.												
	33														
1163	34														
	35														
1161	36														
	37														
1159	38														
	39														
1157	40														
	41														
1155	42														
	43														
1153	44														
	45														
1151	46														
	47														
1149	48														
	49														
1147	50														
	51														
1145	52														
	53														
1143	54														
	55														

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PROJECT NAME
Matilija Canyon Storm Damage

PROJECT NUMBER
223-274

BORING NUMBER
24B-04

REVISION DATE
7/12/2024

SHEET
2 of 2

LOGGED BY **E. Patel**
BEGIN DATE **5-22-24**
COMPLETION DATE **5-22-24**
HAMMER TYPE auto-trip
BORING NUMBER **24B-05**
FINAL BY **L. Berry**
BOREHOLE LOCATION (Lat/Long or North/East and Datum) **34.4917°/-119.3110°**
SURFACE ELEVATION **1207.0 ft**
DRILLING METHOD **8-inch Hollow-Stem Auger**
BOREHOLE LOCATION (Offset, Station, Line) **--**
WEATHER NOTES **cloudy, windy**
DRILLER **2R Driller**
LOCATION DESCRIPTION 0.58 PM from the begining of the Matilija Canyon Road
BACKFILLED WITH Cement grouting
DRILL RIG **CME 750**
GROUNDWATER READINGS DURING DRILLING **not encountered** AFTER DRILLING (DATE)
TOTAL DEPTH OF BORING **15.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		SEDIMENTARY ROCK (SHALE); (SILTY SAND with GRAVEL (SM)); brown, intensely to very intensely fractured; (JUNCAL FORMATION).												
	1														
1205	2														
	3		Dark brown.		1	11 27 29	56	100		6	113				-200 (28% G, 58% S, 15% F)
1203	4														
	5		Thinly bedded siltstone.		2	12 26 36	62	100							
1201	6														
	7														
1199	8														
	9														
1197	10		Brown to black.		R1			100							
	11														
1195	12														
	13														
1193	14														
	15		Bottom of borehole at 15.0 ft bgs												Auger refusal at 15 ft.
1191	16														
	17		This Boring Record was developed in accordance with the FHWA Description and Identification Guidelines (2017) and FHWA Rock Characterization Guidelines (2017) except as noted on the Soil or Rock Legend or below.												
1189	18														
	19														
1187	20														
	21														
1185	22														
	23														
1183	24														
	25														

5 BR - STANDARD 223-274 MATILIJA CANYON STORM DAMAGE.GPJ CALIFORNIA YEH LIBRARY (YEH V4 JANUARY 2024).GLB 9/18/24

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PROJECT NAME **Matilija Canyon Storm Damage**
PROJECT NUMBER **223-274**
BORING NUMBER **24B-05**
REVISION DATE **7/12/2024**
SHEET **1 of 1**

LOGGED BY **N. Simon**	BEGIN DATE **5-30-24**	COMPLETION DATE **5-30-24**	HAMMER TYPE N/A	BORING NUMBER **Borrow Site**
FINAL BY **L. Berry**			BOREHOLE LOCATION (Lat/Long or North/East and Datum) **34.4929°/-119.3147°**	SURFACE ELEVATION **1137.0 ft**
DRILLING METHOD **Other Drilling Method**			BOREHOLE LOCATION (Offset, Station, Line) **--**	WEATHER NOTES
DRILLER **2R Driller**			LOCATION DESCRIPTION 0.8 PM from the begining of the Matilija Canyon Road	BACKFILLED WITH N/A
DRILL RIG **N/A**			GROUNDWATER READINGS — DURING DRILLING / AFTER DRILLING (DATE) **not encountered**	TOTAL DEPTH OF BORING **0.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		SEDIMENTARY ROCK (SHALE); (Well-graded GRAVEL with SILT and SAND (GW-GM)); (JUNCAL FORMATION).												PA (52% G, 35% S, 5% F) CR (pH = 7.62, r = 1,540 ohm-cm, SO_4^{2-} = 92 mg/kg, Cl^- = <2 mg/kg) CP ($\gamma_{D, MAX}$ = 127 pcf, w_{OPT} = 11%) SE
	1		Bottom of borehole at 0.5 ft bgs												
1135	2														
	3		This Boring Record was developed in accordance with the FHWA Description and Identification Guidelines (2017) and FHWA Rock Characterization Guidelines (2017) except as noted on the Soil or Rock Legend or below.												
1133	4														
	5														
1131	6														
	7														
1129	8														
	9														
1127	10														
	11														
1125	12														
	13														
1123	14														
	15														
1121	16														
	17														
1119	18														
	19														
1117	20														
	21														
1115	22														
	23														
1113	24														
	25														

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PROJECT NAME **Matilija Canyon Storm Damage**	
PROJECT NUMBER **223-274**	
BORING NUMBER **Borrow Site**	
REVISION DATE **7/12/2024**	SHEET **1 of 1**

