FOR CONTRACT NO.: 07-258804

INFORMATION HANDOUT

MATERIALS INFORMATION

GEOTECHNICAL REPORT

Geotechnical Report
Plan Review/Recommendations for Slope Protection at
Sand Canyon Overcrossing on Route 14

ROUTE: 07-LA-5, 10, 47, 60, 110, 134, 210, 405, 605-Var

State of California **Business, Transportation and Housing Agency**

M e m o r a n d u m

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Be energy efficient!

To: MR. REFUGIO DOMINGUEZ
Senior Transportation Engineer
Office of Design D
District 7

Date: January 30, 2012

File: 07-LA-14 PM 33.4
EA: 07-272-258801
E-FIS: 0700020195
Slope Protection/Sand Canyon OC

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design - South 1
Branch A

Subject: Plan Review/Recommendations for Slope Protection at Sand Canyon Overcrossing on SR14

1.0 INTRODUCTION

The Office of Geotechnical Design South-1 (OGDS-1) has reviewed the preliminary plan and site photos that were forwarded to us with your request dated December 27, 2011, regarding the slope protection at the Sand Canyon Overcrossing on State Route 14. We also reviewed the available as-built plans, dated September 30, 1997, and Log of Test Borings (LOTB), dated July 31, 1961 and June 30, 1997, associated with the construction of the Sand Canyon OC bridge structure. Our findings and recommendations are provided below.

2.0 PROJECT DESCRIPTION

The project is located at the intersection of Sand Canyon Road in the City of Santa Clarita, County of Los Angeles and SR 14 (Antelope Valley Freeway), as shown in the attached Figure 1.

The existing slopes within the State right-of-way (R/W) on both sides of the north abutment of the Sand Canyon OC have experienced instability in the forms of surficial sloughing and erosion as can be seen from the attached Photographs 1 and 2.

It is our understanding that the District's general practice is to maintain slopes that are experiencing surficial erosion by surface paving or shotcreting. However, due to the extent of soil loss and steep slope conditions at this location, the District has requested this Office to review the slope conditions based on a set of preliminary plans and photographs of the slopes, and provide stabilization recommendations.

3.0 SCOPE OF WORK

Our scope of work included the followings:

- Review of the preliminary site plans and photographs provided by your Office
- Collection and review of the as-built plans and logs of boring for the adjacent Sand Canyon OC bridge structure.
- Evaluation of the slope conditions based on the above information
- Review of the various potential methods of stabilization of the subject slop
- Selection and development of the most appropriate method for stabilization, and
- Preparation of this memo presenting the results of our review and recommended stabilization measures.

3.0 SLOPE CONDITIONS

Based on our review of the available information, the existing slopes on both sides of the north abutment of the Sand Canyon OC are cut slopes associated with the construction of SR 14. The height of the subject slopes ranges approximately from 30 to 35 feet. These slopes are very steep with slope ratios 1:2 (H:V) or steeper within the lower portions.

Based on the attached as-built LOTB's as well as visual observation of the exposed materials on the attached photographs, the surface soils consist of 5 to 7 feet of loose to medium dense silty sand (SM), which is underlain by semi-consolidated conglomerate that are partially cemented by clayey sand. The above soil layers are underlain by claystone and sandstone bedrock.

4.0 FINDINGS AND CONCLUSIONS

- The existing slope surfaces are very steep. Such steep slopes are susceptible to surficial sloughing due to gravitational forces.

- The upper 5 to 7 feet of the slope materials are relatively loose and cohensionless in nature. Such materials are susceptible to erosion due to rainfall, surface run off and wind.

- The subject slopes are highly susceptible to surficial sloughing and erosion due to the combination of the steep gradient, and the presence of loose and cohesionless soils at the surface.

- Surficial sloughing and erosion problems are visible from site photos provided. The eroded materials can be seen accumulated along the on ramp shoulder.

- These slopes appear to be stable against overall or global sliding failures.

- Because of the steep surface gradient, 1(H):2(V) or steeper, and the loose and cohesionless nature of the surficial soils; surface paving or application of shotcrete alone are not considered adequate for the protection of these slopes against surficial instability.

- Additional stabilization measures are necessary to protect or maintain these slopes.

