INFORMATION HANDOUT

For Contract No. 01-0A4904
At 01-Hum-299-R25.0/R25.9

Identified by
Project ID 0100020308

MATERIALS INFORMATION

Preliminary Geotechnical Design Report, Dated May 15, 2014

Addendum to the Preliminary Geotechnical Design Report, Dated November 18, 2015

Optional Disposal Site Information

Nonpotable Water Source Information

MATERIALS INFORMATION

Preliminary Geotechnical Design Report,

Dated May 15, 2014

M e m o r a n d u m

Serious Drought.
Help Save Water!

To: JOHN L. MARTIN
Chief, Design R1

Attn: Mr. Robert Nixon

Date: May 15, 2014

File: 01-HUM-299 PM 25.0/25.7
ID 0100020308
EA 01-0A4900
Circle Point Curve
(Curve Improvement)

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

Subject: Preliminary Geotechnical Design Report (PGDR) for Circle Point Curve Improvement

1. Introduction

The Office of Geotechnical Design-North (OGDN) has prepared this District Preliminary Geotechnical Report (DPGR) for the proposed Circle Point Curve Improvement project. The project site is located on State Route (SR) 299, from post mile 25.0 to 25.7 in Humboldt County. The project site is approximately 13 miles west of the town of Willow Creek. A vicinity map is presented on Plate No. 1.

2. Investigations and Pertinent Reports

The Office of Geotechnical Design North conducted a field reconnaissance in April 2014. Within the project limits a subsurface investigation, was not performed for the original SR 299 design and construction. A subsurface investigation was also not conducted for this report.

The geology maps and literature/reports reviewed for preparing this report are listed below:

- Falls, J.N., Wills, C.J., and Hardin, B.C., 2006, Landslides in the Highway 299 corridor between Blue Lake and Willow Creek, Humboldt County, California: California Geological Survey, Special Report 195, 59 pages, 1:12,000.

- Susan M. Cushman, Harvey M. Kelsey, and Deborah R. Harden, 1995, Geology of the Redwood Creek Basin, Humboldt County, California. Geomorphic processes and aquatic habitat in the Redwood Creek basin, northwestern California: U.S. Geological Survey Professional Paper 1454, Chapter D.

- The Geologic Map of California, Redding Sheet, Olaf P. Jenkins Edition, 1962, 2nd Printing, 1969.

3. Existing Facilities and Proposed Improvement

Existing Facilites

State Route (SR) 299 is a two-lane conventional highway located in rural, mountainous terrain. The route is a main west-east highway in northern California connecting State Route 101 and Interstate 5 between the cities of Eureka and Redding.

At the project location, the highway alignment consists of a horizontal curve with a central angle of 225 degrees and a radius of 650 feet, and is referred to as Circle Point Curve.

Within the project limits, SR 299 consists of one 12 foot westbound lane (outside of curve) and two 12 foot eastbound lanes (inside of curve). Paved shoulders vary from 2 to 4 feet in width. The roadway has a superelevation sloping downward towards the inside of the curve.

The inside of the curve consists of rock cut slopes with heights ranging from 100 to 150 feet and a slope inclination ranging from 0.75:1 (H:V) to 1:1. The outside of the curve consists of cut and fill slopes. Details of the existing cut and fill slopes for the outside of the curve are presented in **Table 1**.

Table 1. Outside Curve Existing Cut and Fill Slope Data

Begin STA (ft)	End STA (ft)	Line	Cut/Fill	Approximate Highest Cut Slope Height (ft)	Approximate Slope Inclination H:V
157+00	157+50	R1	Fill	N/A	2:1
157+50	160+00	R1	Cut	30	1.5:1-2:1
160+00	163+00	R1	Fill	N/A	1.5:1
163+00	168+50	R1	Cut	50	1.5:1–2:1
168+50	174+50	R1	Fill	N/A	1.5:1
174+50	181+00	R1	Cut	100	1.3:1
181+00	185+00	R1	Fill	N/A	1.5:1
185+00	187+89	R1	Cut	10	2:1

Note: The stationing and slope inclination in this table were estimated from a preliminary project layout plan.

Information for the existing fill slopes such as grading plans, thickness of fill material, and quality of fill material are not available.

Proposed Improvements

This project is a safety improvement project. The project proposes to widen the existing highway to the outside of the curve to provide an 8 foot shoulder and a 4 foot median and to install centerline and shoulder rumble strips.

The earthwork needed to facilitate the proposed widening is presented in **Table 2**.

Table 2. Earthwork Needed for Proposed Widening

Begin STA (ft)	End STA (ft)	Line	Earthwork Needed
157+00	168+50	R1	Cut into existing 1.5:1(H:V) cut slope on the outside of the curve a horizontal distance ranging from 20 to 24 feet. Proposed slope angle to be 1.5:1 (H:V) or flatter.
168+50	174+50	R1	There is sufficient room at the existing outside curve fill slope for proposed widening. No additional fill is required.
174+50	181+00	R1	Cut into existing 1.5:1(H:V) cut slope on the outside of the curve a horizontal distance ranging from 20 to 25 feet. Proposed slope angle to be 1.5:1 (H:V) or flatter.
185+00	187+89	R1	Cut into the existing 2:1(H:V) cut slope on the outside of the curve a horizontal distance ranging from 5 to 10 feet. Proposed slope angle to be 4:1 (H:V). Cut into the existing ±2:1(H:V) cut slope on the inside of the curve a horizontal distance ranging from 5 to 10 feet. Proposed slope angle to be 1.5:1 (H:V).

Notes: 1. The stationing in this table was estimated from a preliminary project layout plan.
2. The horizontal distance and the slope angle were estimated from a preliminary project layout plan.

4. Physical Setting

4.1 Climate

There is not specific climate information available for the project site. The nearby Redwood Creek Basin receives an average of approximately 80 inches of precipitation

annually. This annual precipitation was averaged from approximately 60 inches of precipitation near Orick and approximately 100 inches in the headwaters (Harden 1975). The data was from 1953 to 1975 (circa). Redwood Creek is located west of the project site.

According to the Western Regional Climate Center (www.wrcc.dri.edu), the average annual precipitation in Willow Creek is about 52 in. The majority of this precipitation falls between October and April. The average maximum temperature is about 95°F in July. The average minimum temperature is about 35°F in January. The monthly climate summary for Willow Creek is presented in **Table 3**.

Table 3. Monthly Climate Summary, Willow Creek

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Max. Temperature (F)	51.1	56.6	61.9	68.5	77.6	86.6	94.6	94.4	87.8	74.2	58.5	50.2
Average Min. Temperature (F)	34.6	36.6	37.7	39.2	44	49	52.5	51.5	47.3	41.7	39.4	35.4
Average Total Precipitation (in.)	9.49	7.55	6.81	3.24	1.88	0.64	0.13	0.38	1.02	3.09	7.9	9.63
Average Total Snowfall (in.)	0.9	0.4	0.1	0	0	0	0	0	0	0	0.1	1.0

4.2. Topography and Drainage

Circle Point, on the inside of the curve has a summit elevation of 2140 feet. The vertical alignment of the roadway is uphill in the eastbound direction and consists of a 4.5% slope. The roadway elevation ranges from 1825 feet at PM 25.0 to 2015 feet at PM 25.7.

Runoff from the cut slopes and sheet flow from the roadway are drained to a ditch along the inside of the curve between stations 168+50 and 174+50. Water from the ditch is conveyed across the highway through culverts where it is drained along the fill slope on the outside of the curve.

4.3 Man-made and Natural Features of Engineering and Construction Significance

Other than the SR 299 roadway there are no significant man-made or natural features of engineering or construction significance within the proposed project limits.

5. Geology

5.1 Regional

The project site is located on the eastern edge of the Coast Ranges geomorphic province of California. The Geologic Map of California, Redding Sheet (Olaf P. Jenkins Edition, 1962, 2nd Printing, 1969) indicates the bedrock beneath the project site is Franciscan Formation (KJf) with varying rock types (Plate 2).

