

FOR CONTRACT NO.: 03-2A6904

INFORMATION HANDOUT

MATERIALS INFORMATION

GEOTECHNICAL DESIGN REPORT

ADDENDUM TO GEOTECHNICAL DESIGN REPORT

ROUTE: 49-Nev-15.4/18.0

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. WINDER BAJWA
Project Manager
North Region - District 3

Date: March 7, 2008

Attention: Mr. Arshad Iqbal
Project Engineer
Design Branch S16



File: 03-NEV-49-15.5/18.0
(PM 9.7/11.2)
EA: 03-2A6901
La Barr Meadows

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

Subject: Geotechnical Design Report

Introduction

Per your request, we are providing a Geotechnical Design Report (GDR) for State Route 49 from KP 15.5 to 18.0 (PM 9.7 to 11.2) in Nevada County, California. The project proposes to widen Route 49 from two to four lanes with continuous median / left turn lanes, create a new signalized intersection, and replace driveway and private road access to the highway with a system of frontage roads. In addition, two soundwalls and a wildlife crossing will also be constructed. A vicinity map is presented as Attachment 1.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and to recommend design and construction criteria. This report also establishes a geotechnical baseline to be used in assessing the merit and/or scope of potential changed site conditions and is intended for use by the project design engineer, construction personnel, bidders and contractors.

Pertinent Reports and Investigations

The following publications and plans were reviewed to assist in the assessment of site conditions:

1. Grass Valley, CA 7.5-minute quadrangle, United States Geological Survey, 1995.
2. Geologic Map of the Chico Quadrangle, CA Division of Mines and Geology, 1992.
3. California Seismic Hazard Map 1996, Caltrans, Lalliana Mualchin, 1996.
4. Monthly Climate Summary, Grass Valley, California 1966-2005.
5. Route 49 Project Plans, undated.

Existing Facilities

California Route 49 in the project vicinity is a two-lane undivided highway paved with asphalt concrete. Lane widths are 3.6 meters and shoulder widths are 0 to 2.4 meters. The highway is aligned in a general north/south direction.

Within the area where the proposed improvements are to occur, the highway is built in both cut and fill sections. The cut sections range from 0.5 m to 6 meters in height with side slopes ranging from 1:1 to 1:1.5 (V:H). The fill sections range from 0.5 m to 5 m in height with side slopes ranging from 1:1 to 1:2 (V:H). The slopes are heavily vegetated with grasses and appear to be performing favorably. Commercial buildings, residential buildings, and vacant land are located adjacent to the highway. Above and below ground utilities are also present adjacent to the highway.

Proposed Improvements

The project proposes to widen Route 49 from two to four lanes with continuous median / left turn lanes, facilitated by cut and fill sections, from approximately Lady Jane Road to Norambagua Way. The intersection of La Barr Meadows Road and Highway 49 will be relocated to the south and signalized. The highway will be widened from two to four lanes with continuous median / left turn lanes north and south of the new intersection to provide adequate storage and left turn movements. The numerous driveways and private road access will be eliminated by a system of frontage roads that will provide access to the highway at the new signalized intersection. In addition, this project includes construction of two soundwalls and a wildlife crossing.

Physical Setting

The physical setting of the project site and the surrounding area was reviewed to provide climate, topography and drainage, geology and seismicity, and soil survey characteristics to aid in project design and construction planning.

Climate

According to the Western Regional Climate Center for 1966-2005, the average annual precipitation in Grass Valley (located 7 km north of the project site) is 1350 mm (53 in).

The majority of this precipitation falls between October and May. The average annual air temperature is approximately 20.3° C (68.5° F) with the highest average daily maximum of 30.8° C (87.4° F) in July and the lowest average daily minimum of -0.2° C (31.6° F) in December.

Topography and Drainage

The Grass Valley, CA 7.5-minute quadrangle dated 1954 was reviewed to determine the topographic features in the region of the project area. The terrain is mountainous with elevations ranging from approximately 610 to 700 meters (2000 to 2300 feet). Existing highway drainage includes V-ditches on both sides of the highway.

Site Geology

According to the California Department of Conservation, Division of Mines and Geology Geologic Map Series "Geologic Map of California, Chico Sheet, California", dated 1992, the borrow site is located in an area of Mesozoic plutonic rock composed primarily of quartz diorite, tonalite, trondhjemite, quartz monzonite.

Exposed materials observed in the existing cut slopes within the project limits consist of moderately soft, brown with iron staining, thinly-bedded metashale and residual soil derived from the metashale.

Slope Stability

Existing cut slopes and embankments along Route 49 within the project limits are observed to be generally performing well at their approximately 1:1.5 (V:H) to 1:1 (V:H) slope inclinations. Some minor erosion was observed on the cut slopes and embankments; however, the slopes appear to be in stable condition. The slopes are moderately to well vegetated with grasses, shrubbery, and trees.

Seismicity

Based on the Caltrans California Seismic Hazard Map, dated 1996, the controlling fault for the site is the Big Bend-Wolf Creek-Maidu-Bear Mountain fault (BWM, normal). This fault possesses a Maximum Credible Earthquake moment magnitude of $M_w = 6.5$, and is

located approximately 2 kilometers west of the site. Based on the referenced map, the peak bedrock acceleration at the site is estimated to be 0.5g. The potential for surface rupture due to fault movement at the site is considered insignificant, as there are no known faults projecting towards or passing through the project site.

Liquefaction is a loss of soil strength and stiffness due to an increase in pore water pressure during cyclic loading, such as occurs during an earthquake. Soils with liquefaction potential include loose cohesionless soils that may become saturated. Based on the subsurface investigation potential at the project location may be considered low due to presence of cohesive soils at the project location.