5.0 RECOMMEDATIONS

1. We recommend that the subject slopes be protected by installing a surficial slope stabilization measures consisting either a wire-reinforced shotcrete or a geotextile-wire mesh facing anchored with grouted soil nails, as shown schematically in the attached Figure 2.

2. If geotextile-wire mesh facing is used, the slope may be hydro-seeded with draught resistance vegetation suitable for steep slopes and local weather. Watering the slope for the purpose of landscaping should be avoided. Watering, if any, required during the initial vegetation establishment period should be minimized.

3. We also recommend constructing a lined surficial interceptor drain or channel along the top of the slope to intercept and prevent runoff from above from entering into or flowing over the slope. The intercept drain should have sufficient size and gradient necessary to convey collected water in a non-erosive manner. Collected water collected should be discharge to a stable and non-erodible area.

4. Construction of the recommended stabilization system should follow the following sequence:

    i. Prepare Slope Surface: The existing slope surface should be cleaned of all vegetation and other deleterious non-inorganic matters. The slope surface should then be trimmed to remove surficial loose and disturbed soils, and to allow the facing wire mesh to contour the slope surface as closely as possible.

    ii. Localized areas of deeper loose or disturbed soils, if present, on the slope should be removed and backfilled with compacted soils. Fill soils, if placed, should be compacted to at least 90% percent of the relative compaction as per ASTM D1557. On-site excavated soils may be used as compacted fills.

iii. Install Soil Nails: Drill holes and install 15 feet long threaded grouted nails (#6 or 7 Grade 60) in a grid pattern (5 ft by 5 ft) as shown schematically in the attached Figure 2. The soil nails should be double corrosion protected.

iv. Install Facing: Install welded wire mesh (6"x 6" W2xW2) reinforced shotcrete facing (≥4 inch thick) or geotextile-welded wire mesh facing. Either Type A or Type geotextile fabric as defined in Section 88-1.04 of the Caltrans' Standard Specifications may be used.

v. Anchor Facing: Install and tension 10" by 10" square, ¾" thick bearing plates over the soil nail heads. The tension force should be on the order of 1.5 to 2.0 kips. If shotcrete facing is used, tensioning should be performed once the shotcrete has developed adequate strength.

6.0 CLOSURE

The findings and recommendations presented herein are based on a review of the available and pertinent existing site information. No site or project specific subsurface investigation was conducted. If slope subsurface conditions encountered during construction are significantly different than those described herein, this Office should be contacted immediately to review and, if necessary, provide updated recommendations.

If you need additional information or have any questions regarding this project, please do not hesitate to contact us.

Sincerely,

THANG LE, P.E.
Senior M&R Engineer (Specialist)
Office of Geotechnical Support

MOHAMMED S ISLAM, PH.D., G.E.
Senior Transportation Engineer (Specialist)
Office of Geotechnical Design -South 1

Attachments

cc: Karen Fong Chief Office of Design D, District 7
John Ehasn, Chief, Office of Geotechnical Design –South 1

