FOR CONTRACT NO.: 10-340424

ADDITIONAL INFORMATION HANDOUT

MATERIALS INFORMATION

GEOTECHNICAL DEISGN REPORT
ADDENDUM DATED NOVEMBER 3, 2011

GEOTECHNICAL DEISGN REPORT, EAST SONORA

STAGE II DATED NOVEMBER 17, 2006

MATRIAL INFORMATION HANDOUT, EAST SONORA BYPASS,
STAGE II

ROUTE: 10-Tuo-108-R4.0/R6.0

ADDED PER ADDENDUM NO.2 DATED November 3, 2011

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: **KAL DAHER**
Senior Transportation Engineer
District 6 Project Development – Design IV

Date: October 25, 2011

File: 10-Tuo-108
PM R3.0/6.0
EA: 10-340424

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Geotechnical Design Report Addendum

Introduction

Per your request on September 26, 2011, the Office of Geotechnical Design – North is providing this addendum memo to address the Bidder Inquiry #7/10-340424 Tuo-108-R3.0/6.0, B.O. 10-04-11 for the project situated on Highway 108 in Tuolumne County, between postmiles R3.0 and 6.0. The inquiry addressed the necessity to pre-split for blasting as previously recommended in the Geotechnical Design Report, dated November 17, 2006.

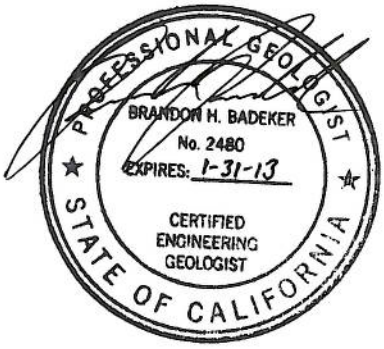
It is our understanding that the proposed slopes will be cut at 1:1 and 1.5:1 (h:v). Given the anticipated cut slope angles, it is our offices recommendation that pre-splitting not be performed.

Pertinent Reports and Investigations

In preparing of this report, the District provided cross sections and layouts. The following documents were reviewed:

1. Caltrans, Geotechnical Design Report, East Sonora II, 140-Tuo-108 KP R6.4/9.7 (PM R4-6), November 17, 2006
2. Caltrans, Geotechnical Design Report, East Sonora Bypass, 10-TUO-108 KP 2.9/11.1 (PM 1.8/R6.9), dated August 6, 1997

If you have any questions or comments, please call me, Brandon Badeker, at (916) 227-1040 or my supervisor, John Huang, at (916) 227-1037.



BRANDON BADEKER, C.E.G.
Engineering Geologist
Office of Geotechnical Design – North
Branch E

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. KAL DAHER
Design Engineer, Design IV, Branch 1
Project Development

Date: November 17, 2006

File: 10-TUO-108-KPR6.4/R9.7
(PM R4/R6)
East Sonora II
10-340421

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Geotechnical Design Report – East Sonora Stage II

Per your request, we are providing a Geotechnical Design Report (GDR) for the construction of Sonora Bypass Stage II for State Route 108. The limit of the stage II is from 0.8 km west of Peaceful Oak Road to Via Este Road in East Sonora, Tuolumne County. A vicinity map of the project area is attached as Plate 1.

This GDR addresses geotechnical recommendations related to the construction of the roadway, cut and fill slopes for Route 108 extension Stage II including a frontage Road. Geotechnical considerations for the structure foundations of the full interchange at Peaceful Oak Road and a grade separation over Mono Way, near Serrano Road will be addressed in separate reports prepared by others.

Pertinent Reports and Investigations

The District has provided us with project information including a project vicinity map, typical cross sections, profiles and layout plans. Additionally, our research of prior projects located in the vicinity of this project yielded several documents and maps that were utilized in preparing this report as follows:

- GDR for East Senora Bypass, 10-Tuo-108-KP 2.9/11.1 prepared by Office of Structure Foundations, Roadway Geotechnical Engineering- North, dated August 6, 1997.
- GDR for two-ways left turn lane on Route 108 from Standard Road to Via Este Road prepared by the Office of Geotechnical Design North dated December 29, 2005.