The project site is located in a very complex geologic area in California. The bedrock along SR 299 from post mile 23.209 to post mile 29.009 is the incoherent Coyote Creek unit (Kjfc) which is part of the Eastern Belt Franciscan Complex (Falls, J.N., Wills, C.J., and Hardin, B.C., 2006, Plate 3). Falls etc. 2006 described the Coyote Creek unit as "dominantly of a fine-grained sandstone and shale assemblage that has been pervasively sheared into a mélange by tectonic processes." In this area, mélange generally forms rounded hilltops with gentle slopes and "intact tectonic blocks", which mainly consist of sandstone, and generally formed "sharp-crested" ridges with steep rock slopes that stand out from the surrounding mélange formed rolling hills landscape. Circle Point, which lies inside the curve, has relatively steep rock cut slopes. There are landslides and/or earth flows on both ends of the project limits.

5.2 Site Geology

Within the project limits, the rock within the cut slopes is the Coyote Creek unit (Kjfc) of the Franciscan Complex. The Coyote Creek unit (Kjfc) within the project limits consists of graywacke (meta-sandstone) and meta-shale.

Site and geologic conditions observed during our field visit are presented below.

<u>Cut Slopes</u>

<u>STA 163+00 to STA 168+50</u>

The cut slope from STA 163+00 to STA 168+50 has a maximum height of approximately 50 feet with an approximate slope ratio ranging from 2:1 (H:V) to 1.5:1 (H:V). The slope surface is covered by small trees, moss, and grass. Three small areas (approximately two square feet) were cleared by hand to expose the bedrock for visual inspection.

The bedrock observed is gray fine-grained fractured graywacke and dark gray fractured meta-shale. In general, the rock is weathered along and between the joints/fractures.

Weathering ranges from fresh to intensely weathered (see Plate 5). The strike of the bedding ranges from 297° to 347°. The dip of the bedding is approximately 35°, dipping to the north. Joints with a strike of 265° and dipping 44° south were observed in graywacke.

A photograph showing the cut slope is presented on Plate No. 4. Photographs showing the material in the cut slope are presented on Plate No. 5.

STA 174+50 to STA 181+00

The cut slope from STA 174+50 to STA 181+00 has a maximum height of approximately 100 feet with an approximate slope ratio of 1.3:1 (H:V). The slope surface is covered by small trees, grass, and exposed rock. Three small areas (approximately two square feet) were cleared by hand to expose the bedrock for visual inspection.

The bedrock exposed is fine-grained, gray, very hard, fresh, moderately fractured graywa187+89cke and dark gray, moderately weathered, intensely fractured meta-shale. The strike of the bedding ranges from 245° to 301°. The dip of the bedding ranges from 44° to 69°, dipping to the north.

A photograph showing the cut slope is presented on Plate No. 6. Photographs showing the material in the cut slope are presented on Plate No. 7.

STA 185+00 to STA 187+89

The cut slope from STA 185+00 to STA 187+89 has a maximum height of approximately 40 feet with an approximate slope ratio of 2:1 (H:V). The slope surface is covered by grass and exposed rock. Three small areas (approximately two square feet) were cleared by hand to expose the bedrock for visual inspection.

Landslide or earthflow debris was observed within this cut. The landslide or earthflow debris consists of soft to very soft decomposed shale and very hard, fresh graywacke blocks.

A photograph showing the cut slope is presented on Plate No. 8. Photographs showing the material in the cut slope are presented on Plate No. 9.

A small shallow slope failure was observed at approximate station 189+00. This failure is localized approximately 40 feet long and is facing west along a driveway that is perpendicular to SR 299. The scarp of the failure is about 2 feet high (Plate 10).

Fill Slopes (as shown in **Table 1**)

Fill slopes were covered by rock fragments, scattered vegetation, and trees. As-Built information regarding the slope design is not available. Therefore, the type and quality of material used in the fill slopes is unknown. The construction method used for placement of the fill (benched or unbenched, relative compaction) is also unknown.

During our field visit, cracking was observed in the roadway within the fill slope area between stations 168+50 and 174+50 as shown in the photographs on **Plate No. 11**. The pavement toward the outside curve of the cracking is slightly lower than the pavement toward the inside curve. The cracking is caused by differential soil movement, which may include vertical movement (settlement), horizontal movement, or a combination of both.

5.3 Laboratory Testing

Laboratory testing was not performed for this report.

5.4 Groundwater

Existing groundwater information is not available for this project. Within the project limits numerous seeps and horizontal drainage pipes were observed within the cut slope along the inside of the curve.

5.5 Faulting and Seismicity

Based on the Caltrans ARS Online Tool (version 2.3.06) the nearest controlling active faults to the project site are presented in **Table 4** below.

Table 4. Nearest Active Fault Data

Fault Name/ Fault ID	Fault Type	Dip (Deg.)	Dip Direction	Age	Slip Rate (mm/yr)	R(x) (km)	MMax	PGA (g)
Big Lagoon Bald MTN/9	Rev	35	NE	LQ	1	3.2	7.5	0.990
Trinidad (alt 1)/21	Rev	35	NE	H	1.5	12.16	7.5	0.735
McKinleyville (alt 1)/29	Rev	35	NE	H	0.6	16.2	7.2	0.589
Mad River (alt 1)/30	Rev	35	NE	H	0.7	17.94	7.1	0.537
Fickle Hill (alt 1)34	Rev	35	NE	H	0.6	20.91	7.0	0.417

Based on the Memo to Designer 20-10,Fault Rupture, January 2013, the potential for surface fault rupture at the site is absent as there are no known faults that are Holocene or younger in age that fall within 1,000 feet of the project site and the project site does not fall within an Alquist-Priolo Fault Zone.

6. Geotechnical Recommendations

The existing cut slopes on the inside of the curve are generally stable and no geologic hazards were observed during our April 2014 field visit. Based on the information gathered from field observations, the bedding attitude (strike and dip) of the rock is favorable to cut slope stability. Between approximately PM 25.40 and PM 25.6, some rock fragments (gravel and cobble size) as a result of weathering, are on the slope surface and may fall to the existing SR 299 roadway. This office concurs with the proposed cut slope ratios. The proposed cut slope ratios vary between 1.5:1 (H:V) and 4:1 (H:V).

As discussed previously, cracking was observed in the roadway within the fill slope area between stations 168+00 and 174+50 ("R1" line).

The fill slope is located in what was originally a small canyon that was a natural drainage outlet. In general, groundwater is a very important factor that causes soil movement.

Since the design layouts and cross sections indicate that the traffic lane will relocate towards the edge of the fill slope, which is over the existing cracks and depressed area, a subsurface investigation (drilling) may be needed to evaluate the fill slope condition to prevent further pavement damage caused by fill slope movement.

A dewatering system such as horizontal drains installed within the cut slope above the roadway and within the fill slope below the roadway may help to reduce the soil movement and minimize future pavement damage.

During the cut slope construction, an Engineering Geologist from this Office should be called to the site to map the new cut slope.

7. Construction Considerations

In general, the rock within the project limits is anticipated to be rippable, based on field observations and proposed design cross sections from D2 Design. There may be some rock, such as graywacke, within the proposed cut sections that may not be easily ripped, and the use of pneumatic hammers, hydraulic splitters or other rock excavation

techniques may be necessary. If rock that cannot be ripped by conventional techniques is encountered within the limits of the proposed cuts, removal of the rock should be performed in accordance with Standard Special Provision 19-4_X1 Rock Excavation.

If you have any questions or need further information regarding this report, please contact Xing Zheng at (916)227-1036, or Ben Barnes at (916) 227-1039.