ATTACHMENTS

FIGURES AND PHOTOS

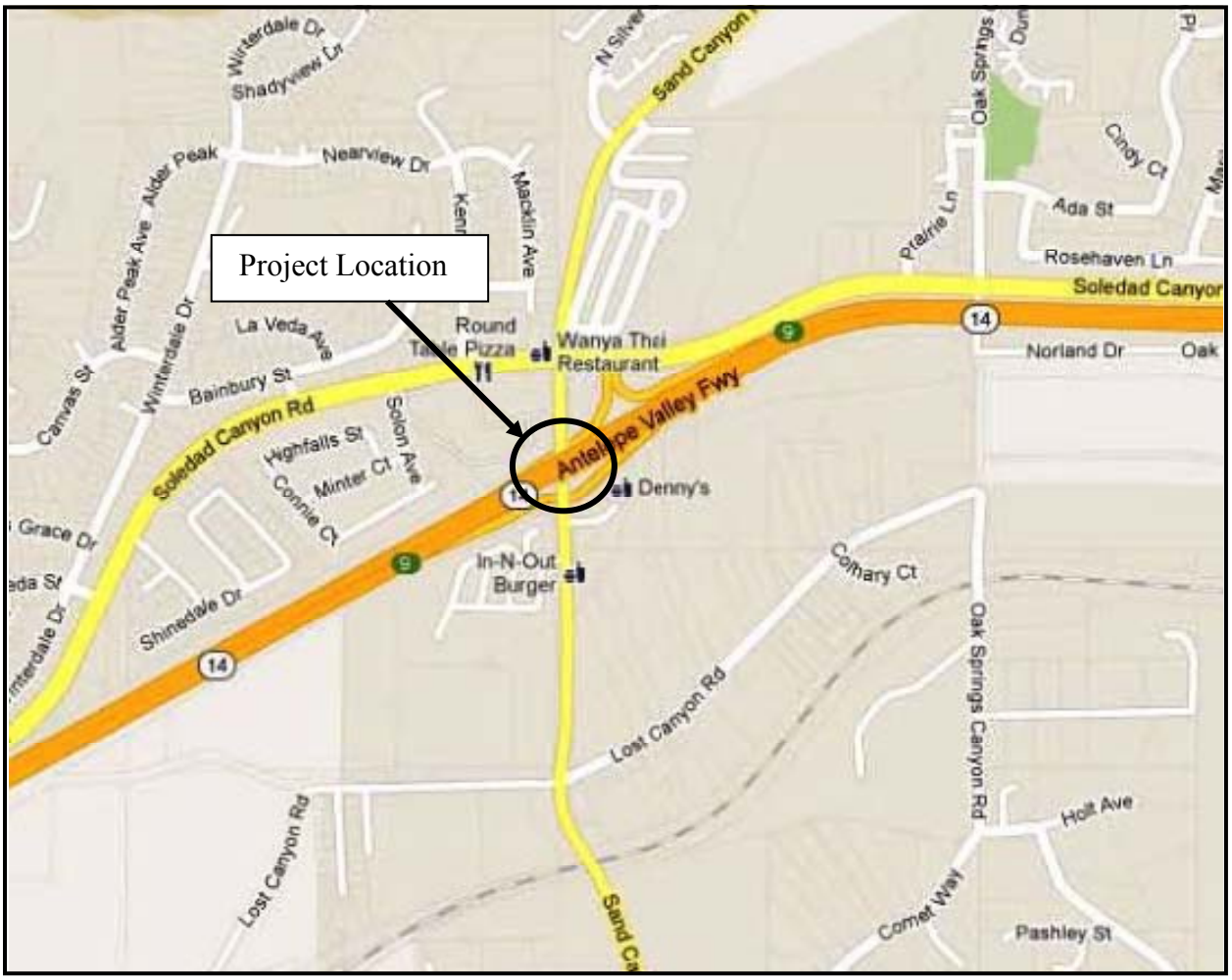
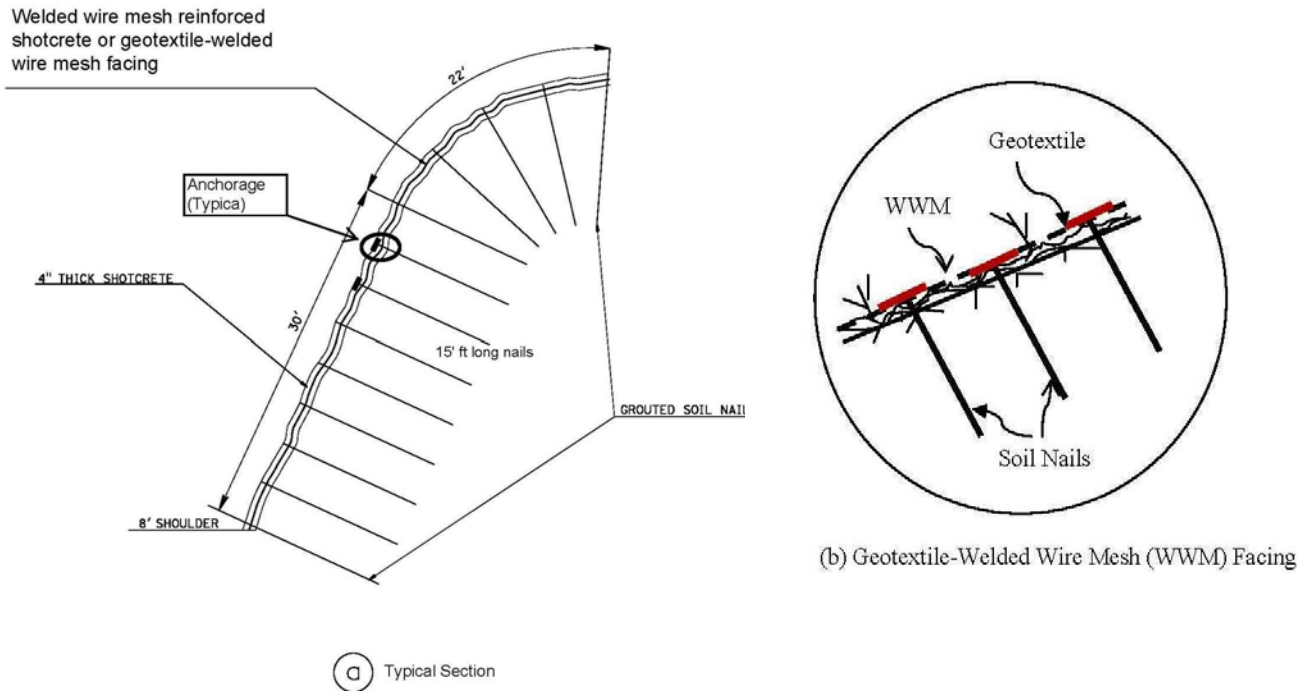
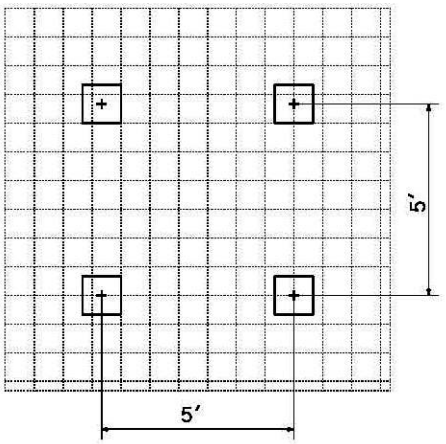


