FOR CONTRACT NO.: 04-4S1604

INFORMATION HANDOUT

PERMITS

CALIFORNIA COASTAL COMMISSION

MATERIALS INFORMATION

FOUNDATION REPORT FOR SOLDIER PILE WALL DATED JULY 14, 2010

ROUTE: 1-Son-21.7

Notice of Final Action on a Coastal Permit

Sonoma County Permit and Resource Management Department
2550 Ventura Avenue, Santa Rosa, CA 95403
(707) 565-1900 FAX (707) 565-1103

Date: August 14, 2012

File:	CPH11-0004
Applicant:	Caltrans
Address:	2015 E. Shields Ave., Ste 100
City, State, Zip:	Fresno, CA 93726
Planner:	David Hardy

This notice is being distributed to the Coastal Commission and those who requested notice. The following project is located within the Coastal Zone. A project decision has been completed.

Project Description: Request for a Coastal Permit with hearing for repair on Highway 1 at Post Mile 34.5 hairpin, consisting of a 265 foot retaining wall with cable railing, guardrails, and road bed widening.

Project Location: Post Mile 34.5 hairpin, adjacent to 20605 Highway 1, Timber Cove.

Assessor's Parcel Number: 109-090-013

_X_ Approved by the Board of Zoning Adjustments on August 2, 2012.

Conditions of Approval dated August 2, 2012 enclosed.

Findings: The project, as described in the application and as conditioned, conforms with the plans, policies, requirements and standards of the Sonoma County Coastal Program. Specifically:

1. The project, as described in the application and accompanying materials and as conditioned, is consistent with the Goals, Objectives and Policies of Sonoma County General Plan 2020.

2. The project, as described in the application and accompanying materials and as conditioned, conforms with the plans, policies, requirements and standards of the Sonoma County Local Coastal Program. In this specific case, the proposed improvements are necessary to protect an existing, necessary public transportation use that was developed consistent with provisions of the Local Coastal Plan and California Coastal Act.

3. The proposed project is in conformity with the public access and public recreation policies of Chapter 3 of the California Coastal Act (commencing with Section 30200).

4. Based upon the information contained in the project file, the project is exempt from further environmental review pursuant to Section 15302 of the CEQA Guidelines, because the wall repairs damage from an existing small landslide scarp that underlies the southbound lane of Highway 1. While the size of the traffic lane will increase in size by one foot in width and the shoulder will increase to four feet, there will still remain one lane in each direction.

5. Because of the dark paint applied to project surfaces, revegetation with native landscaping, the widening of an existing Class III bikeway, and distance of more than 100 feet from Kolmer Creek, the project is consistent with the applicable policies of the GP2020 regarding bikeways, visual resources, and riparian corridors.

6. The project conforms to the Visual Resource policies of the Local Coastal Plan because the metal guard beams, wooden timbers, steel support H-beams, and the concrete whaler of the wall will be painted a non-reflective dark brown color to blend with the surrounding vegetative character. The use of the dark

painted cable rails will also minimize the visual impact of the project, because the cable rails provide a thin protective barrier and avoid the need for thicker and bulkier rails considered as alternatives. The project will use native plants planted on soil placed to minimize the visibility of the wall when seen from across the gulch.

7. The project conforms to the Transportation policies of the Local Coastal Plan in that it has four-foot wide shoulders considered "standard" in the LCP and implements Policy No. 28 to "provide adequate shoulder width to accommodate bicyclists and pedestrians on Highway 1."

8. LCP Environmental Resource Policy No. 9 requires a 100-foot setback from riparian areas, and Policy No. 10 requires erosion and sediment controls for projects in riparian areas. The subject project is set back more than 100 feet from the water's edge, and it includes erosion control measures, as set forth on Sheet EC-1 and ECD-1. Policies related to Coastal bluffs require erosion control, prohibit removal of soil except for road maintenance, require minimal removal of plants, and they require an engineering geologist's report shows the project will be stable when working on Coastal bluffs. Caltrans has conducted a geotechnical evaluation of the project and concluded that the design and length of the project are the minimum work necessary to prevent further slope instability along this stretch of the highway.

__X__ Appealable. The decision may be appealed in writing to the Sonoma County Board of Supervisors within ten (10) calendar days. The decision of the Board of Supervisors is appealable to the State Coastal Commission within ten (10) working days.

Address:
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

Final Conditions of Approval

Date: August 2, 2012 **File No.:** CPH11-0004
Applicant: Caltrans **APN: 109-090-013**
Address: 20605 Highway 1, Timber Cove

Project Description: Request for a Coastal Permit with hearing for repair on Highway 1 at Post Mile 34.5 hairpin, consisting of a 265 foot retaining wall with cable railing, guardrails, and road bed widening.

Prior to commencing the use, evidence must be submitted to the file that all of the following non-operational conditions have been met.

PLANNING:

1. This Coastal Permit allows the applicant to repair on Highway 1 at Post Mile 34.5 hairpin, consisting of a 265 foot retaining wall with cable railing, guardrails, and road bed widening The use shall be operated in accordance with the proposal statement and site plan located in File# CPH11-0004 unless otherwise modified by these conditions.

2. Within the project area and project limits, Caltrans shall remove by manual means invasive non-native plants such as ivy, iceplant, pampas grass, gorse, broom, and Pride of Madeira. Revegetation shall be accomplished with deep-rooted, native, drought resistant perennial plants indigenous to the Sonoma County coastal scrub environment. Prior to commencement of construction, Caltrans shall indicate the method of irrigation to establish the planting and provide a list of replacement species to PRMD and the District Landscape Architect for California State Parks for review and approval.

3. The metal beam guard rail and posts, cables and upright posts of the cable railing, steel H-beams to support the wood lagging, the treated wood lagging, the horizontal whaler beams of the wall, and any other metal work on the wall shall be painted or stained with a dark non-reflective coating so as to blend the projects with the wooded coastal scrub landscaping. Cables in the cable railing do not need to be painted if they use Corten cable.

4. From the intersection of State Route 1 with the Windermere Point driveway (approximate station 15+00) southbound to Kolmer Gulch beach, Caltrans shall construct the portion of the California Coastal Trail within the project area and proposed project limits, according to the design and specifications as set forth in the State Parks approved environmental document for the trail.

5. From the intersection of State Route 1 with the Windermere Point driveway (approximate station 15+00) northbound, Caltrans shall grant an encroachment permit or easement to California State Parks, Sonoma County Regional Parks, or another state or county agency for the purpose of constructing the California Coastal Trail entirely or partially within Caltrans right of way.

6. Any proposed modification, alteration, and/or expansion of the use as described by the application materials and design drawings dated April 10, 2012, and as authorized by this Coastal Permit shall require the prior review and approval of the Permit and Resource Management Department or the Board of Zoning Adjustments, as appropriate. Such changes may require a new or modified Coastal Permit and additional environmental review.

7. All construction and improvement plans shall have the following note printed on plan sheets:

   "In the event that archaeological resources such as pottery, arrowheads, midden or culturally modified soil deposits are discovered at any time during grading, scraping or excavation within the property, all work shall be halted in the vicinity of the find and County PRMD Project Review staff shall be notified and a qualified archaeologist shall be contacted immediately to make an evaluation of the find and report to PRMD. PRMD staff may consult and/or notify the appropriate tribal representative from tribes known to PRMD to have interests in the area. Artifacts associated with prehistoric sites include humanly modified stone, shell, bone or other cultural

materials such as charcoal, ash and burned rock indicative of food procurement or processing activities. Prehistoric domestic resources include hearths, firepits, or house floor depressions whereas typical mortuary resources are represented by human skeletal remains. Historic artifacts potentially include all by-products of human land use greater than 50 years of age including trash pits older than fifty years of age. When contacted, a member of PRMD Project Review staff and the archaeologist shall visit the site to determine the extent of the resources and to develop and coordinate proper protection/mitigation measures required for the discovery. PRMD may refer the mitigation/protection plan to designated tribal representatives for review and comment. No work shall commence until a protection/mitigation plan is reviewed and approved by PRMD - Project Review staff. Mitigations may include avoidance, removal, preservation and/or recordation in accordance with California law. Archeological evaluation and mitigation shall be at the applicant's sole expense.

"If human remains are encountered, all work must stop in the immediate vicinity of the discovered remains and PRMD staff, County Coroner and a qualified archaeologist must be notified immediately so that an evaluation can be performed. If the remains are deemed to be Native American, the Native American Heritage Commission must be contacted by the Coroner so that a "Most Likely Descendant" can be designated and the appropriate provisions of the California Government Code and California Public Resources Code will be followed."

8. This permit shall be subject to revocation or modification by the Permit and Resource Management Department if: (a) the department finds that there has been non-compliance with any of the conditions or (b) the department finds that the use for which this permit is here by granted constitutes a nuisance. Any such revocation shall be preceded by a public hearing noticed and heard pursuant to Section 26-335 and 26C-335.2 of the Coastal Zoning Ordinance.

In any case where a Coastal Permit has not been used within three (3) years after the date of granting thereof, or for such additional period as may be specified in the permit, such permit shall become automatically void and of no further effect provided, however, that upon written request by the applicant prior to the expiration of the two year period the permit approval may be extended for not more than one (1) year by the authority which granted the original permit pursuant to Section 26C-348 of the Coastal Zoning Ordinance.