APPENDIX C - RESULTS OF LABORATORY TESTING

SUMMARY OF LABORATORY TEST RESULTS

Sample Information							Gradation			Atterberg		Corrosion				Compaction					
Boring No.	Sample No.	Depth (ft)	Sample Type	Total Unit Weight, γ_t, (pcf)	Dry Unit Weight, γ_d, (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Plasticity Index (PI)	Liquid Limit (LL)	pH	Resistivity (Ω- cm)	SO_4^{2-} (mg/kg)	Cl^- (mg/kg)	Max. Dry Unit Weight, $\gamma_{d, MAX}$, (pcf)	Optimum Moisture Content (%)	R-Value	Expansion Index	Additional Testing	Soil/Rock Classification
24B-01	C	0.0	BULK	--	--	--	43	30	18	6	22	--	--	--	--	--	--	--	--	--	SILTY, CLAYEY GRAVEL with SAND (GC-GM)
24B-01	1	2.5	SPT	--	--	--	--	--	--	--	--	7.58	2,001	29	<2	--	--	--	--	--	SILTY, CLAYEY GRAVEL with SAND (GC-GM)
24B-02	D	0.0	BULK	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	DS	SILTY, CLAYEY GRAVEL with SAND (GC-GM)
24B-02	1	2.5	MCAL	118	109	8	--	--	--	--	--	7.87	2,989	13	<2	131	12	--	--	DS	SILTY, CLAYEY GRAVEL with SAND (GC-GM)
24B-03	1	2.5	SPT	--	--	4	80	6	14	--	--	--	--	--	--	--	--	--	--	--	SILTY, CLAYEY SAND with GRAVEL (SC-SM)
24B-04	A	0.0	BULK	--	--	--	--	--	--	--	--	--	--	--	--	134	12	--	--	DS	SILTY, CLAYEY GRAVEL with SAND (GC-GM)
24B-04	1	2.5	SPT	--	--	--	--	--	--	--	--	7.68	1,730	25	<2	--	--	--	--	--	SEDIMENTARY ROCK (SILTSTONE)
24B-04	2	5.0	MCAL	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SEDIMENTARY ROCK (SHALE)
24B-05	1	2.5	MCAL	120	113	6	28	58	15	--	--	--	--	--	--	--	--	--	--	--	SILTY SAND with GRAVEL (SM)
Borrow Site	1	0.0	BULK	--	--	--	52	35	5	--	--	7.62	1,540	92	<2	127	11	--	--	SE	WELL-GRADED GRAVEL WITH SILT AND SAND
Sandstone Boulder	1A	0.0	GRAB	158	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	UC	SEDIMENTRY ROCK (SANDSTONE)
Sandstone Boulder	1B	0.0	GRAB	151	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	UC	SEDIMENTRY ROCK (SANDSTONE)

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PROJECT NAME
Matilija Canyon Storm Damage

PROJECT NO.
223-274

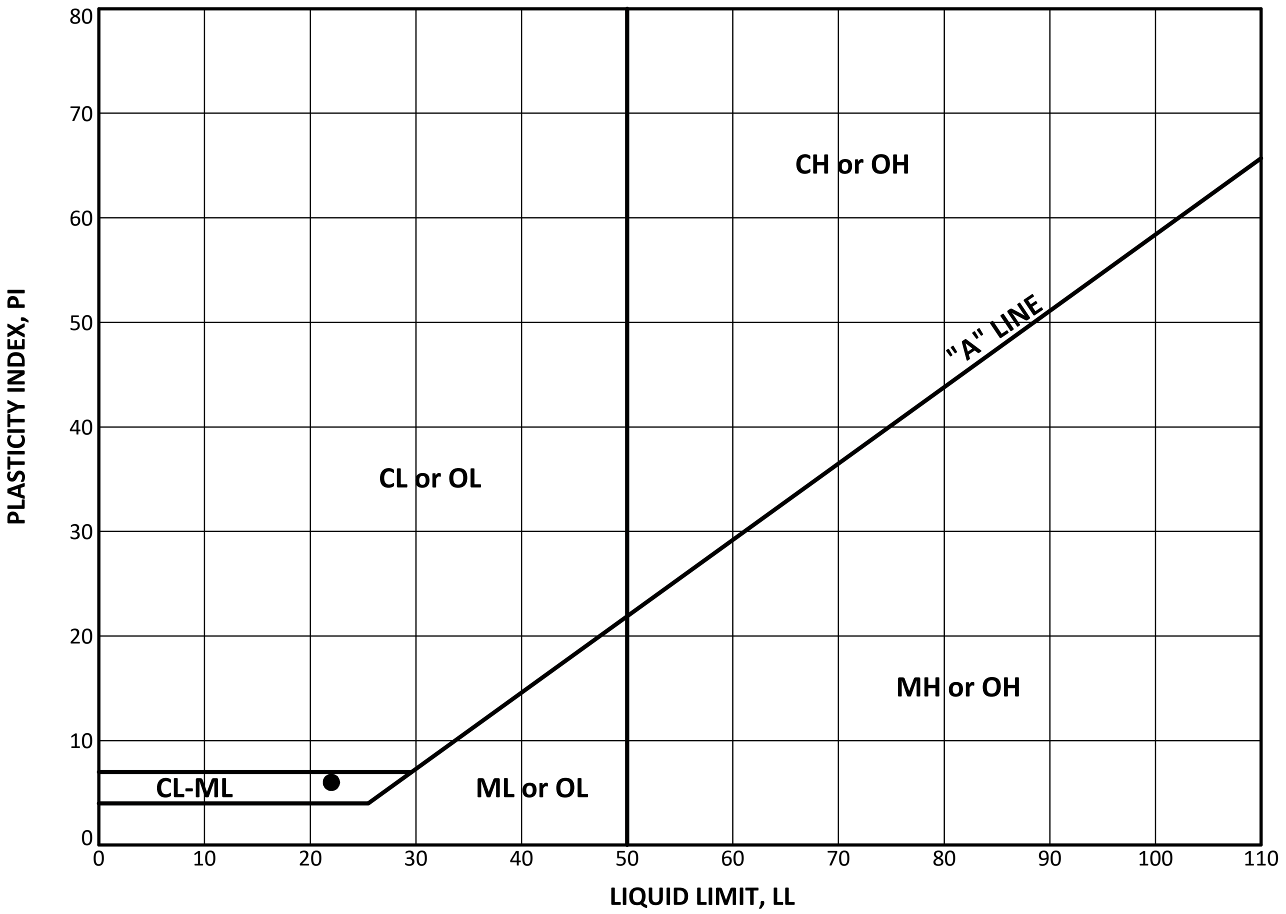
REVISION DATE
7-12-24

PROJECT MANAGER
L. Berry

PREPARED BY
E. Patel

CHECKED BY
L. Berry

SHEET
1 of 1



Boring Number	Sample ID	Depth (ft)	Test Symbol	MC (%)	Fines (%)	LL	PL	PI	Classification
24B-01	C	0.0	●	--	18	22	16	6	SILTY, CLAYEY GRAVEL with SAND (GC-GM)