- Geologic Map of California, Sheets of the San Francisco-San Jose Quadrangle, Scale 1: 250,000, published by CDMG (1991).
- Mualchin, L., A Technical Report to Accompany the Caltrans-California Seismic Hazard Map 1996.
- Report and General Soil Map, Western Tuolumne County, California prepared by U.S. Department of Agriculture Soil Conservation Service, dated June 1967.
- Stephens, E., August 1978, Calculating Earthwork Factors Using Seismic Velocities, California Department of Transportation, Report No. FHWA-CA-TL-78-23.

Existing Facilities and Proposed Improvements

The Stage I construction was completed a few years ago. The Stage I construction ended at the Standard Road/ Peaceful Oak Road.

Stage II of the proposed project extends the two-lane expressway from Peaceful Oak Road (where Stage I ended) to Via Este Road (approximately 3.3 km). It traverses through rocky and rolling hill terrain and several sweeping curves in this section. Within Stage II project limit, the existing SR 108 is a two-lane undivided roadway paved with asphalt concrete aligned in a general east/west direction. The existing cut and fills side slopes are ranging from 1:1 to 1:2 (V:H).

Stage II includes construction of the full interchange at Peaceful Oak Road and a grade separation over Mono Way near Serrano Road. A frontage road will be built connecting both Seaborn Road and Waif Mine Road to Mono Way (See Plate 1 for location). Mono Way will be realigned east of Haystack Road to intersect the new expressway with a "T" intersection just west of Grace Way. Existing Route 108 from Via Este Road to Draper Mine Road will be widened to three-lanes. Peaceful Oak Road will be widened to five-lanes between the eastbound on-ramp and the westbound on-ramp. This report addresses the geotechnical considerations for the roadway portions of the proposed alignment.

Physical Setting

The physical setting of the project site and the surrounding area was reviewed to provide climate, topography and drainage, geology, and seismicity characteristics to aid in the project design and construction. The following is a discussion of our review:

Climate

According to the Western Regional Climate Center, the average annual precipitation at the Sonora Ranger Station is about 818 mm (32.19 in), based on record from 01/11/1931 to 09/30/2005. The majority of this precipitation (over 95 percent) falls between October and May. The mean annual temperature is approximately 14.9° C (58.8° F) with the highest average daily maximum of 34.94° C (94.9° F) in July and the lowest average daily minimum of -0.7° C (33.3° F) in December. A hot, dry season usually extends from May through October. A cool and wet season usually occurs from November through April. Sonora has a frost-free season of about 230 days.

Topography & Drainage

According to the District Project Profiles as well as the topographic map of the project region at http://www.topozone.com/, the topography of project site is generally rolling hill terrain. The site is located on the western side of the Sierra Nevada Mountain Range. Within the project boundaries, the ground elevation ascends gradually from the west end to the east end by approximately 150 m (approximate elevation 700-m on the western side to approximate elevation 850-m on the eastern side). Most of the localized drainage is generally trending to the south and west. The topography can be found on Plate No. 2.

Geology

The site is situated within the foothills of the Sierra Nevada geomorphic province. This province is a northwest trending mountain range 400 miles in length and 40 to 100 miles in width. It is bounded on the west by the Great Valley province, on the north by the Cascade Range, and on the east by the Basin Ranges province. The Geologic Map of the San Francisco-San Jose quadrangle sheet, California, 1991 published by CDMG, indicates that the site is underlain by Mesozoic Granitic rocks (Mzg)- granite and granodiorite.

During our field reconnaissance, a rock outcropping observed within the existing cut slopes and ditches is medium to fine grained, intensely to moderately weathered, hard to moderately hard and gray color. Most of overburden soils at site are dense silty sand with some fine-grained sub-angular gravel, cobble and boulder. The soils appear to be shallow in depth and contain weathered bedrock or boulders suspended in the residual soil. A

geologic map of the project area is presented as Plate 3.

Seismicity

Based on the Department's Caltrans California Seismic Hazard Map 1996, the controlling fault for the site is the Prairie Creek-Spenceville-Dentman (PSD) with a maximum credible earthquake moment magnitude of Mw= 6.5. The PSD is a normal fault type and located approximately 23 km to the southwest of the site. The peak bedrock acceleration based on the attenuation equation by Geometrix '97 is estimated to be 0.2g. Please note that the peak ground acceleration corresponding to a period of zero seconds is estimated to be 0.2g.

Groundwater

The Department of Water Resources web site was reviewed to locate groundwater level monitoring data in the vicinity and no data was available. Groundwater conditions will vary according to variations in rainfall, well pumping, and construction activities.

Surface running or pounding water along existing irrigation ditches was observed during our site visit. We anticipate that any groundwater encountered during construction activities would be perched water.