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. GORDON DANKE
Design Branch 9 Chief
Bridge Design Services

Date: July 14, 2010

Attention: Pete Norboe

File: 04-SON-1 PM 21.7
04- 4S1601
(0400001213)
Soldier pile Wall
Storm Damage Project

H. Nikoui

From: HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject: Foundation Report (FR) for Soldier Pile Wall

This Foundation Report is prepared in response to your request for the proposed soldier pile wall at the above referenced location. The proposed wall is designed to replace an existing failed timber retaining wall and to stabilize an on-going slope movement along the southbound edge of Route 1 just north of Town of Jenner in Sonoma County.

1. SCOPE OF WORK

The following tasks were performed for the preparation of this FR:

- Site Reconnaissance
- GPS Mapping
- Search of the Geotechnical Files for available information. No geotechnical explorations were necessary since adequate geotechnical information is available at this site from the previous project EA 04-193961.
- Foundation Design Analysis; and
- Preparation of this Foundation Report.

2. PROJECT DESCRIPTION

This memo provides foundation recommendations for the proposed retaining wall on Route 1 (PM 21.7) just North of the Town of Jenner (just south of River End Restaurant)

in Sonoma County. It is proposed to replace the severely damage existing timber wall located at the R/W line (at the roadway toe of slope) in front of a private residence driveway (10990 Highway 1- See attached Photos #1A, #1B and #1C) with a new wall. This timber wall constructed by the owner of the above residence has been damaged due to slide movement at this location. Since the slide movement is beyond the limits of the existing timber wall the proposed wall will need to be extended to protect and support the roadway from further undermining.

3. HISTORY OF THE SITE

The slope movement at the site has been an on-going problem since early 1992 and accelerated during the heavy rains in the Winter of 1992-1993. Observation of the performance of the roadway in 1992 and 1993, as well as a detailed geologic investigation shows that the upper slide scarp is clearly defined by arcuate cracking in the highway pavement and shoulder area. Slope movement was occurring within and below the roadway in the southbound lane, and extending well into the northbound lane. Major cracking was observed in the edge of the southbound shoulder and in the driveway of the garage apartment in the Winter of 1992 (see attached photos #2A through #2G). The toe of the slide could not be identified but it is believed to be at or below the river level. The slipout was approximately 300 feet wide; however only 250 feet of the slipout affected the highway.

The onset of slide movement in 1992 coincided with a water main break in the main part of the slipout on March 5, 1993. The water main belongs to Russian River Utilities, which was relocated in mid March 1993. The water main crosses State Route 1 at the southern end of the main slide scarp within the roadway. The broken water main was repaired in 1993.

Based on our geotechnical record, in 1993 the driveway of the garage apartment (10990 Highway 1) was approximately at roadway level (maybe 1 to 2 feet differential- see Photo# 2E, #2F, #4). The record indicates that the driveway for the garage and the garage foundation were experiencing settlement and distortion, making the driveway difficult to use. The private residence (10990 Highway 1) is located approximately 30 ft downslope from highway elevation. Both home and the driveway apartment have an on-site sewage disposal system, which contributes to the long-term saturation of the slope. On December 1992, the owner of the residence (10990 Highway 1) Mr. Brown, contacted the Geotechnical Section several times and expressed his concerns about the distortion in the

garage, and the fact that the driveway is now well below the roadway level. Mr. Dave Heyes, District Engineering Geologist met with the owner's Geotechnical Consultant (Mr. Donn Ristau of Phoenix Geotechnical) on January 22, 1993 and later provided him with our geotechnical borings and lab test results and the results of our monitoring program (piezometers and inclinometer readings). Our records do not show what the owner's geotechnical consultants have done for their client to remediate the land sliding problem at his property. We are in the process of contacting Sonoma County to obtain any geotechnical information regarding this property.

Phoenix Geotechnical was contacted on January 21, 2010 to acquire any information regarding their investigation of the above property. Mr. Bob Broadhurst, the owner of Phoenix Geotechnical, stated that his firm only did preliminary work and submitted a proposal to Mr. Brown, the owner of the property, but Mr. Broadhurst never got any response from the owner to proceed with their investigation.

3.1 1992 Geotechnical Investigation

A subsurface investigation was conducted during June and July 1992 and consisted of five power borings. Inclinometers were then placed in the two borings within the slipout, and piezometers placed in the three borings outside the slipout on the northbound lane of the roadway. The inclinometers indicate that the movement is occurring at an approximate depth of 16 feet below ground surface. The inclinometers sheared off between January 15 and 19, 1993, and are no longer functional. The groundwater level was recorded in the piezometers and the inclinometers. Please see Section 6.5 of this report for groundwater data.

3.2 1993 Subsurface Investigation and Slide Repair

An extensive foundation investigation was completed in Summer of 1993 (July 12 through July 20), at this landslide location under EA 04-193961. The foundation investigation consisted of seven rotary sample borings, including undisturbed Modified California, 2 inches hydraulic push and Standard Penetration Test (SPT) sampling, and 6 electronic cone penetration borings. The boring data is shown in the attached "Log of Test Borings" dated September 1993.

Micropiles (Pin Piles) with concrete cap was recommended (Foundation Report dated September 22, 1993 by Nikoui/Van Velsor to Office of Structures) and used to repair the

slide and stop the slide movement in Fall of 1993. A 5 ft deep, 385 ft long underdrain system was also installed along the NB outside edge of the shoulder under this contract (EA 04-193961). The attached plans show the location and details of micropiles (pin piles) the underdrain system constructed in 1993.

As per our request, the contractor installed six inclinometers after the micropile construction was completed, to monitor the slide movement within the roadway. Three inclinometers were installed within the shoulder, inside the pipe piles of the micropile system, to a depth of approximately 40 ft. Three inclinometers were installed near the edge of the NB traveled way (one to depth of 100 ft and two to depth of 40 ft). Monument cover was placed over all inclinometers. The periodic slope indicators reading show no significant movement to date (January 2010).

3.3 REPORTED SLIDE MOVEMENT IN 2009

During our initial site visit on April 2009, we observed that an existing timber wall which was build by the owner of the residence at 10990 Highway 1 has been severely damaged due to continued slide movement at this location. We also observed that a portion of the buried concrete cap connecting all micropiles (pin piles) is exposed behind and adjacent to the existing timber wall (see attached photo #1A, #1B and #1C). The scarp of the slide appears to run along the edge of the southbound shoulder of Highway 1, directly above the timber wall. The scarp of the landslide starts at the south end, and above the existing timber wall, and possibly ends somewhere near the north end of the existing micropiles, a distance of about 250 feet. However, the visible portion of the slide scarp is only about 65 ft to 70 ft long. The rest of the slide scarps are obscure and may be masked by recent shoulder backing materials (placed by Maintenance) and heavy vegetation. We have not identified the landslide toe, but believe it is likely to be at or below the Russian River level.

We have asked Maintenance to immediately place some lightweight fill behind the existing timber wall to fill up all the cavities and voids, which has already been done (see attached photos #3A and #3B). No signs of movement were observed in the roadway pavement. In fact, roadway surface (Route 1) is in excellent condition within the limits of the micropile system.

In order to determine the actual extent of the slope instability within the limits of the existing micropiles so that the actual length of the proposed retaining wall could be

determined, our geologists Chris Risden and Ed Kretschmer conducted site reconnaissance and GPS mapping of the site on early March 2010. Our geologists' conclusions were that there are no signs indicating the slope instability beyond those visible cracks absorbed on and below the roadway SB shoulder. They also concluded that landslide below the River End Restaurant's parking (see Photo #7) is an independent and localized landslide in which its scarp does not extend southward below and within the limits of the existing micropiles. This landslide has no negative impact on the roadway at this time.

4. EXCEPTIONS TO POLICY

There is no known exception to Department policy relating to the investigation or design of the proposed soldier pile wall.

5. SITE GEOLOGY AND SUBSURFACE CONDITIONS

5.1 Regional Geology

Located within the Coast Range geomorphic province of California, the geology of the region consists of northwest-trending ridges, gently sloping hills, intermontane valleys, and large elongated depressions. The San Andreas Fault System, the most prominent geologic feature in the area, includes the San Andreas Fault as well as numerous splays, including the Hayward and Calaveras Faults, which together take up strain between the northward migrating Pacific plate and the southward (relatively) moving North American plate. The major faults within the system are predominantly right lateral, strike-slip faults with some compressional component.

Rocks of the Franciscan Group as well as locally derived alluvium and thin residual soils underlie the project site. Franciscan Group rocks at the site are argillitic shale and graywacke, the former being highly erodible. Graywacke is found as knockers, or blocks, within the shale matrix and can be found as prominent outcrops along Route 1.

5.2 Slide Plane Location

The slide plane of the active landslide is better defined in its upper reaches by cracking along the outside edge of the roadway shoulder (southbound) and the slope inclinometer data. Evidence for the slide toe is less clear.

The data from the inclinometers SI-1 and SI-2, which were installed in the southbound shoulder taken in November 1992, suggest that the slide plane is approximately 10-16 feet below ground surface. Direction of the mass movement is to the southwest; S11° W and S26° W as recorded in SI-1 and SI-2, respectively. During heavy rains in January 1993, SI-1 sheared at 14.9 feet, and SI-2 sheared at 8 feet.