Report by:

REGISTERED GEOLOGIST
XING ZHENG
No. 2130
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
exp. 3/31/15

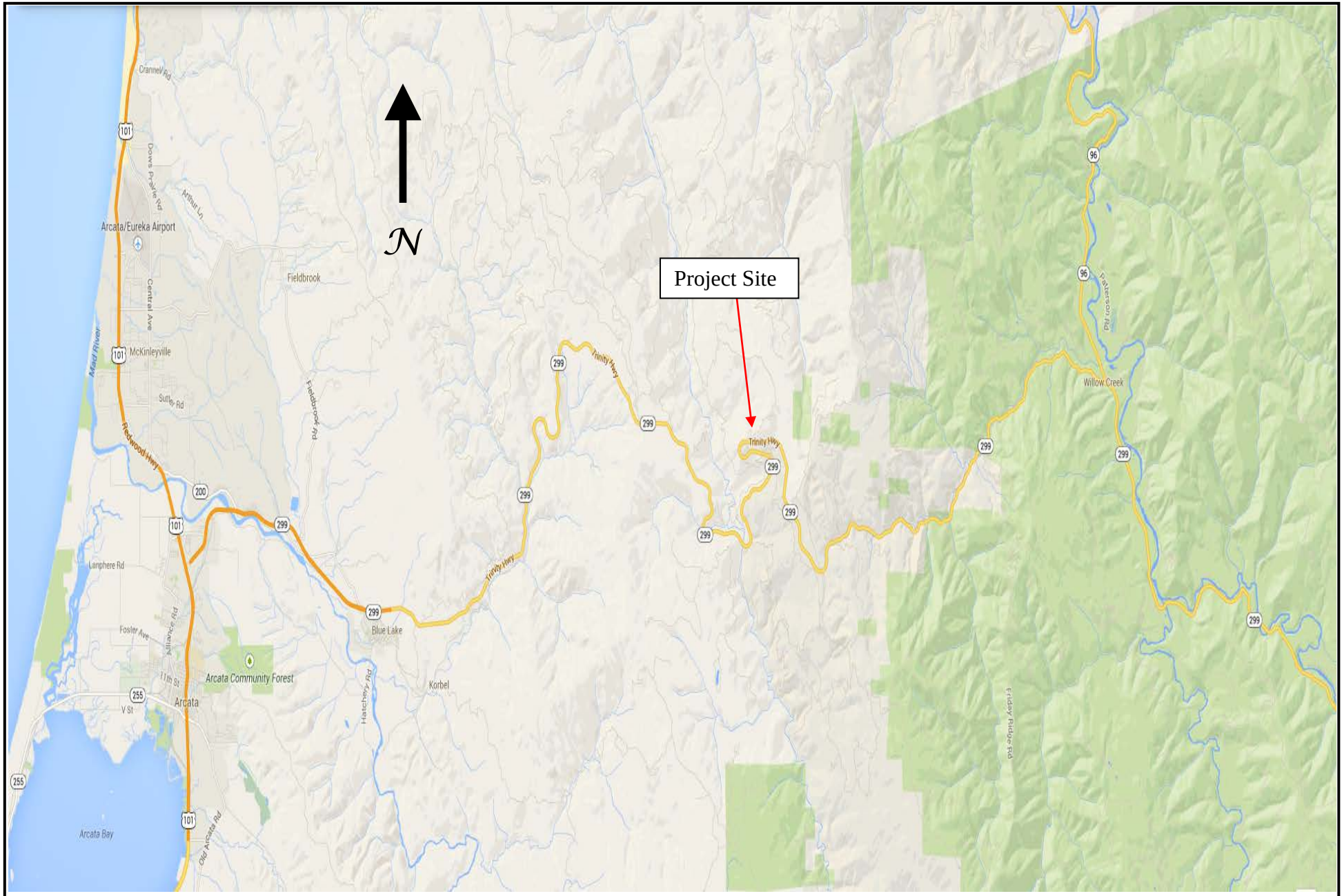
Xing Zheng C.E.G. NO. 2130
Engineering Geologist
Office of Geotechnical Design-North

Benjamin M. Barnes, P.E.
Transportation Engineer
Office of Geotechnical Design-North

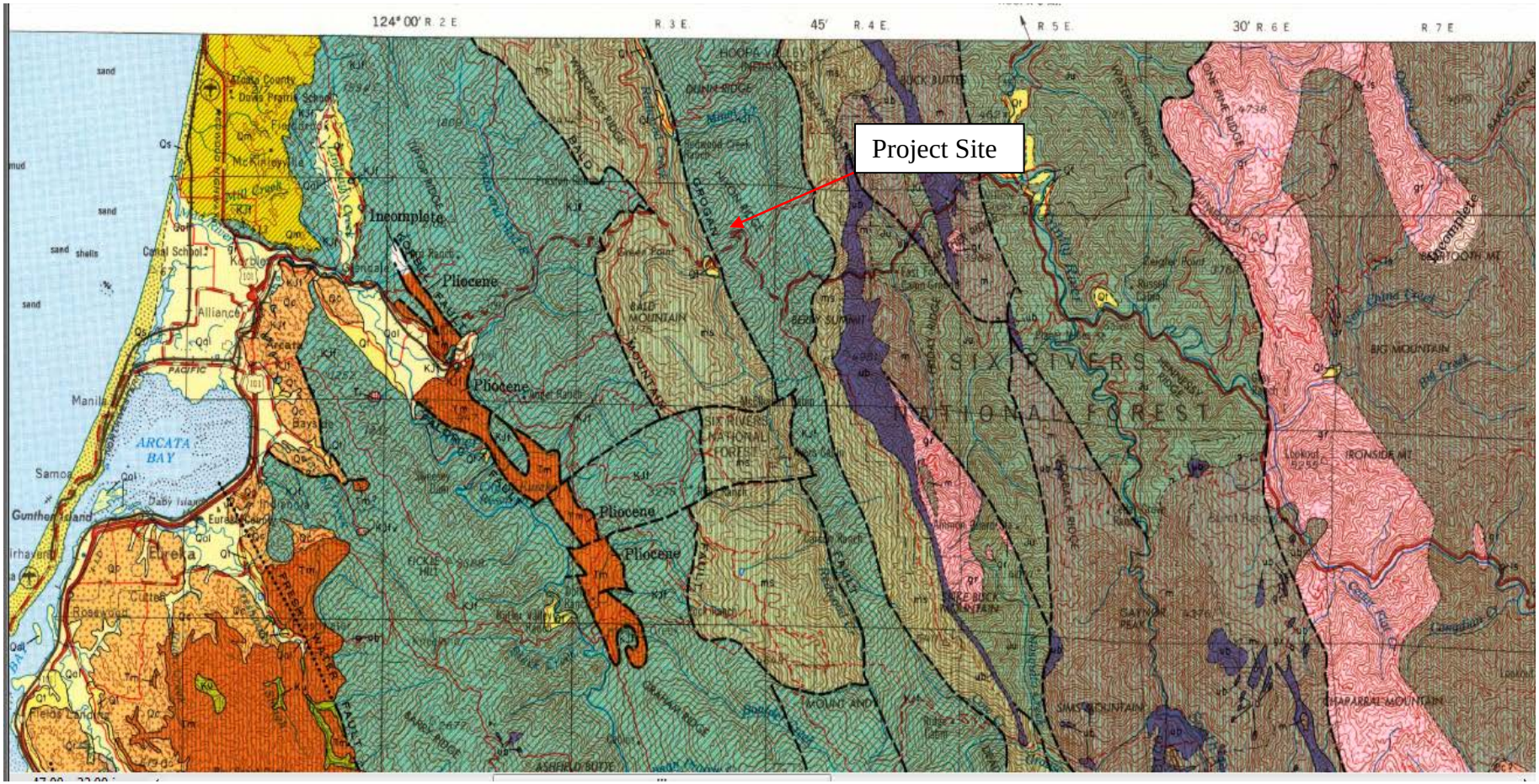
Attachments
Plate No. 1 – Vicinity Map
Plate No. 2 and 3 – Geologic Map
Plate Nos. 4 through 11 – Site Photographs

REGISTERED PROFESSIONAL ENGINEER
BENJAMIN M. BARNES
No. 66090
Exp. 6/30/2014
CIVIL
STATE OF CALIFORNIA

c: Reza Mahalatti (Office Chief, OGDN)
Reid Buell (Branch Chief, OGDN-A)
Charlie Narwold (Branch Chief, OGDN-B)
Kim Floyd (Project Manager)
Eskinder Taddese (Project Coordination Engineer)
Tom Fitzgerald (District Materials Engineer)
Geotechnical Archive (http://10.160.173.158/)



Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Vicinity Map	Plate No. 1
		EA 01-0A4900	01-HUM-299-pm 25.0/25.7	

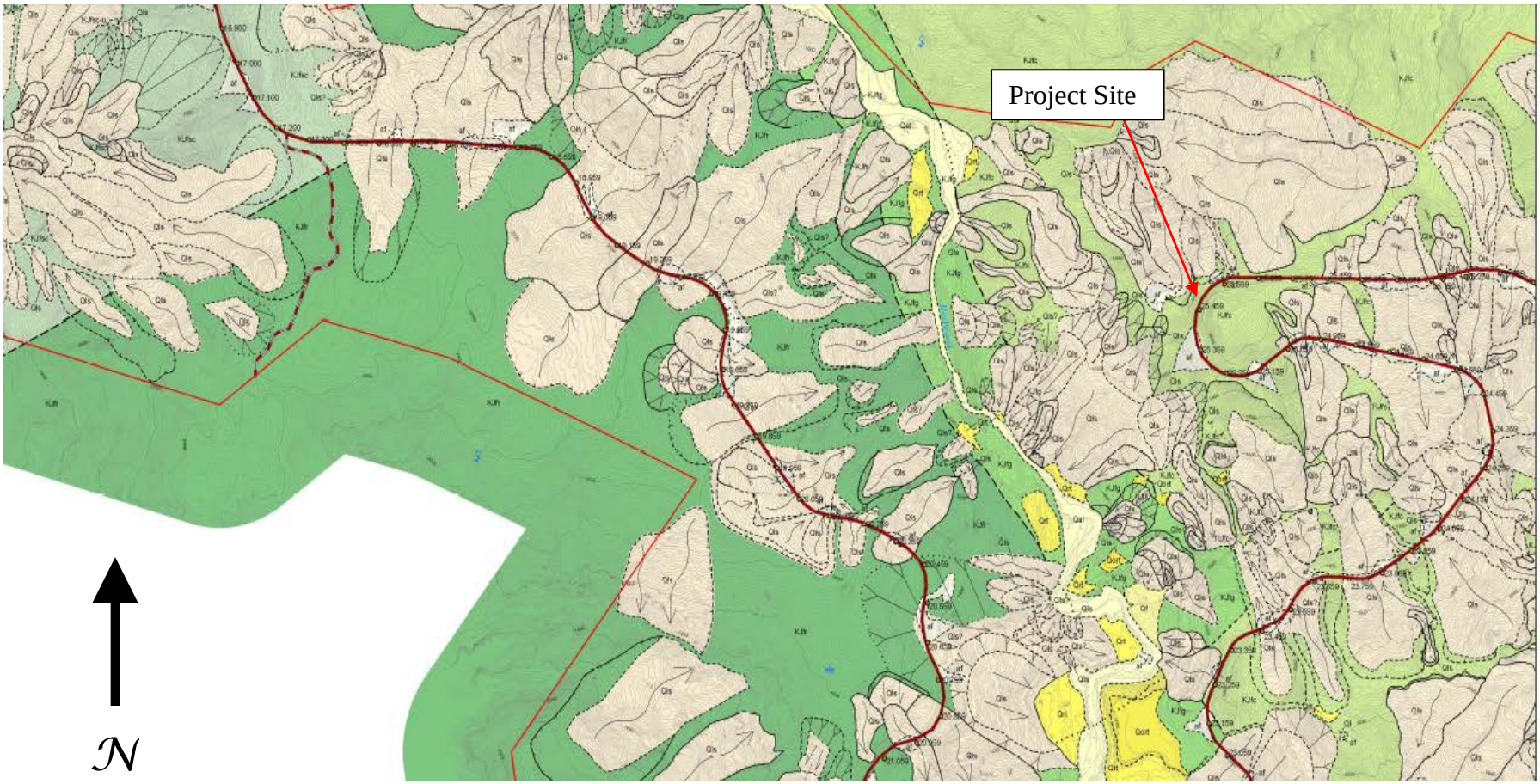


Kjf --- Franciscan Formation
Ms ---- Pre-Cretaceous metamorphic rocks

From Geologic Map of California Redding Sheet
Compilation by Rudolph G. Strand 1962

N

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Geologic Map	Plate No. 2
		EA 01-0A4900	01-HUM-299-pm 25.0/25.7	



Kjfc Incoherent unit of Coyote Creek (Cretaceous-Jurassic) Eastern Belt Franciscan Complex - This unit consists dominantly of a fine-grained sandstone and shale assemblage that has been pervasively sheared into a mélange by tectonic processes. The unit underlies the Redwood Creek basin east of the Grogan fault. The Coyote Creek unit is further characterized by the presence of greenstone, chert and minor conglomerate. Greenstone blocks are found as "floaters" in pervasively sheared mudstone matrix. Soils developing on the bedrock are typically clay rich and highly susceptible to erosion and sliding.

From Geologic Map of the Highway 299 Corridor, Humboldt County, California
Blue lake to Willow Creek (pm 6.6 – pm 40.0), Plate 1, Sheet 1 of 2 (Western Portion)
James N. Falls, CEG and Burt C. Hardin, CEG, 2005

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308 EA 01-0A4900	Geologic Map 01-HUM-299-pm 25.0/25.7	Plate No. 3

Site Photograph shows the existing 1.5:1 (H:V) cut slope, taken on the shoulder of Highway 299 on the outside of Circle Point Curve at STA 163+00 looking toward STA 168+50.

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Site Photograph	Plate No. 4
		EA 01-0A4900	01-HUM-299 PM 25.0/25.7	

Site Photograph shows meta-shale on the cut slope of SR 299 on the outside of Circle Point Curve between STA 163+00 and STA 168+50.

Site Photograph shows graywacke on the cut slope of SR 299 on the outside of Circle Point Curve between STA 163+00 and STA 168+50.

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Site Photographs	Plate No. 5
		EA 01-0A4900	01-HUM-299 PM 25.0/25.7	

Site Photograph shows the existing 1.5:1 (H:V) cut slope, taken on the shoulder of Highway 299 on the outside of Circle Point Curve, at STA 174+50 looking toward STA 181+00.

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Site Photograph	Plate No. 6
		EA 01-0A4900	01-HUM-299 PM 25.0/25.7	

Site Photograph shows graywacke exposed along joint on the cut slope of SR 299 on the outside of Circle Point Curve between STA 174+50 and STA 181+00.

Site Photograph shows graywacke and meta-shale interbed on the cut slope of SR 299 on the outside of Circle Point Curve between STA 174+50 and STA 181+00.

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Site Photographs	Plate No. 7
		EA 01-0A4900	01-HUM-299 PM 25.0/25.7	

Site Photograph shows the existing 2:1 (H:V) cut slope, taken on the shoulder of Highway 299 on the outside of Circle Point Curve at STA 187+89 looking toward STA 185+00.