Geotechnical Exploration

A field exploration consisting of geotechnical drilling was performed from January 7-10, 2008. Personnel from the Office of Geotechnical Design North, along with support staff, performed the work.

Drilling and Sampling

The subsurface exploration portion of this project consisted of drilling five borings to depths between 6.6 and 12.6 meters below the existing ground surface. The borings were drilled with CS500 and CS2000 drill rigs equipped with a 75-mm (3-in.) diameter mud rotary bit. Soil samples were obtained by driving a 36-mm inner diameter SPT Sampler 0.46 meters into the soil with a 63.5 kg hammer falling 0.76 meters. The number of hammer blows required to drive the sampler the last 0.3 meters into the ground was recorded. After the borings were completed, the boreholes were loosely backfilled with the drill cuttings. The boring locations are presented as Attachments 2 through 4. The soil classification system, the boring log legend, and the boring logs are presented as Attachments 5 through 14.

Subsurface Conditions

In general, the near-surface soils indicated in the borings for this investigation consist of medium dense poorly graded sand with gravel to a depth of approximately 1 meter. These soils were underlain by mostly very stiff lean sandy clay to medium dense clayey sand and extended to a depth of approximately 4.5 meters. These soils were underlain by mostly

medium dense to dense well-graded sand to the maximum depth explored. Groundwater was not encountered in the borings.

Geotechnical Recommendations

Based on the field reconnaissance, subsurface investigation, and literature review, the following geotechnical recommendations are provided.

Embankments

The cross sections provided by the Office of Design for the proposed construction show embankments with slope inclinations of 1:2 (V:H) with the exception of "B Line" (County Road) Sta 18+00 to 22+00 where the slope is 1:1.5 (V:H). If the embankments will be constructed using local borrow material, the embankments may be constructed as proposed. According to the *Highway Design Manual*, slope designs steeper than 1:4 (V:H) must be approved by the District Landscape Architect.

At locations where embankments are proposed to be widened or placed against existing hillsides, embankment fill should be placed in accordance with Standard Specification 19-6.01, "Embankment Construction, Placing", to assure adequate embankment performance. Specifically, "When embankment is to be made and compacted on hillsides or where new embankment is to be compacted against existing embankments, the slopes of original hillsides and old or new embankments shall be cut into a minimum of 2 m horizontally as the work is brought up in layers."

Cut Slopes

The cross sections provided by the Office of Design for the proposed construction show cut slopes with slope inclinations of 1:1.5 (V:H). Based upon our site investigations, it is the recommendation of this Office that the cuts slopes may be constructed as proposed with slope inclinations no steeper than 1:1.5 (V:H). Additionally, it is anticipated that the material within the cuts should be rippable by conventional means.

Soundwall 1 (STA 231+20 to STA 234+50)

Soundwall 1 has a height of 3658 mm (12 feet) and sits atop a concrete barrier. The subsurface soil at the location of soundwall 1 consists of medium dense sand and gravel underlain by very stiff sandy clay to clayey sand. The angle of friction ϕ , is estimated to be 30°. A drainage ditch is proposed on the highway side of the wall but is located far enough away to not affect the design of the foundation. CIDH Concrete Piles are recommended for the foundation. According to the 2004 Standard Plans, Masonry Block on Barrier Soundwall, design parameters are as follows:

Design Parameters for Soundwall 1

Maximum Wall Height (mm)	Pile Spacing (mm)	Pile Depth (mm)	Pile Diameter (mm)
3759	3000	2600	400

We note that the concrete barrier may not be used to retain earth under these design parameters.

Soundwall 2 (STA 231+50 to STA 234+20)

Soundwall 2 has a height of 3658 mm (12 feet). The subsurface soil consists of medium dense sand and gravel underlain by very stiff sandy clay to clayey sand. The angle of friction ϕ , is estimated to be 30°. CIDH Concrete Piles are recommended for the foundation. According to the 2004 Standard Plans, Soundwall – Masonry Block on Pile Cap, design parameters are as follows:

Design Parameters for Soundwall 2

Maximum Wall Height (mm)	Pile Spacing (mm)	Pile Depth (mm)	Pile Diameter (mm)
3658	4900	2400	400

Wildlife Crossing

A wildlife crossing is proposed from STA 228+10 to STA 228+40 and will traverse beneath the highway embankment. Based on subsurface investigation, there is sufficient soil bearing capacity at this location to support the crossing.

Construction Considerations

Erosion control should be considered for all disturbed areas within the project limits. The District Landscape Architecture branch should be contacted for erosion control recommendations.

Caving of soil into the drilled holes during our investigation was minimal. During construction of the CIDH piles, caving expected should also be minimal.