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ATTERBERG LIMITS

PROJECT NAME
Matilija Canyon Storm Damage

PROJECT NO.
223-274

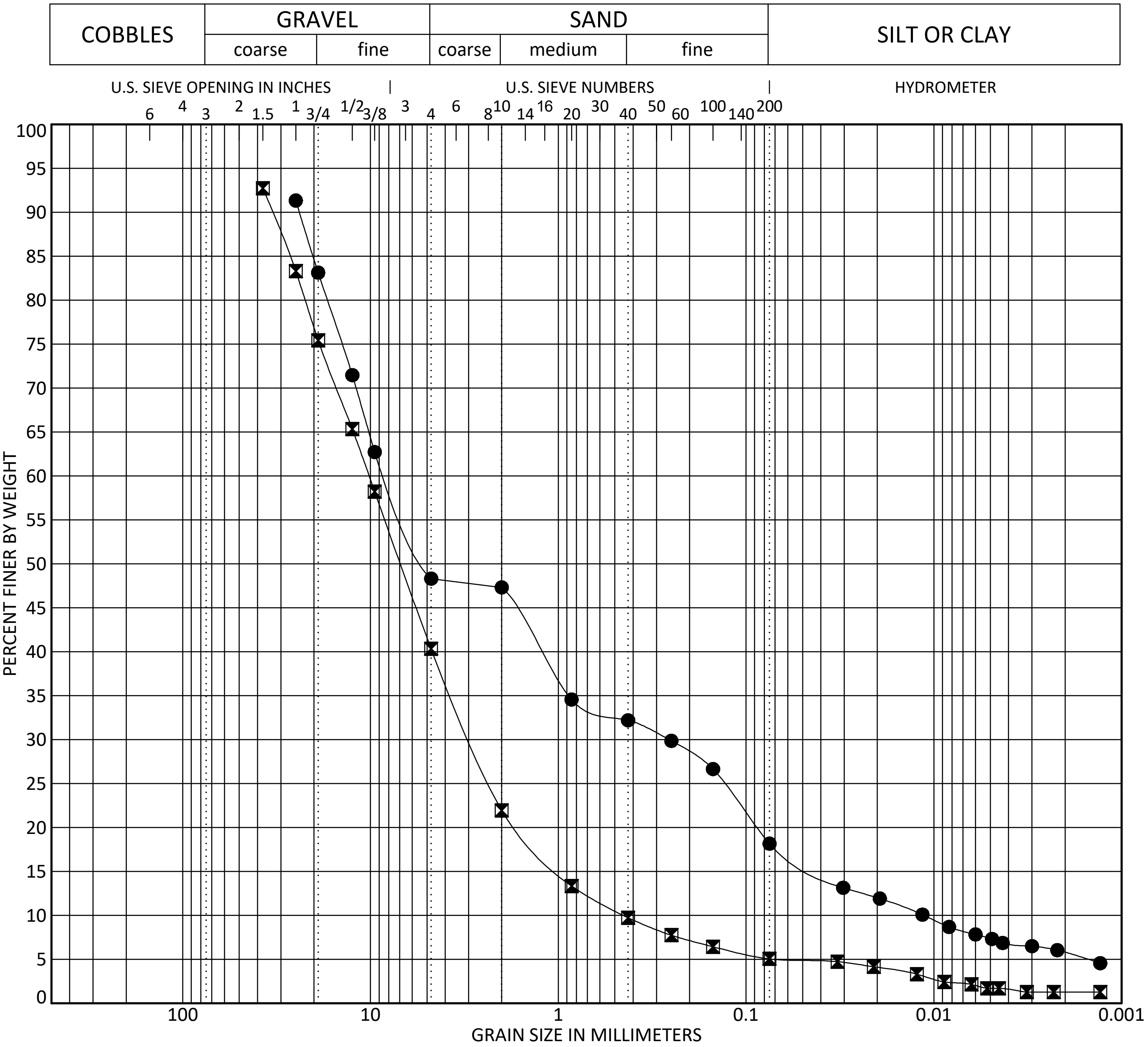
REVISION DATE
7-12-24

PROJECT MANAGER
L. Berry

PREPARED BY
E. Patel

CHECKED BY
L. Berry

SHEET
1 of 1



Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	24B-01 0.0 ft	SILTY, CLAYEY GRAVEL with SAND (GC-GM)	--	--	--	0.71	739.47
☒	Borrow Site 0.0 ft	Well-graded GRAVEL with SILT and SAND (GW-GM)	--	--	--	1.88	22.75

Specimen Identification		D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	24B-01 0.0 ft	25	8.334	5.15	0.258	0.011	43.0	30.2	10.8	7.4
☒	Borrow Site 0.0 ft	37.5	10.176	6.91	2.922	0.447	52.4	35.3	3.3	1.7

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GRAIN SIZE DISTRIBUTION

PROJECT NAME **Matilija Canyon Storm Damage**
PROJECT NO. **223-274**
REVISION DATE **7-12-24**
PROJECT MANAGER **L. Berry**
PREPARED BY **E. Patel**
CHECKED BY **L. Berry**
SHEET **1 of 1**

YEH SIEVE 223-274 MATILIJA CANYON STORM DAMAGE.GPJ CALIFORNIA YEH LIBRARY (YEH V4 JANUARY 2024).GLB 7/12/24

6/6/2024

Client Yeh and Associates, Inc.
Address Yeh and Associates, Inc.
56 E. Main Street
Suite 104
Ventura CA, 93001

Client Reference No
Project No 0107
Project Yeh - On-Call Master Agreement
Material Source Matilija Canyon, Ojai; Borrow Site
Material Description Silty Sand (SM); light brown, moist
Location Detail Borrow Site #1 @ 0-0.5'

Sand Equivalent Value of Soils and Fine Aggregate

Caltrans CT217

Date Tested 6/6/2024
Sample Rec Date 5/30/2024
Date Sampled 5/30/2024

Sampled By Client

Prep Method Dry
Shaker Method Mechanical Shaker

		Specification
Sand Reading Average	4.1	
Clay Reading Average	6.5	
Sand Equivalent Value	63.0	

Remarks

Technician Adam Sinutko
Digital Signature By User Login

Manager Adam Sinutko
Digital Signature By User Login

Test results relate only to the sample tested. This test report shall not reproduced, except in full, without the prior written approval of the agency.