5.3. Fault and Seismicity

The project area lies within the seismically active San Francisco Bay region and lies very close to the San Andreas Fault. Table 1 lists the active faults near the project area and the peak ground accelerations that could be expected from a maximum credible earthquake. The two major active faults in the region, the San Andreas and the Healdsburg/Rodgers Creek, both have the potential for magnitude 7.0 or greater earthquakes.

Table 1. Predicted Maximum Credible Earthquakes and Accelerations*

FAULT	Distance from project	Maximum Credible Earthquake	Peak Ground Acceleration
San Andreas	2.5 km	8.0	0.68 g
Rodgers Creek/ Healdsburg	33.0 km	7.0	0.15 g

*MCE's and accelerations from Mualchin (1996)

5.4 Subsurface Soil and Rock Condition

The borings drilled in 1993 along the edge of the southbound shoulder of Highway 1 for the existing micropile foundation, describe the foundation as combination of hard, silty clay and dense clayey silty sand with rock fragments to a depth of 7 to 13 feet below the roadway elevation, over bedrock.

At this location, the rocks consist of sandstone blocks within a highly weathered, tectonically sheared, shale matrix. The sandstone is fine to coarse-grained greywacke, which shows high degrees of weathering in some samples and increases the sand percentage of the shale matrix. The shale is generally a fine grained, gray to green-gray, fissile, sheared matrix material, which is differentially weathered. The shale weathers to blue-gray clay. Tectonic and landslide shearing has mixed the weathered sandstone and

weathered shale, as evidenced in the sandy clay samples recovered from in our investigation (Log of Test Borings will be submitted when ready).

5.5. Groundwater

During our foundation investigation on July 1993, a pocket of groundwater was encountered in power boring P-3, located within the central portion of the landslide mass at 24 feet below the ground surface. In power boring P-7, also within the central area of the landslide, no groundwater was encountered. Other power borings, within and on the flanks of the slide mass, showed similar scatter in groundwater occurrence.

During heavy rainfall in January 1993, groundwater was recorded in piezometers in the shoulder of the northbound lane as follow: Piezometers 1, 2 and 3: 36.85 feet, 9.85 feet, and 14.5 feet below ground surface, respectively. Measurements in June 1993 show the following: groundwater was encountered at the depth of 71.7 feet and 36.1 feet below ground surface in piezometers 1 and 3, respectively. No data was collected from piezometer 2 in June 1993, as the monitoring well was accidentally covered with asphalt during paving repair to compensate for slide displacement.

It is expected that groundwater will be encountered in holes excavations during construction.

6. SCOUR ELEVATION

There is no scour issue at this site.

7. CORROSION EVALUATION

Corrosion investigation in 1993 revealed that the site is in a relatively non-corrosive environment as indicated by the pH, resistivity, and soluble salt analyses of soil samples (see table below).

pH	Resistivity, Ohm/Cm	Sulfates, ppm	Chlorides, ppm
7.62 to 8.99	929 to 2546	690	30

8. CONCLUSIONS

Although the use of micropiles (Pin Piles) were successful in stopping the movement within the roadway itself, there has been some movement of the roadway embankment beyond the pile cap and roadway shoulder in the southbound direction including, the subject area where the existing timber wall has been damaged, and is on verge of failure. After visiting the site in April 2009, we decided to replace the timber wall in kind. However, after further study of the site and search of geotechnical files, we believe that, due to the seriousness of the ground movement at this location, the timber wall, which was initially recommended, would not be appropriate for this site. A timber wall might work temporarily, but will fail within a few years because past monitoring data, as well as our recent site reconnaissance indicates that a portion of slope below the roadway hinge point is creeping down toward the Russian River. Further search of landslide files (see photos #2A, #2D and #2G) and study of the site revealed that the slide movement along the edge of SB shoulder was beyond just timber wall. However, after the construction of the micropiles most of the movements have been stopped. As stated above, the recent site reconnaissance and GPS mapping by our geologists revealed that there are no signs indicating the slope instability beyond those visible cracks absorbed on the roadway SB shoulder above and slightly north of the existing timber wall.

9. RECOMMENDATIONS

The following recommendations are made:

- We recommend that the existing failed timber wall be replaced with soldier pile wall. Our recent site visit revealed that the major movement of slope is within the limits of the existing timber wall and slightly beyond the timber wall toward north for the total length of about 70 feet to 75 feet. We believe, at this time, it is only necessary to construct a soldier pile wall within the above-mentioned limits, since there is no sign of significant movement beyond these limits. The soldier pile wall should, however, be designed so that it can be extended northward in case of future movement. It should be mentioned that there is a significant ground movement at the end of the existing micropile around the CIDH pile foundation belonging to the parking area of the River End Restaurant, but has not negatively affected the roadway (See the attached photos #7) at this time.

We recommend the soldier pile wall be designed for a maximum height of 15 feet future cantilever wall with wood lagging and lightweight fill backfill. However, the height of the wall, which will be exposed within the limits of existing timber wall (in front of the 10990 Highway 1 residence), is to be determined by Project Development. We recommend that the wall length be about 95 ft starting somewhere near the south end of the existing timber wall. Project Development should determine the exact location and alignment of the proposed soldier pile wall. The exposed height of the proposed wall beyond the north end of the existing timber wall should be limited to 12 feet. Refer to attached Exhibit A, Photo #5A and #5B.

- We recommend that the top of the wall be flush with the roadway level, having a concrete cap and barrier or MBGR with or without concrete cap.

- As shown on the attached Exhibit A, we recommend 2 ft diameter CIDH piles. We recommend the total length of the soldier beam to be at least 45 ft within the entire length of the proposed wall.

- We recommend that the soldier pile wall be designed for the following:

  For ***active pressure*** against the wall, use the following:

  - Between 0 ft to 15 ft depth (future dredge line) :

    Internal Friction Angle (ϕ) = 30°
    Cohesion (C) = 0 psf
    Moist Unit Weight (γ) = 120 pcf

  - For earth pressure distribution, use a triangular pressure distribution.

  - A rectangular pressure diagram from top of the wall to the depth of 10, for traffic surcharge equivalent to about 2 ft of fill.

  - The wall shall be capable of resisting an additional seismic uniform pressure estimated to be equal to 2H psf.

For ***passive pressure*** against the soldier piles (below 15 ft depth), use the following:

Internal Friction Angle (ø) = 33°
Cohesion (C) = 700 psf
Moist Unit Weight (γ) = 125 pcf
Friction Factor (δ) = ¾ ø

For ***vertical CIDH pile Capacity and penetration depth*** use the following:

- Maximum pile spacing shall be limited to 8 ft.
- The ultimate vertical compression and tension capacities of piles may be calculated using a unit pile shaft friction of 5 ksf per unit surface area of the pile length below the dredge line.
- Use 60% of the compression shaft resistance value mentioned above to calculate the ultimate tension (uplift) resistance of the pile.
- For ultimate pile tip compression, use bearing pressure of 60 ksf per unit tip of the CIDH pile.

- We recommend installing a series of horizontal drain galleries in the middle of the slope between the riverbed and the proposed wall to drain the hillside above and below the proposed wall. The two locations of the horizontal drain galleries (Site 1 and Site 2) are shown in the attached Exhibit B . These horizontal drains should be installed after the construction of the wall. Care should be taken to locate these horizontal drains so that not to interfere with the proposed soldier beam and the existing micropiles. If during drilling for these horizontal drains the existing micropiles are intercepted, we recommend either to re-drill the hole slightly away from it or drill through the micro piles, if possible. The exact location, depth and details of these horizontal drains are shown on the attached Exhibit B. All horizontal drains should be drain into a newly constructed concrete gutter and discharged further away from the flat area over the embankment slope (the exact length of these two gutters need to be determined by Project Development. The length of these horizontal drains should be 100 ft to 150 ft (or R/W line on the eastside of the roadway) and installed at different angles into the hillside below and above the roadway. The slope of these horizontal drains should be 1% above horizontal. Refer to the attached Exhibit B. Horizontal drain installation shall be in accordance with Section 68-2 of Caltrans Standard Specifications.

The above recommendations are based on parameters established by our previous field exploration and engineering judgment.

10. CONSTRUCTION CONSIDERATIONS

The following construction considerations and requirements should be included in the design and construction specifications for the proposed wall and mitigation measures.

The contractor may encounter difficulties during drilling for the soldier piles. This is due to the hard drilling condition experience during drilling into sandstone rock especially below the depth of 25 ft below the ground surface. Therefore, the contractor should be prepared for hard drilling condition during holes excavation for the soldier piles.

Groundwater may encounter during drilling operation for the proposed CIDH piles. Because of the existence of groundwater, the contractor may choose to use a closed system using a concrete pump or a tremie tube to place concrete at the bottom of the holes for soldier piles. A positive head should be maintained at all times to reduce potential for concrete segregation.

Installation of CIDH piles should be performed in accordance with Section 49-4 of the Standard Specifications.

- The drilling and concrete placement for CIDH pile construction shall be staged. No open holes shall be adjacent.