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:

A. None

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

A. Geotechnical Design Report for EA 03-2A6901, dated 3/7/2008.

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

Mr. Winder Bajwa
March 7, 2008
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La Barr Meadows

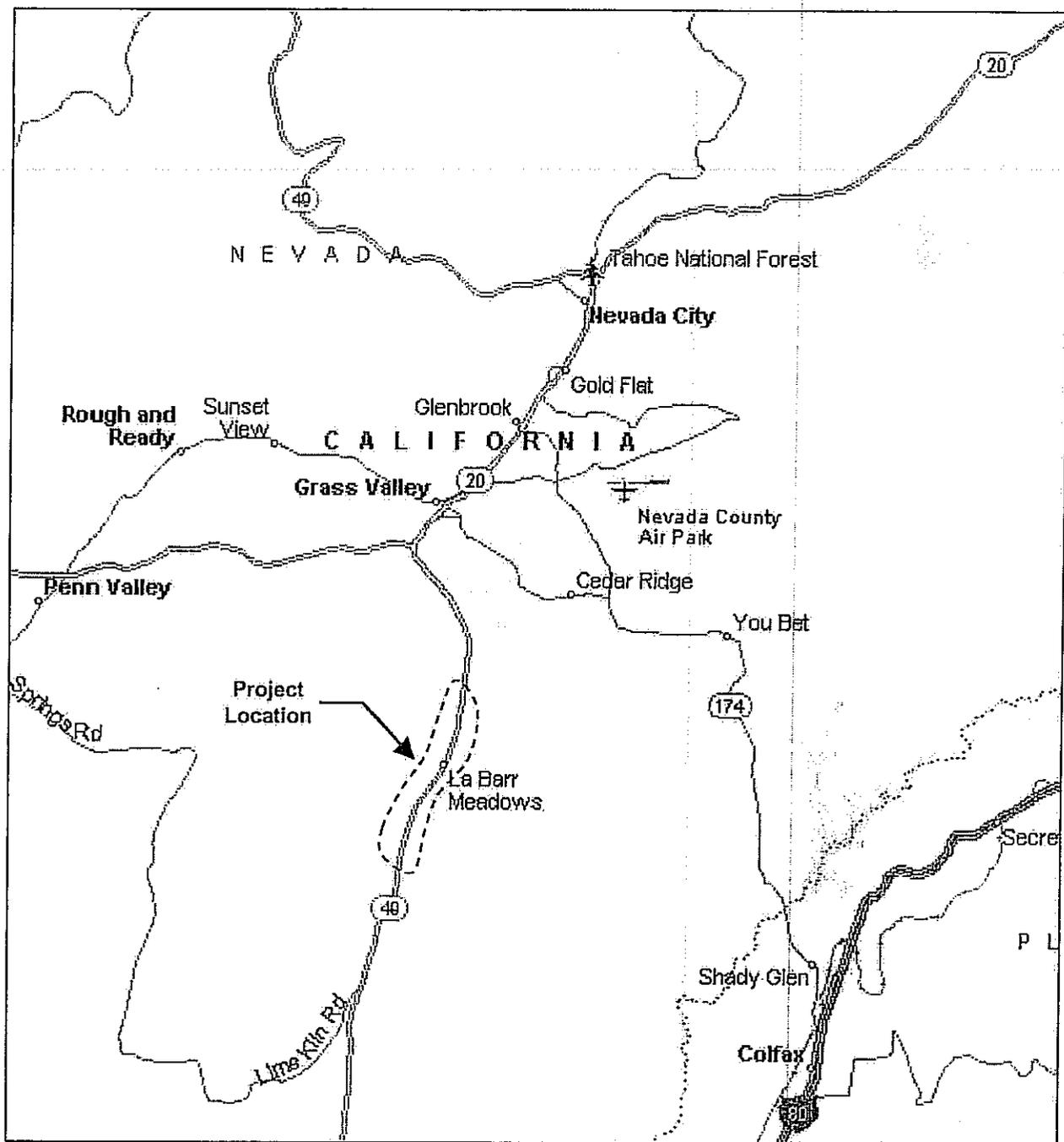
The recommendations contained in this report are based on specific project information. If any conceptual changes are made during final design, the Office of Geotechnical Design-North should review those changes to determine if these recommendations still apply. If you have any questions regarding this report, please contact Benjamin Barnes at 916-227-1039.



BENJAMIN BARNES, P.E.
Transportation Engineer
Office of Geotechnical Design – North



c: Qiang Huang
GDN File
GS File Room



Scale: 1" = 2.5 miles



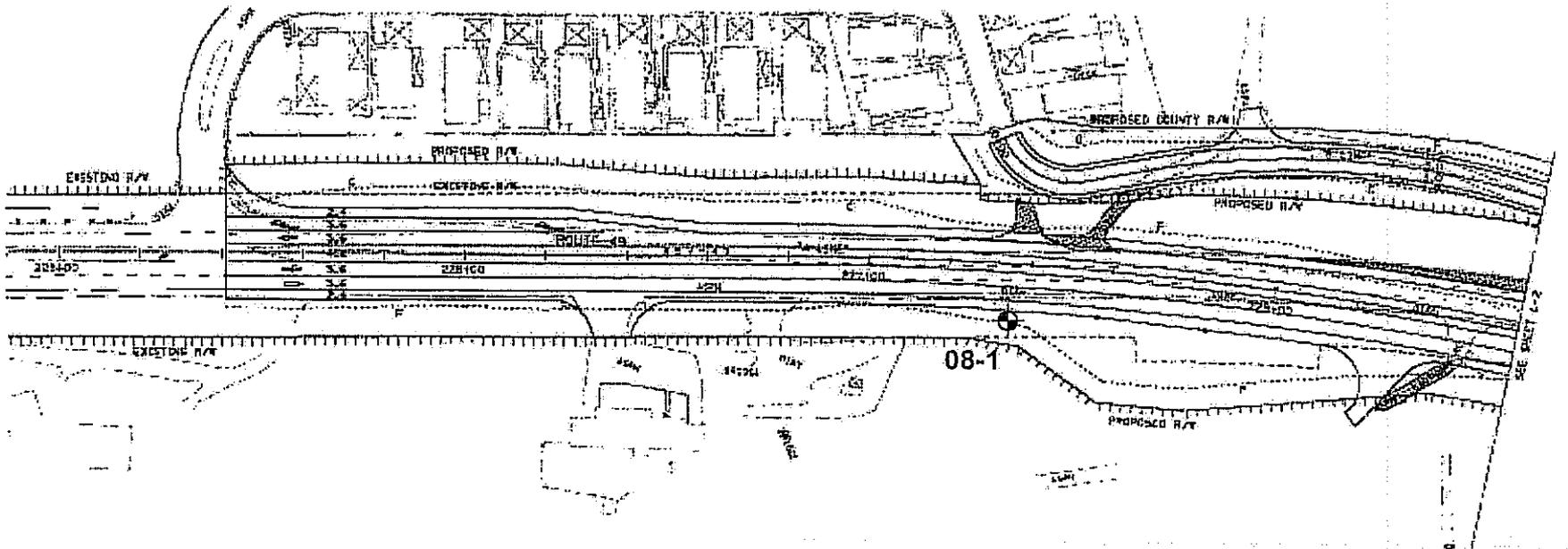
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EA: 03-2A6901
 Date: March 2008