Lab Address 2247 Statham Blvd. Oxnard CA, 93033
System Link http://umt.vahalo.com/assignments/A2C366FD-75A7-4767-5EA2-DAC503C99D62
System Path Yeh - On-Call Master Agreement / SOILS / AGGREGATE LAB / 0107 - MCSD - 223-274 (SE) @ 0 - 0.5' YEH240530

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Proctor Compaction

Test Method: ASTM D698, D1557

Project Name	Matilija Canyon Storm Dama	Project No.	223-274
Tested By	GF	Testing Date	6/10/2024

SPECIMEN ID AND CLASSIFICATION

Boring No.	23B-02	Sample No.	D	Depth (ft)	2.5
Soil Description	Lean CLAY (CL): brown, moist				

EQUIPMENT AND PROCEDURE

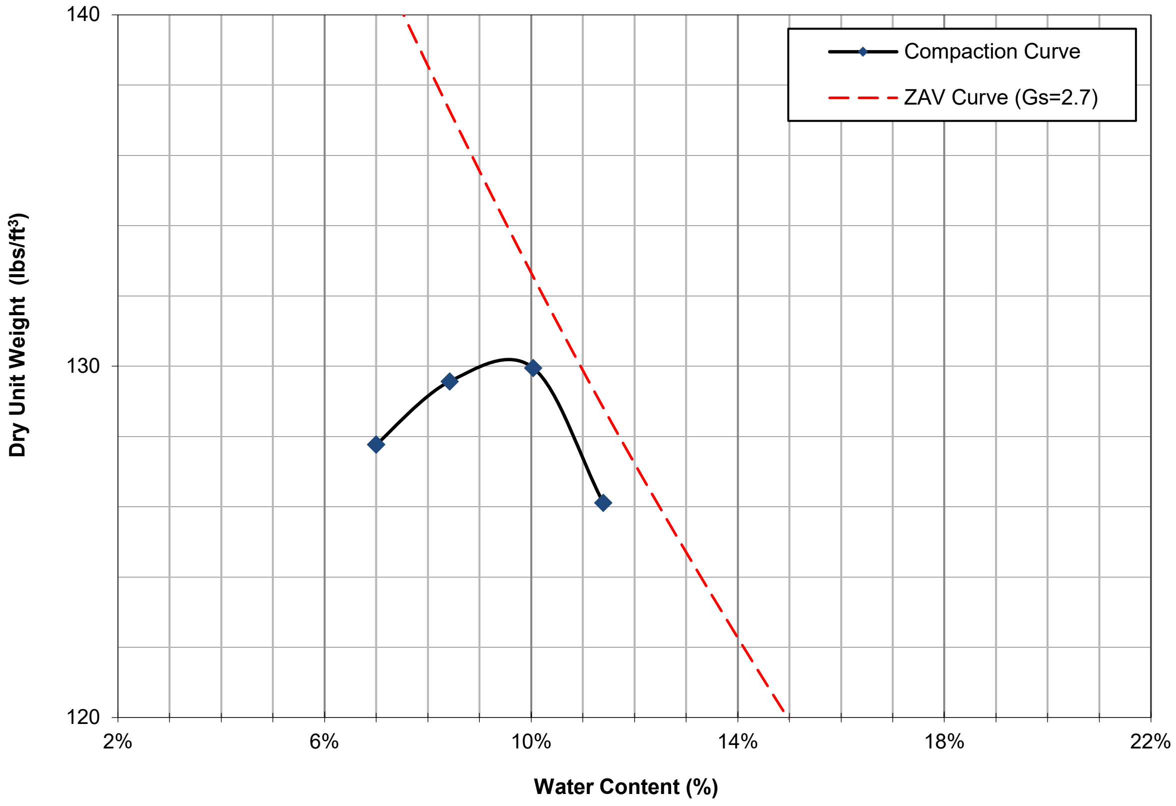
Test Method (D698/D1557)	D1557	Ram. Mass (g)	4530	# of Lifts	5
Mold Volume (cm^3)	943	Mold Mass(g)	2001	Blows/ Lift	25

DENSITY AND MOISTURE MEASUREMENTS

Mass of Soil + Mold (g)	4067	4124	4162	4124	
Dish ID	34	33	22	23	
Mass of Dish (g)	559.78	525.35	480.17	630.89	
Mass of Moist Soil + Dish (g)	2,453.68	2,451.54	2,467.89	2,737.87	
Mass of Dry Soil + Dish (g)	2,329.76	2,301.88	2,286.53	2,522.32	

RESULTS

Water Content	7.0%	8.4%	10.0%	11.4%	
Dry Density (Mg/m^3)	2.048	2.076	2.083	2.021	
Dry Unit Weight (lbs/ft^3)	127.8	129.6	130.0	126.1	
Lab Max. Dry Density (Mg/m^3)	2.091		Optimum Water Content (%)		11.6%
Lab Max. Dry Unit Wt. (lbs/ft^3)	130.5				