- Use of casing may be required during drilling in unstable fill to keep the drilled hole walls from collapsing and reduce the amount of dewatering required (if encountered). The casing should be removed with the help of continuous vibration to reduce the potential for concrete to "hang up" on casing. The equipment used to drill should produce a hole free from a surface film of weak and disturbed material. Loose material and debris should be removed from the hole and the bottom of the hole should be tamped or any loose materials at the bottom should be grouted to minimize settlement.

The contractor may encounter difficulties during drilling for the soldier beam piles. This is due to the hard drilling condition experienced during drilling.

Draft Special Provisions

Sections 10-1._DRILLED HOLES (Paragraph 4) and TIEBACK ANCHORS (Paragraph 2):

Difficult pile installation is anticipated due to presence of overlying medium dense soils, caving soils, groundwater and traffic control. Also, hard rock conditions are anticipated although rock conditions are variable. Difficult pile installation is anticipated due to the presence of cobbles and large boulders. The rock has a chaotic structure which results in discontinuous, cobble to boulder sized blocks of formational rock within a soft, intensely weathered to a very stiff, slightly weathered clayey sand/sandy clay matrix.

****

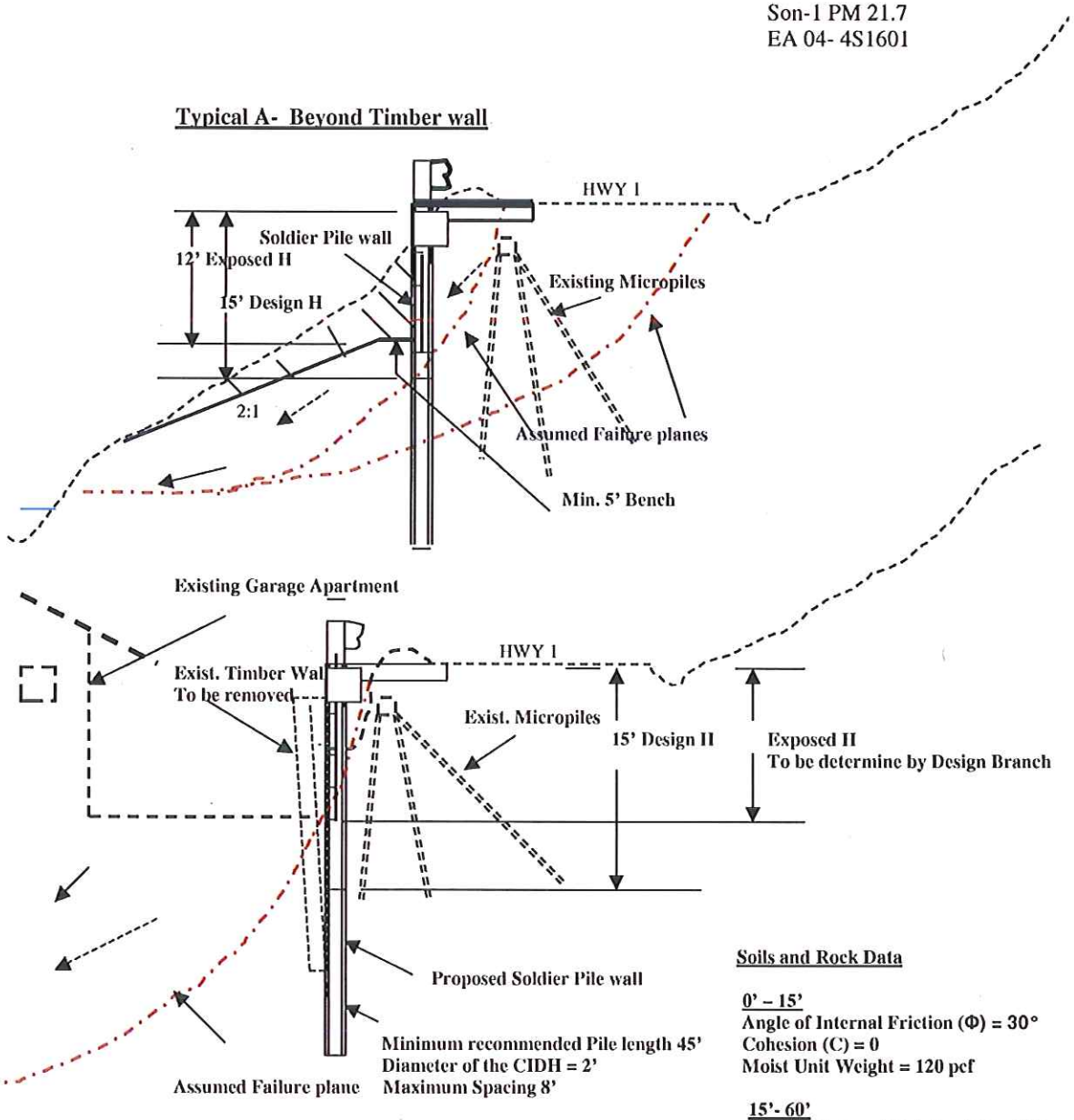
If you have any questions or need additional information, please call me at 510-286-4811.

Attachments

c: TPokrywka, HNikoui, RWoo/WFong, KLe/SNg/SKakihara, JHaghparast/HBinning /ANijhawan, Hydraulics, Project File, Daily File

HNikoui/mm

EXHIBIT A
Son-1 PM 21.7
EA 04- 4S1601



Soils and Rock Data

0' – 15'
Angle of Internal Friction (Φ) = 30°
Cohesion (C) = 0
Moist Unit Weight = 120 pcf

15'- 60'
Angle of Internal Friction (Φ) = 33°
Cohesion (C) = 700 psf
Moist Unit Weight = 125 pcf

Exhibit A

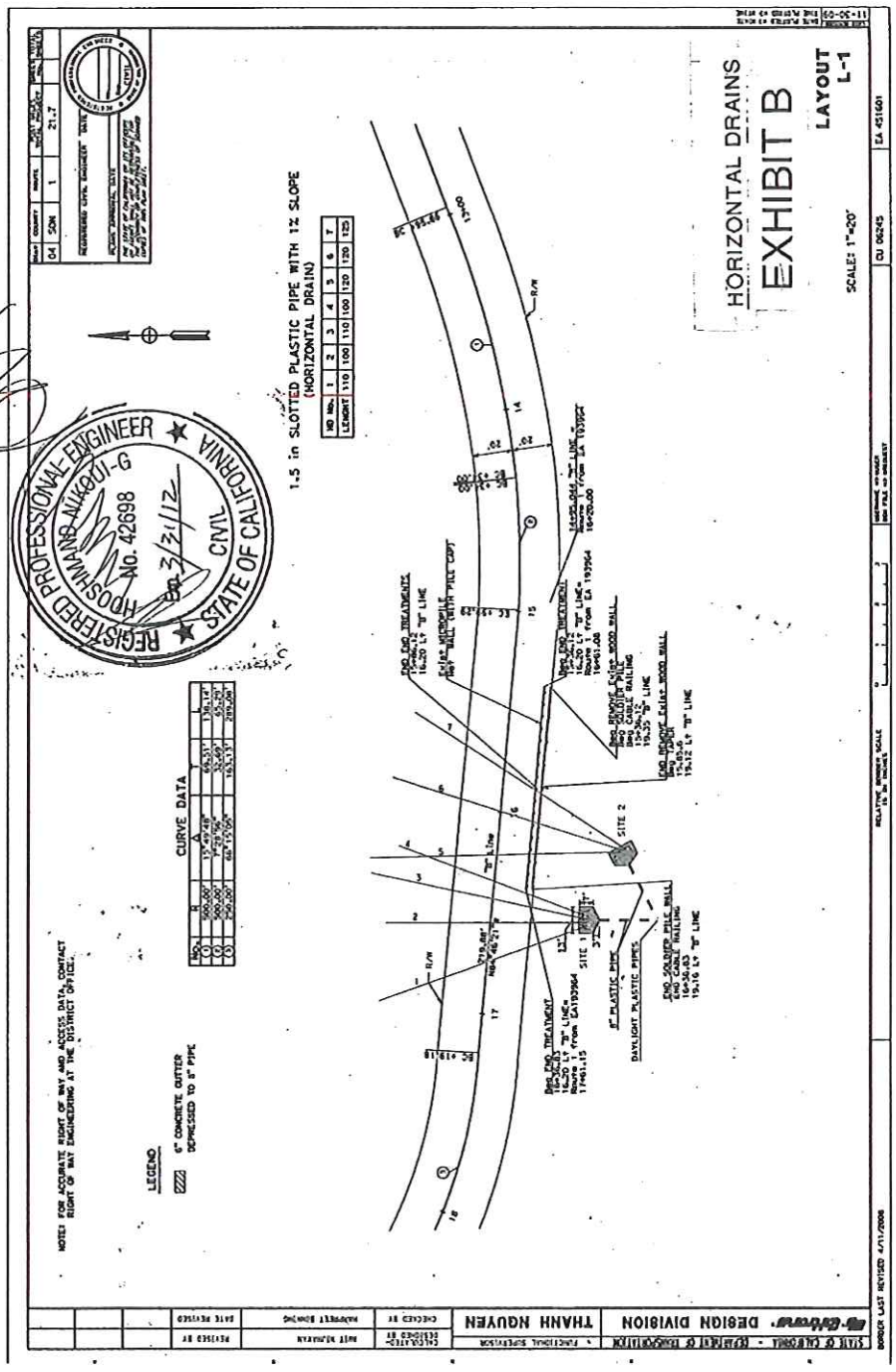

HORIZONTAL DRAINS
EXHIBIT B
LAYOUT
L-1
SCALES 1"=20'
1:5 in SLOTTED PLASTIC PIPE WITH 1% SLOPE
(HORIZONTAL DRAIN)
CURVE DATA
LEGEND
6" CONCRETE GUTTER DEPRESSED TO 6" PIPE
NOTE: FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
REGISTERED PROFESSIONAL ENGINEER
HOSHMAND ALIKOUI-G
No. 42698
CIVIL
STATE OF CALIFORNIA
DESIGN DIVISION
THANH NGUYEN
SITE 1
SITE 2
4" PLASTIC PIPE
DAYLIGHT PLASTIC PIPES

Exhibit B

Figure 1A: Failed Timber Wall at Driveway of 10990 Hwy 1 (April 2009).