VICINITY MAP

03-NEV-49 KP 15.5/18.0 (PM 9.7/11.2)
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Figure No. 1



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EA: 03-2A6901

Date: March 2008

BORING LOCATION MAP

Figure
 No. 2

03-NEV-49 KP 15.5/18.0 (PM 9.7/11.2)
 GEOTECHNICAL DESIGN REPORT

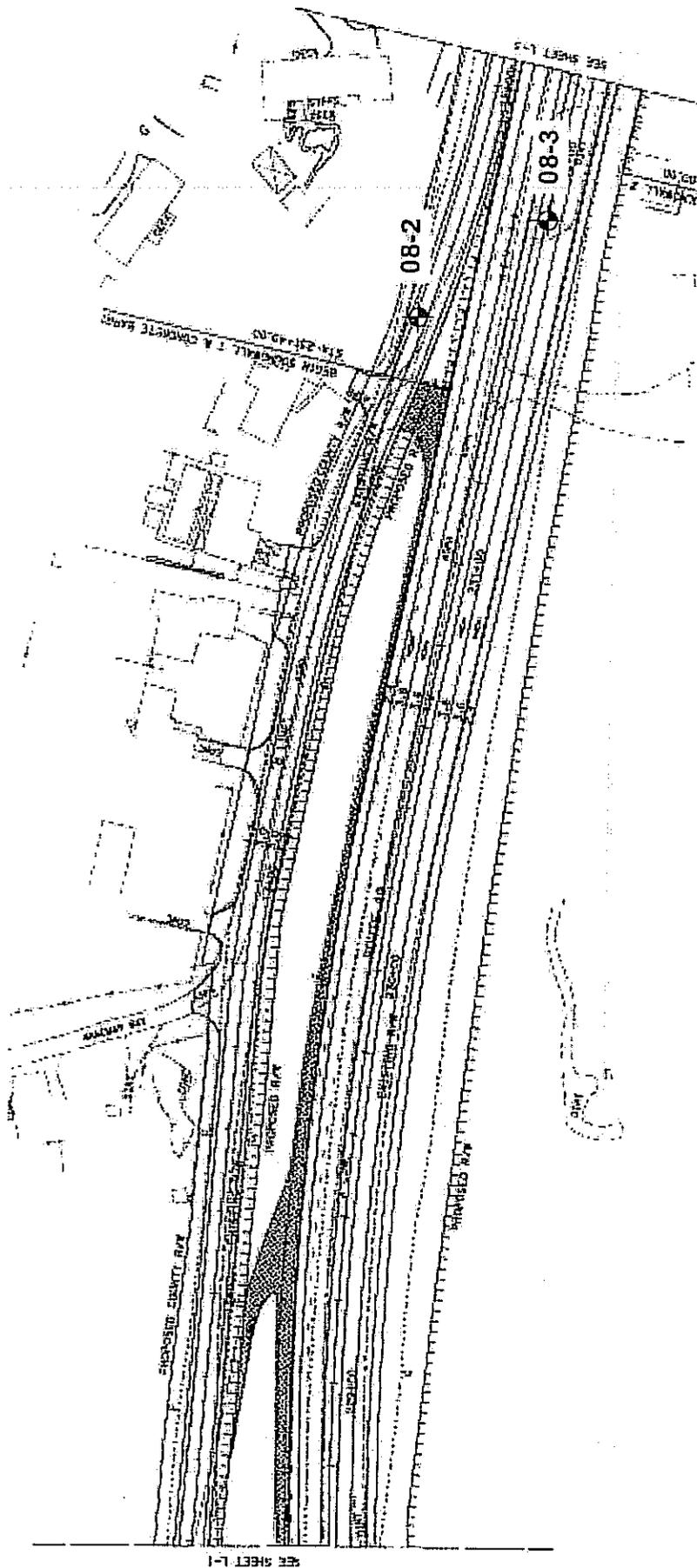


Figure No. 3

BORING LOCATION MAP

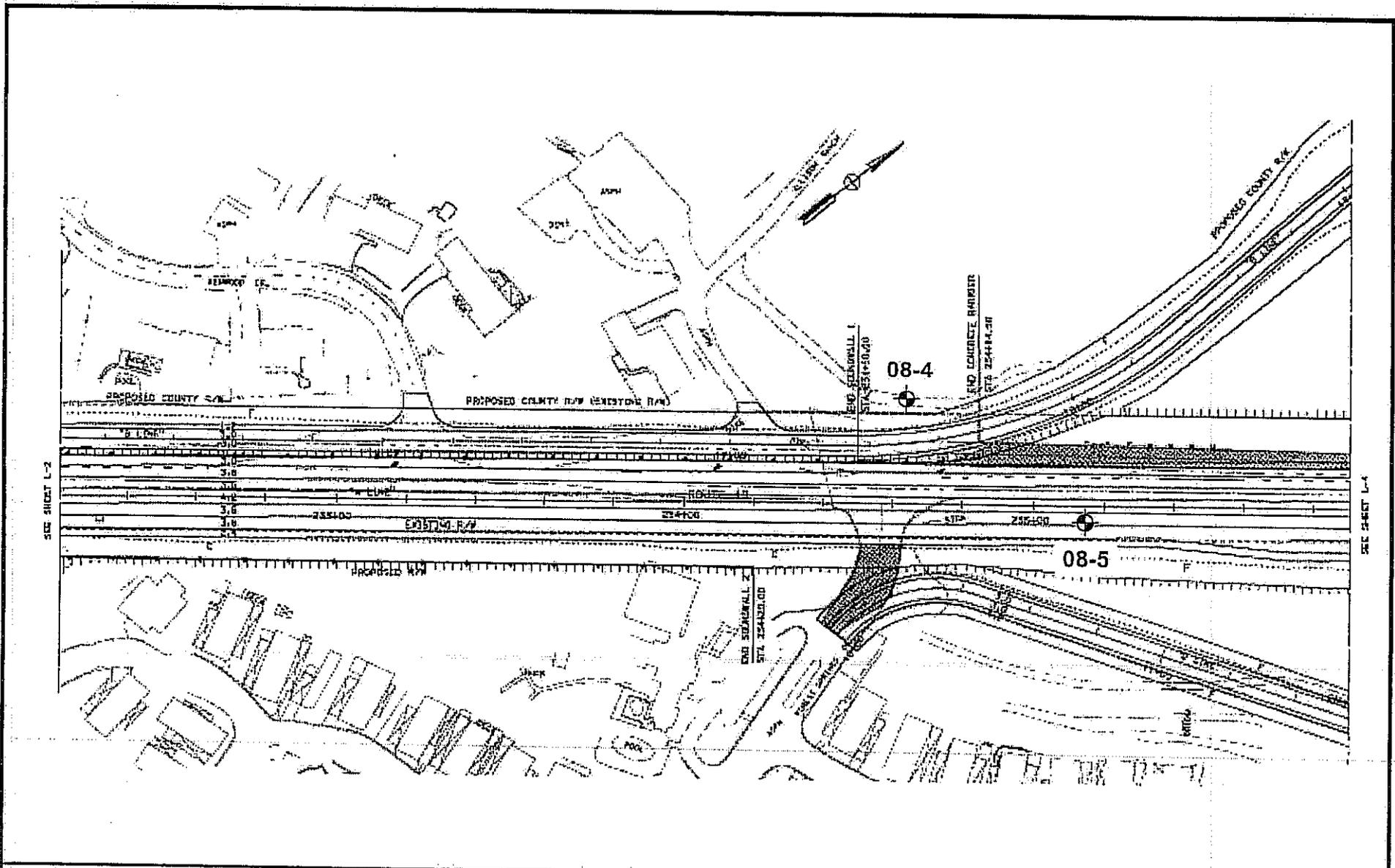
EA: 03-2A6901

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03-NEV-49 KP 15.5/18.0 (PM 9.7/11.2)
 GEOTECHNICAL DESIGN REPORT



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Date: March 2008

BORING LOCATION MAP

Figure
 No. 4

03-NEV-49 KP 15.5/18.0 (PM 9.7/11.2)
 GEOTECHNICAL DESIGN REPORT

CONSISTENCY OF COHESIVE SOILS

Descriptor	Unconfined Compressive Strength (tsf)	Pocket Penetrometer (tsf)	Torvane (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	2.0 - 4.0	1.0 - 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N_{60} - Value (blows / foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Descriptor	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

SOIL PARTICLE SIZE

Descriptor	Size	
Boulder	> 12 inches	
Cobble	3 to 12 inches	
Gravel	Coarse	3/4 inch to 3 inches
	Fine	No. 4 Sieve to 3/4 inch
Sand	Coarse	No. 10 Sieve to No. 4 Sieve
	Medium	No. 40 Sieve to No. 10 Sieve
	Fine	No. 200 Sieve to No. 40 Sieve
Silt and Clay	Passing No. 200 Sieve	

PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CEMENTATION

Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

NOTE This legend sheet provides descriptors and associated criteria for required soil description components only. Refer to Caltrans Soil and Rock Logging, Classification, and Presentation Manual (July 2007), Section 2, for tables of additional soil description components and discussion of soil description and identification.



