Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 11/02/2011
Date Submitted 10/27/2011

To: Prav Dayah
Parikh Consultants, Inc.
2360 Qume Dr, Ste.A
San Jose, CA 95131

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2011-107-PDN/PANOCHE Site ID : BH1#1 @ 2'.
Thank you for your business.

* For future reference to this analysis please use SUN # 61256-125862.

EVALUATION FOR SOIL CORROSION

Soil pH	7.44	
Minimum Resistivity	4.56 ohm-cm (x1000)	
Chloride	9.3 ppm	00.00093 %
Sulfate	2.4 ppm	00.00024 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE: B-3

COOPER TESTING LABORATORY

Unconfined Compressive Strength and Young's Modulus of Rock Core (ASTM D7012D)

CTL Job No.:	157-296A	Boring:	BH-1	Date:	11/16/2011
Client:	Parikh Consultants	Sample:	UC-1 Core 1	By:	PJ
Project Name:	Panoche Creek Bridge	Depth,ft.:	13	Checked:	DC
Project No.:	2011-107-FDN				

Visual Description: Bluish Gray Rock

Moisture Condition at Test: Sample was washed and in a moist state.

Test Temperature, (°C): Ambient

Remarks: A corner of the sample was missing and required capping. Therefore, the measured density is approximate. Sample failed along pre-existing fractures.

Sample Height, in.	5.00	**Unconfined Compressive Strength, psi**	**4304**
Sample Diameter, in.	2.39		
Height / Diameter	2.1		
Sample Area, in^2	4.49		
Wet Density, pcf	186.2	**Young's Modulus (E) (psi)**	**1,095,000**
Dry Density, pcf	185.6		
Moisture Content, %	0.3		
Strain Rate, % / min	0.05		

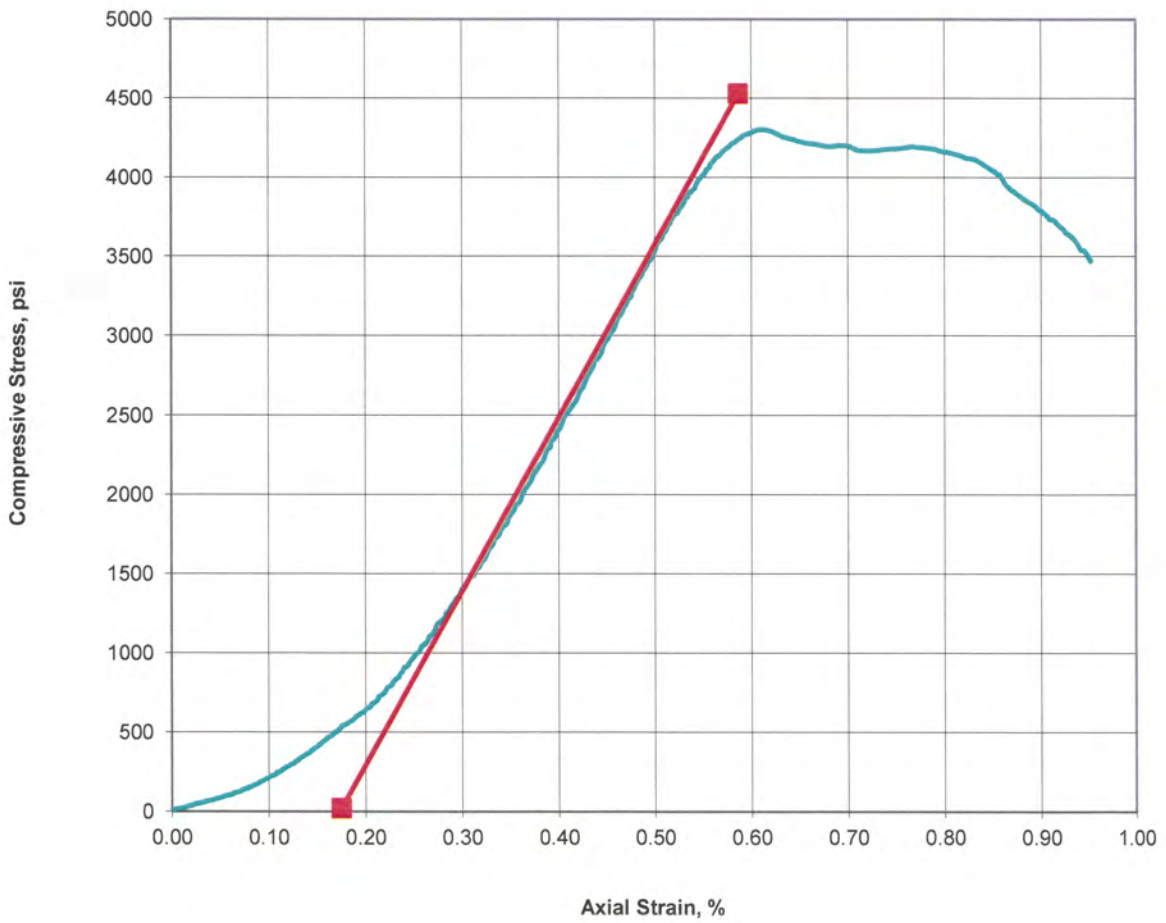


PLATE: B-4A

COOPER TESTING LABORATORY

Unconfined Compressive Strength and Young's Modulus of Rock Core (ASTM D7012D)

CTL Job No.:	157-296B	Boring:	BH-1	Date:	11/16/2011
Client:	Parikh Consultants	Sample:	UC-2 Core 2	By:	PJ
Project Name:	Panoche Creek Bridge	Depth,ft.:	17	Checked:	DC
Project No.:	2011-107-FDN				

Visual Description: Bluish Gray Rock

Moisture Condition at Test: Sample was washed and in a moist state.

Test Temperature, (°C): Ambient

Remarks: Sample failed along a pre-existing fracture.

Sample Height, in.	5.02	**Unconfined Compressive Strength, psi**	**8988**
Sample Diameter, in.	2.39		
Height / Diameter	2.1		
Sample Area, in^2	4.49		
Wet Density, pcf	191.7	**Young's Modulus (E) (psi)**	**3,770,000**
Dry Density, pcf	191.4		
Moisture Content, %	0.2		
Strain Rate, % / min	0.05		

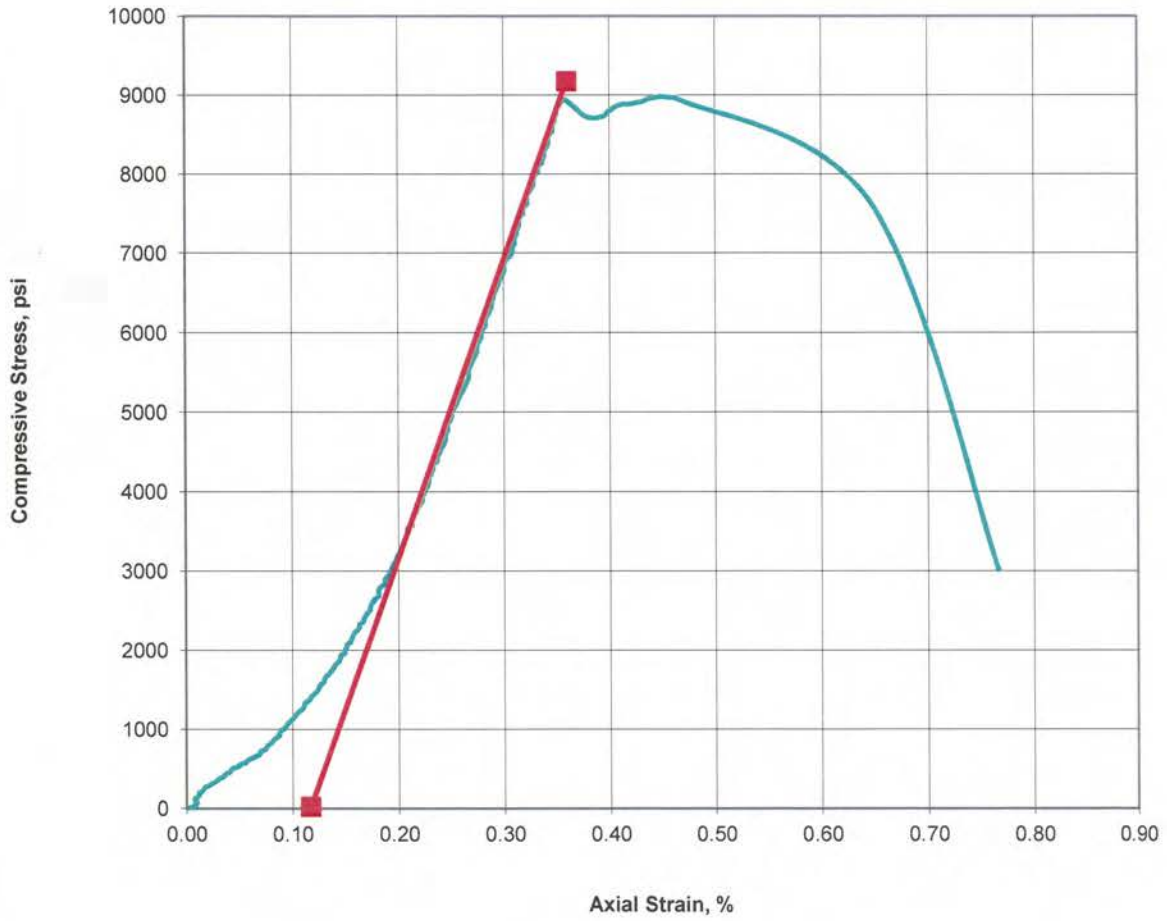


PLATE: B-4B

COOPER TESTING LABORATORY

Unconfined Compressive Strength and Young's Modulus of Rock Core (ASTM D7012D)

CTL Job No.:	157-296C	Boring:	BH-2	Date:	11/16/2011
Client:	Parikh Consultants	Sample:	UC-3 Core 3	By:	PJ
Project Name:	Panoche Creek Bridge	Depth,ft.:	11	Checked:	DC
Project No.:	2011-107-FDN				

Visual Description: Greenish Black Rock

Moisture Condition at Test: Sample was washed and in a moist state.

Test Temperature, (°C): Ambient

Remarks: Minor spalling occurred at ends of sample during trimming. Therefore, the measured density is approximate.