Proctor Compaction

Test Method: ASTM D698, D1557

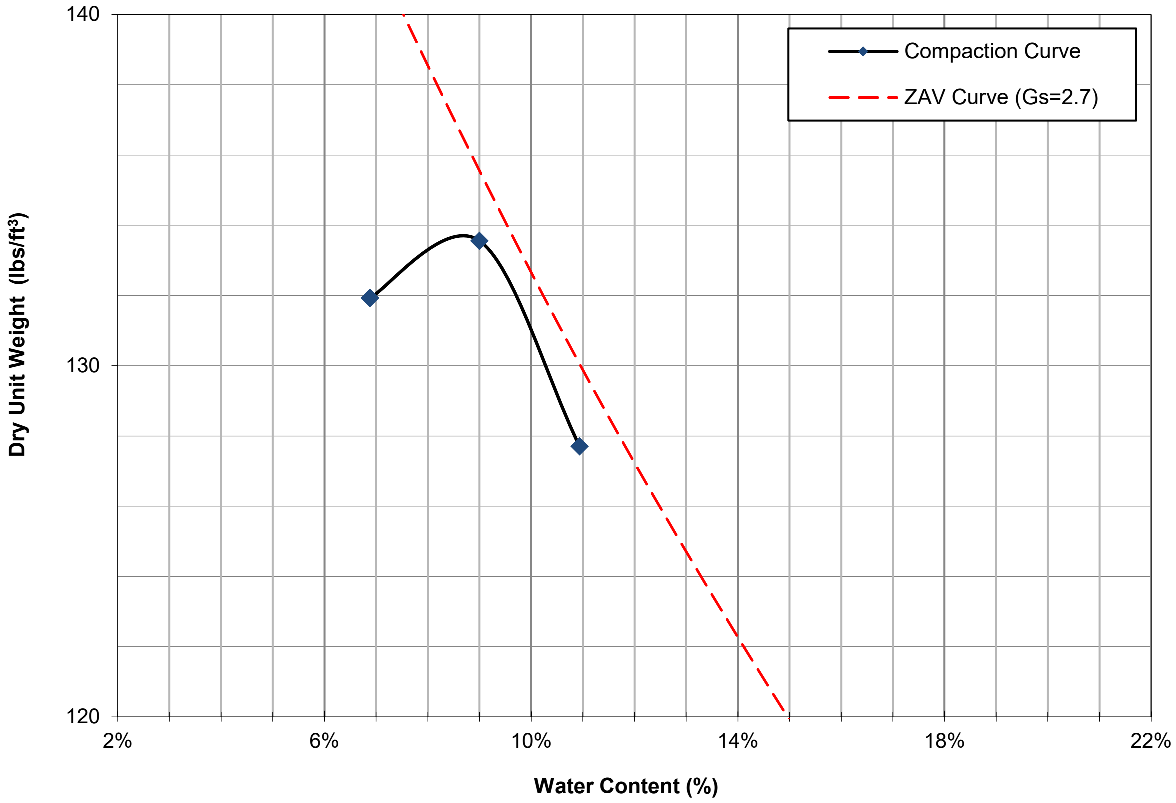
Project Name	Matilija Canyon Storm Dama	Project No.	223-274
Tested By	GF	Testing Date	6/10/2024

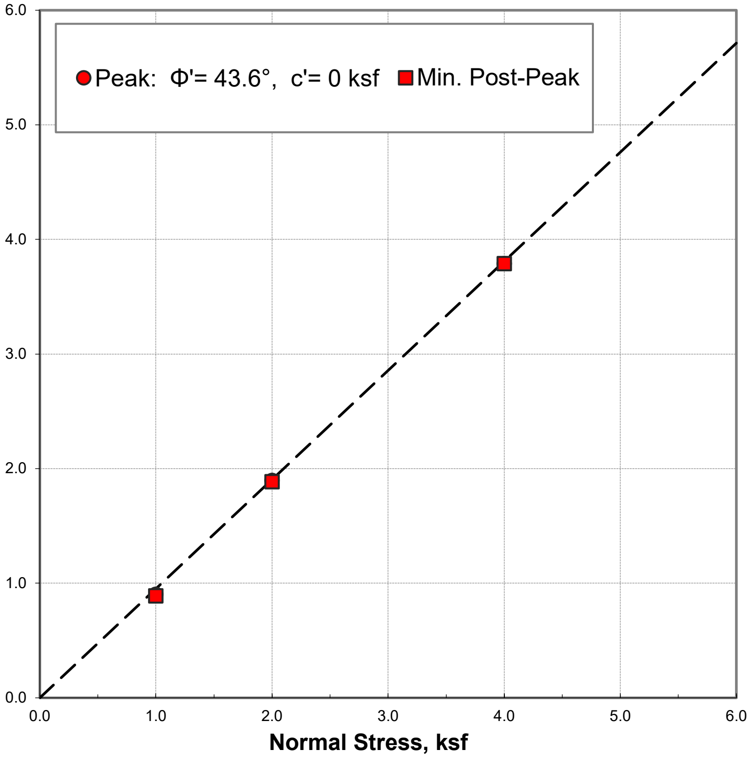
SPECIMEN ID AND CLASSIFICATION					
Boring No.	23B-04	Sample No.	A	Depth (ft)	0.0
Soil Description	Lean CLAY (CL): brown, moist				

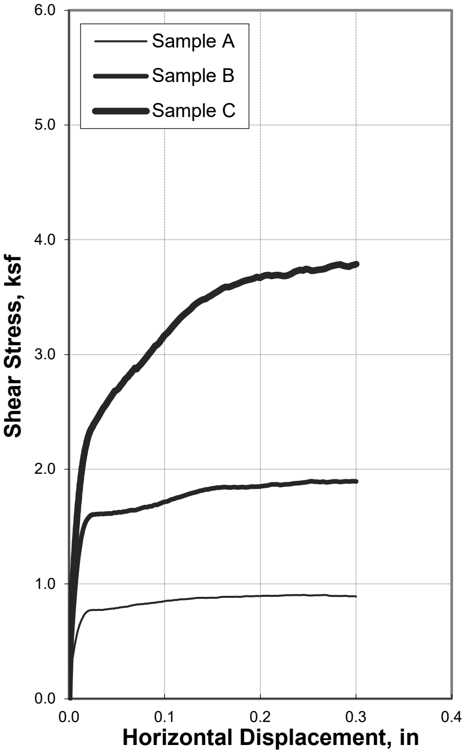
EQUIPMENT AND PROCEDURE					
Test Method (D698/D1557)	D1557	Ram. Mass (g)	4530	# of Lifts	5
Mold Volume (cm^3)	943	Mold Mass(g)	2001	Blows/ Lift	25