Site Investigation and Observation

A drilling and seismic survey program was performed in 1997 by our office, and the results were presented in a report titled "Geotechnical Design Report – East Sonora Bypass" dated August 6, 1997. That report covered entire project including Stages I, II, III and IV in general.

For Stage II construction, personnel from the Office of Geotechnical Design - North performed the site reconnaissance in June 2006 and a follow up in September and October 2006. The drilling program performed in 1997 was adequate for Stage II.

In general, the overburden soil within the project limit is the residual in-situ material made up of reddish brown silty sand consisting of numerous granite cobbles, boulders and some large boulders up to 7 m in dimension in a matrix of decomposed granite. Rock outcrops consisting of varying degrees of fractured and weathered were observed in many

of the cut slopes. A new alignment of Route 108 extension traverses through ridge, Mono Way, grasses, weed and a few trees.

The District proposes two deep cuts (35 m at Station 65+00 to 68+00 and 25 m at Station 82+00 to 85+20 in depth) in Stage II. At the first cut section from Station 65+00 to 68+00, the material does not appear rippable and blasting will be required for material reduction and removal. Evidence of previous boulder blasting was observed at the current cut. The surficial (rippable) material and rocks may have been removed and used as construction materials during previous SR 108 construction. At the second deep cut from Station 82+00 to 85+20, unrippable materials may be lower than at the first deep cut and exposed on the surface to the north of proposed alignment. The overall number of granite boulders exposed at the surface and in the existing SR 108 road cut is much less than at the first cut. The rest of proposed cuts vary in depth from 2 to 14 m. Due to the relatively shallow nature of the cuts, less amount of blasting is required and the floating boulders are present in the matrix of decomposed granite. In general, power lines are present in the vicinity of the project and parallel to the proposed alignments and vegetated with grasses, weeds and trees.

Subsurface Conditions

Based on the results of the borings from the Geotechnical Design Report – East Sonora Bypass (1997), site observation, and the Geologic Map, the entire project area is covered by Mesozoic granitic rocks, which are overlain by decomposed rock. Based on the Report and General Soil Map, the soils in the project area are listed as "Rl/BD" and R1/E under Group 2. The Group soils are developed on coarse-grained basic igneous rock. These soils have moderate erosion potential and are easily eroded when the cover is disturbed.

The rate of permeability is moderately slow ranging from 5 to 15mm/hr. The depth to weathered bedrock, stated in the Report and General Soil Map, varies from 0.6 to 1.3 meter below the ground surface. A General Soil Map of the project area is attached as Plate 4.

Geotechnical Recommendations

The geotechnical considerations discussed in this section are referenced to our field visits and a literature review.

Route 108 Extension - Cuts/ Fills

Based on the layouts, typical cross-sections and profiles provided to our office on 10/18/06, it is our understanding that the proposed cut and fill for the new alignment for Route 108 extension are as follows:

Table 1: Details of Cut and Fill

Location (Station)	Cut/Fill	Max. Vertical Depth/Height (m)	Proposed Slope Ratio (V:H)
57+00-57+20	Cut	6	1:2 or flatter for fill slopes 1:1.5 or flatter for cut slopes
57+20-58+00	Fill	8	
58+00-58+60	Cut and Fill	6	
58+60-61+00	Fill	10	
62+00-62+80	Fill	18	
64+40-65+00	Cut and Fill	14	
65+00-68+00	Cut	35	
68+00-69+20	Fill	14	
69+20-70+00	Cut	8	
70+00-70+40	Cut and Fill	6	
70+40-78+20	Fill	37	
78+20-79+20	Cut and Fill	7	
79+20-82+00	Fill	8	
82+00-85+20	Cut	25	
85+20-86+80	Cut and Fill	12	
86+80-88+00	Fill	8	

Note: Values in the above table are very approximate and pending on survey verification.

We recommend the cut/fill slope ratio as shown in Table 1 that concurs with the District proposed design. Additionally, we recommend that slope rounding be completed at the top of the new cuts. Slope dressing above the new cuts that may remove existing vegetations and cause more surficial erosion is not recommended.

The new fills should be keyed in and compacted in accordance with Section 19 of the Standard Specifications. The material "residual sandy soils (decomposed granite)" excavated for the cuts will be suitable for construction of the proposed fill slopes. Due to the granular nature and in-situ density of the majority of soil encountered, we anticipate minimal settlement to occur under the proposed embankments. A settlement period need not be specified for the highway embankment. Drainage should be controlled so as to minimize erosion on the slope face. It is recommended that Landscape architecture be consulted regarding erosion control measures and storm water runoff management.