Sample Height, in.	5.01	**Unconfined Compressive Strength, psi**	**1173**
Sample Diameter, in.	2.47		
Height / Diameter	2.0		
Sample Area, in^2	4.80		
Wet Density, pcf	165.7	**Young's Modulus (E) (psi)**	**588,500**
Dry Density, pcf	164.2		
Moisture Content, %	0.9		
Strain Rate, % / min	0.05		

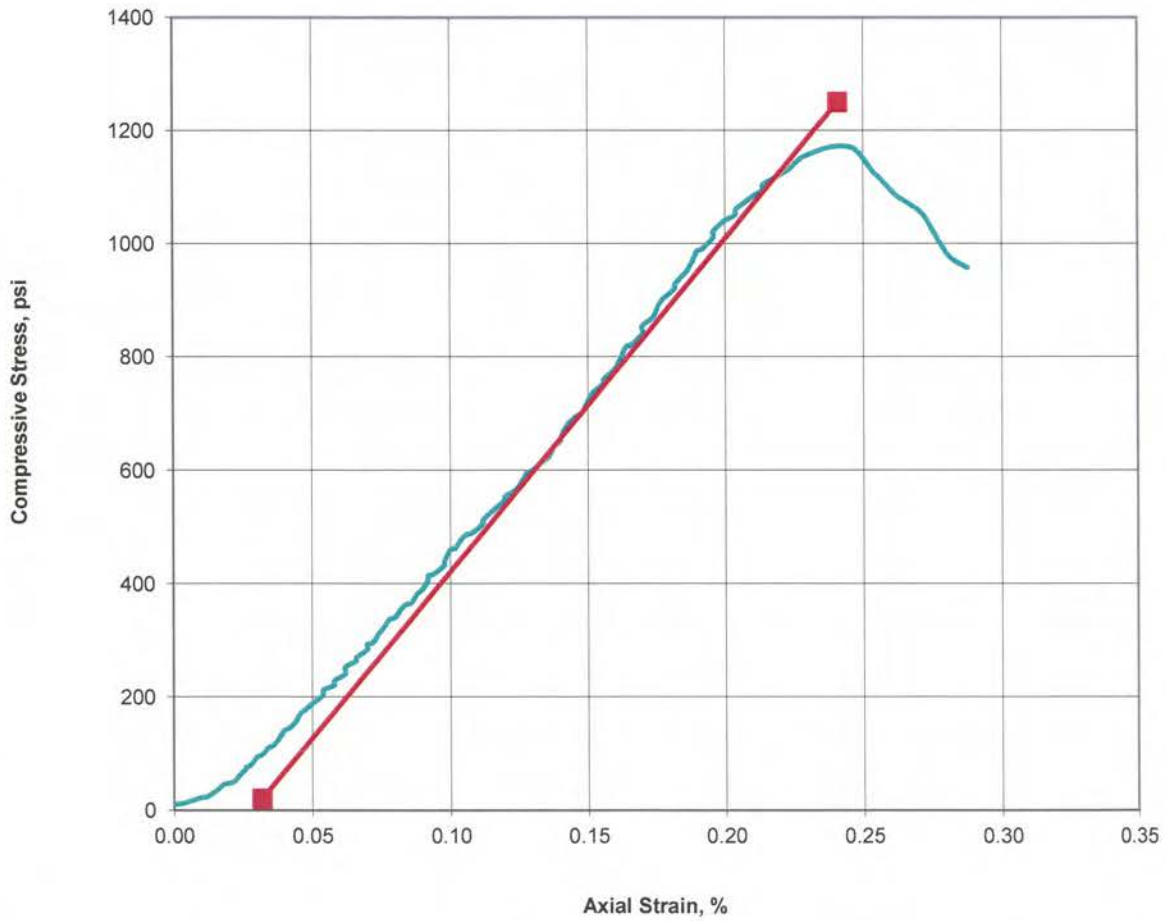


PLATE: B-4C

COOPER TESTING LABORATORY

Unconfined Compressive Strength and Young's Modulus of Rock Core (ASTM D7012D)

CTL Job No.:	157-296D	Boring:	BH-2	Date:	11/16/2011
Client:	Parikh Consultants	Sample:	UC-4 Core 4	By:	PJ
Project Name:	Panoche Creek Bridge	Depth,ft.:	19	Checked:	DC
Project No.:	2011-107-FDN				

Visual Description: Grayish Olive Green Rock

Moisture Condition at Test: Sample was washed and in a moist state.

Test Temperature, (°C): Ambient

Remarks: Minor spalling occurred at ends of sample during trimming. Therefore, the measured density is approximate.

Sample Height, in.	5.03	**Unconfined Compressive Strength, psi**	**3358**
Sample Diameter, in.	2.48		
Height / Diameter	2.0		
Sample Area, in^2	4.82		
Wet Density, pcf	168.3	**Young's Modulus (E) (psi)**	**1,275,000**
Dry Density, pcf	165.5		
Moisture Content, %	1.7		
Strain Rate, % / min	0.05		

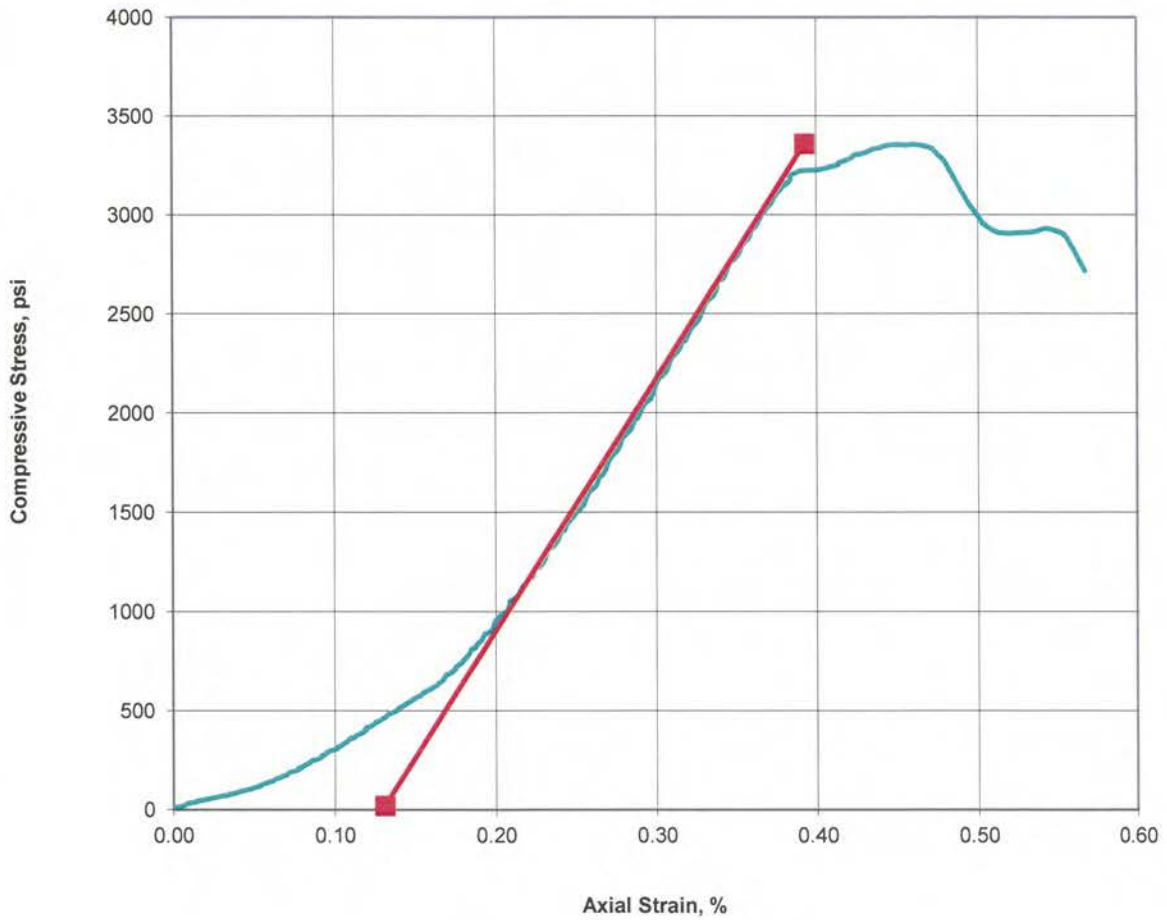
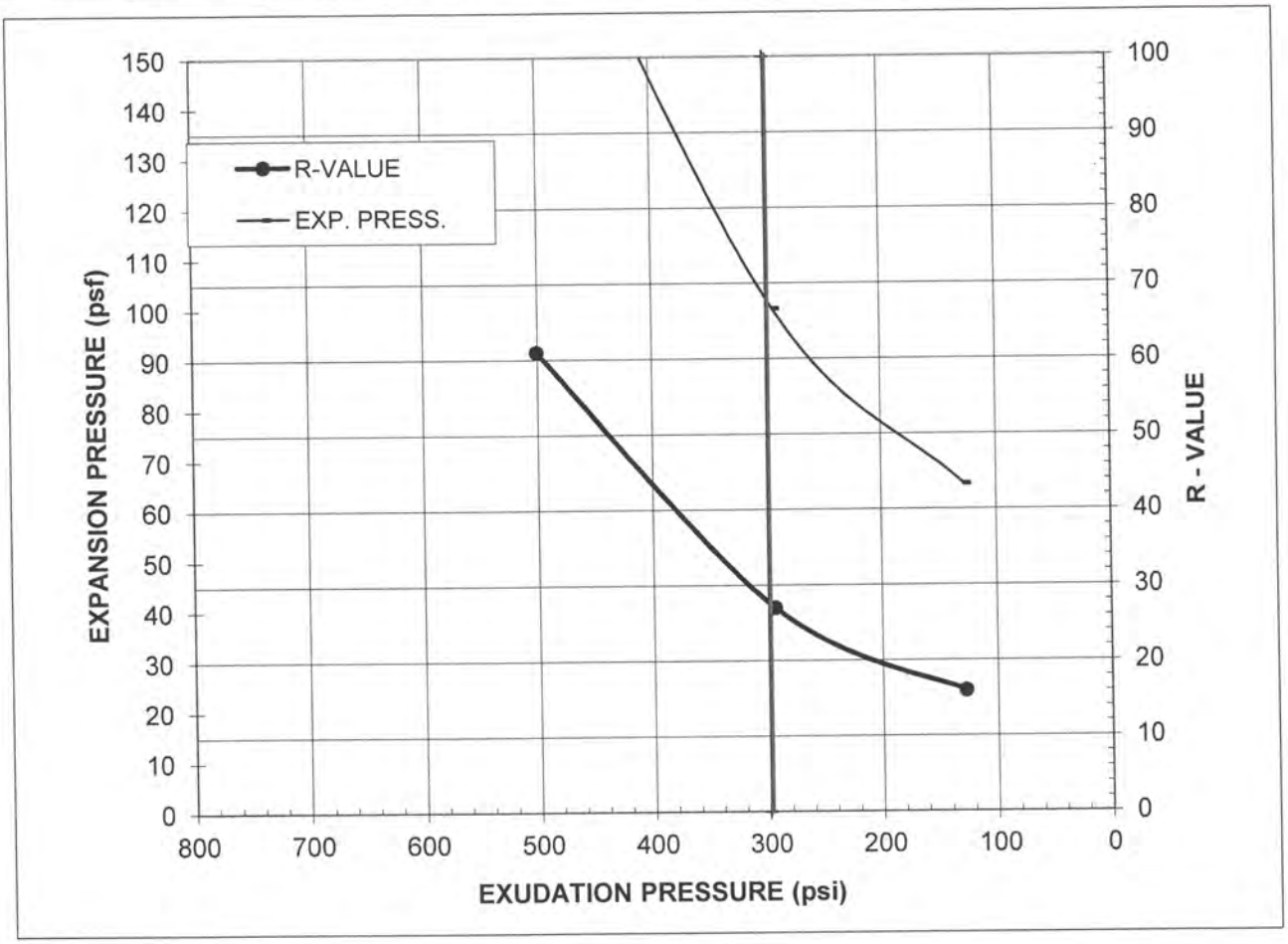