Figure 1B: Failed Timber Wall at Driveway 10990 Hwy 1 (April 2009).

Figure 1C: Exposed Concrete Pile Cap of Micropiles at the Scarp of the slide (1/23/2010).

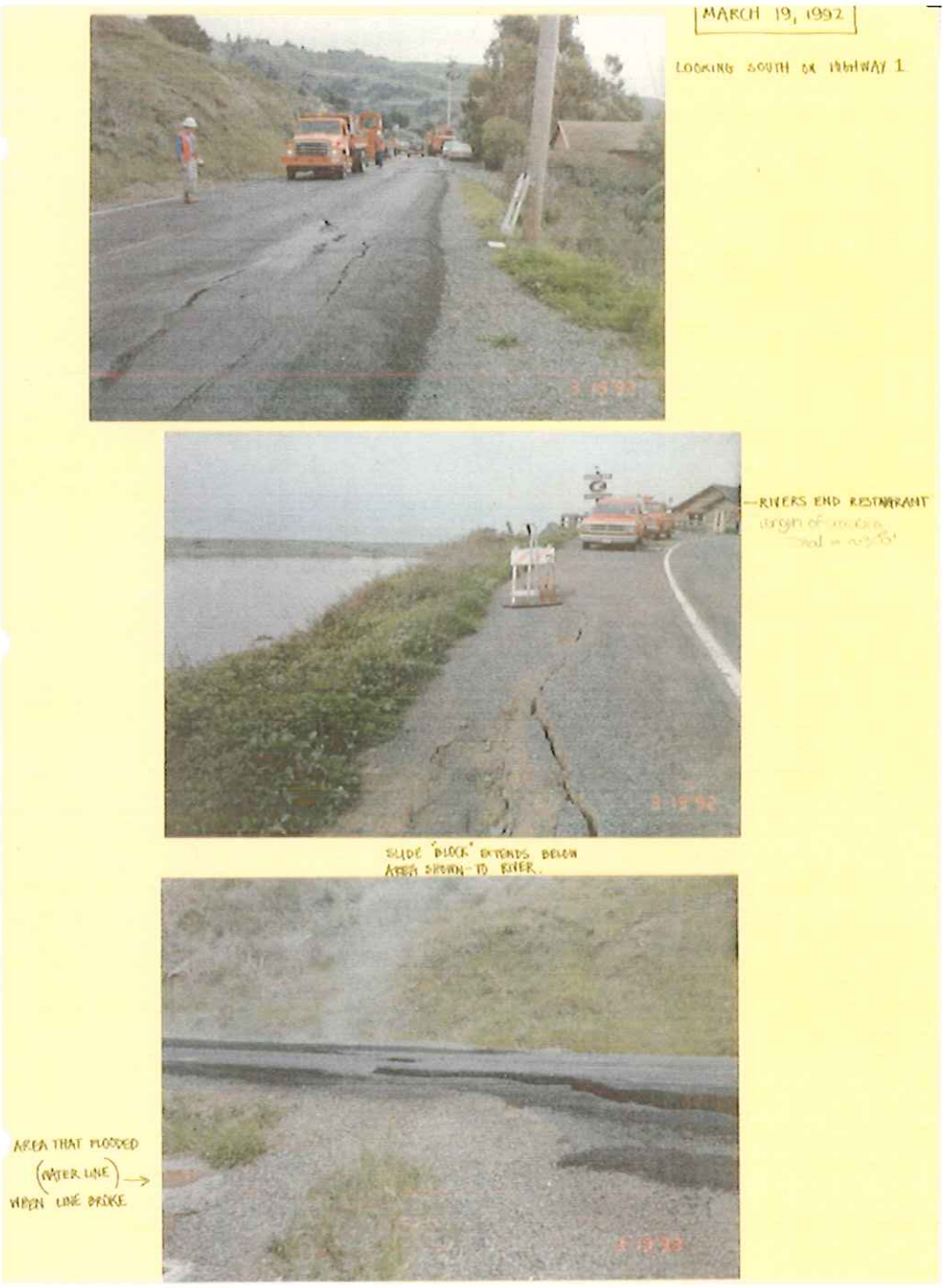


Figure 2A: Photos of the landslide (1992).

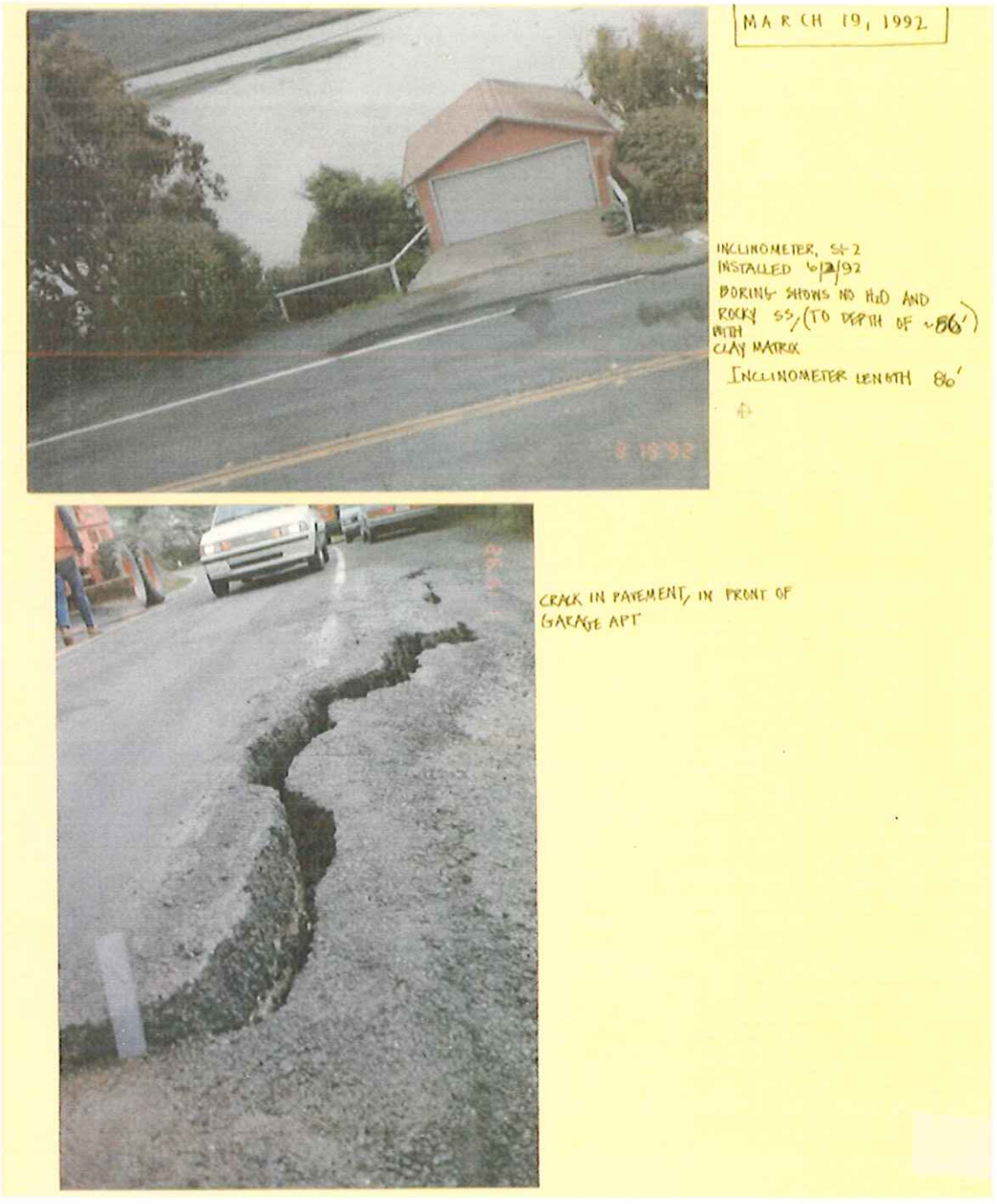


Figure 2B: Large crack in front of the Garage Apartment Driveway (1992).