Route 108 Extension - Rippability

Based on our field observations, boring records and seismic refraction data performed in 1997 and 2005, the proposed cut slopes consist of massive and very hard granitic rocks that typically have seismic wave velocities of greater than 2000 meters/sec. We would expect that the competency of the rock would increase with depth and thus so would the effort required to excavate the rock. Based on the Rippability charts prepared by Caterpillar Tractor Inc., massive granite (≥ 2000 meters/sec) is non-rippable with a D9 bulldozer. Table 2 below shows an estimated blasting quantities required for the specific section.

Table 2: Estimated Blasting Quantities

Station 57+00 to 57+20	5% of cut section, possible floating boulders
Station 58+00 to 58+60	5% of cut section, possible floating boulders
Station 64+40 to 65+00	50% of cut section, large boulders will require reduction
Station 65+00 to 68+00	80% of cut section, large boulders will require reduction
Station 69+20 to 70+00	10% of cut section, possible floating boulders
Station 70+00 to 70+40	5% of cut section, possible floating boulders
Station 78+20 to 79+20	5% of cut section, possible floating boulders
Station 82+00 to 85+20	70% of cut section, large boulders will require reduction
Station 85+60 to 86+80	5% of cut section, possible floating boulders

Note: Excavation equipment and technique will influence the amount of blasting required.

Cut slope construction into rock will require use of controlled blasting techniques to prevent damage to the surrounding buildings, structures and utilities from blast induced fly rock, ground vibration, and over-break. The controlled blasting shall conform to the Non-Standard Special Provisions. Pre-splitting may be carried out in conjunction with

the controlled blasting method. The specifications for Controlled Blasting and Pre-splitting Rock are attached.

Frontage Road

Frontage road construction is part of the Stage II, but it is a separate section from the main extension road (See Vicinity Map). The frontage road is proposed to be built on a maximum of 8 meter high fill; at slope ratio of 1:2 (V:H) or flatter and a minor cut between Seaborn Road and the east end of Waif Mine Road to Mono Way. Based on our field assessment, the proposed frontage road may be constructed as planned.

Earthwork Factors

Earthwork factors for the cut materials were based on seismic refraction data performed in 1997 and 2005. The values are adopted from a published Caltrans study (Stephens, 1978) that established an empirical correlation between seismic velocities and earthwork factors for specific rock types. The estimated earthwork factors of 0.9 for the residual sandy soil (decomposed granite) and range between 1.1 and 1.4 for the varying degrees of fractured and weathered granite are to be used for material quantity estimates.

Construction Considerations

The proposed cut excavations can be accomplished by ripping with varying degrees of difficulty. Blasting may be required locally for excavating rock at the proposed cut locations.

We understand that the cut slopes at all soil locations and fill slopes will be landscaped or treated for additional erosion control upon completion of new face of the slopes.

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads. If any conceptual changes are made during final project design, the Office of Geotechnical Design - North should review those changes to determine if these foundation recommendations are still applicable.

Project Information

Standard Special Provision S5-280, "Project Information", discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid

opening. The following is an excerpt from SSP S5-280 disclosing information originating from Geotechnical Services. Items listed to be included in the Information Handout will be provided in Acrobat (.pdf) format to the addressee(s) of this report via electronic mail.

Data and information attached with the project plans are:

1. *None*

Data and Information included in the Information Handout provided to the bidders and Contractors are:

A. *Geotechnical Design Report for the East Sonora Stage II, Dated 11/17/2006*
B. *Geotechnical Design Report for the East Sonora Bypass, Dated 08/06/1997*

Data and Information available for inspection at the District Office:

A. *None*

Data and Information available for inspection at the Transportation Laboratory are:

A. *None*

If you have any questions or comments, please call Myo Naing at (916) 227-7233 or John Huang at (916) 227-7237.