PLATE: B-4D

R-VALUE REPORT

Parikh Consultants, Inc. | ASTM D2844 or CTM 301 | (408) 452-9000

Project Name:	Panoche Road Bridge Project			Date:	10/11/11
Client:	Quincy Engineering Inc.			Project #:	2011-107-FDN
Sample #:	BH2 / R2	Depth:	0'-5'	Lab #:	M832
Location / Source:	On-Site / Native			Sample Date:	
Material :	Lean Clay with Gravel, brown			Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	128	294	501
Expansion Pressure, psf	65	100	195
R-Value	16	27	61
Moisture Content at Test, %	10.6	9.7	8.8
Dry Density at Test, pcf	127.5	131.0	132.9

R-Value @ 300 psi Exudation Pressure = 27

Expansion Pressure @300 psi Exudation, psf = **100**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

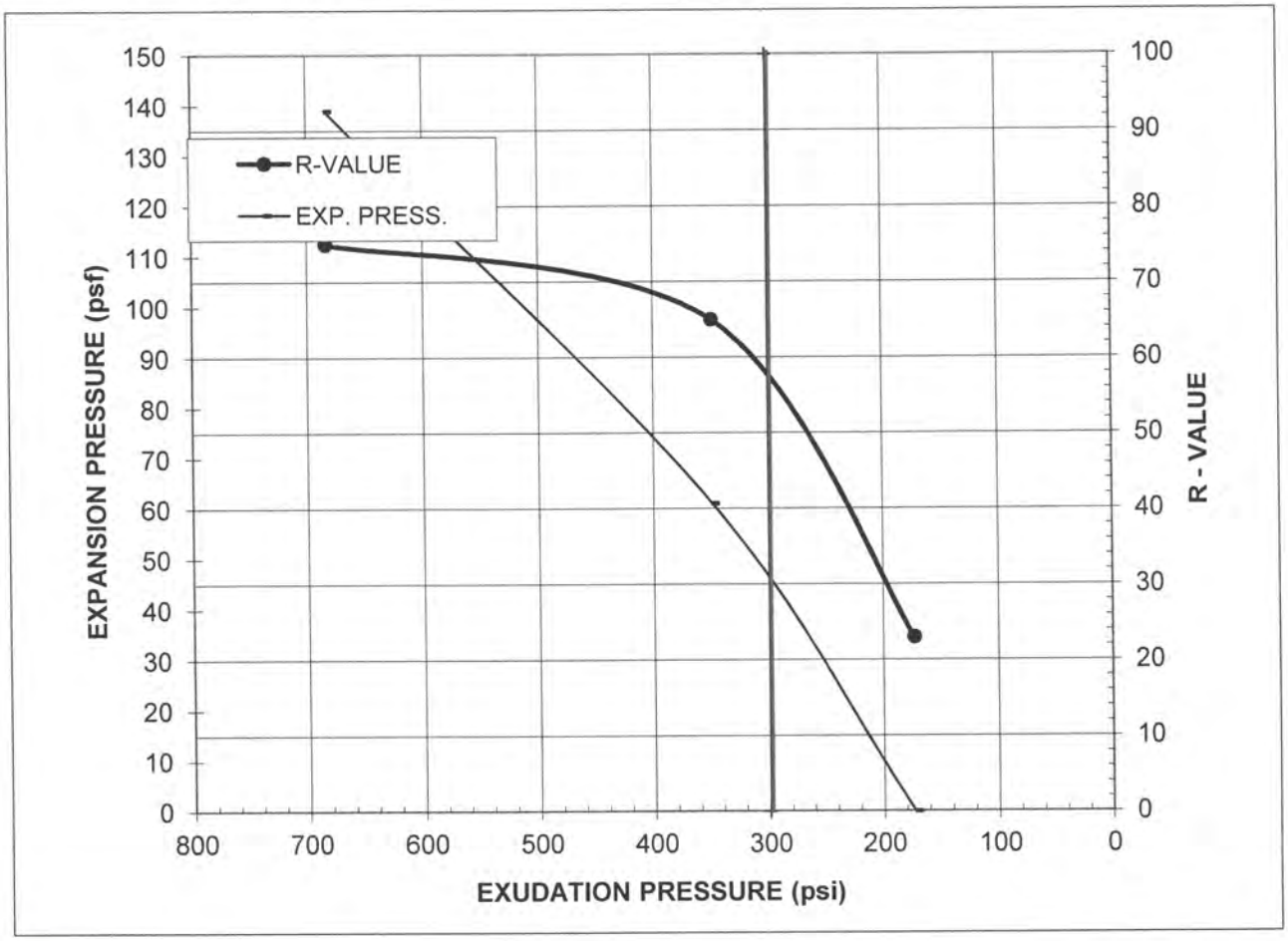
PLATE: B-5A

RVALUE with calcs pdp

R-VALUE REPORT

Parikh Consultants, Inc. | ASTM D2844 or CTM 301 | (408) 452-9000

Project Name:	Panoche Road Bridge Project			Date:	10/11/11
Client:	Quincy Engineering Inc.			Project #:	2011-107-FDN
Sample #:	BH1 / R1	Depth:	0'-5'	Lab #:	M832
Location / Source:		On-Site / Native		Sample Date:	
Material :	Lean Clay with Gravel, gray			Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	173	349	684
Expansion Pressure, psf	0	61	139
R-Value	23	65	75
Moisture Content at Test, %	8.1	7.2	6.6
Dry Density at Test, pcf	132.7	134.8	135.2

R-Value @ 300 psi Exudation Pressure = 57

Expansion Pressure @300 psi Exudation, psf = **45**

Minimum R-Value Requirement:

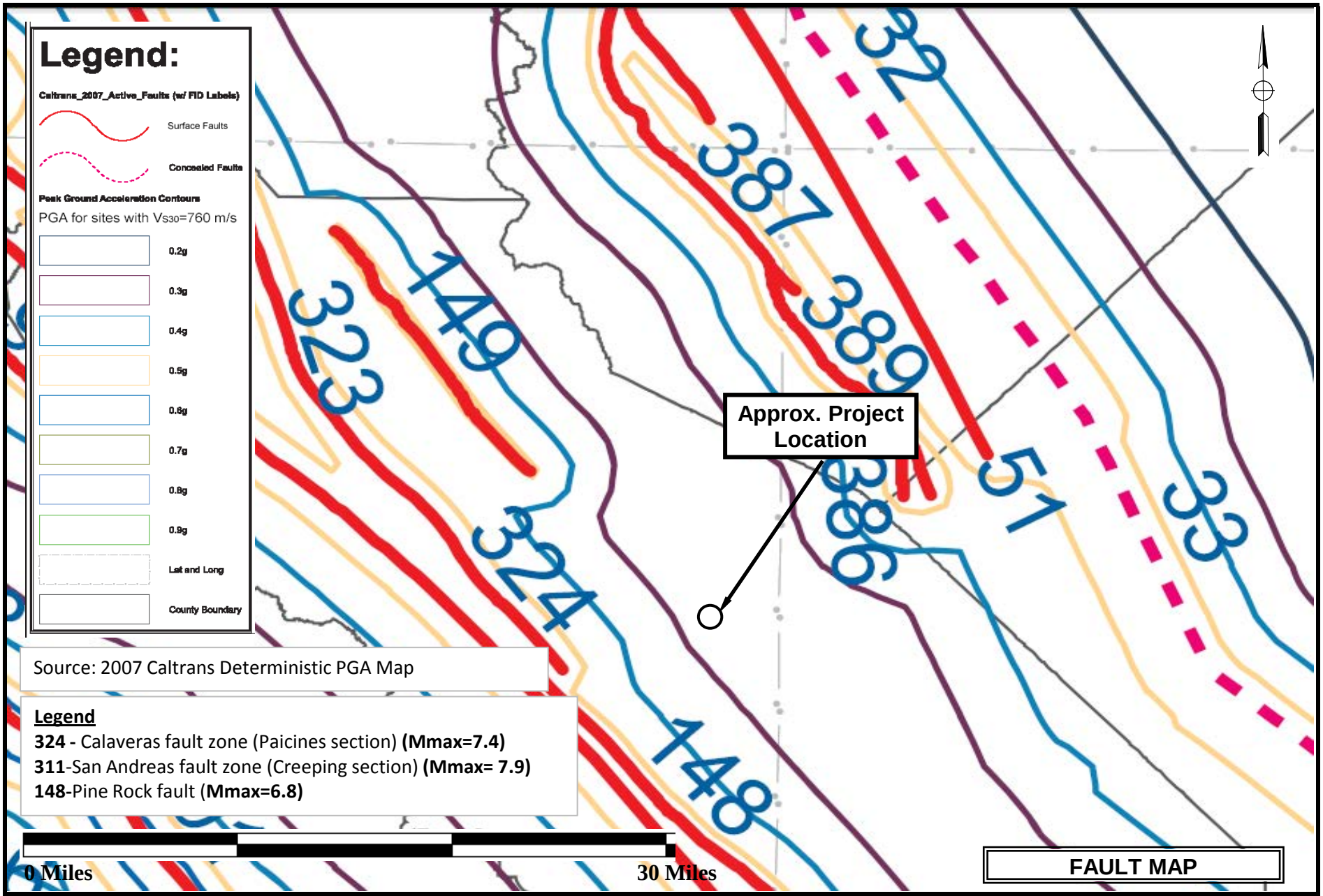
Comments:

Report By: Prav Dayah

PLATE: B-5B

RVALUE with calcs pdp

APPENDIX IV



PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

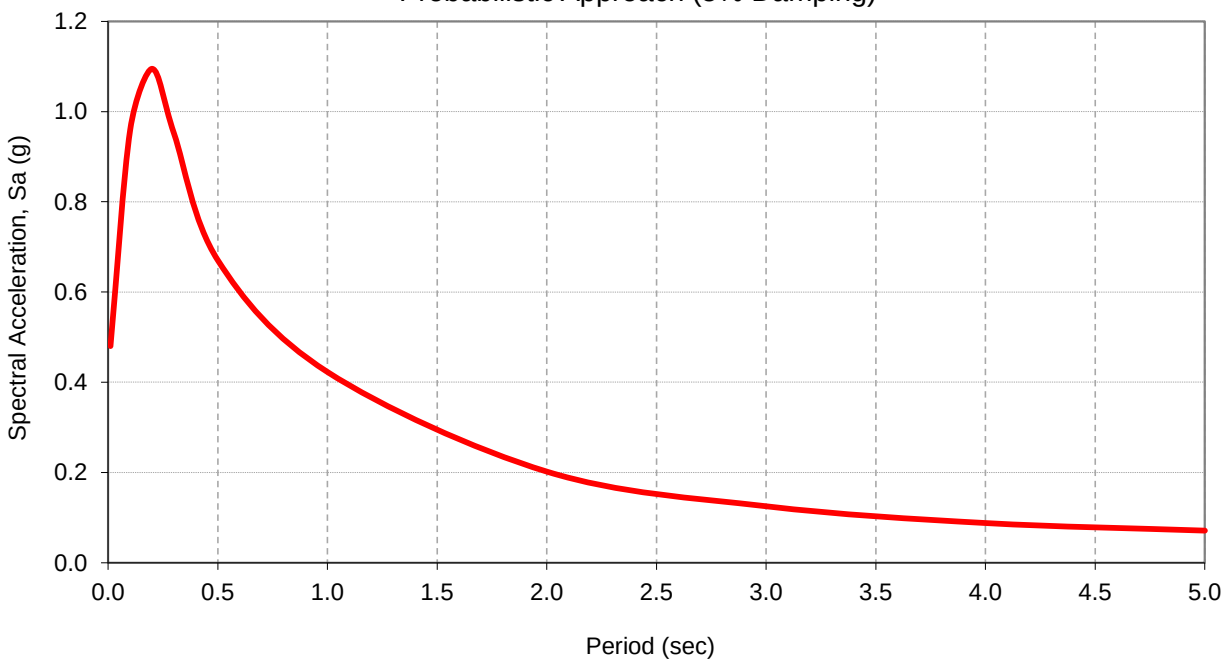
PANOCHE ROAD BRIDGE
SAN BENITO COUNTY, CALIFORNIA

JOB NO.: 2011-107-FDN

PLATE NO.: IV-1

RECOMMENDED ARS CURVE

Probabilistic Approach (5% Damping)



Site Information

Latitude:	36.6540
Longitude	-121.0670
V_{S30} (m/s) =	560
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	8.2

Governing Curve:

Caltrans ARS Online Probablistic Curve

Recommended Response Spectrum

Period (sec)	Caltrans Online Spectral Acceleration (g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.48	1.000	1.000	0.480
0.1	0.96	1.000	1.000	0.960
0.2	1.095	1.000	1.000	1.095
0.3	0.951	1.000	1.000	0.951
0.5	0.67	1.000	1.000	0.670
1.0	0.352	1.200	1.000	0.422
2.0	0.168	1.200	1.000	0.202
3.0	0.104	1.200	1.000	0.125
4.0	0.073	1.200	1.000	0.088
5.0	0.059	1.200	1.000	0.071

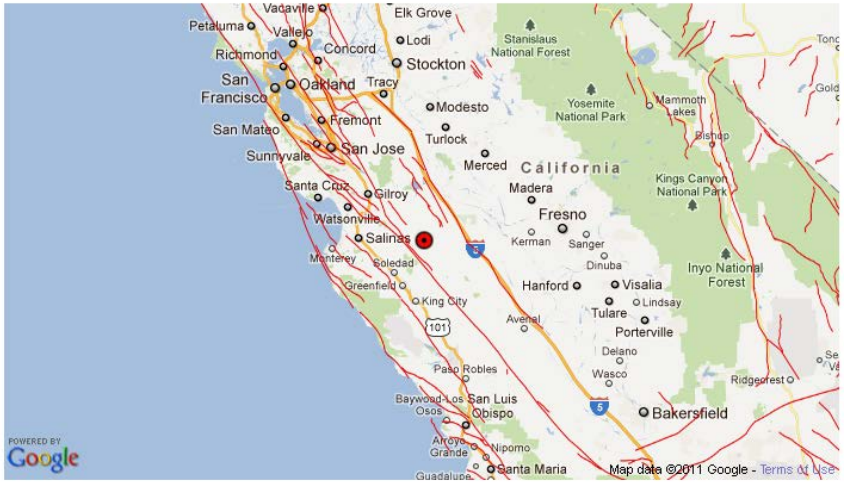
Source:

1. Caltrans ARS Online tool (V.1.0.4, http://dap3.dot.ca.gov/shake_stable/)
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)
3. Caltrans Geotechnical Services Design Manual (Version 1.0)

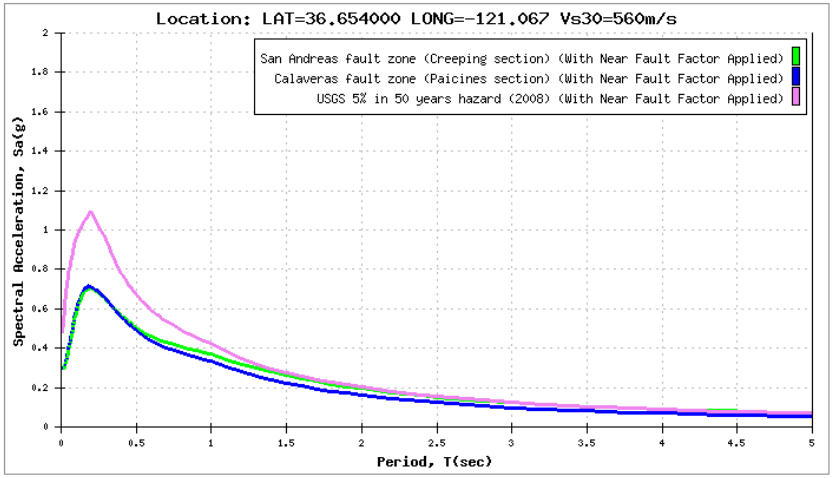
Note:

Refer to "Probablistic Response Spectum Spreadsheet" (attached) for development of the recommended ARS curve.

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs30:	560 m/s
Latitude:	36.654000
Longitude:	-121.067000
Depth to Vs = 1.0 km/s:	74 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

San Andreas fault zone (Creeping section)

Fault ID:	311
Maximum Magnitude (MMax):	7.9
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	12.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	12.79 km
Rjb:	12.79 km
Rx:	12.79 km
Fnorm:	0
Frev:	0

Period	SA(Base Spectrum)	Basin Factor	Near Fault Factor(Applied)	SA(Final Spectrum)
0.01	0.297	1.000	1.000	0.297
0.02	0.302	1.000	1.000	0.302
0.022	0.306	1.000	1.000	0.306
0.025	0.312	1.000	1.000	0.312
0.029	0.320	1.000	1.000	0.320
0.03	0.323	1.000	1.000	0.323
0.032	0.329	1.000	1.000	0.329
0.035	0.338	1.000	1.000	0.338
0.036	0.341	1.000	1.000	0.341
0.04	0.354	1.000	1.000	0.354
0.042	0.361	1.000	1.000	0.361
0.044	0.368	1.000	1.000	0.368
0.045	0.371	1.000	1.000	0.371
0.046	0.374	1.000	1.000	0.374
0.048	0.381	1.000	1.000	0.381
0.05	0.388	1.000	1.000	0.388
0.055	0.409	1.000	1.000	0.409
0.06	0.429	1.000	1.000	0.429
0.065	0.449	1.000	1.000	0.449
0.067	0.457	1.000	1.000	0.457
0.07	0.469	1.000	1.000	0.469
0.075	0.488	1.000	1.000	0.488
0.08	0.507	1.000	1.000	0.507
0.085	0.525	1.000	1.000	0.525
0.09	0.542	1.000	1.000	0.542
0.095	0.559	1.000	1.000	0.559
0.1	0.576	1.000	1.000	0.576
0.11	0.603	1.000	1.000	0.603
0.12	0.627	1.000	1.000	0.627
0.13	0.647	1.000	1.000	0.647
0.133	0.653	1.000	1.000	0.653
0.14	0.664	1.000	1.000	0.664
0.15	0.679	1.000	1.000	0.679
0.16	0.688	1.000	1.000	0.688
0.17	0.694	1.000	1.000	0.694
0.18	0.699	1.000	1.000	0.699

0.19	0.702	1.000	1.000	0.702
0.2	0.704	1.000	1.000	0.704
0.22	0.695	1.000	1.000	0.695
0.24	0.684	1.000	1.000	0.684
0.25	0.678	1.000	1.000	0.678
0.26	0.671	1.000	1.000	0.671
0.28	0.658	1.000	1.000	0.658
0.29	0.651	1.000	1.000	0.651
0.3	0.644	1.000	1.000	0.644
0.32	0.627	1.000	1.000	0.627
0.34	0.611	1.000	1.000	0.611
0.35	0.603	1.000	1.000	0.603
0.36	0.595	1.000	1.000	0.595
0.38	0.579	1.000	1.000	0.579
0.4	0.563	1.000	1.000	0.563
0.42	0.550	1.000	1.000	0.550
0.44	0.538	1.000	1.000	0.538
0.45	0.532	1.000	1.000	0.532
0.46	0.526	1.000	1.000	0.526
0.48	0.514	1.000	1.000	0.514
0.5	0.503	1.000	1.000	0.503
0.55	0.471	1.000	1.020	0.481
0.6	0.444	1.000	1.040	0.462
0.65	0.420	1.000	1.060	0.445
0.667	0.412	1.000	1.067	0.440
0.7	0.399	1.000	1.080	0.431
0.75	0.380	1.000	1.100	0.418
0.8	0.363	1.000	1.120	0.406
0.85	0.348	1.000	1.140	0.396
0.9	0.334	1.000	1.160	0.387
0.95	0.321	1.000	1.180	0.379
1	0.309	1.000	1.200	0.371
1.1	0.286	1.000	1.200	0.343
1.2	0.266	1.000	1.200	0.319
1.3	0.249	1.000	1.200	0.298
1.4	0.233	1.000	1.200	0.279
1.5	0.219	1.000	1.200	0.262
1.6	0.205	1.000	1.200	0.246
1.7	0.193	1.000	1.200	0.231
1.8	0.182	1.000	1.200	0.218
1.9	0.172	1.000	1.200	0.206
2	0.163	1.000	1.200	0.195
2.2	0.146	1.000	1.200	0.175
2.4	0.133	1.000	1.200	0.159
2.5	0.127	1.000	1.200	0.152
2.6	0.121	1.000	1.200	0.145
2.8	0.112	1.000	1.200	0.134
3	0.103	1.000	1.200	0.124
3.2	0.096	1.000	1.200	0.115
3.4	0.090	1.000	1.200	0.108
3.5	0.087	1.000	1.200	0.104
3.6	0.084	1.000	1.200	0.101
3.8	0.079	1.000	1.200	0.095
4	0.075	1.000	1.200	0.090
4.2	0.071	1.000	1.200	0.085
4.4	0.068	1.000	1.200	0.081
4.6	0.064	1.000	1.200	0.077
4.8	0.062	1.000	1.200	0.074
5	0.059	1.000	1.200	0.071

Calaveras fault zone (Paicines section)

Fault ID:	324
Maximum Magnitude (MMax):	7.4
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	11.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	10.20 km
Rjb:	10.20 km
Rx:	9.93 km
Fnorm:	0
Frev:	0