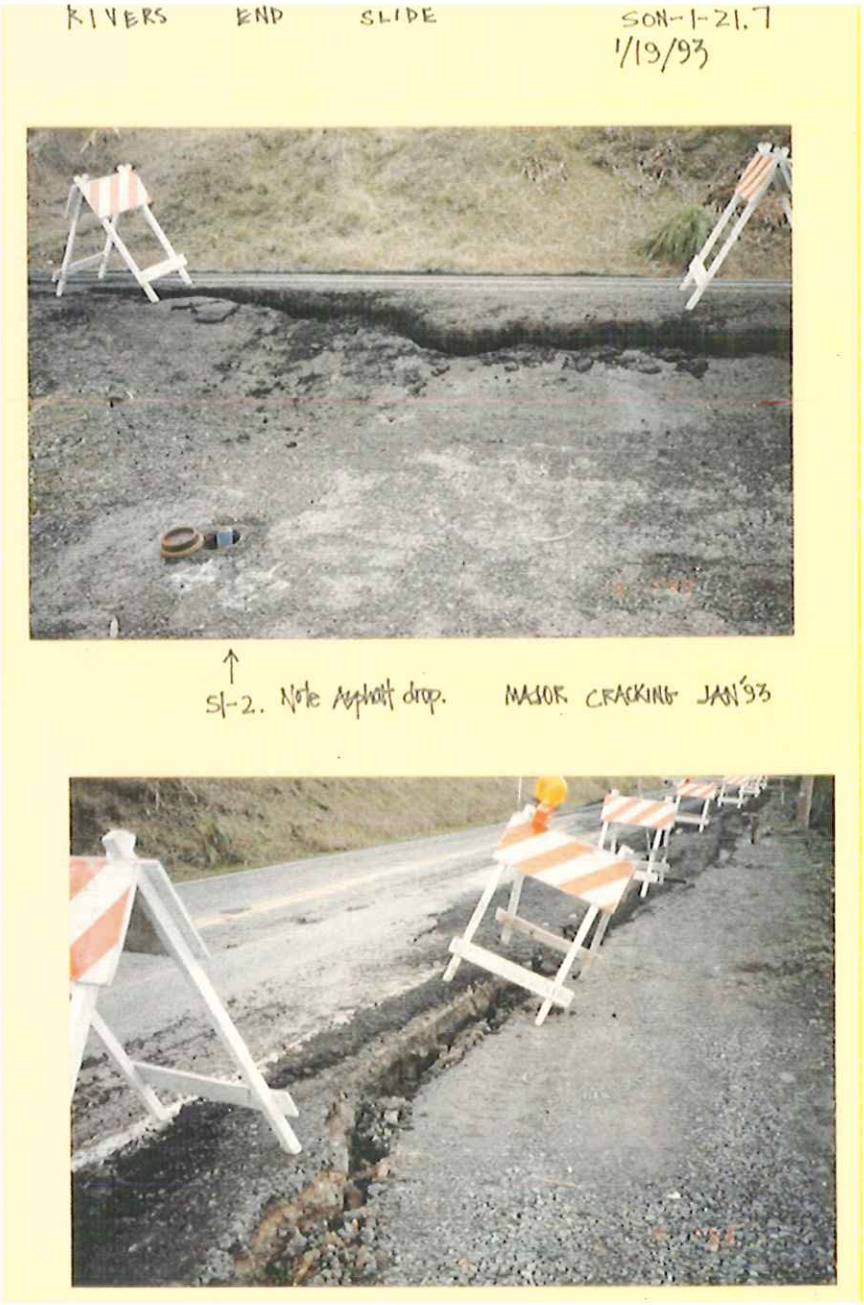


Figure 2C: Cracks associated with slide movement – Crack in front of the Garage Apartment where the timber Wall is located now (January 1993).

Figure 2D: Saw dust placed by Maintenance crew to lever the dropping SB shoulder due to sliding. Photo taken before the Micropile construction (1993).

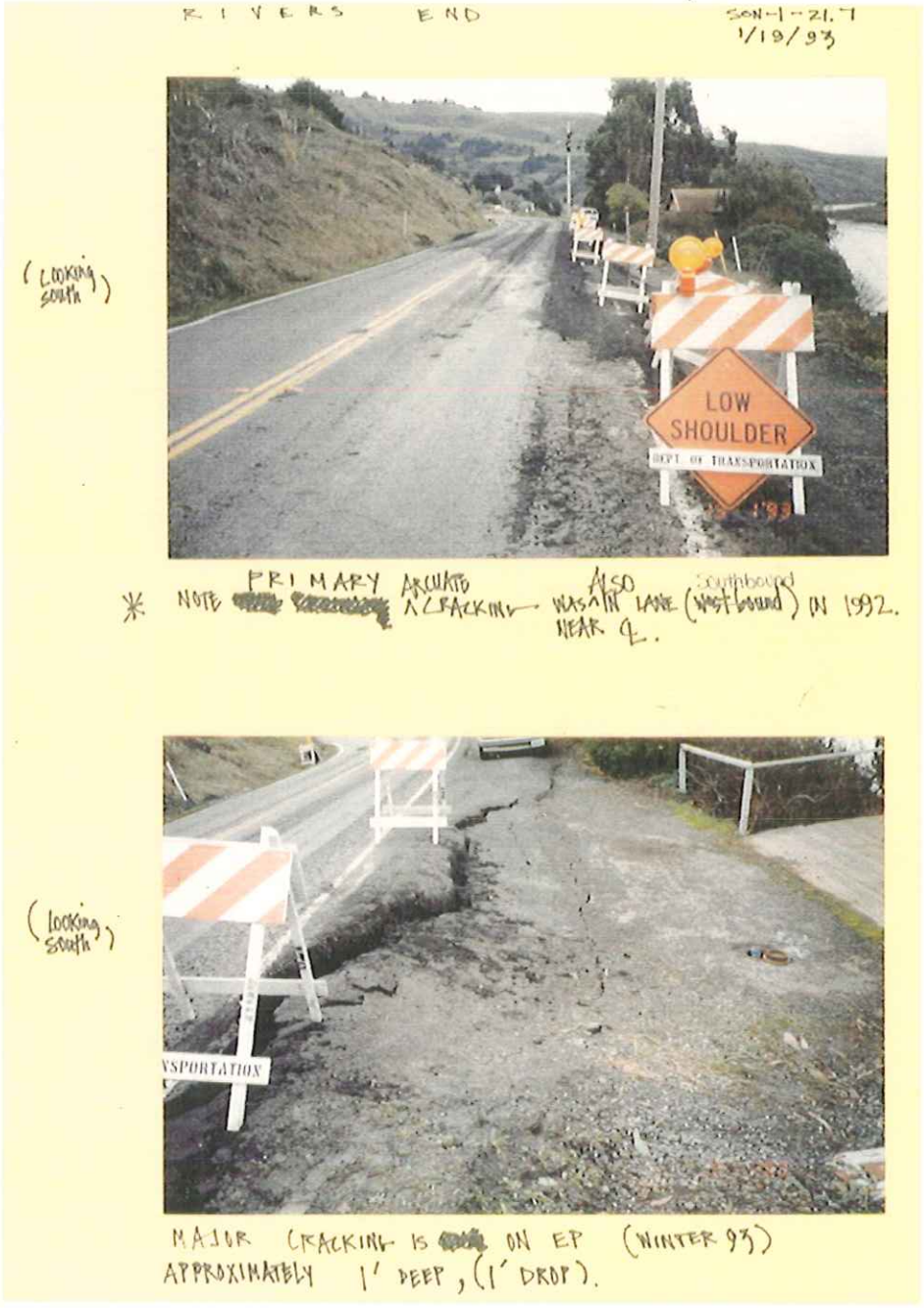


Figure 2E: Cracks in front of the Garage Apartment Driveway; also showing SI-2 (January 1993).

Figure 2F: Slide in front of Garage Apartment where the timber wall is now (1993).

Figure 2G: Sawdust was placed by Maintenance crew to level the SB shoulder area. Photo taken prior to micropile construction (1993).

Figure 3A: Failed Timber Wall with Lightweight Backfill (1/23/2010).

Figure 3B: Failed Timber Wall with Lightweight Backfill (1/23/2010).

Figure 4: Air Photo of Son-1 PM 21.7-21.67 (1993).