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 Office of Geotechnical Design - North

REPORT TITLE

BORING RECORD LEGEND

DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA 03-2A6901
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PROJECT OR BRIDGE NAME

La Barr Meadows

BRIDGE NUMBER	PREPARED BY	DATE	SHEET 2 of 2
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GROUP SYMBOLS AND NAMES			
Graphic / Symbol	Group Names	Graphic / Symbol	Group Names
	GW Well-graded GRAVEL		CL Lean CLAY
	GP Poorly graded GRAVEL		CL Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
	GW-GM Well-graded GRAVEL with SILT		CL-ML SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
	GW-GC Well-graded GRAVEL with CLAY (or SILTY CLAY)		ML SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
	GP-GM Poorly graded GRAVEL with SILT		ML SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
	GP-GC Poorly graded GRAVEL with CLAY (or SILTY CLAY)		
	GM SILTY GRAVEL		OL ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
	GC CLAYEY GRAVEL		
	GC-GM SILTY, CLAYEY GRAVEL		OL ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
	SW Well-graded SAND		
	SP Poorly graded SAND		CH Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
	SW-SM Well-graded SAND with SILT		
	SW-SC Well-graded SAND with CLAY (or SILTY CLAY)		MH Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
	SP-SM Poorly graded SAND with SILT		
	SP-SC Poorly graded SAND with CLAY (or SILTY CLAY)		OH ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
	SM SILTY SAND		
	SC CLAYEY SAND		OH ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
	SC-SM SILTY, CLAYEY SAND		
	PT PEAT		OL/OH ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTS	
C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
OC	Organic Content (ASTM D 2974-07)
P	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-05)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96 [2004])

SAMPLER GRAPHIC SYMBOLS	
	Standard Penetration Test (SPT)
	Standard California Sampler
	Modified California Sampler
	Shelby Tube
	NX Rock Core
	Bulk Sample
	Piston Sampler
	HQ Rock Core
	Other (see remarks)

DRILLING METHOD SYMBOLS			
	Auger Drilling		Rotary Drilling
	Dynamic Cone or Hand Driven		Diamond Core

WATER LEVEL SYMBOLS	
	First Water Level Reading (during drilling)
	Static Water Level Reading (short-term)
	Static Water Level Reading (long-term)



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REPORT TITLE				
BORING RECORD LEGEND				
DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA 03-2A6901
PROJECT OR BRIDGE NAME La Barr Meadows				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 2	

LOGGED BY B. Barnes	BEGIN DATE 1-10-08	COMPLETION DATE 1-10-08	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID 08-1
DRILLING CONTRACTOR Caltrans			BOREHOLE LOCATION (Station, Offset, Line) Offset 30R A	SURFACE ELEVATION 2120 ft
DRILLING METHOD Rotary Wash			DRILL RIG CS 500	BOREHOLE DIAMETER 4 in.
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT			SPT HAMMER TYPE Safety	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER DURING DRILLING AFTER DRILLING (DATE) READINGS	TOTAL DEPTH OF BORING 41.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per Foot	Recovery (%)	R.Q.D. (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
2118.00	2		Poorly graded SAND with GRAVEL (SP); medium dense; brown; dry to moist.												
2116.00	4		SANDY lean CLAY (CL); very stiff; yellowish brown; moist; high plasticity fines.												
2114.00	6			1	6	27						PP = 2			
2112.00	8		CLAYEY SAND (SC); medium dense; reddish brown; moist; medium plasticity fines.												
2110.00	10			2	19	36									
2108.00	12				18										
2106.00	14				18										
2104.00	16			3	12	26									
2102.00	18				11										
2100.00	20				15										
2098.00	22		SILTY SAND (SM); dense; yellowish brown; moist; low plasticity fines.												
2096.00	24			4	10	28									
	21				10										
	22				18										

(continued)

CALTRANS BORING RECORD 052007 LA BARR MEADOWS BORING LOGS.GPJ CT SACTO 053107.GDT 2/29/08

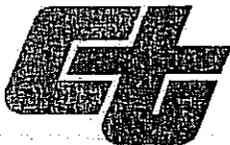


Department of Transportation
 Division of Engineering Services
 Geotechnical Services
 Office of Geotechnical Design - North

REPORT TITLE BORING RECORD				HOLE ID 08-1	
DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA 03-2A6901	
PROJECT OR BRIDGE NAME La Barr Meadows					
BRIDGE NUMBER	PREPARED BY B. Barnes	DATE	SHEET 1 of 2		

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per Foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks	
	25		SILTY SAND (SM) (continued).		5	11 17 25	42									
2094.00	26															
	27															
2092.00	28															
	29															
2090.00	30					6	8 13 20	33								
	31															
2088.00	32															
	33															
2086.00	34															
	35															
2084.00	36					7	9 13 19	32								
	37															
2082.00	38															
	39															
2080.00	40					8	7 10 12	22								
	41															
2078.00	42		Bottom of Borehole at 41.5 ft.													
	43															
2076.00	44															
	45															
2074.00	46															
	47															
2072.00	48															
	49															
2070.00	50															
	51															
2068.00	52															
	53															
2066.00	54															
	55															

CALTRANS BORING RECORD 052007 LA BARR MEADOWS BORING LOGS.GPJ CT SACTO 053107.GDT 2/28/08



Department of Transportation
 Division of Engineering Services
 Geotechnical Services
 Office of Geotechnical Design - North

REPORT TITLE
BORING RECORD

DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0
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HOLE ID 08-1
EA 03-2A6901

PROJECT OR BRIDGE NAME
La Barr Meadows

BRIDGE NUMBER	PREPARED BY B. Barnes
---------------	--------------------------

DATE

SHEET 2 of 2

LOGGED BY B. Barnes	BEGIN DATE 1-9-08	COMPLETION DATE 1-9-08	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID 08-2
DRILLING CONTRACTOR Caltrans			BOREHOLE LOCATION (Station, Offset, Line) Offset 30R A	SURFACE ELEVATION 2170 ft
DRILLING METHOD Rotary Wash			DRILL RIG CS 500	BOREHOLE DIAMETER 4 in.
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT			SPT HAMMER TYPE Safety	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER DURING DRILLING AFTER DRILLING (DATE) READINGS	TOTAL DEPTH OF BORING 21.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per Foot	Recovery (%)	FCR (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (lbf)	Drilling Method	Casing Depth	Remarks
0	0		Poorly graded SAND with GRAVEL (SP); medium dense; reddish brown; moist.												
2168.00	2		SANDY lean CLAY (CL); very stiff; yellowish brown; moist; high plasticity fines.												
2166.00	4														
2164.00	6			1	26	34						PP = 2.5			
2162.00	8														
2160.00	10			2	8	21						PP = 1			
2158.00	12		CLAYEY SAND (SC); dense; dark brown; moist; medium plasticity fines.												
2156.00	14														
2154.00	16			3	14	32									
2152.00	18														
2150.00	20			4	14	40									
2148.00	22		Bottom of Borehole at 21.5 ft.												
2146.00	24														
	25														