Period	SA(Base Spectrum)	Basin Factor	Near Fault Factor(Applied)	SA(Final Spectrum)
0.01	0.301	1.000	1.000	0.301
0.02	0.306	1.000	1.000	0.306
0.022	0.311	1.000	1.000	0.311
0.025	0.317	1.000	1.000	0.317
0.029	0.325	1.000	1.000	0.325
0.03	0.328	1.000	1.000	0.328
0.032	0.334	1.000	1.000	0.334
0.035	0.344	1.000	1.000	0.344
0.036	0.347	1.000	1.000	0.347
0.04	0.361	1.000	1.000	0.361
0.042	0.368	1.000	1.000	0.368
0.044	0.375	1.000	1.000	0.375
0.045	0.378	1.000	1.000	0.378
0.046	0.382	1.000	1.000	0.382
0.048	0.389	1.000	1.000	0.389
0.05	0.396	1.000	1.000	0.396
0.055	0.417	1.000	1.000	0.417
0.06	0.439	1.000	1.000	0.439
0.065	0.460	1.000	1.000	0.460
0.067	0.468	1.000	1.000	0.468
0.07	0.480	1.000	1.000	0.480
0.075	0.500	1.000	1.000	0.500
0.08	0.519	1.000	1.000	0.519
0.085	0.538	1.000	1.000	0.538
0.09	0.556	1.000	1.000	0.556
0.095	0.573	1.000	1.000	0.573
0.1	0.590	1.000	1.000	0.590
0.11	0.617	1.000	1.000	0.617

0.12	0.641	1.000	1.000	0.641
0.13	0.661	1.000	1.000	0.661
0.133	0.666	1.000	1.000	0.666
0.14	0.678	1.000	1.000	0.678
0.15	0.693	1.000	1.000	0.693
0.16	0.700	1.000	1.000	0.700
0.17	0.706	1.000	1.000	0.706
0.18	0.710	1.000	1.000	0.710
0.19	0.713	1.000	1.000	0.713
0.2	0.714	1.000	1.000	0.714
0.22	0.703	1.000	1.000	0.703
0.24	0.690	1.000	1.000	0.690
0.25	0.683	1.000	1.000	0.683
0.26	0.675	1.000	1.000	0.675
0.28	0.660	1.000	1.000	0.660
0.29	0.652	1.000	1.000	0.652
0.3	0.644	1.000	1.000	0.644
0.32	0.626	1.000	1.000	0.626
0.34	0.609	1.000	1.000	0.609
0.35	0.600	1.000	1.000	0.600
0.36	0.592	1.000	1.000	0.592
0.38	0.575	1.000	1.000	0.575
0.4	0.559	1.000	1.000	0.559
0.42	0.544	1.000	1.000	0.544
0.44	0.529	1.000	1.000	0.529
0.45	0.522	1.000	1.000	0.522
0.46	0.515	1.000	1.000	0.515
0.48	0.501	1.000	1.000	0.501
0.5	0.489	1.000	1.000	0.489
0.55	0.453	1.000	1.020	0.462
0.6	0.423	1.000	1.040	0.440
0.65	0.397	1.000	1.060	0.420
0.667	0.388	1.000	1.067	0.414
0.7	0.373	1.000	1.080	0.403
0.75	0.353	1.000	1.100	0.388
0.8	0.335	1.000	1.120	0.375
0.85	0.318	1.000	1.140	0.363
0.9	0.304	1.000	1.160	0.352
0.95	0.290	1.000	1.180	0.342
1	0.278	1.000	1.200	0.333
1.1	0.254	1.000	1.200	0.305
1.2	0.234	1.000	1.200	0.281
1.3	0.216	1.000	1.200	0.259
1.4	0.200	1.000	1.200	0.241
1.5	0.187	1.000	1.200	0.224
1.6	0.174	1.000	1.200	0.208
1.7	0.162	1.000	1.200	0.194
1.8	0.152	1.000	1.200	0.182
1.9	0.142	1.000	1.200	0.171
2	0.134	1.000	1.200	0.161
2.2	0.119	1.000	1.200	0.143
2.4	0.108	1.000	1.200	0.129
2.5	0.102	1.000	1.200	0.123
2.6	0.098	1.000	1.200	0.117
2.8	0.089	1.000	1.200	0.107
3	0.082	1.000	1.200	0.099
3.2	0.076	1.000	1.200	0.091
3.4	0.071	1.000	1.200	0.085
3.5	0.068	1.000	1.200	0.082
3.6	0.066	1.000	1.200	0.079
3.8	0.062	1.000	1.200	0.074
4	0.058	1.000	1.200	0.070
4.2	0.055	1.000	1.200	0.066
4.4	0.052	1.000	1.200	0.062
4.6	0.049	1.000	1.200	0.059
4.8	0.047	1.000	1.200	0.057
5	0.045	1.000	1.200	0.054

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA(Base Spectrum)	Basin Factor	Near Fault Factor(Applied)	SA(Final Spectrum)
0.01	0.480	1.000	1.000	0.480
0.02	0.591	1.000	1.000	0.591
0.022	0.609	1.000	1.000	0.609
0.025	0.632	1.000	1.000	0.632
0.029	0.661	1.000	1.000	0.661
0.03	0.668	1.000	1.000	0.668
0.032	0.681	1.000	1.000	0.681
0.035	0.700	1.000	1.000	0.700
0.036	0.706	1.000	1.000	0.706
0.04	0.728	1.000	1.000	0.728
0.042	0.739	1.000	1.000	0.739
0.044	0.750	1.000	1.000	0.750
0.045	0.755	1.000	1.000	0.755
0.046	0.760	1.000	1.000	0.760
0.048	0.770	1.000	1.000	0.770
0.05	0.779	1.000	1.000	0.779
0.055	0.802	1.000	1.000	0.802
0.06	0.823	1.000	1.000	0.823
0.065	0.843	1.000	1.000	0.843
0.067	0.851	1.000	1.000	0.851
0.07	0.862	1.000	1.000	0.862
0.075	0.880	1.000	1.000	0.880
0.08	0.897	1.000	1.000	0.897
0.085	0.914	1.000	1.000	0.914

0.09	0.930	1.000	1.000	0.930
0.095	0.945	1.000	1.000	0.945
0.1	0.960	1.000	1.000	0.960
0.11	0.977	1.000	1.000	0.977
0.12	0.994	1.000	1.000	0.994
0.13	1.009	1.000	1.000	1.009
0.133	1.013	1.000	1.000	1.013
0.14	1.023	1.000	1.000	1.023
0.15	1.037	1.000	1.000	1.037
0.16	1.050	1.000	1.000	1.050
0.17	1.062	1.000	1.000	1.062
0.18	1.073	1.000	1.000	1.073
0.19	1.085	1.000	1.000	1.085
0.2	1.095	1.000	1.000	1.095
0.22	1.059	1.000	1.000	1.059
0.24	1.028	1.000	1.000	1.028
0.25	1.013	1.000	1.000	1.013
0.26	0.999	1.000	1.000	0.999
0.28	0.974	1.000	1.000	0.974
0.29	0.962	1.000	1.000	0.962
0.3	0.951	1.000	1.000	0.951
0.32	0.910	1.000	1.000	0.910
0.34	0.873	1.000	1.000	0.873
0.35	0.856	1.000	1.000	0.856
0.36	0.839	1.000	1.000	0.839
0.38	0.809	1.000	1.000	0.809
0.4	0.781	1.000	1.000	0.781
0.42	0.755	1.000	1.000	0.755
0.44	0.732	1.000	1.000	0.732
0.45	0.721	1.000	1.000	0.721
0.46	0.710	1.000	1.000	0.710
0.48	0.689	1.000	1.000	0.689
0.5	0.670	1.000	1.000	0.670
0.55	0.616	1.000	1.020	0.628
0.6	0.570	1.000	1.040	0.593
0.65	0.530	1.000	1.060	0.562
0.667	0.518	1.000	1.067	0.553
0.7	0.497	1.000	1.080	0.536
0.75	0.467	1.000	1.100	0.514
0.8	0.438	1.000	1.120	0.491
0.85	0.413	1.000	1.140	0.471
0.9	0.390	1.000	1.160	0.453
0.95	0.370	1.000	1.180	0.437
1	0.352	1.000	1.200	0.423
1.1	0.318	1.000	1.200	0.382
1.2	0.290	1.000	1.200	0.348
1.3	0.266	1.000	1.200	0.319
1.4	0.246	1.000	1.200	0.295
1.5	0.229	1.000	1.200	0.274
1.6	0.213	1.000	1.200	0.256
1.7	0.200	1.000	1.200	0.240
1.8	0.188	1.000	1.200	0.226
1.9	0.178	1.000	1.200	0.213
2	0.168	1.000	1.200	0.202
2.2	0.150	1.000	1.200	0.180
2.4	0.136	1.000	1.200	0.163
2.5	0.129	1.000	1.200	0.155
2.6	0.123	1.000	1.200	0.148
2.8	0.113	1.000	1.200	0.136
3	0.104	1.000	1.200	0.125
3.2	0.096	1.000	1.200	0.115
3.4	0.089	1.000	1.200	0.107
3.5	0.086	1.000	1.200	0.103
3.6	0.083	1.000	1.200	0.100
3.8	0.078	1.000	1.200	0.093
4	0.073	1.000	1.200	0.087
4.2	0.070	1.000	1.200	0.084
4.4	0.067	1.000	1.200	0.080
4.6	0.064	1.000	1.200	0.077
4.8	0.061	1.000	1.200	0.074
5	0.059	1.000	1.200	0.071

Envelope Data

Period	SA
0.01	0.480
0.02	0.591
0.022	0.609
0.025	0.632
0.029	0.661
0.03	0.668
0.032	0.681
0.035	0.700
0.036	0.706
0.04	0.728
0.042	0.739
0.044	0.750
0.045	0.755
0.046	0.760
0.048	0.770
0.05	0.779
0.055	0.802
0.06	0.823
0.065	0.843
0.067	0.851
0.07	0.862

0.075	0.880
0.08	0.897
0.085	0.914
0.09	0.930
0.095	0.945
0.1	0.960
0.11	0.977
0.12	0.994
0.13	1.009
0.133	1.013
0.14	1.023
0.15	1.037
0.16	1.050
0.17	1.062
0.18	1.073
0.19	1.085
0.2	1.095
0.22	1.059
0.24	1.028
0.25	1.013
0.26	0.999
0.28	0.974
0.29	0.962
0.3	0.951
0.32	0.910
0.34	0.873
0.35	0.856
0.36	0.839
0.38	0.809
0.4	0.781
0.42	0.755
0.44	0.732
0.45	0.721
0.46	0.710
0.48	0.689
0.5	0.670
0.55	0.628
0.6	0.593
0.65	0.562
0.667	0.553
0.7	0.536
0.75	0.514
0.8	0.491
0.85	0.471
0.9	0.453
0.95	0.437
1	0.423
1.1	0.382
1.2	0.348
1.3	0.319
1.4	0.295
1.5	0.274
1.6	0.256
1.7	0.240
1.8	0.226
1.9	0.213
2	0.202
2.2	0.180
2.4	0.163
2.5	0.155
2.6	0.148
2.8	0.136
3	0.125
3.2	0.115
3.4	0.108
3.5	0.104
3.6	0.101
3.8	0.095
4	0.090
4.2	0.085
4.4	0.081
4.6	0.077
4.8	0.074
5	0.071

APPENDIX E

HYDRAULIC STUDY REPORT AND SUPPLEMENTAL LOCATION HYDRAULIC REPORT

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Panoche Road at Tres Pinos Creek Bridge Replacement Project
San Benito County, California

Location Hydraulic Study Report

Federal Aid Project Number: BRLS-5943(056)
San Benito County Project Number: 698

Prepared for:

San Benito County
Department of Public Works

Prepared by:

Quincy Engineering, Inc.