MYO NAING
Engineering Geologist
Geotechnical Design - North

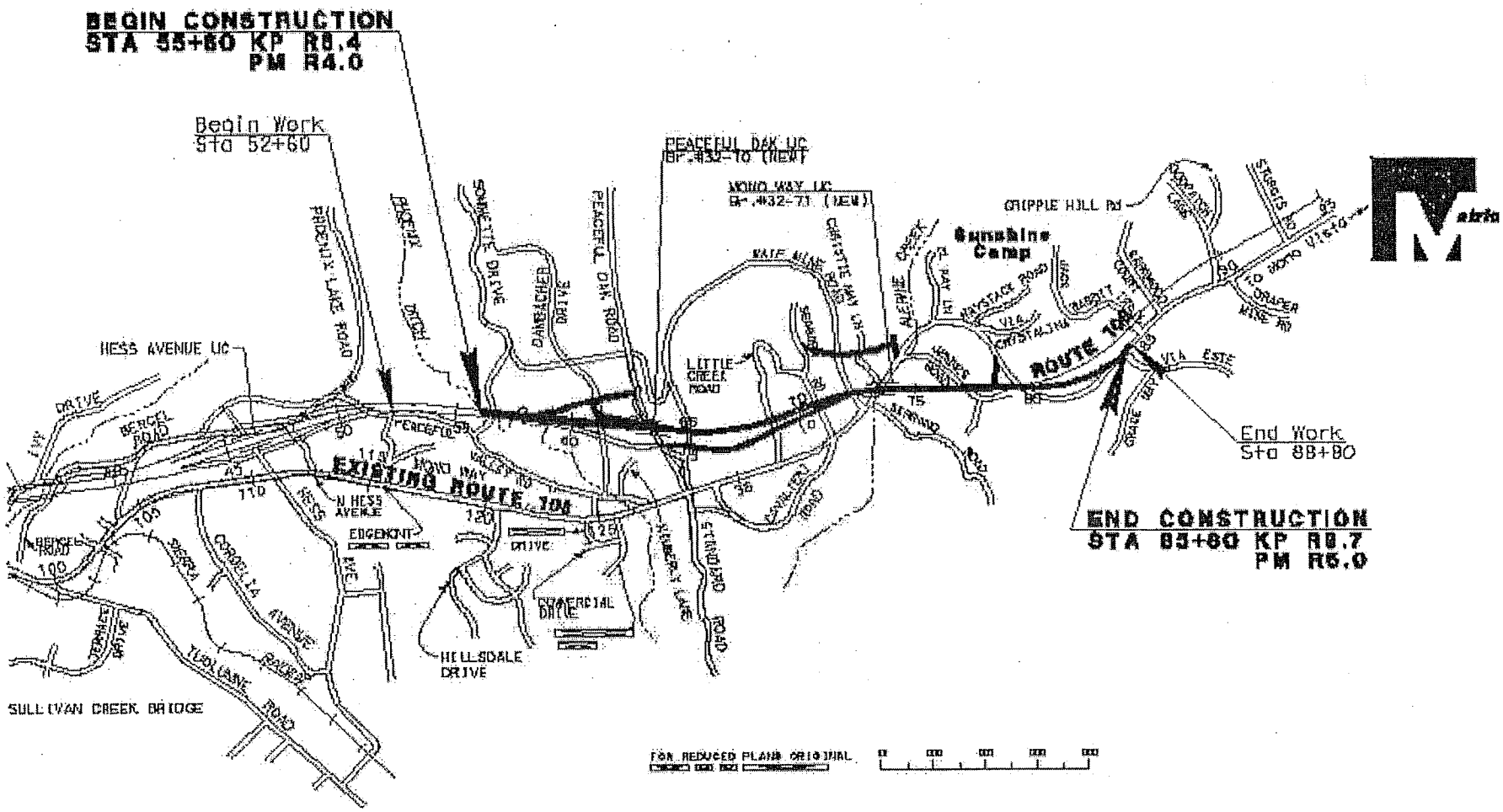
JOHN HUANG
Senior Materials & Research Engineer
Geotechnical Design - North