FIGURE 1. SITE LOCATION





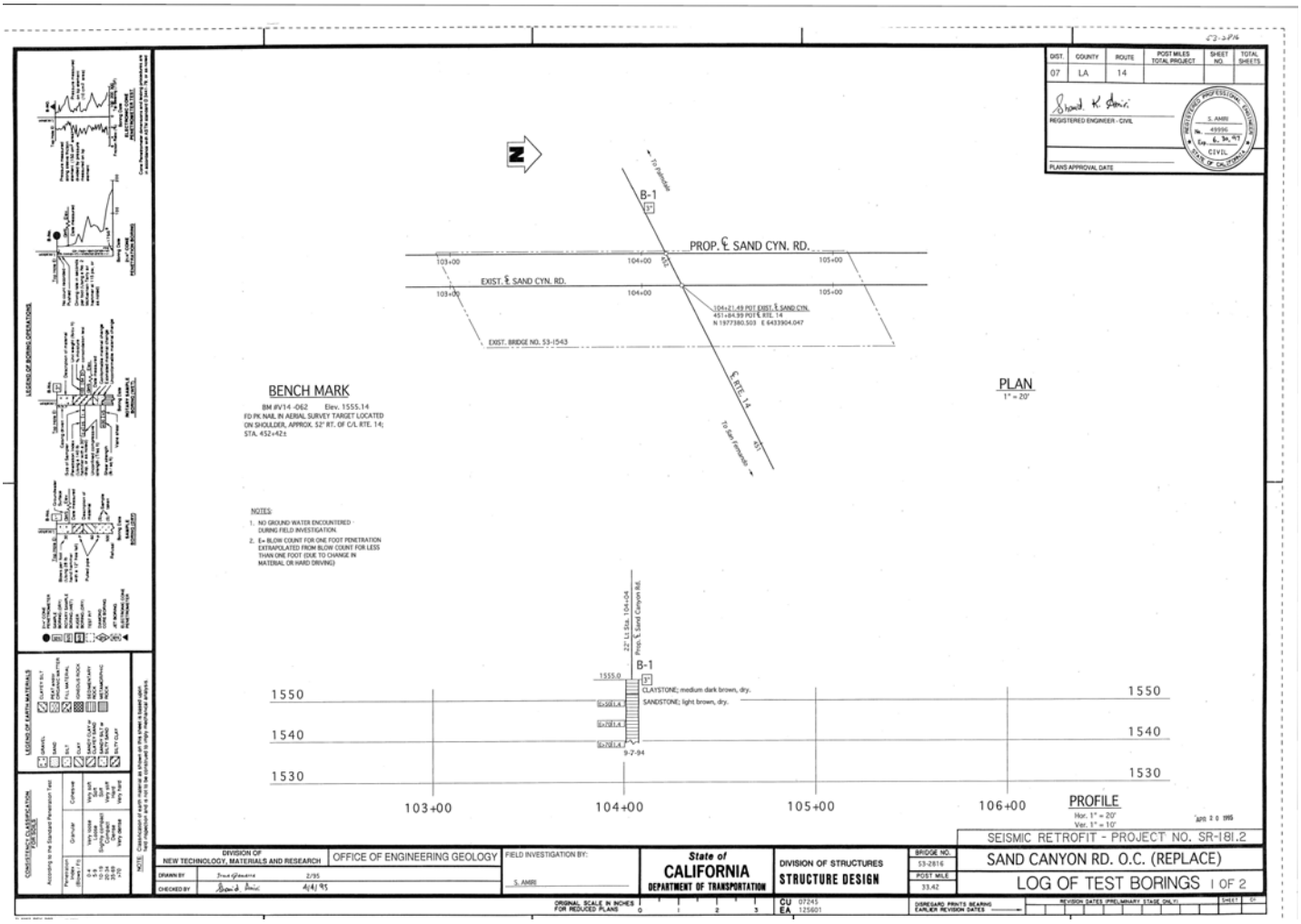
NOT TO SCALE