WRECO

July 2013

Panoche Road at Tres Pinos Creek Bridge Replacement Project
San Benito County, California

Location Hydraulic Study Report

Federal Aid Project Number: BRLS-5943(056)
San Benito County Project Number: 698

[The cover photo is the upstream face of the Panoche Road bridge from the California Department of Transportation's Bridge Inspection Report from December 3, 2008, and it was taken facing southeast.]

Submitted to:
San Benito County Department of Public Works

This report has been prepared by or under the supervision of the following Registered Engineer. The Registered Civil Engineer attests to the technical information contained herein and has judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

Han-Bin Liang, Ph.D., P.E.
Registered Civil Engineer

7/23/2013
Date

July 2013

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Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ADT	average daily traffic
BIR	Bridge Inspection Report
BMP	Best Management Practices
BSA	Biological Study Area
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIP	cast-in-place
CRLF	California red-legged frog
CTS	California tiger salamander
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
HBP	Highway Bridge Program
HEC-RAS	Hydrologic Engineering Center River Analysis System
I-5	Interstate 5
LBV	least Bell's vireo
NEPA	National Environmental Policy Act
NGVD 29	National Geodetic Vertical Datum of 1929
PS&E	Project Report, and final Plans, Specifications, and Estimates
SCCC	South Central California Coast
SR 25	State Route 25

LOCATION HYDRAULIC STUDY FORM *

Dist. 5 Co. San Benito Rte. Panoche Road P.M. N/A
Fed. Proj. Number BRLS-5943(056) Bridge No. 43C-0027

Floodplain Description:
The hydraulic analysis indicates that the 100-year flood will be below the soffit of the proposed bridge.

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)

The project proposes to replace the existing bridge with a new longer and wider bridge on an improved roadway alignment. The proposed scope of work for this project includes bridge demolition, channel slope protection, approach roadway work, bridge construction, metal beam guard rails, bridge railing, temporary traffic control, right-of-way acquisition and temporary construction easements, utility relocation, and environmental mitigation. The total length of the project is approximately 685 feet, which includes approximately 550 feet of roadway work beyond the bridge abutments. The roadway work consists of realigning the roadway downstream (southerly) of the existing bridge. The proposed bridge will have two equal spans and will be approximately 132 feet long by 34 feet, 10 inches wide. The existing bridge structure has a hydraulic opening of approximately 61 feet and has two piers in the channel. The replacement bridge would have a hydraulic opening of approximately 92 feet with only one pier in the channel. The larger hydraulic opening in the proposed condition would allow for greater conveyance capacity, which would lower the water surface elevation and result in reduced backwater upstream of the bridge. A rock weir is proposed to be constructed approximately at the existing bridge location and transverse to the flow direction to maintain channel velocities and protect the upstream east bank.

2. ADT: Current (2010) 241 Projected (2029) 425

3. Hydraulic Data: Base Flood Q_{100}= 4,020 cfs
WSE_{100}= 1,800.4 feet NGVD 29 (existing bridge), 1,795.0 feet NGVD 29 (proposed bridge); see Section 2.3 of the Location Hydraulic Study Report for further discussions.
The flood of record, if greater than Q_{100}:
Q= N/A cfs WSE= N/A
Overtopping flood Q=8,800 cfs WSE= 1,800.7 feet NGVD 29
Are NFIP maps and studies available? YES x NO

4. Is the highway location alternative within a regulatory floodway?
YES NO x

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain.

Figure 5 of the Location Hydraulic Study Report shows the existing bridge and the 100-year floodplain. Figure 6 of the Location Hydraulic Study Report shows the proposed bridge improvements and the limits of the estimated 100-year flood limits that were delineated by WRECO based on the hydraulic modeling.

Potential Q_{100} backwater damages:

A.	Residences?	NO x	YES
B.	Other Bldgs?	NO x	YES
C.	Crops?	NO x	YES
D.	Natural and beneficial floodplain values?	NO x	YES

6. Type of Traffic:

A. Emergency supply or evacuation route?	NO	YES x
B. Emergency vehicle access?	NO	YES x
C. Practicable detour available?	NO x	YES
D. School bus or mail route?	NO	YES x

7. Estimated duration of traffic interruption for 100-year event hours: N/A

8. Estimated value of Q_{100} flood damages (if any) – moderate risk level.

A.	Roadway	$ N/A
B	Property	$ N/A
	Total	$ N/A

9. Assessment of Level of Risk Low x
Moderate
High

For High Risk projects, during design phase, additional Design Study Risk Analysis may be necessary to determine design alternative.

Signature – Hydraulic Engineer _____ Date _____
(Item numbers 3,4,5,7,9)

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible floodplain development? NO x YES

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

Signature – Project Engineer_____Date_____
(Item numbers 1,2,6,8)

** Same as Figure 804.7A Technical Information for Location Hydraulic Study located in Chapter 804 of the Highway Design Manual*

SUMMARY FLOODPLAIN ENCROACHMENT REPORT *

Dist. 5 Co. San Benito Rte. Panoche Road P.M. N/A
Federal Project No. BRLS-5943(056) Bridge No. 43C-0027
Limits: The limits of the work are the bridge and 550 feet of approach roadway. The total length of the project is approximately 685 feet.
Floodplain Description: The hydraulic analysis indicates that the 100-year flood will be below the soffit of the proposed bridge.

		No	Yes
1.	Is the proposed action a longitudinal encroachment of the base floodplain?	x	
2.	Are the risks associated with the implementation of the proposed action significant?	x	
3.	Will the proposed action support probable incompatible floodplain development?	x	
4.	Are there any significant impacts on natural and beneficial floodplain values?	x	
5.	Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain.	x	
6.	Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q).	x	
7.	Are Location Hydraulic Studies that document the above answers on file? If not explain.		x

PREPARED BY:

_____ _____
Signature – Hydraulic Engineer Date

APPROVED BY:

_____ _____
Signature - Caltrans Environmental Branch Chief Date

_____ _____
Signature – District Local Assistance Engineer Date

** Same as Figure 804.7B Floodplain Evaluation Report Summary located in Chapter 804 of the Highway Design Manual*

1 GENERAL DESCRIPTION

1.1 Project Description

San Benito County (County) proposes to replace the existing Panoche Road bridge over Tres Pinos Creek (Bridge No. 43C-0027) with a new longer and wider bridge on an improved roadway alignment. The proposed bridge will replace the existing single-lane, 16-foot wide by 87-foot long bridge that was constructed in 1959. The existing alignment does not meet current American Association of State Highway and Transportation Officials (AASHTO) standards for design speed or road/bridge width. The site is located approximately 25 miles southeast of the City of Hollister and 15 miles southeast of State Route 25 (SR 25) along Panoche Road. Panoche Road is functionally classified as a Rural Major Collector with an average daily traffic (ADT) volume of approximately 150. The road runs roughly east west, connecting SR 25 and Interstate 5 (I-5). East of the project, the road condition degrades, and THE design speed hinders this from being a preferred alternate route to I-5. See Figure 1 for the Project Location Map and Figure 2 for the Project Vicinity Map.

The proposed replacement of the existing Panoche Road bridge over Tres Pinos Creek will heretofore be referred to as the Project.

The proposed scope of work for this Project includes bridge demolition, channel slope protection, approach roadway work, bridge construction, metal beam guard rails, bridge railing, temporary traffic control, right-of-way acquisition and temporary construction easements, utility relocation, and environmental mitigation. The California Department of Transportation (Caltrans), on behalf of the Federal Highway Administration (FHWA), is providing project oversight because federal funds are involved.

The proposed replacement bridge will provide two 12-foot traffic lanes with adjacent 4-foot paved shoulders on both sides. The total length of the project is approximately 685 feet, which includes approximately 550 feet of roadway work beyond the bridge abutments. The roadway work consists of realigning the roadway downstream (southerly) of the existing bridge to allow construction of the new bridge in one stage while maintaining traffic on the existing alignment during construction. The proposed shifted alignment also improves roadway geometry by eliminating the slight “S” curve over the existing bridge.

The proposed bridge will have two equal spans and will be approximately 132 feet long by 34 feet, 10 inches wide. A hydraulic analysis of the creek has been performed to determine the water surface elevation for establishing the approximate roadway/bridge profile. The new bridge will have over 3.5 feet of freeboard. The proposed bridge deck will be approximately 5 to 6 feet higher than the existing bridge deck. The proposed higher profile provides adequate freeboard for drift in the channel, and also limits the cut excavation into the hillside adjacent to the roadway.

Geotechnical explorations have been completed, and they include one boring near each proposed abutment location. The bridge site has good rock at relatively shallow depths for all three proposed support locations. The use of low impact hammers for rock excavation, as requested by the property owner, is expected to minimize potential impacts to the owner's natural spring located near the northeast corner of the bridge. The proposed bridge foundation will consist of shallow spread footings supported on rock. A reinforced concrete pier wall will provide intermediate support for the spans across the creek.

A stream diversion will be required during construction of the pier because water in this section of the creek flows generally year around, fed mostly by underground springs in the summer.

The structure type currently being considered is a cast-in-place (CIP) pre-stressed concrete slab with a structure depth of 2.0 feet. Bridge construction will require falsework in the channel spanning over the wetted creek area.

The existing bridge will be removed after construction of the new bridge is completed. One scour countermeasure being considered involves leaving either all or a portion of the existing east concrete abutment in place, depending on its condition after further examination. The west abutment will be removed and the bank will be re-graded to remove a portion of the artificial fill material that was placed during construction of the existing bridge.

There is an unnamed tributary that runs east to west, discharging into Tres Pinos Creek on the east bank adjacent to the existing bridge. The channel currently runs between the southern edge of Panoche Road and the toe of a steep hillside adjacent to the road, past the existing east bridge abutment and into the creek. Because the roadway alignment is shifting to the south, this channel will essentially be covered. A 5-foot diameter culvert and inlet structure will be provided to capture the tributary channel flows where the new roadway alignment starts to shift across into the tributary flow line. The most optimal hydraulic alignment is to terminate the end of the culvert through the new eastern bridge abutment wall and deposit water directly into the creek. This will maintain the general flow line of the tributary channel and keep the outlet of the culvert pointed in the general direction of the flow downstream as it enters the main creek. Further analysis has determined that outlet protection will be required where the culvert outfalls into Tres Pinos Creek. The proposed roadway/bridge profile has been established to allow vertical clearance for the 5-foot diameter pipe.