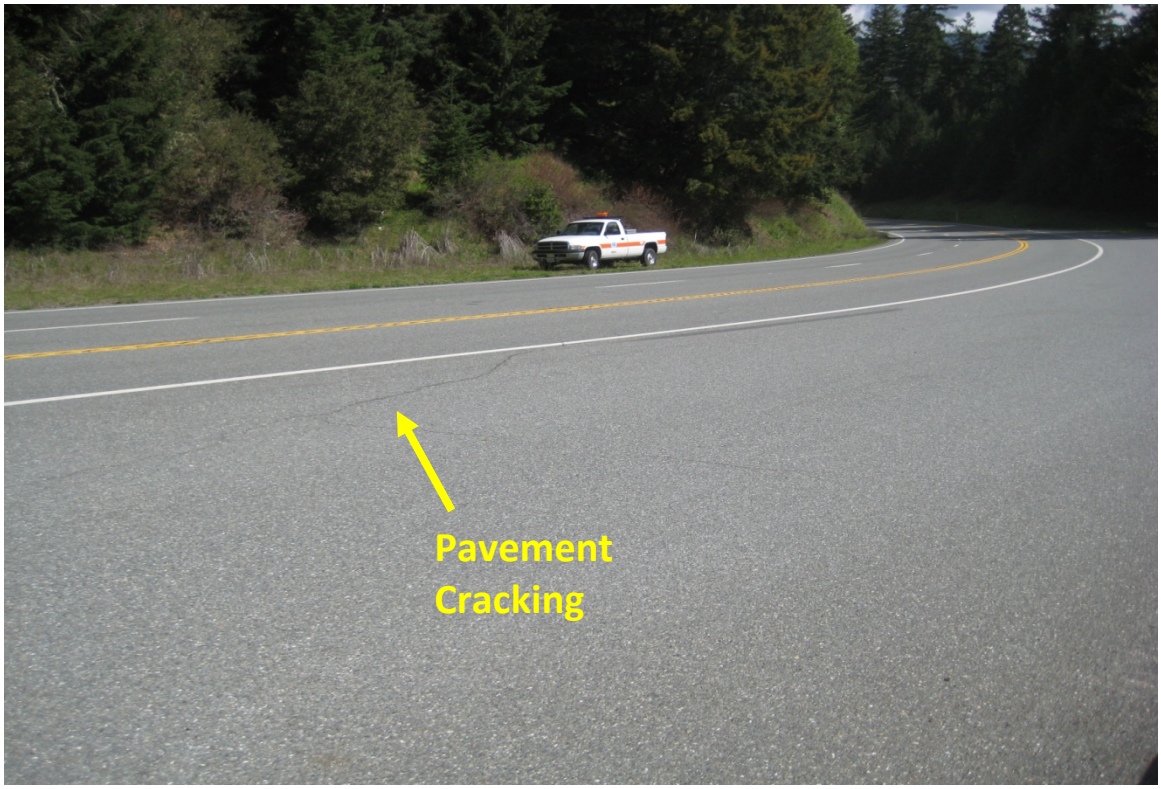
Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Site Photograph	Plate No. 8
		EA 01-0A4900	01-HUM-299-pm 25.0/25.7	

Site Photograph shows subsurface conditions (landslide debris – decomposed shale) on the cut slope of SR 299 on the outside of Circle Point Curve between STA 174+50 and STA 192+00.

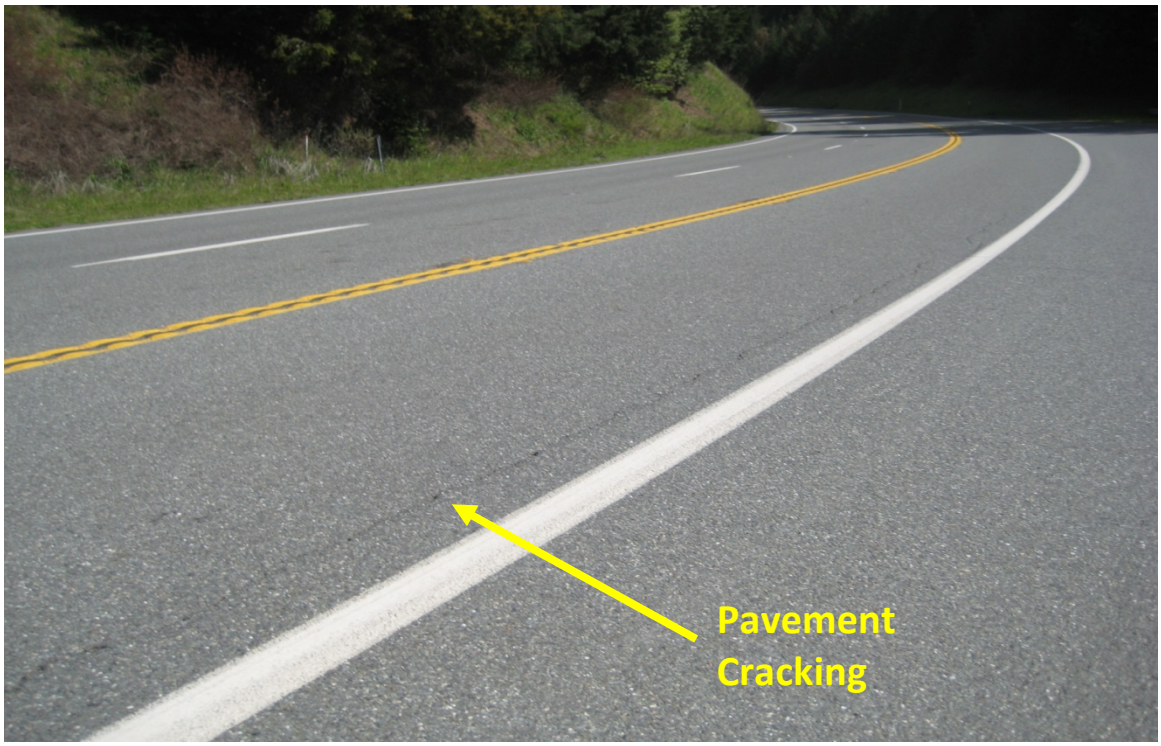
Site Photograph shows subsurface conditions (landslide debris – graywacke blocks) on the cut slope of SR 299 on the outside of Circle Point Curve between STA 174+50 and STA 192+00.

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Site Photographs	Plate No. 9
		EA 01-0A4900	01-HUM-299-pm25.0/25.7	

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Small Scale slope failure	Plate No. 10
		EA 01-0A4900	01-HUM-299-pm25.0/25.7	



Site Photograph shows pavement cracking from edge of pavement to fog line along the shoulder of SR 299 on the outside of Circle Point Curve between STA 22+00 and STA 28+00.



Site Photograph shows pavement cracking along the fog line on SR 299 on the outside of Circle Point Curve between STA 22+00 and STA 28+00.

Caltrans	Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	ID 0100020308	Site Photographs	Plate No. 11
		EA 01-0A4900	01-HUM-299-pm25.0/25.7	

MATERIALS INFORMATION

Addendum to the Preliminary Geotechnical Design Report,

Dated November 18, 2015

State of California
Department of Transportation

California State Transportation Agency

Memorandum

Serious Drought.
Help Save Water!

To: JOHN L. MARTIN
Chief, Design R1

Attn: Mr. Robert Nixon

Date: November 17, 2015

File: 01-HUM-299 PM 25.0/25.7
ID 0100020308
EA 01-0A490
Circle Point Curve
(Curve Improvement)

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

Subject: Addendum to the Preliminary Geotechnical Design Report (PGDR) for Circle Point Curve Improvement

1. Introduction

The Office of Geotechnical Design-North (OGDN) has prepared this Addendum to the PGDR for the proposed Circle Point Curve Improvement project. This Addendum provides the results of the seismic refraction survey and an evaluation of the roadway deformation observed between Stations 168+50 and 174+50. This information supersedes the recommendations found in the PGDR (Section 7.0) and includes additional work necessary by the contractor. Both the PGDR and this Addendum are to be included in the informational handout.

The project site is located on State Route (SR) 299, from post mile 25.0 to 25.7 in Humboldt County. The project site is approximately 13 miles west of the town of Willow Creek. Refer to the PGDR (2014), Plate No. 1 for a vicinity map.

2. Seismic Refraction Survey

As reported in the PGDR, the existing road cuts expose bedrock consisting of gray, fine-grained fractured graywacke and dark gray fractured meta-shale. In general, the rock is weathered along and between the joints/fractures. Joints and fractures permeate the exposed rock in the existing cutslope and result in clasts that range from gravel to cobble to small diameter boulders. Weathering ranges from fresh to intensely weathered. Since all of the proposed cuts are within bedrock, the rippability of the material was evaluated for construction planning.

Three seismic refraction lines were surveyed as part of the field investigation for the proposed cuts. The approximate locations of the seismic refraction survey lines are shown in Figure 1 and 2 of this document. All of the refraction lines are located within the limits of the existing road cuts. The velocity profiles for Seismic Refraction Lines 1 through 3 are provided as Figures 3 through 5. Table 1 summarizes the results of the seismic refraction surveys.