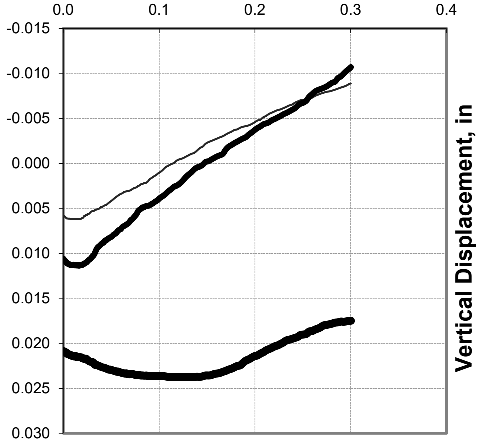
DENSITY AND MOISTURE MEASUREMENTS					
Mass of Soil + Mold (g)	4132	4201	4142		
Dish ID	21	20	32		
Mass of Dish (g)	478.28	534.04	478.54		
Mass of Moist Soil + Dish (g)	2,169.97	2,669.66	2,592.33		
Mass of Dry Soil + Dish (g)	2,061.03	2,493.31	2,383.93		

RESULTS					
Water Content	6.9%	9.0%	10.9%		
Dry Density (Mg/m^3)	2.114	2.140	2.047		
Dry Unit Weight (lbs/ft^3)	131.9	133.6	127.7	#VALUE!	
Lab Max. Dry Density (Mg/m^3)	2.139		Optimum Water Content (%)	11.6%	
Lab Max. Dry Unit Wt. (lbs/ft^3)	133.5				





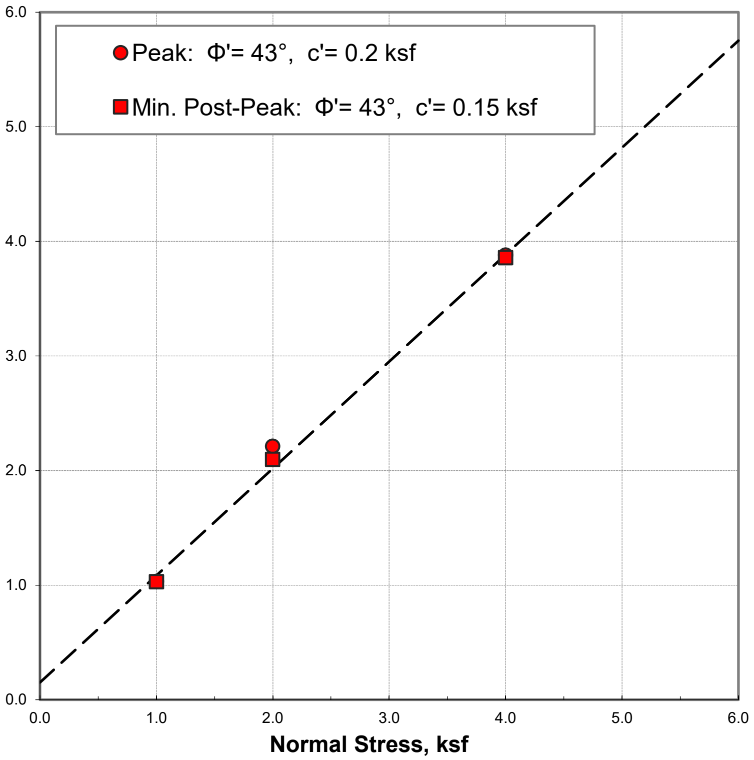


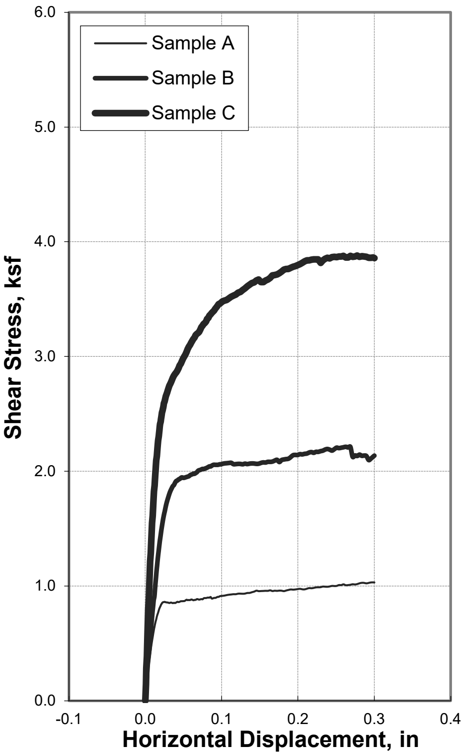


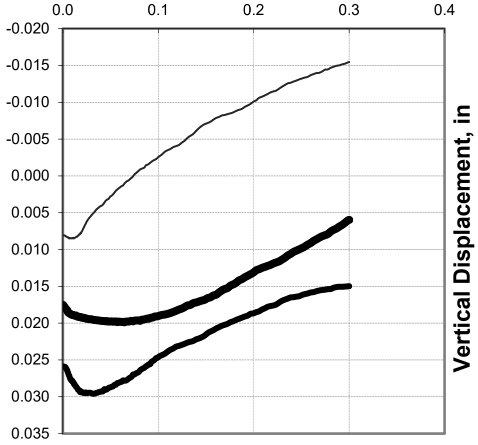
SAMPLE ID	Boring Number:	23B-02			
	Sample Number:	D			
	Sample Depth:	2.5 ft			
	USCS Classification:	Sandy lean CLAY (CL): dark brown, moist			
INITIAL	Specimen	A	B	C	D
	Water Content, %	10.0%	10.0%	10.0%	
	Dry Unit Weight, pcf	114.0	116.7	116.4	
	Saturation, %	52%	56%	55%	
	Void Ratio	0.54	0.51	0.51	
	Diameter, in	2.42	2.42	2.42	
	Height, in	1.00	1.00	1.00	
FINAL	Water Content, %	16.7%	18.6%	18.1%	
	Dry Unit Weight, pcf	115.1	115.2	117.4	
	Void Ratio	0.53	0.53	0.50	
TEST SUMMARY	Displacement at Peak, in	0.24	0.25	0.30	
	Displacement Rate, in/min	0.0005	0.0005	0.0005	
	Normal Stress, ksf	1.0	2.0	4.0	
	Peak Shear Stress, ksf	0.90	1.90	3.79	
	Min. Post-Peak Stress, ksf	0.89	1.89	3.79	
	Test Method: ASTM D3080				
REMARKS	Project: Matilija Canyon Storm Damage Specimens were compacted to approximately 90% R.C. Tested By: CalPoly GEO-E Lab Checked By: L. Berry, Yeh and Associatesested				