CALTRANS BORING RECORD 062007, LA BARR MEADOWS BORING LOGS.GPJ, CT SACTO 053107.GDT 2/28/08



Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE BORING RECORD				HOLE ID 08-2	
DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA .03-2A6901	
PROJECT OR BRIDGE NAME La Barr Meadows					
BRIDGE NUMBER		PREPARED BY B. Barnes		DATE	SHEET 1 of 1

LOGGED BY B. Barnes	BEGIN DATE 1-9-08	COMPLETION DATE 1-9-08	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID 08-3
DRILLING CONTRACTOR Caltrans			BOREHOLE LOCATION (Station, Offset, Line) Offset 50R A	SURFACE ELEVATION 2180 ft
DRILLING METHOD Rotary Wash			DRILL RIG CS 500	BOREHOLE DIAMETER 4 in.
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT			SPT HAMMER TYPE Safety	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER DURING DRILLING AFTER DRILLING (DATE) READINGS	TOTAL DEPTH OF BORING 31.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per Foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
2178.00	1		Poorly graded SAND with GRAVEL (SP); medium dense; brown; dry to moist.												
2176.00	3		SANDY lean CLAY (CL); very stiff; yellowish brown; moist; medium to high plasticity fines.												
2174.00	5			1	9	21						PP = 4			
2172.00	6				10										
2170.00	7				11										
2168.00	10			2	6	16						PP = 1.5			
2166.00	11				7										
2164.00	12				8										
2162.00	15		Well-graded SAND (SW); medium dense; brown; moist.	3	4	13									
2160.00	16				5										
2158.00	17				6										
2156.00	18				7										
	20			4	3	11									
	21				4										
	22				7										
	23														
	24		Well-graded SAND (SW); dense; brown; moist.												
	25														

(continued)



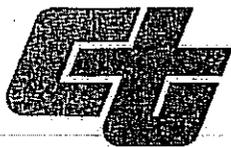
Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE BORING RECORD				HOLE ID 08-3	
DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA 03-2A6901	
PROJECT OR BRIDGE NAME La Barr Meadows					
BRIDGE NUMBER		PREPARED BY B. Barnes		DATE	SHEET 1 of 2

CALTRANS BORING RECORD 052007 LA BARR MEADOWS BORING LOGS.GPJ CT.SACTO.053107.GDT 2/23/08

CALTRANS BORING RECORD 052007 LA BARR MEADOWS BORING LOGS.GPJ CT SACTO 053107.GDT 2/29/08

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per Foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Well-graded SAND (SW) (continued).		20	48									
2154.00	26				22										
	27					26									
2152.00	28														
	29														
2150.00	30														
	31			6	10	53									
	31				35										
	31				18										
2148.00	32		Bottom of Borehole at 31.5 ft.												
	33														
2146.00	34														
	35														
2144.00	36														
	37														
2142.00	38														
	39														
2140.00	40														
	41														
2138.00	42														
	43														
2136.00	44														
	45														
2134.00	46														
	47														
2132.00	48														
	49														
2130.00	50														
	51														
2128.00	52														
	53														
2126.00	54														
	55														



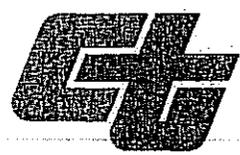
Department of Transportation
 Division of Engineering Services
 Geotechnical Services
 Office of Geotechnical Design - North

REPORT TITLE BORING RECORD				HOLE ID 08-3	
DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA 03-2A6901	
PROJECT OR BRIDGE NAME La Barr Meadows					
BRIDGE NUMBER	PREPARED BY B. Barnes	DATE	SHEET 2 of 2		

LOGGED BY B. Barnes	BEGIN DATE 1-9-08	COMPLETION DATE 1-9-08	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID 08-4
DRILLING CONTRACTOR Caltrans			BOREHOLE LOCATION (Station, Offset, Line) Offset 60R A	SURFACE ELEVATION 2260 ft
DRILLING METHOD Rotary Wash			DRILL RIG CS 500	BOREHOLE DIAMETER 4 in.
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT			SPT HAMMER TYPE Safety	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER DURING DRILLING AFTER DRILLING (DATE) READINGS	TOTAL DEPTH OF BORING 21.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location Sample Number	Blows per 6 in.	Blows per Foot	Recovery (%)	ROD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		Poorly graded GRAVEL with SAND (SP); medium dense; brown; dry to moist.											
2258.00	2		SANDY lean CLAY (CL); very stiff; yellowish brown; moist; medium to high plasticity fines.											
2256.00	4													
2254.00	6			1	9 10 16	26								
2252.00	8		CLAYEY SAND (SC); loose; brown; moist; no to low plasticity fines.											
2250.00	10			2	3 3 3	6								
2248.00	12													
2246.00	14		Well-graded SAND (SW); medium dense; brown; moist.											
2244.00	16			3	11 12 15	27								
2242.00	18													
2240.00	20			4	9 10 19	29								
2238.00	22		Bottom of Borehole at 21.5 ft.											
	23													
2236.00	24													
	25													