A natural spring exists near the northeast corner of the existing bridge and provides much of the water supply for the large ranch at the site. Engineering studies have been performed by the landowner identifying the soil layers and approximate extent of the spring. The landowner has a spring box and pump house located approximately 80 feet northwest of Panoche Road. It is believed that constructing the bridge downstream of the existing bridge (as proposed) will avoid impacts to the spring. Leaving the existing east

abutment in place after construction will be considered to avoid potential impacts to the spring.

A rock weir is proposed to be constructed approximately at the existing bridge location and transverse to the flow direction. The erosion of the soils at the east bank could have the potential to negatively affect the adjacent spring water box. Therefore, this weir is proposed to be constructed to maintain channel velocities and protect the upstream east bank. The size of the rock was determined to be ½ ton class rock by following criteria in *Fish Passage Design for Road Crossings* (Caltrans 2009). The voids between the rocks should be filled by injecting sand/fine gravel material or hand tamped void filler as described in the attached specification. Plants will grow in the filler placed in the voids between the ½ ton class rocks over time. Alternatively, native seed mix can be incorporated into the fill material, and willows can be planted at the weir base near the channel banks. This will help to decrease stream velocities as well as provide a more natural look, which is aesthetically pleasing and sustainable.

Quincy Engineering, Inc. is providing the engineering design, environmental clearance, a Project Report, and final Plans, Specifications, and Estimates (PS&E) for the roadway and bridge design for this project. The bridge replacement project is eligible for funding under the Federal Aid Highway Bridge Program (HBP). Environmental approvals (California Environmental Quality Act [CEQA] and National Environmental Policy Act [NEPA]) are currently being processed as well as right-of-way acquisition and utility relocation. Construction is expected to take place in 2013.

1.2 Regulatory Setting

1.2.1 Executive Order 11988

Executive Order 11988 (Floodplain Management) directs all federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Requirements for compliance are outlined in Title 23, Code of Federal Regulations, Part 650, Subpart A (23 CFR 650A) titled “Location and Hydraulic Design of Encroachment on Floodplains.”

If the preferred alternative involves significant encroachment onto the floodplain, the final environmental document (final environmental impact statement or finding of no significant impact) must include:

- The reasons why the proposed action must be located in the floodplain;
- The alternatives considered and why they were not practicable; and
- A statement indicating whether the action conforms to applicable State or local floodplain protection standards.

1.2.2 California's National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) is the nationwide administrator of the National Flood Insurance Program (NFIP), which is a program that was established by the National Flood Insurance Act of 1968 to protect lives and property, and to reduce the financial burden of providing disaster assistance. Under the NFIP, FEMA has the lead responsibility for flood hazard assessment and mitigation, and it offers federally backed flood insurance to homeowners, renters, and business owners in communities that choose to participate in the program. FEMA has adopted the 100-year floodplain as the base flood standard for the NFIP. FEMA is also concerned with construction that would be within a 500-year floodplain for proposed projects that are considered "critical actions," which are defined as any activities where even a slight chance of flooding is too great. FEMA issues the Flood Insurance Rate Maps (FIRMs) for communities that participate in the NFIP. These FIRMs present delineations of flood hazard zones.

In California, nearly all of the State's flood-prone communities participate in the NFIP, which is locally administered by the California Department of Water Resources' (DWR) Division of Flood Management. Under California's NFIP, communities have a mutual agreement with the State and Federal government to regulate floodplain development according to certain criteria and standards, which is further detailed in the NFIP. Typically, each county (or community) has a Flood Insurance Study (FIS), which is used to locally develop FIRMs and Base Flood Elevations (BFE).

The County's effective FIS, number 06069CV000A, was published April 16, 2009, and includes both unincorporated and incorporated areas. This FIS does not contain any detailed hydrologic or hydraulic information for Tres Pinos Creek.

1.3 Design Standards

1.3.1 FEMA Standards

FEMA standards are employed for design, construction, and regulation to reduce flood loss and to protect resources. Two types of standards are often employed: design criteria and performance standards.

A design criteria or specified standard dictates that a provision, practice, requirement, or limit be met; e.g. using the 1% flood and establishing floodway boundaries so as not to cause more than a 1-ft increase in flood stages.

A performance standard dictates that a goal is to be achieved, leaving it to the individual application as to how to achieve the goal; e.g. providing protection to the regulatory flood, keeping post-development stormwater runoff the same as pre-development, or maintaining the present quantity and quality of water in a wetland.

The 1% annual chance flood and floodplain have been adopted as a common design and regulatory standard in the United States. The NFIP adopted it in the early 1970s, and it was adopted as a standard for use by all federal agencies with the issuance of Executive

Order 11988. States or local agencies are free to impose a more stringent standard within their jurisdiction.

1.4 Description of Creek Crossings

The Project crosses over Tres Pinos Creek and an unnamed tributary. Tres Pinos Creek originates on the east-central edge of San Benito County. The watershed that drains to the site consists primarily of forests and grazing lands. The tributaries that contribute to the flows at the Project site include Sulphuritos Creek, Antelope Creek, Payne Creek, Willow Spring Creek, and several unnamed tributaries. Tres Pinos Creek drains into San Benito River downstream of the Project site in the southern part of the City of Hollister.

An aerial image of the Project site is shown in Figure 3, and a photo of the existing bridge is shown in Photo 1. In the photo, the unnamed tributary flows to the site from the left (south), and Tres Pinos Creek flows to the site from the right (north). The existing structure will be removed and replaced with a two-span bridge that is 132 feet long by 34 feet, 10 inches wide; see Figure 4. The location of the proposed rock weir is shown in Figure 5.

1.5 Geographical References

The Project references the National Geodetic Vertical Datum of 1929 (NGVD 29).

1.6 Traffic

The roadway work consists of realigning the roadway downstream (southerly) of the existing bridge to allow construction of the new bridge in one stage while maintaining traffic on the existing alignment during construction.

Panoche Road is functionally classified as a Rural Major Collector. According to Arman Nazemi, the Public Works Assistant Director of San Benito County, the current ADT in 2010 was 241 cars per day, and the future ADT is projected to be 425 cars per day in 2029 (Personal Communication).

1.7 Traffic Interruptions for Base Flood (Q_{100})

The proposed bridge will be designed to be above the 100-year base floodplain. Therefore, traffic interruptions at the proposed bridge are not anticipated.

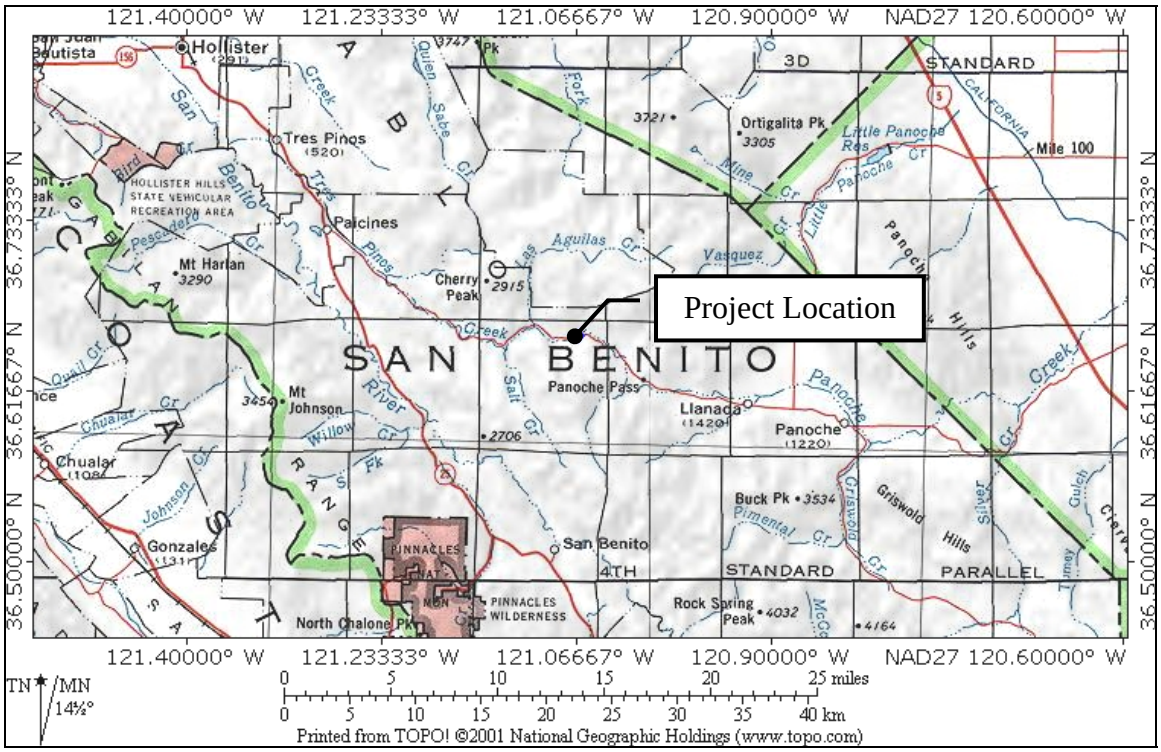

Figure 1. Project Location Map

Source: United States Geological Survey (USGS)