Table 1: Summary of Seismic Refraction Survey

Line No.	Layer	Average Thickness (ft)	Velocity (ft/s)	Inferred Geologic Material	Rippability[1]
Line 1	1	4	1800	Colluvium	ER
Line 1	2	31	2575	Weathered Bedrock	ER
Line 1	3	31+	9350	Sandstone Bedrock	NR
Line 2	1	7	1640	Colluvium	ER
Line 2	2	37	2100	Weathered Bedrock	ER
Line 2	3	37+	9350	Sandstone Bedrock	NR
Line 3	1	15	2300	Weathered Bedrock	ER
Line 3	2	15+	4070	Sandstone Bedrock	MD

[1]ER-Easily Ripped, MD-Moderately Difficult, DR-Difficult Ripping, NR-Not Rippable, NA-Not applicable

Ripping ability is based on MacGregor (1995) for heavy series bulldozers with a single-tooth ripper. Different excavation equipment may experience different results. Penetrating efficacy of the ripping tooth is often more important in predicting ripping success than seismic velocity alone. Seismic velocities and corresponding rippability from MacGreggor (1995) are presented in Table 2:

Table 2: Rippabilty Summary

Velocity (ft/s)	Rippability
<3445	Easily Ripped
3445-4921	Moderately Difficult
4921-6562	Difficult Ripping
>6562	Not Rippable

The refraction survey results indicate that bedrock within the limits of the proposed cuts will be rippable. However, less intensely fractured rock may be encountered locally within the limits of the proposed cuts requiring alternative methods of rock excavation.

3. Slope Inclinometer

The PGDR reports that cracks exist in the paved shoulder between Station 22+00 and Station 28+00. The reported Stationing is incorrect. The correct Stationing is 168+50 to approximately 174+00. A geotechnical boring was conducted at Station 171+75. See Figure 1 (attached) for location. The boring was drilled to a depth of approximately 75 feet to characterize the subsurface conditions. A grouted Slope Inclinometer was installed to monitor for displacement.

No displacement has been detected by the Slope Inclinometer. Based on the boring log and the SI data, we interpret the surface cracks to represent consolidation of the fill materials and not the result of fill failure. The consolidation of the fill materials does not warrant additional geotechnical mitigation. However, design may want to review the quantities calculated for road resurfacing due to the offset road surface.

4.0 Revised Construction Considerations

We recommend the excavation of the slopes be performed in accordance with Standard Special Provision 19_4_X1 Rock Excavation. In general, rock within the limits of the proposed cut is anticipated to be rippable, based on field observations, seismic refraction data and proposed design cross sections from D2 Design. There may be some rock, such as graywacke, within the limits of the proposed cut that may not be easily ripped, and the use of pneumatic hammers, hydraulic splitters or other rock excavation techniques may be necessary.

As a work item for the contractor, the boring located at Station 171+75 will need to be destroyed per the destroy well specification.

If you have any questions or require further assistance, please contact Tagg Nordstrom at (707) 445-7884, or Charlie Narwold (707) 445-6036.

Report by:

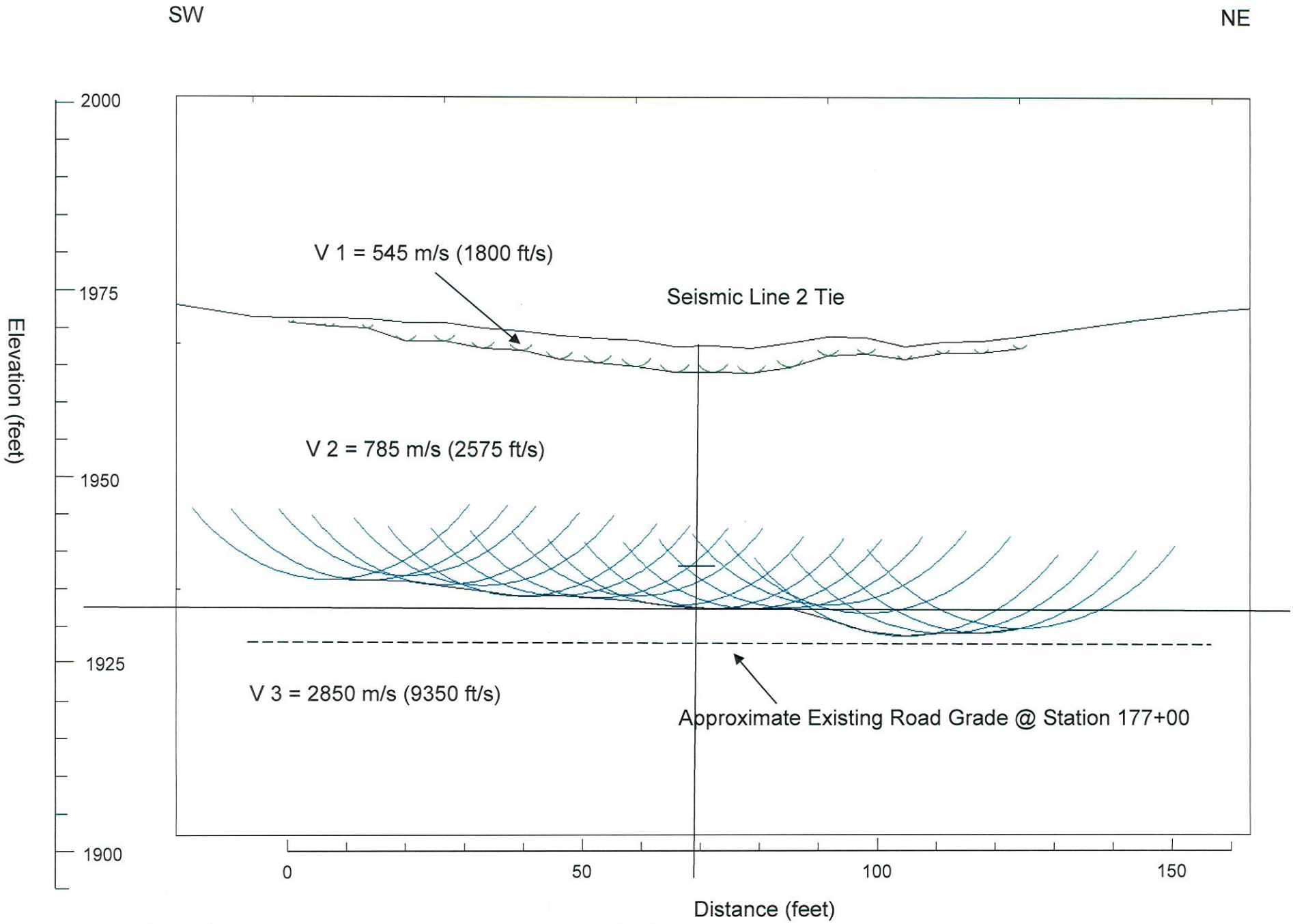
Tagg Nordstrom P.G. NO. 7950
Engineering Geologist
Office of Geotechnical Design-North

Charlie Narwold, C.E.G. NO. 2335
Senior Engineering Geologist
Office of Geotechnical Design-North