REGISTERED PROFESSIONAL ENGINEER
CHANG HUANG
No. C055671
Exp. 12/31/06
CIVIL
STATE OF CALIFORNIA

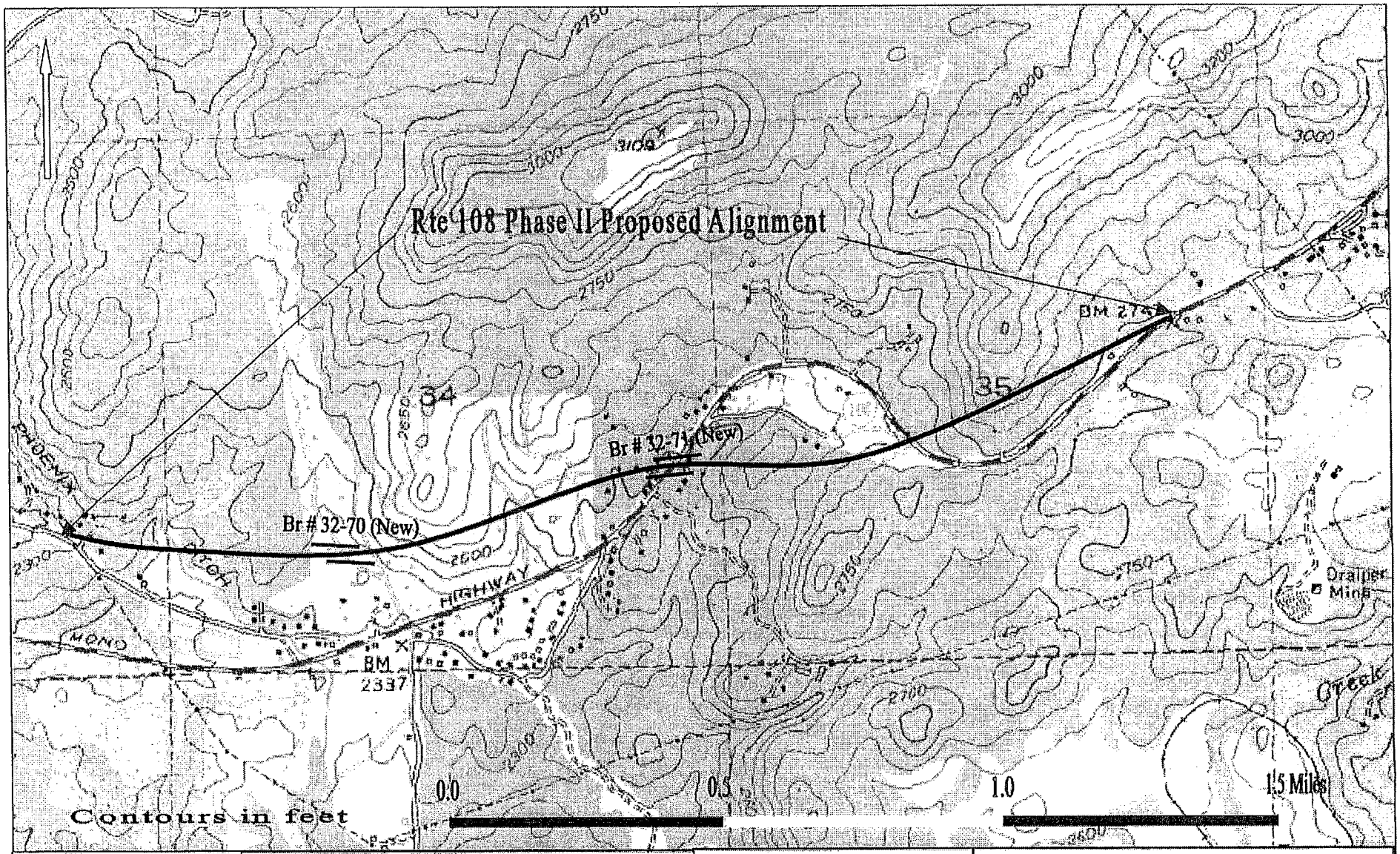
Attachment:

- Plate 1 to 4
- Non-SSP for Rock Excavation Specification
- Standard Special Provision for Pre-splitting Rock Excavation Slopes