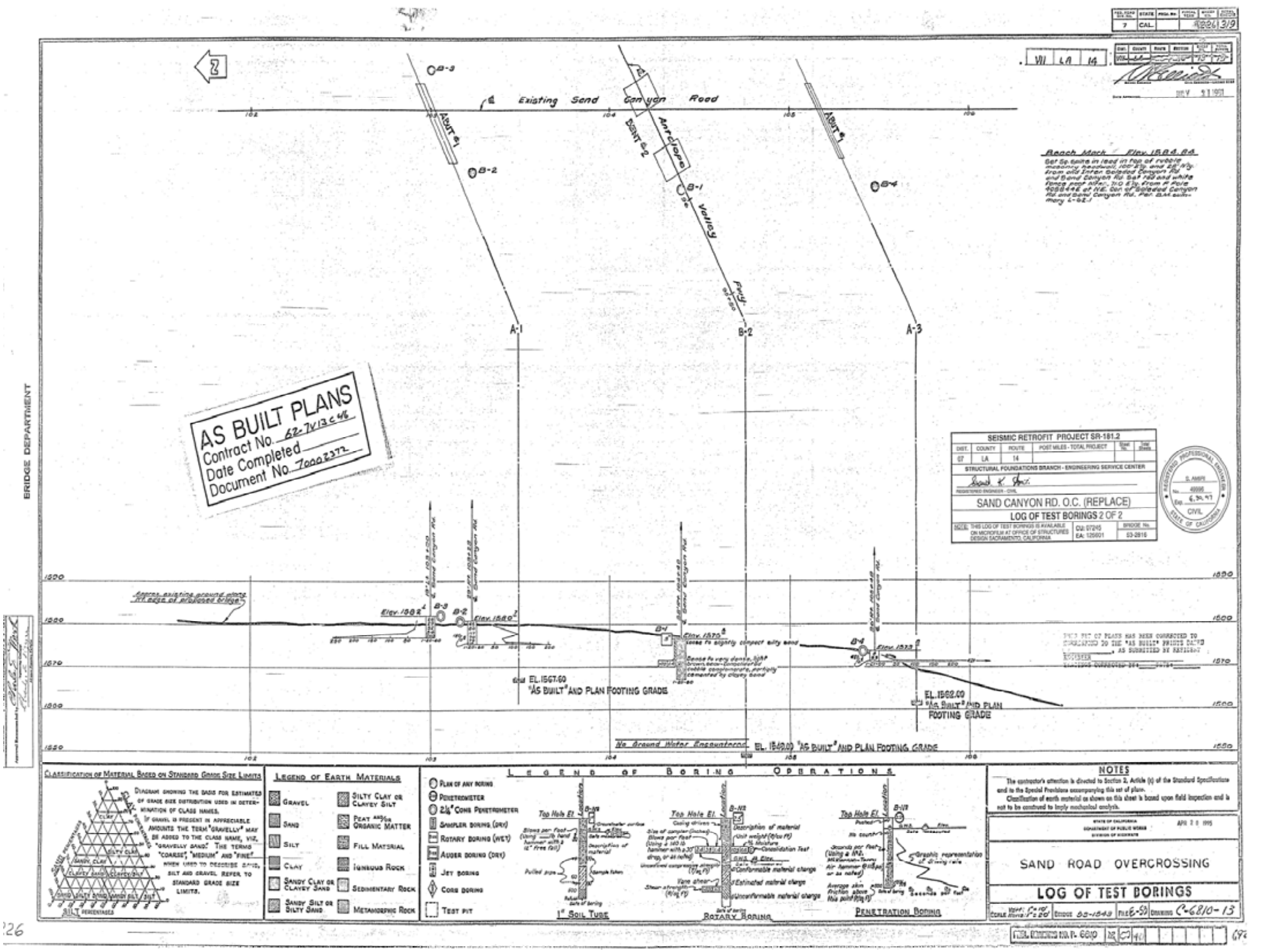
FIGURE 2. RECOMMENDED STABILIZATION MEASURES (SCHEMATIC)