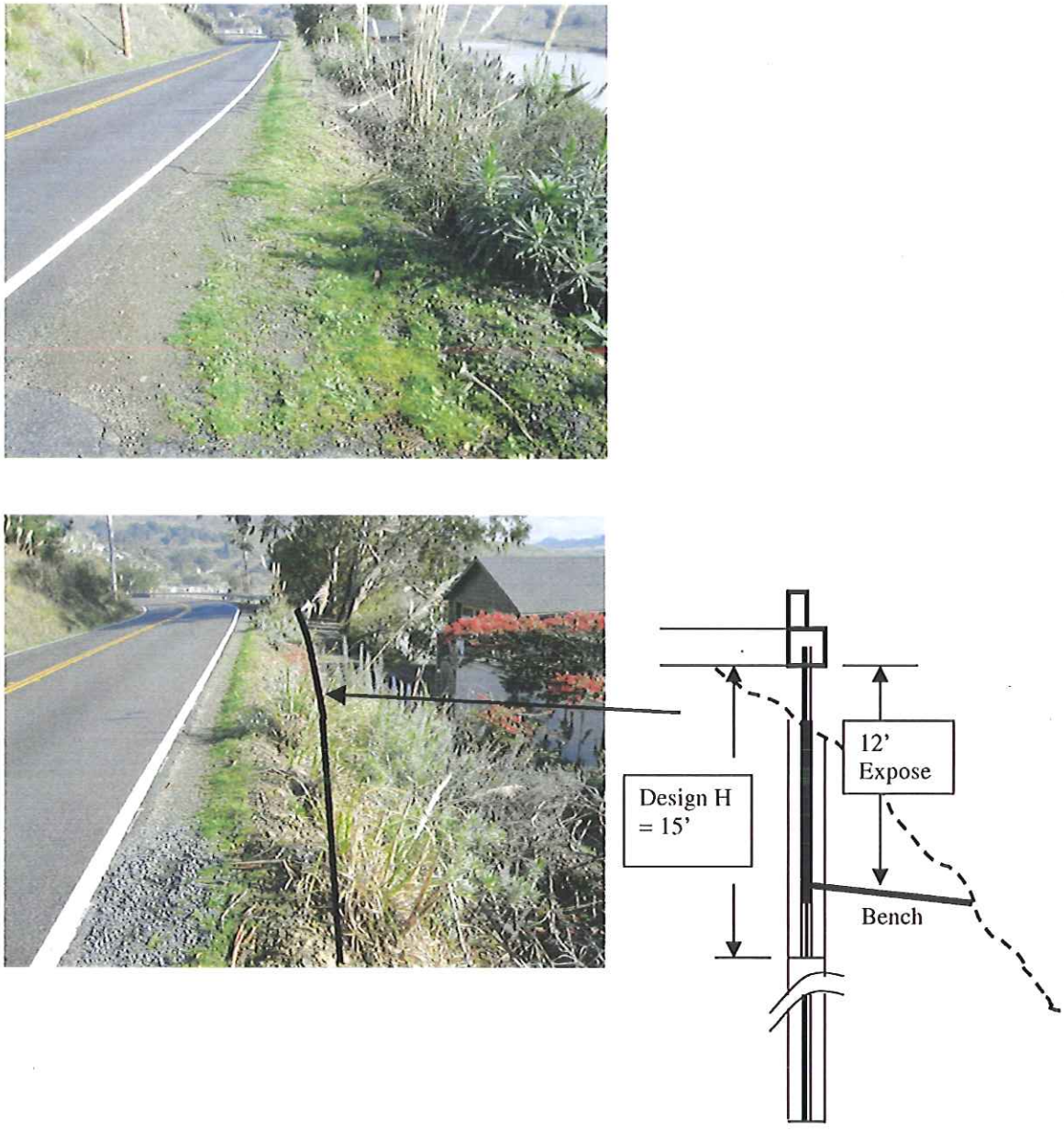
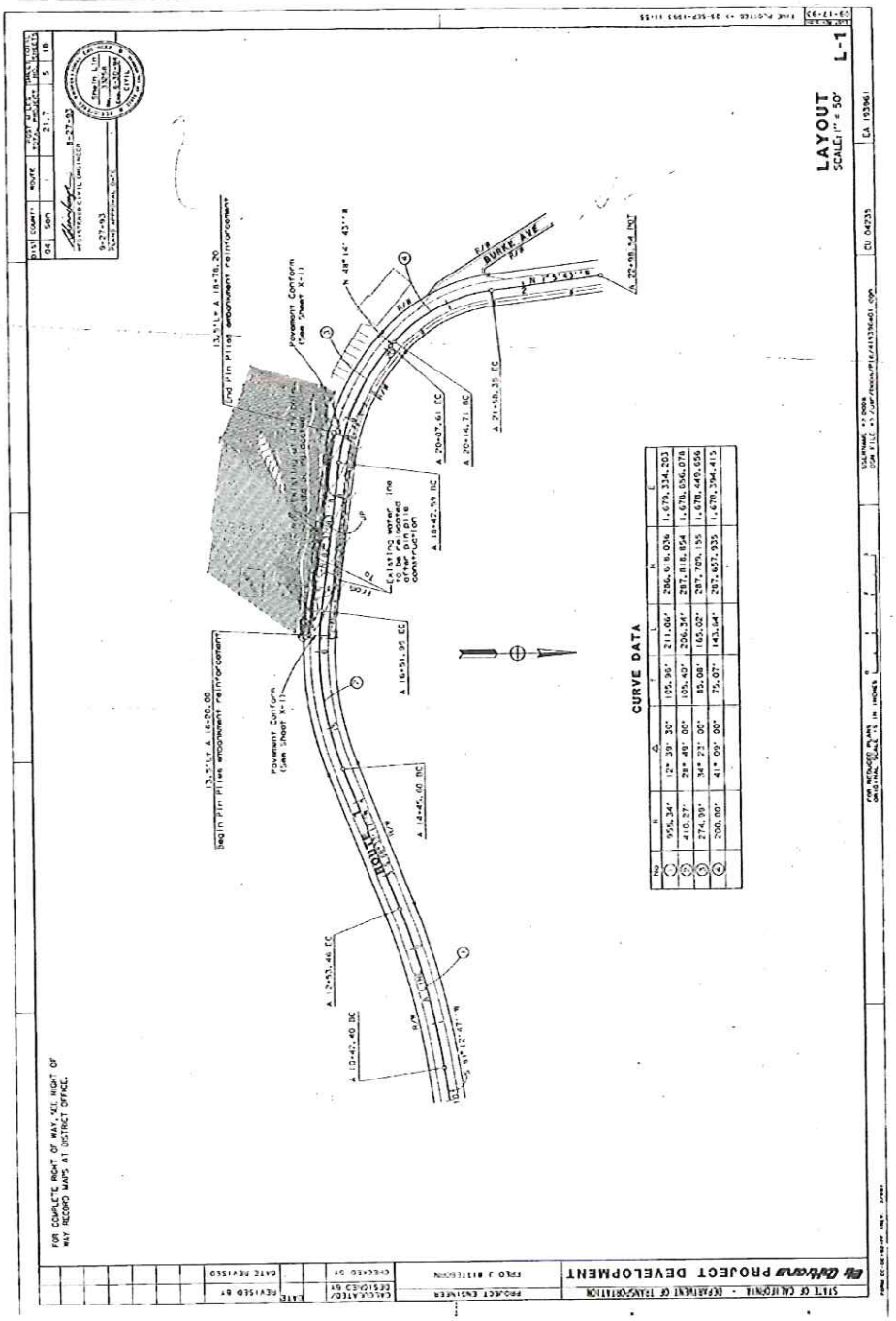
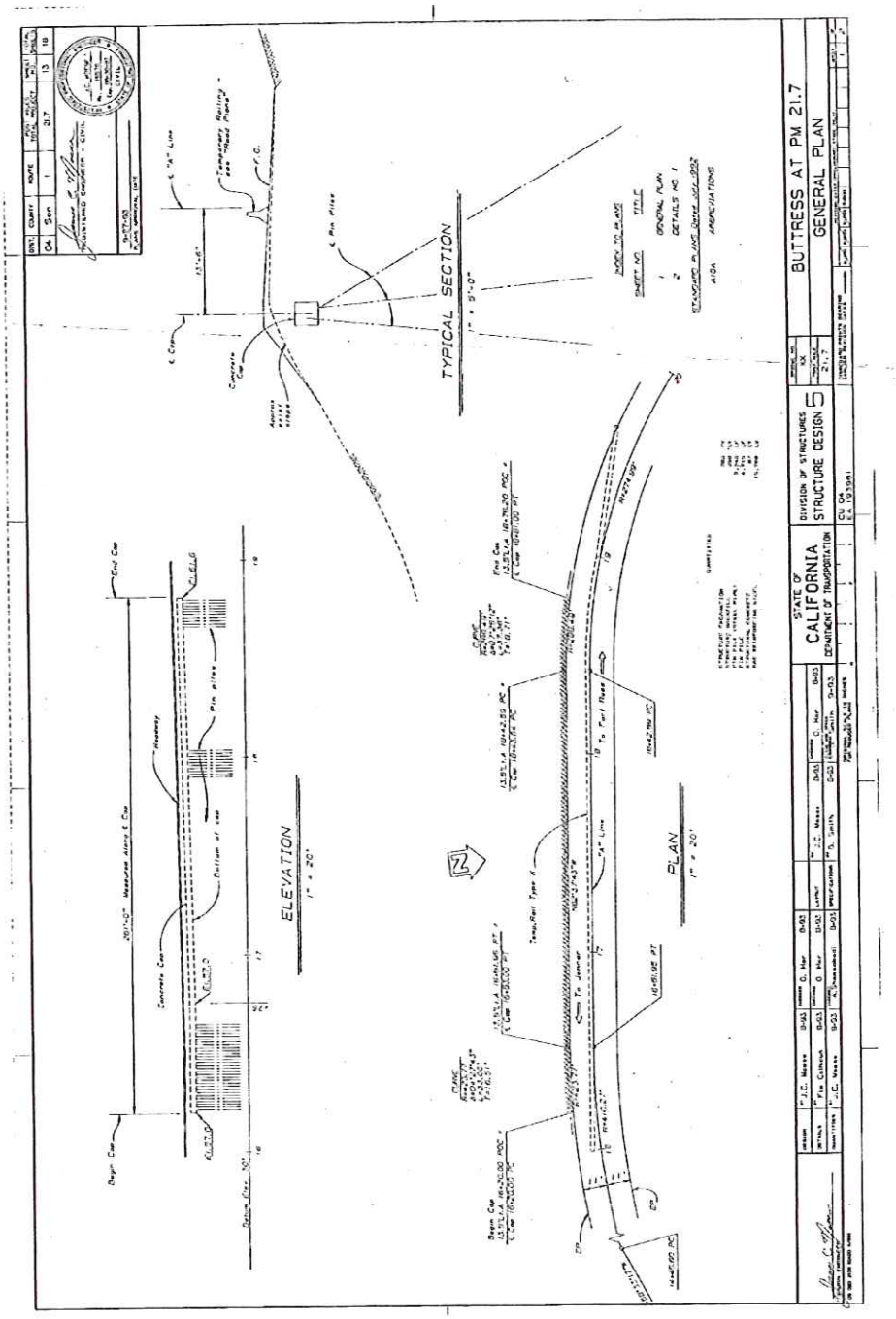


Figure 5A: Upper photo - Existing roadway condition within the existing buried micopiles/cap looking south. Lower photo - Approximate Location of the proposed Soldier Pile Wall Looking South.