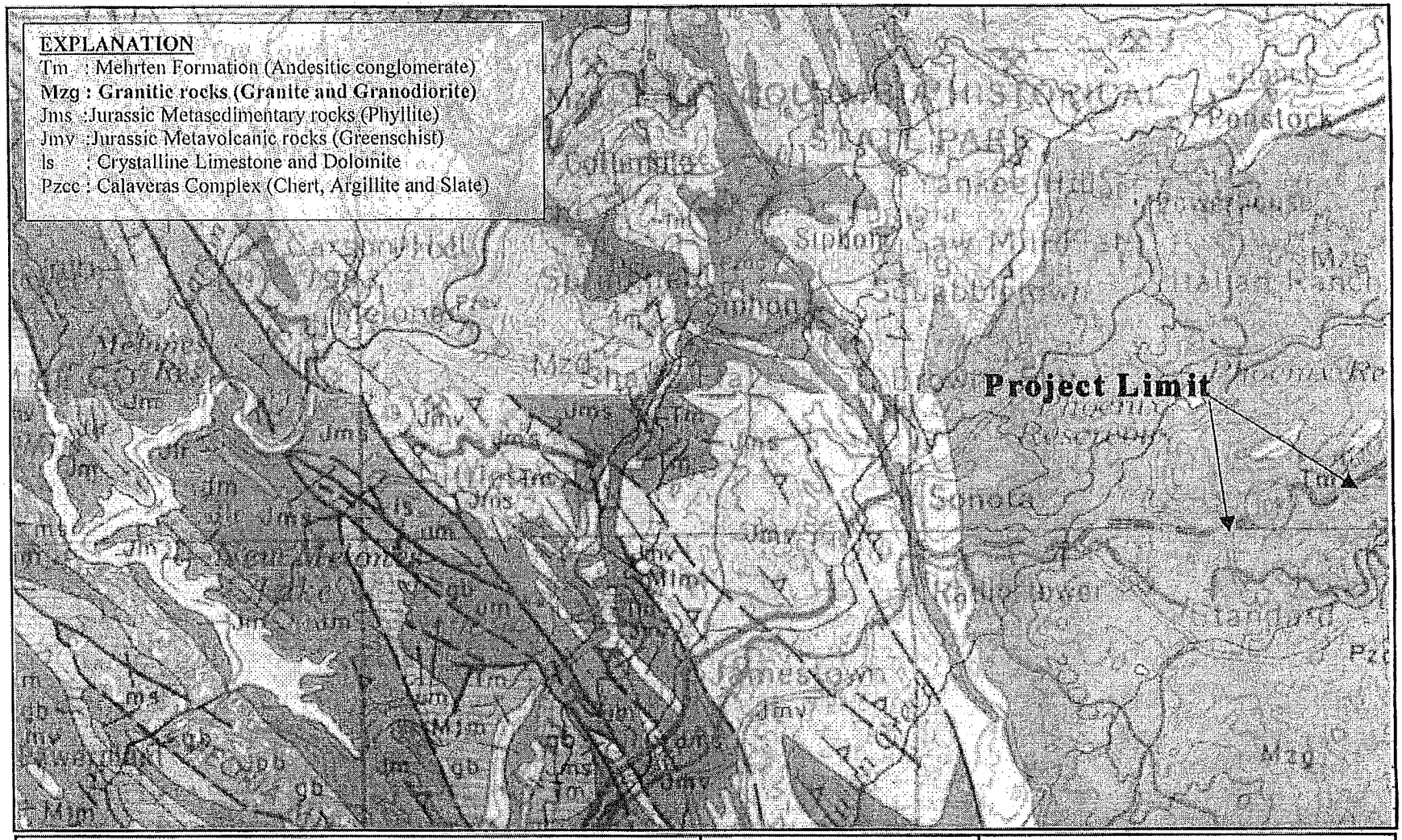
c: Dave Dhillon (E-copy)
GDNFile



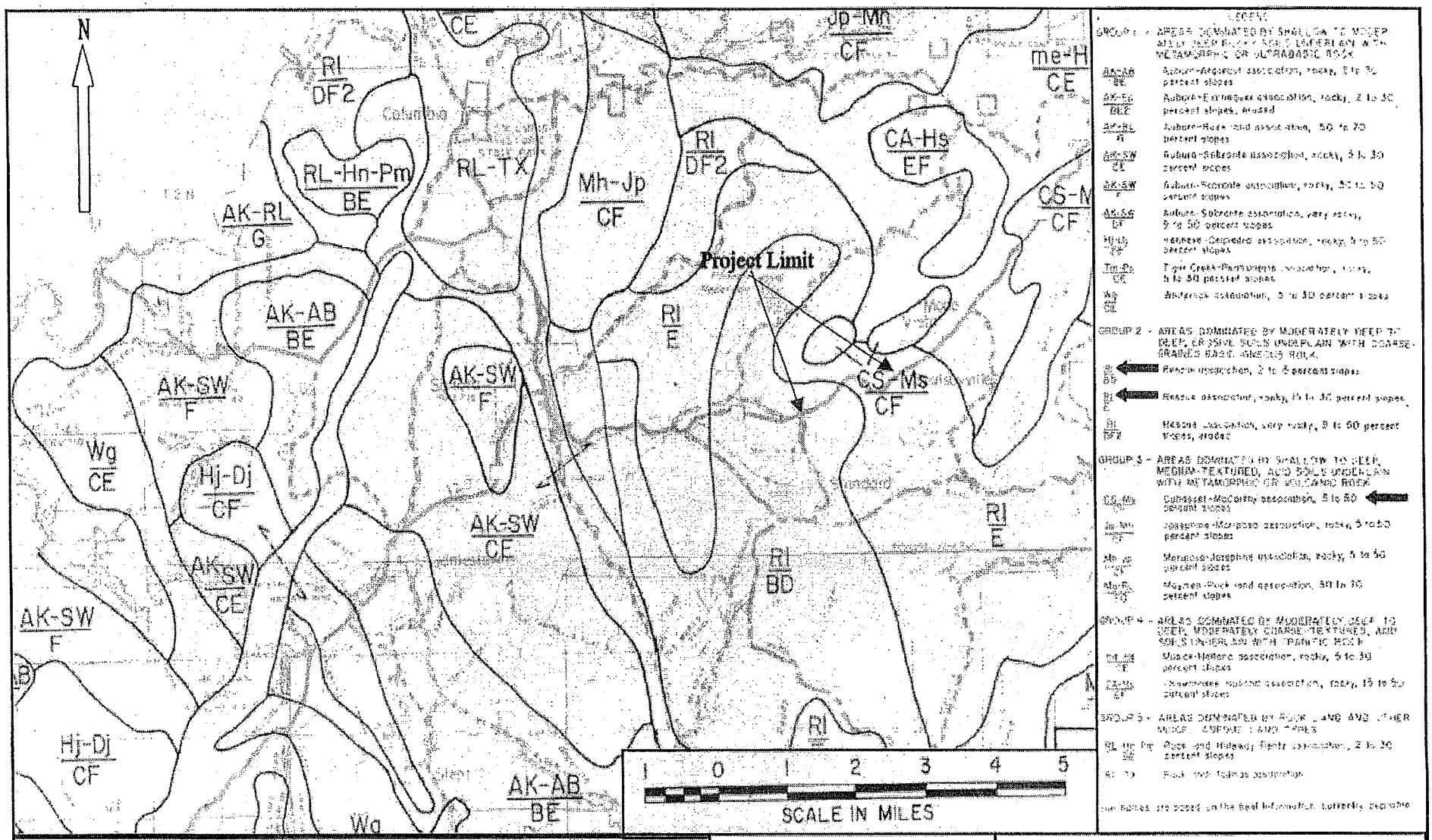
CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design -North	EA: 10-340421 November 2006	**VICINITY MAP** EAST SONORA II
	10-Tuo-108-KP 6.4/9.7 **GEOTECHNICAL DESIGN REPORT**	Plate 1



CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design -North	EA: 10-340421 November 2006	**TOPOGRAPHIC MAP** East Sonora II
	10-TUO-108-KP 6.4/9.7 **GEOTECHNICAL DESIGN REPORT**	Plate 2



CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design North	EA: 10-340421 November 2006	**REGIONALGEOLOGIC MAP** **East Sonora II**
	10-TUO-108-KP 6.4/9.7 (PM 4.0/6.0) **GEOTECHNICAL DESIGN REPORT**	Plate 3



CALTRANS
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design -North

EA: 10-340421

November 2006

GENERAL SOIL MAP
East Sonora Bypass II

10-TUO-108-KP 6.4/9.7
GEOTECHNICAL DESIGN REPORT

Plate 4

Materials Information Handout

East Sonora Bypass Stage II

10- 340421 Tuo-108 4.0/6.0

The following Commercial sources are available to supply products for this project.

Hot Mixed Asphalt (HMA)	Supplier	Distance
	George Reed – Table Mountain Plant 6000 O'Byrnes Ferry Rd. Jamestown, Ca.	12 miles
	George Reed – Munn & Perkins Plant 26292 E. River Rd. Escalon, Ca.	45 miles

Aggregate and Fill	Supplier	Distance
	George Reed – Table Mountain Plant 6000 O'Byrnes Ferry Rd. Jamestown, Ca.	12 miles
	Carson Hill Rock Products 4795 Higway 49 Angeles Camp, Ca.	12 miles
	George Reed – Munn & Perkins Plant 26292 E. River Rd. Escalon, Ca.	45 miles