CALTRANS BORING RECORD 052007 LA BARR MEADOWS BORING LOGS.GPJ CT SACTO:053107.GDT 2/26/08



Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE BORING RECORD				HOLE ID 08-4
DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA 03-2A6901
PROJECT OR BRIDGE NAME La Barr Meadows				
BRIDGE NUMBER	PREPARED BY B. Barnes	DATE	SHEET 1 of 1	

LOGGED BY B. Barnes	BEGIN DATE 1-8-08	COMPLETION DATE 1-8-08	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID 08-5
DRILLING CONTRACTOR Caltrans			BOREHOLE LOCATION (Station, Offset, Line) Offset 30R A	SURFACE ELEVATION 2250 ft
DRILLING METHOD Rotary Wash			DRILL RIG CS 2000 (track)	BOREHOLE DIAMETER 4 in.
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT			SPT HAMMER TYPE Automatic	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER DURING DRILLING AFTER DRILLING (DATE) READINGS	TOTAL DEPTH OF BORING 41.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 In.	Blows per Foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
2248.00	1		Poorly graded SAND with GRAVEL (SP); medium dense; brown; dry to moist.												
2246.00	3		SANDY lean CLAY (CL); very stiff; yellowish brown; moist; medium to high plasticity fines.												
2244.00	5				1	7	18								
2242.00	6					8									
2240.00	10				2	4	6								
2238.00	11					3									
2236.00	14		Well-graded SAND (SW); dense; brownish yellow; moist.												
2234.00	15														
2232.00	18														
2230.00	20				3	6	8								
2228.00	21					5									
2226.00	24					3									

(continued)

CALTRANS BORING RECORD 052007 LA BARR MEADOWS BORING LOGS.GPJ CT SACTO 053107.GDT 2/29/08



Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE BORING RECORD				HOLE ID 08-5	
DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA 03-2A6901	
PROJECT OR BRIDGE NAME La Barr Meadows					
BRIDGE NUMBER	PREPARED BY B. Barnes	DATE	SHEET 1 of 2		

CALTRANS BORING RECORD 052007 LA BARR MEADOWS BORING LOGS.GPJ - CT SACTO 053107.GDT 2/29/08

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per Foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks		
2224.00	25	[Material Graphics: Well-graded SAND (SW)]	Well-graded SAND (SW) (continued).														
2222.00	26																
2220.00	27																
2218.00	28																
2216.00	29																
2214.00	30																
2212.00	31																
2210.00	32																
2208.00	33																
2206.00	34																
2204.00	35																
2202.00	36																
2200.00	37																
2198.00	38																
2196.00	39																
	40																
	41																
2208.00	42		Bottom of Borehole at 41.5 ft.														
	43																
	44																
	45																
	46																
	47																
	48																
	49																
	50																
	51																
	52																
	53																
	54																
	55																



Department of Transportation
 Division of Engineering Services
 Geotechnical Services
 Office of Geotechnical Design - North

REPORT TITLE BORING RECORD				HOLE ID 08-5	
DIST. 03	COUNTY Nevada	ROUTE 49	POSTMILE R15.5/R18.0	EA 03-2A6901	
PROJECT OR BRIDGE NAME La Barr Meadows					
BRIDGE NUMBER	PREPARED BY B. Barnes		DATE	SHEET 2 of 2	

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. WINDER BAJWA
Project Manager
North Region - District 3

Date: April 18, 2008

Attention: Mr. Arshad Iqbal
Project Engineer
Design Branch S16



File: 03-NEV-49-15.5/18.0
(PM 9.7/11.2)
EA: 03-2A6901
La Barr Meadows

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES - MS 5

Subject: Addendum to Geotechnical Design Report

Introduction

This memorandum serves to provide an Addendum to the Geotechnical Design Report (GDR) dated March 7, 2008 for State Route 49 from KP 15.5 to 18.0 (PM 9.7 to 11.2) in Nevada County, California. The purpose of this addendum is to provide foundation recommendations for an additional soundwall (Soundwall 3) proposed along the west side of Highway 49 from STA 238+80 to STA 241+65 (A Line). All other recommendations presented in the original GDR remain applicable.

Soundwall 3 (STA 238+80 to STA 241+65)

Soundwall 3 has a height of 3759 mm (12 feet) and sits atop a concrete barrier. The subsurface soil at the location of soundwall 3 consists of medium dense sand and gravel underlain by very stiff sandy clay to clayey sand. The angle of friction ϕ , is estimated to be 30° . CIDH Concrete Piles are recommended for the foundation. According to the 2004 Standard Plans, Masonry Block on Barrier Soundwall, design parameters are as follows:

Design Parameters for Soundwall 3

Maximum Wall Height (mm)	Pile Spacing (mm)	Pile Depth (mm)	Pile Diameter (mm)
3759	3000	2600	400

We note that the concrete barrier may not be used to retain earth under these design parameters.

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:

A. None

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

A. Addendum to Geotechnical Design Report for EA 03-2A6901, dated 4/18/2008.

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

The recommendations contained in this report are based on specific project information. If any conceptual changes are made during final design, the Office of Geotechnical Design-North should review those changes to determine if these recommendations still apply. If you have any questions regarding this report, please contact Ben Barnes at 916-227-1039.



BENJAMIN BARNES, P.E.
Transportation Engineer
Office of Geotechnical Design - North



c: Qiang Huang
GDN File