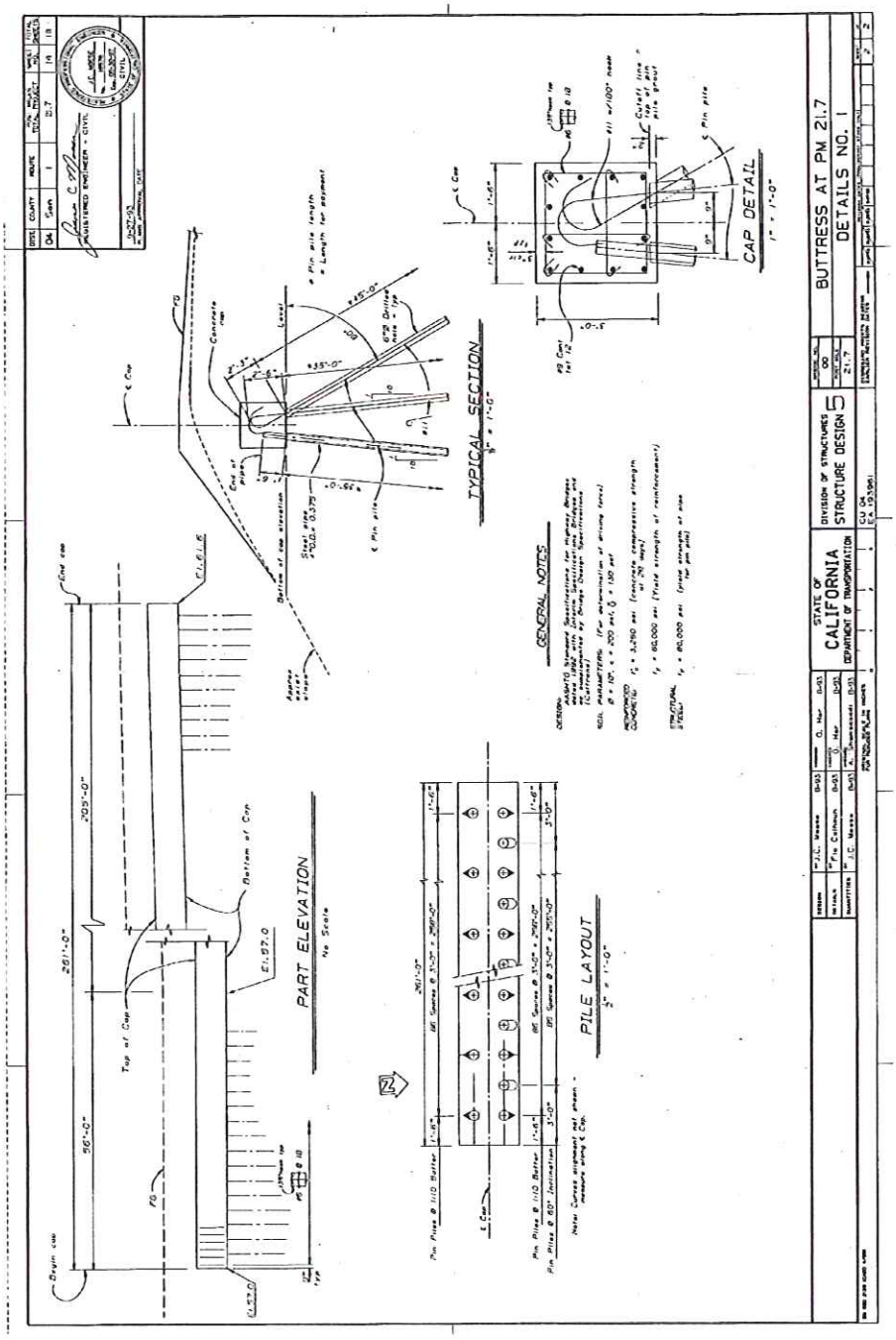
Figure 5B: Upper photo - Approximate location of the Proposed Wall looking north. Lower photo - Approximate Location of the Beginning of the Proposed Soldier Pile Wall looking north.



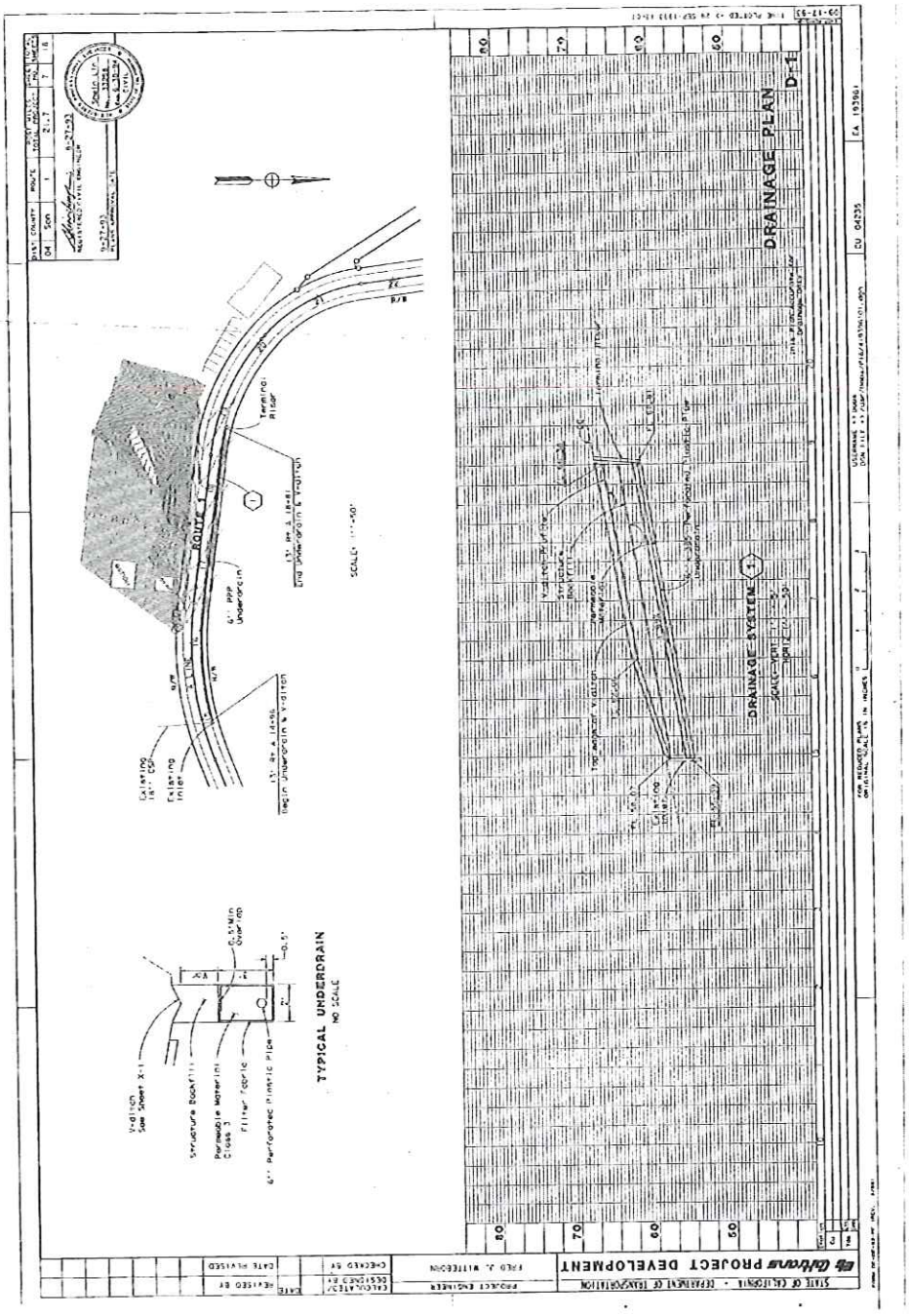
As-Built Pin Pile (Micropile) Construction Plan



As-Built Pin Pile (Micropile) Construction Plan



As-Built Pin Pile (Micropile) Construction Plan



As-Built Pin Pile (Micropile) Construction Plan