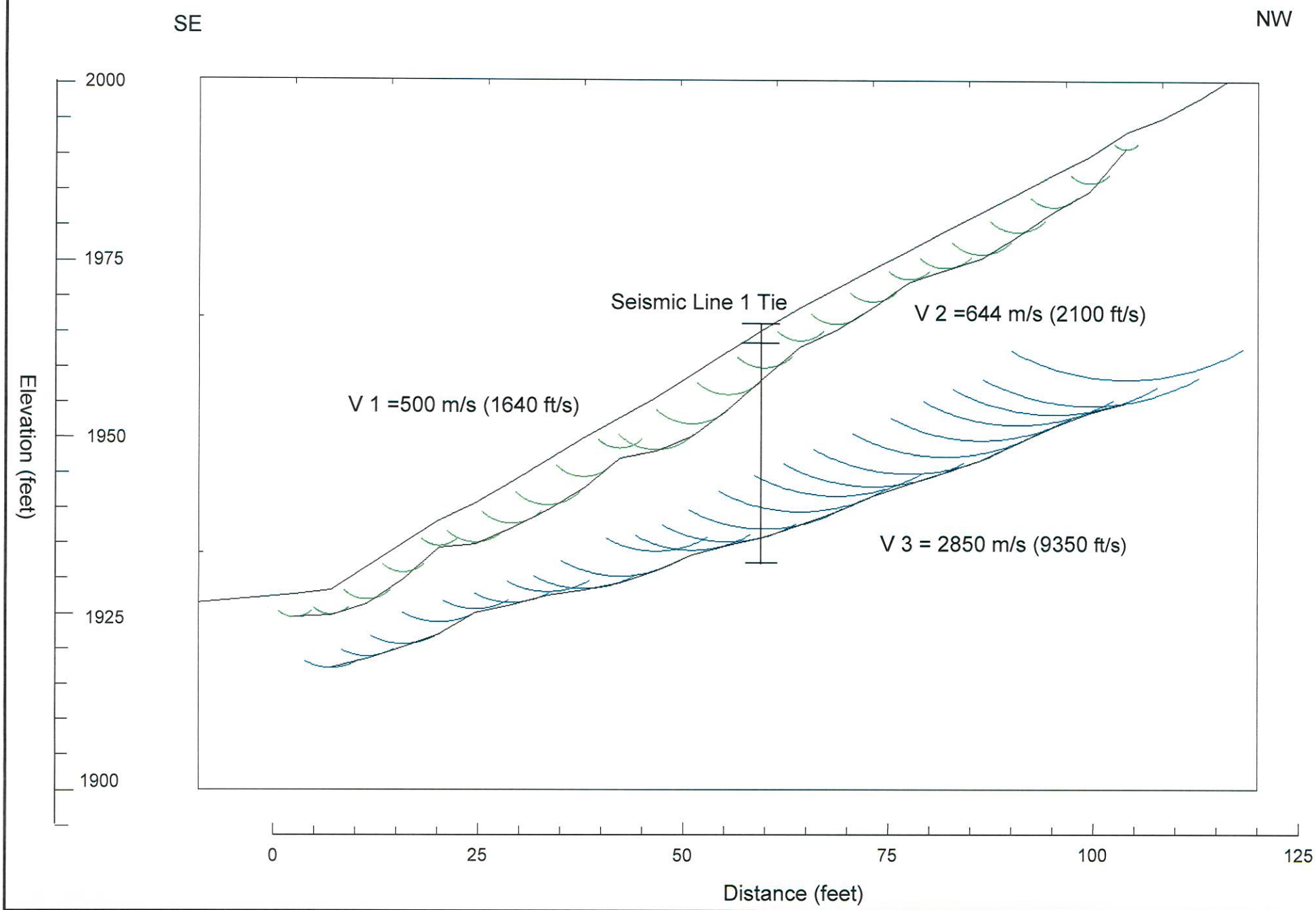
Attachments
Figure 1 – Location Map for Seismic Line 1 and 2
Figure 2 – Location Map for Seismic Line 3
Figures 3 through 5 – Seismic Refraction Profiles

References

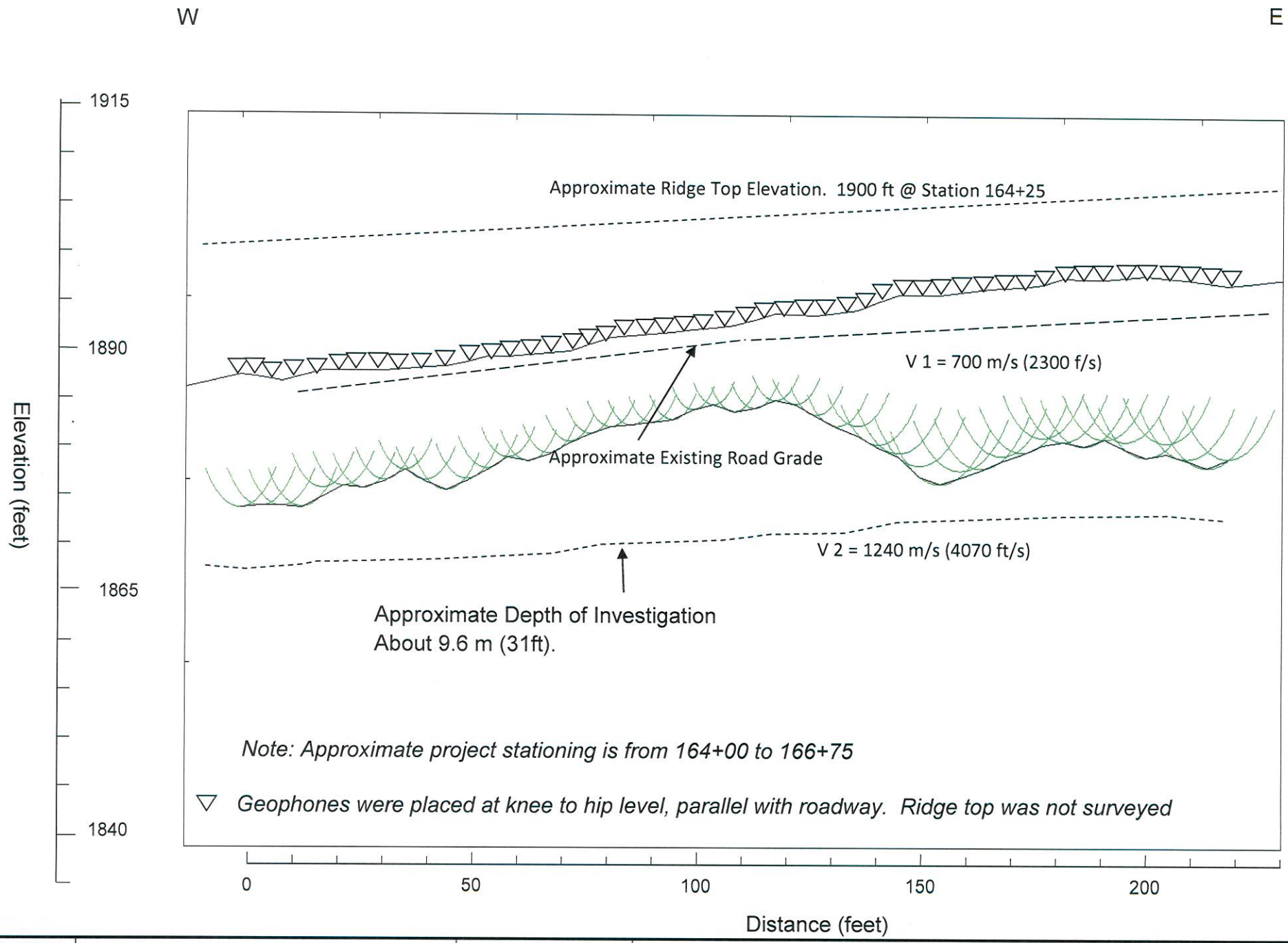
MacGregor, R. Fell, Et. Al. 1994. The Estimation of Rock Rippability, *Quarterly Journal of Engineering Geology. Vol 27, pp 123-144.*