CLASSIFICATION	
Sieve Size	% Passing
3/8-in. (9.5mm)	---
#4 (4.75mm)	---
#16 (1.18mm)	---
#30 (0.6mm)	---
#100 (0.150mm)	---
#200 (0.075mm)	---
Atterberg Limits	
Liquid Limit, %	---
Plastic Limit, %	---
Plasticity Index, %	---
Estimated Gs	2.82
k_{avg} 20ºC, cm/sec	---

DIRECT SHEAR TEST REPORT







SAMPLE ID

Boring Number: 22B-04
Sample Number: A
Sample Depth: 0.0 ft
USCS Classification: Sandy lean CLAY (CL): dark brown, moist

	Specimen	A	B	C	D
INITIAL	Water Content, %	9.0%	9.0%	9.0%	
	Dry Unit Weight, pcf	119.9	120.5	120.0	
	Saturation, %	54%	55%	54%	
	Void Ratio	0.47	0.46	0.47	
	Diameter, in	2.42	2.42	2.42	
	Height, in	1.00	1.00	1.00	
FINAL	Water Content, %	14.8%	15.5%	16.2%	
	Dry Unit Weight, pcf	117.6	122.2	120.2	
	Void Ratio	0.50	0.44	0.46	
TEST SUMMARY	Displacement at Peak, in	0.30	0.27	0.28	
	Displacement Rate, in/min	0.0005	0.0005	0.0005	
	Normal Stress, ksf	1.0	2.0	4.0	
	Peak Shear Stress, ksf	1.03	2.21	3.88	
	Min. Post-Peak Stress, ksf	1.03	2.10	3.86	

Test Method: ASTM D3080

REMARKS

Project: Matilija Canyon Storm Damage
Specimens were compacted to approximately 90% R.C.

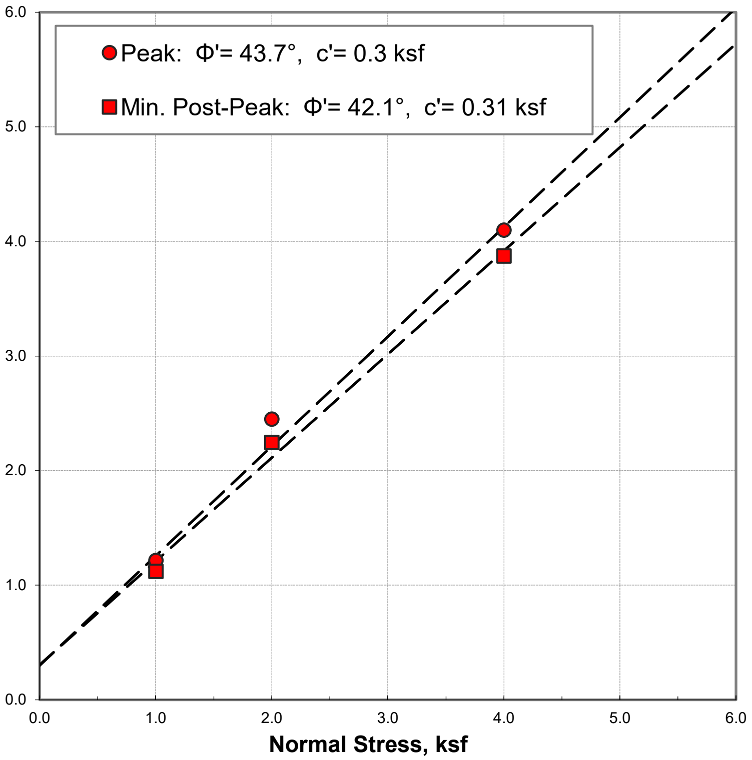
Tested By: CalPoly GEO-E Lab
Checked By: L. Berry, Yeh and Associates

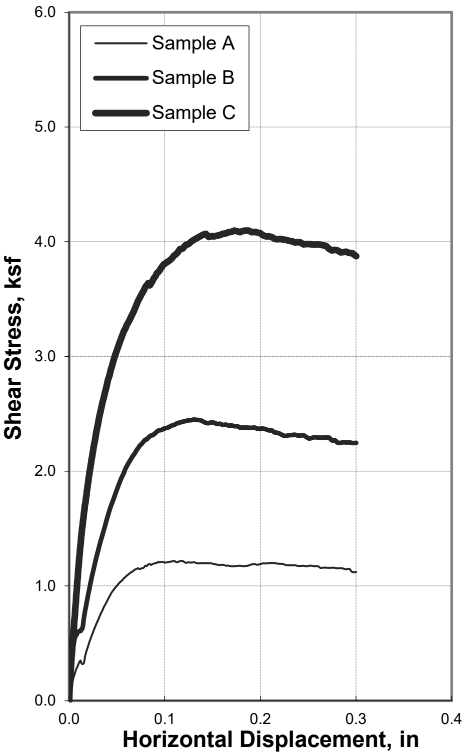
CLASSIFICATION

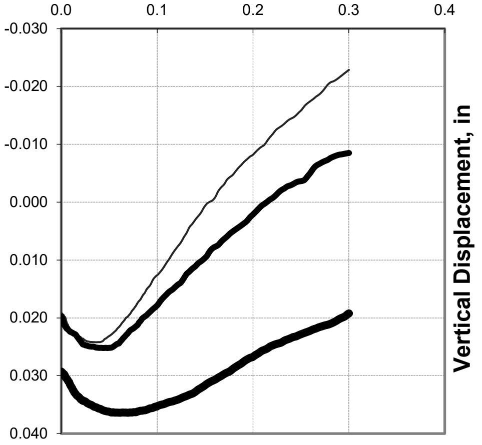
Sieve Size	% Passing
3/8-in. (9.5mm)	---
#4 (4.75mm)	---
#16 (1.18mm)	---
#30 (0.6mm)	---
#100 (0.150mm)	---
#200 (0.075mm)	---