PLATE 1. PHOTO OF EXISTING SLOPE EAST OF SAND CANYON NORTH ABUTMEMT

PLATE 2. PHOTO OF EXISTING SLOPE WEST OF SAND CANYON NORTH ABUTMEMT

AS BUILT PLAN AND LOG OF TEST BORINGS


DIST. 07 | COUNTY LA | ROUTE 14 | POST MILES TOTAL PROJECT | SHEET NO. | TOTAL SHEETS
REGISTERED ENGINEER - CIVIL
PLANS APPROVAL DATE
PROP. ℄ SAND CYN. RD.
EXIST. ℄ SAND CYN. RD.
EXIST. BRIDGE NO. 53-1543
℄ RTE. 14
B-1
PLAN
1" = 20'
BENCH MARK
BM #V14 -062 Elev. 1555.14
FD PK NAIL IN ASPHALT SURFACE TARGET LOCATED ON SHOULDER, APPROX. 52' RT. OF C/L RTE. 14; STA. 452+42±
NOTES:
1. NO GROUND WATER ENCOUNTERED DURING FIELD INVESTIGATION.
2. E= BLOW COUNT FOR ONE FOOT PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR LESS THAN ONE FOOT (DUE TO CHANGE IN MATERIAL OR HARD DRIVING)
CLAYSTONE; medium dark brown, dry.
SANDSTONE; light brown, dry.
9-7-94
PROFILE
Hor. 1" = 20'
Ver. 1" = 10'
SEISMIC RETROFIT - PROJECT NO. SR-181.2
SAND CANYON RD. O.C. (REPLACE)
LOG OF TEST BORINGS 1 OF 2
DIVISION OF NEW TECHNOLOGY, MATERIALS AND RESEARCH
OFFICE OF ENGINEERING GEOLOGY
State of CALIFORNIA DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN
BRIDGE NO. 53-2816
POST MILE 33.42
CU 07245
EA 125601


AS BUILT PLANS
SEISMIC RETROFIT PROJECT SR-181.2
SAND CANYON RD. O.C. (REPLACE)
LOG OF TEST BORINGS 2 OF 2
SAND ROAD OVERCROSSING
LOG OF TEST BORINGS
BRIDGE DEPARTMENT
Existing Sand Canyon Road
NOTES