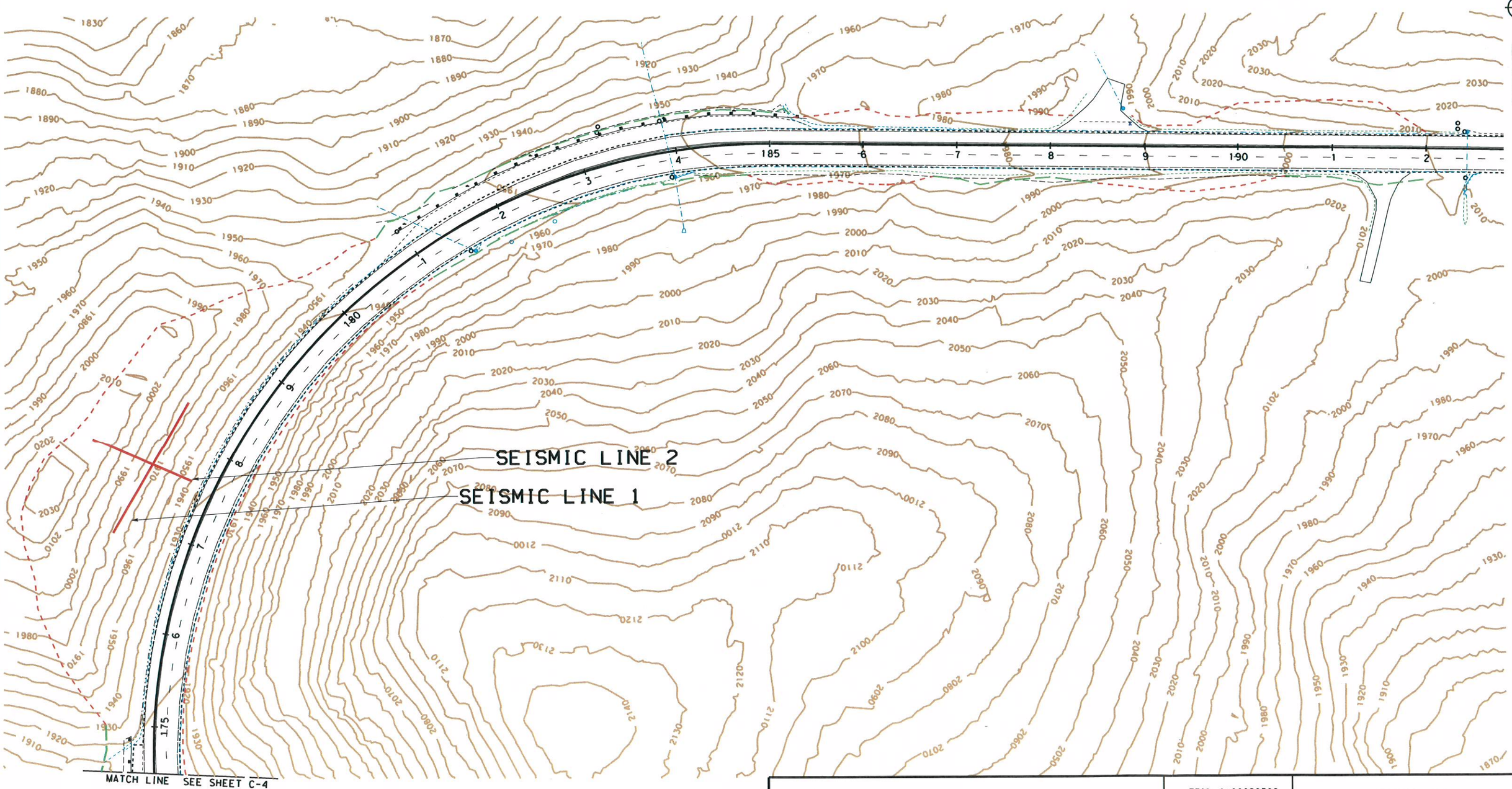
Caltrans Division of Engineering Services Office of Geotechnical Support Geophysics and Geology Branch	01-0A4900	Circle Point Curve Safety Improvement 01-HUM-299-25	Figure 3
	0100020308	Seismic Line 1	



Caltrans Division of Engineering Services Office of Geotechnical Support Geophysics and Geology Branch	01-0A4900	Circle Point Curve Safety Improvement 01-HUM-299-25	Figure 4
	0100020308	Seismic Line 2	



Caltrans Division of Engineering Services Office of Geotechnical Support Geophysics and Geology Branch	01-0A4900	Circle Point Curve Safety Improvement 01-HUM-299-25	Figure 5
	0100020308	Seismic Line 3	



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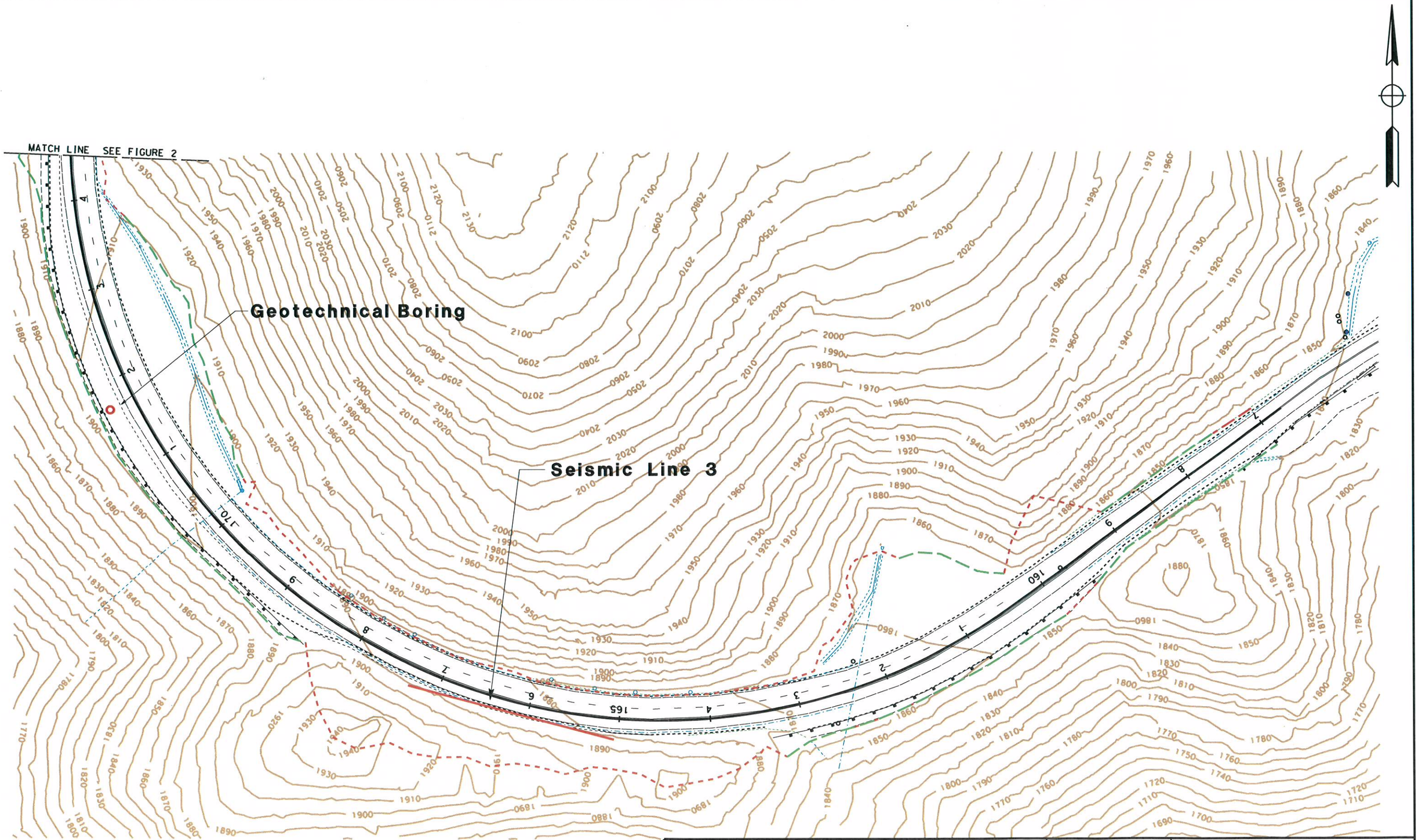
DATE: NOV 12, 2015

SEISMIC LINE 1
SEISMIC LINE 2

CIRCLE POINT CURVE
01-HUM-299-PM R25.1/R25.6

FIGURE 1



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Office of Geotechnical Design North
Branch B

EFIS: 0100020308	SEISMIC LINE 3 Geotechnical Boring
DATE: NOV 12, 2015	
CIRCLE POINT CURVE 01-HUM-299-PM R25.1/R25.6	FIGURE 2

MATERIALS INFORMATION

Optional Disposal Site

OPTIONAL DISPOSAL SITE

Hoopa Valley Aggregates and Ready Mix Enterprises

Cal Pack Road, Hoopa, California, 95546

530-625-4017

MATERIALS INFORMATION

NONPOTABLE WATER SOURCES

Dated November 2014

NONPOTABLE WATER SOURCES

November 2014

Hoopa Valley Aggregates and Ready Mix Enterprises

Cal Pack Road, Hoopa, California, 95546

530-625-4017