Atterberg Limits	
Liquid Limit, %	---
Plastic Limit, %	---
Plasticity Index, %	---
Estimated Gs	2.82
k_{avg} 20ºC, cm/sec	---

DIRECT SHEAR TEST REPORT







SAMPLE ID	Boring Number:	Borrow Site			
	Sample Number:	1			
	Sample Depth:	0.0 ft			
	USCS Classification:	Poorly graded SAND with silt (SP-SM): brown, moist, coarse to medium sand			
INITIAL	Specimen	A	B	C	D
	Water Content, %	10.7%	10.7%	10.7%	
	Dry Unit Weight, pcf	114.0	114.4	113.2	
	Saturation, %	61%	61%	59%	
	Void Ratio	0.48	0.47	0.49	
	Diameter, in	2.42	2.42	2.42	
	Height, in	1.00	1.00	1.00	
FINAL	Water Content, %	17.5%	16.8%	14.5%	
	Dry Unit Weight, pcf	110.7	112.9	117.5	
	Void Ratio	0.52	0.49	0.43	
TEST SUMMARY	Displacement at Peak, in	0.12	0.13	0.18	
	Displacement Rate, in/min	0.0020	0.0020	0.0020	
	Normal Stress, ksf	1.0	2.0	4.0	
	Peak Shear Stress, ksf	1.22	2.45	4.10	
	Min. Post-Peak Stress, ksf	1.12	2.25	3.87	
	Test Method: ASTM D3080				
REMARKS	Project: Matilija Canyon Storm Damage Specimens were compacted to approximately 90% R.C. Tested By: CalPoly GEO-E Lab Checked By: L. Berry, Yeh and Associatesested				

CLASSIFICATION	Sieve Size	% Passing
	3/8-in. (9.5mm)	---
	#4 (4.75mm)	---
	#16 (1.18mm)	---
	#30 (0.6mm)	---
	#100 (0.150mm)	---
	#200 (0.075mm)	---
	Atterberg Limits	
	Liquid Limit, %	---
	Plastic Limit, %	---
	Plasticity Index, %	---
	Estimated Gs	2.7
	k_{avg} 20ºC, cm/sec	---

DIRECT SHEAR TEST REPORT

Unconfined Uniaxial Compressive Strength Test of Cut Rock Prisms

PROJECT	Job No.:	223-274
	Project:	Matilija Canyon Storm Damage
	Client:	Yeh & Associates
	Date:	7/2/2024
	Test Method Notes:	This test is based on ASTM D7012 (1.5.3 Method C: Uniaxial Compressive Strength of Intact Rock Core Specimens). Test specimens were saw cut from provided rock samples not from cores.

Sample ID	Boring Number:	N/A
	Sample Number:	1
	Sample Depth:	N/A
	Classification:	Cut Prism
Properties	Moisture Condition:	Lab. Conditioned
	Moisture Content:	Not Determined
	Unit Weight (pcf):	158.3
	Length (in.)	3.471
	Width 1 x Width 2 (in.):	1.696 x 2.1
	Comp. Strength (psi):	11,700

Per ASTM D7012 section 8.1.1 Length/Diamter of cores should be a minimum of 2.0; Length/Width 1 satisfies this requirement

Images

Note: crack and missing piece near top on right face prior to testing

Sample ID	Boring Number:	N/A
	Sample Number:	2
	Sample Depth:	N/A
	Classification:	Cut Prism
Properties	Moisture Condition:	Lab. Conditioned
	Moisture Content:	Not Determined
	Unit Weight (pcf):	150.9
	Length (in.)	3.929
	Width 1 x Width 2 (in.):	1.74 x 1.976
	Comp. Strength (psi):	14,830

Per ASTM D7012 section 8.1.1 Length/Diamter of cores should be a minimum of 2.0; Length/Width 1 satisfies this requirement

Images

Tested By: CalPoly GEO-E Lab
Checked By: L. Berry, Yeh and Associatesested

COOPER
TESTING LABORATORY

Corrosivity Tests Summary

CTL # 687-225
Date: 6/7/2024
Tested By: PJ
Checked: PJ
Client: Yeh and Associates
Project: Matilija Canyon Storm Damage
Proj. No: 223-274
Remarks:

Sample Location or ID			**Resistivity @ 15.5 °C (Ohm-cm)**			**Chloride**	**Sulfate**		**pH**	**ORP**		**Sulfide**	**Moisture**	**Soil Visual Description**
			As Rec.	**Min**	**Sat.**	**mg/kg**	**mg/kg**	**%**		(Redox)		Qualitative	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		E_H (mv)	At Test	by Lead	**%**	
Boring	**Sample, No.**	**Depth, ft.**	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
23B-01	1,2	2.5-5.0	-	-	-	<2	29	0.0029	-	-	-	-	7.9	Yellowish Brown Sandy CLAY w/ Gravel
23B-02	1,2	2.5-5.0	-	-	-	<2	13	0.0013	-	-	-	-	2.8	Brown Clayey SAND w/ Gravel
23B-04	1,2	2.5-5.0	-	-	-	<2	25	0.0025	-	-	-	-	4.2	Dark Brown Clayey SAND w/ Gravel
Borrow Site	#1	0.5	-	-	-	<2	92	0.0092	-	-	-	-	4.0	Dark Brown Clayey SAND w/ Gravel