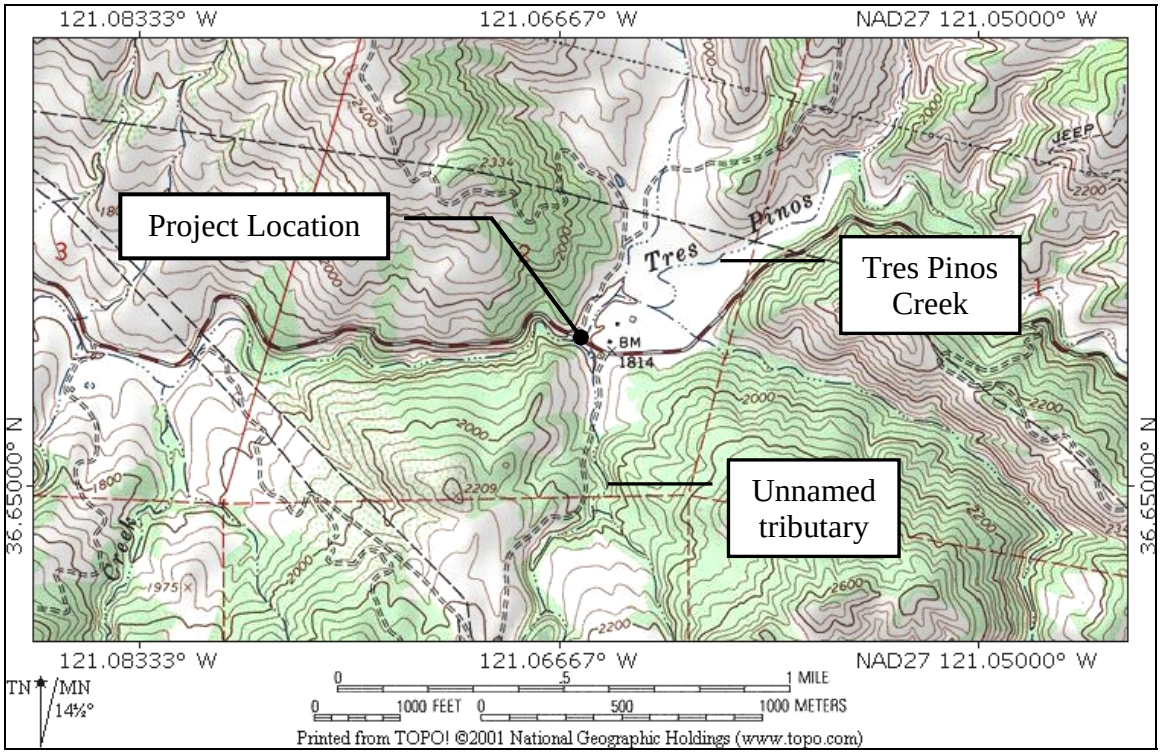

Figure 2. Project Vicinity Map

Source: USGS

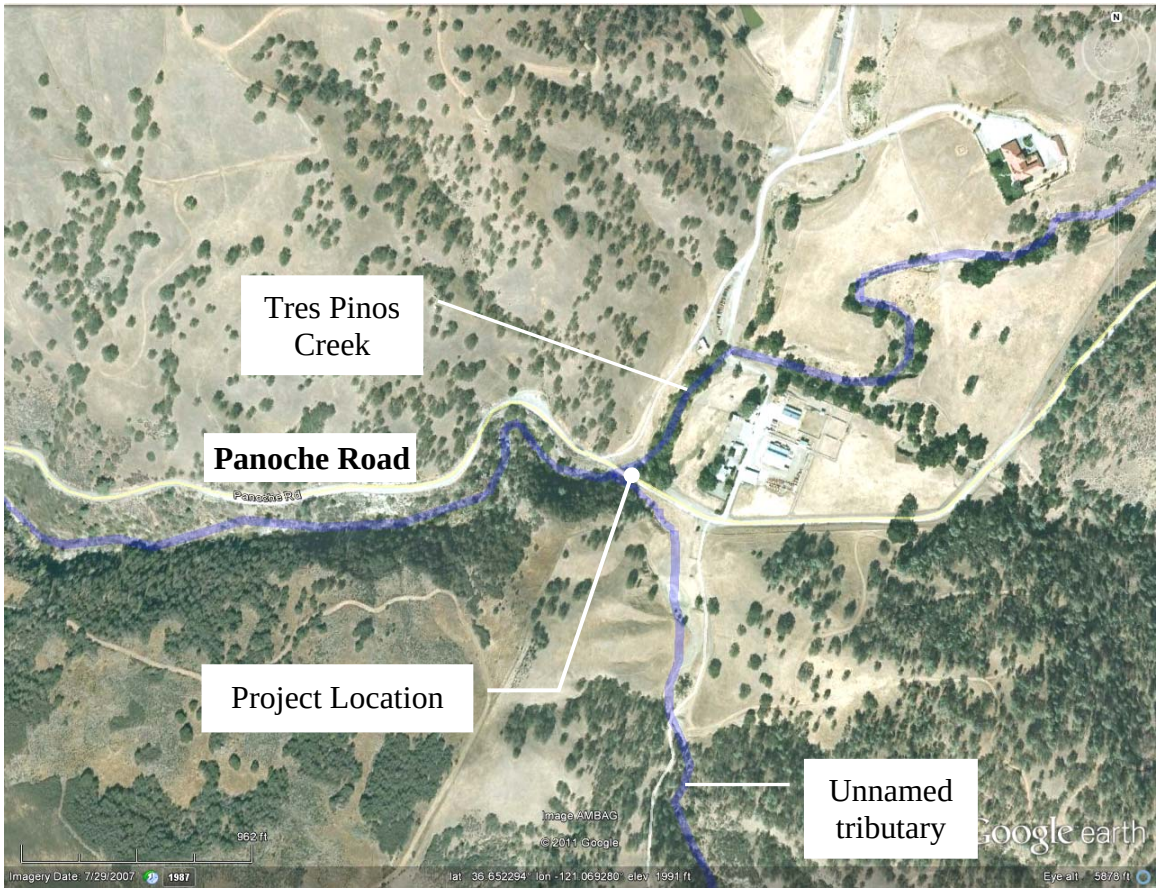

Figure 3. Project Aerial Photograph

Source: Google Earth

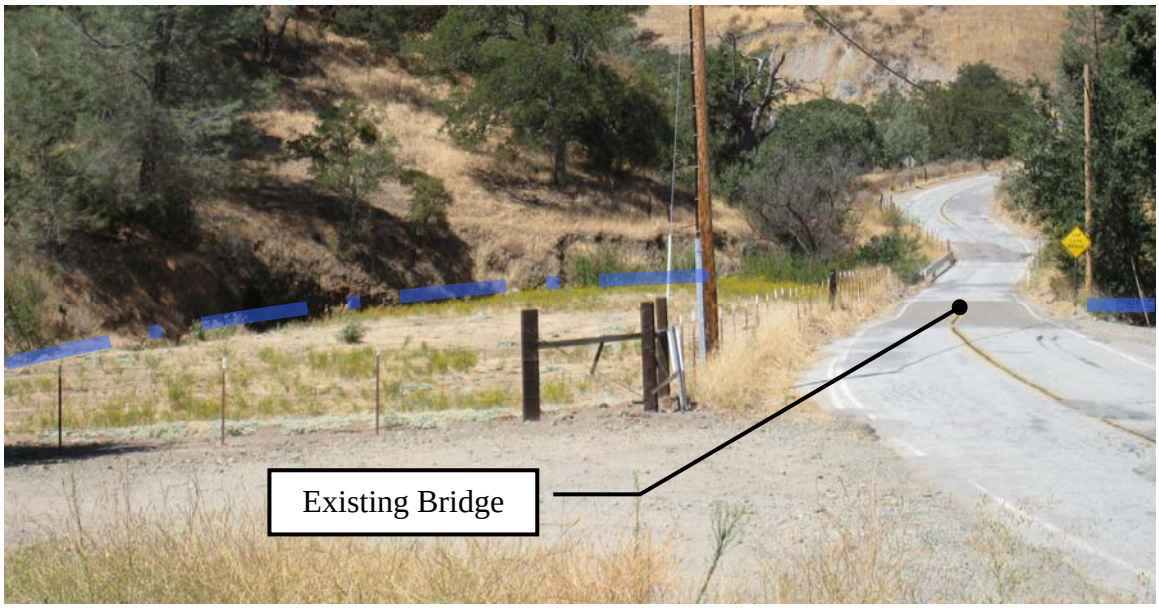

Photo 1. Panoche Road Bridge (Facing Westerly)

Source: Quincy Engineering, Inc.

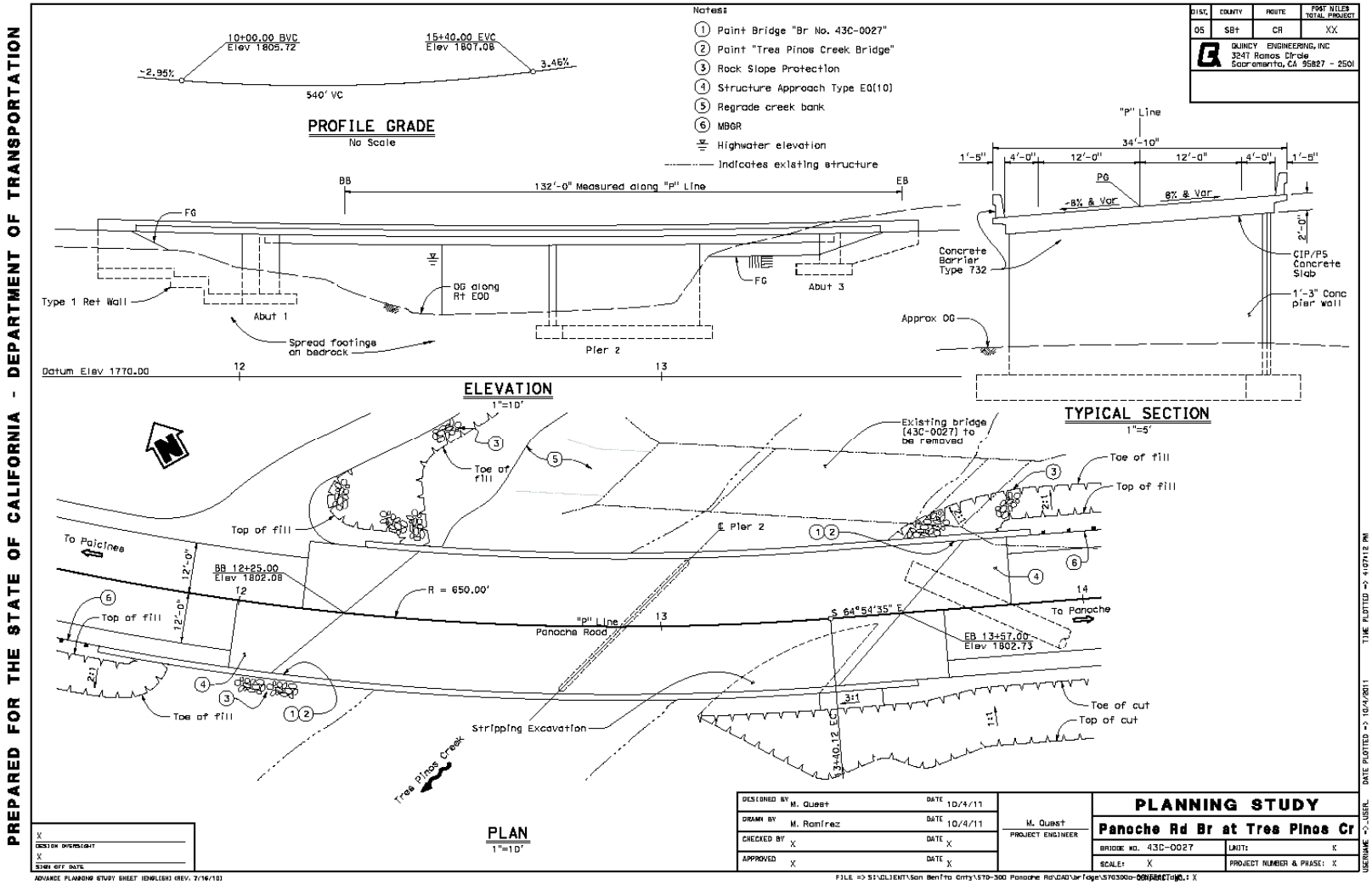

Figure 4. Proposed Panoche Road Bridge Replacement Planning Study

Source: Quincy Engineering, Inc.

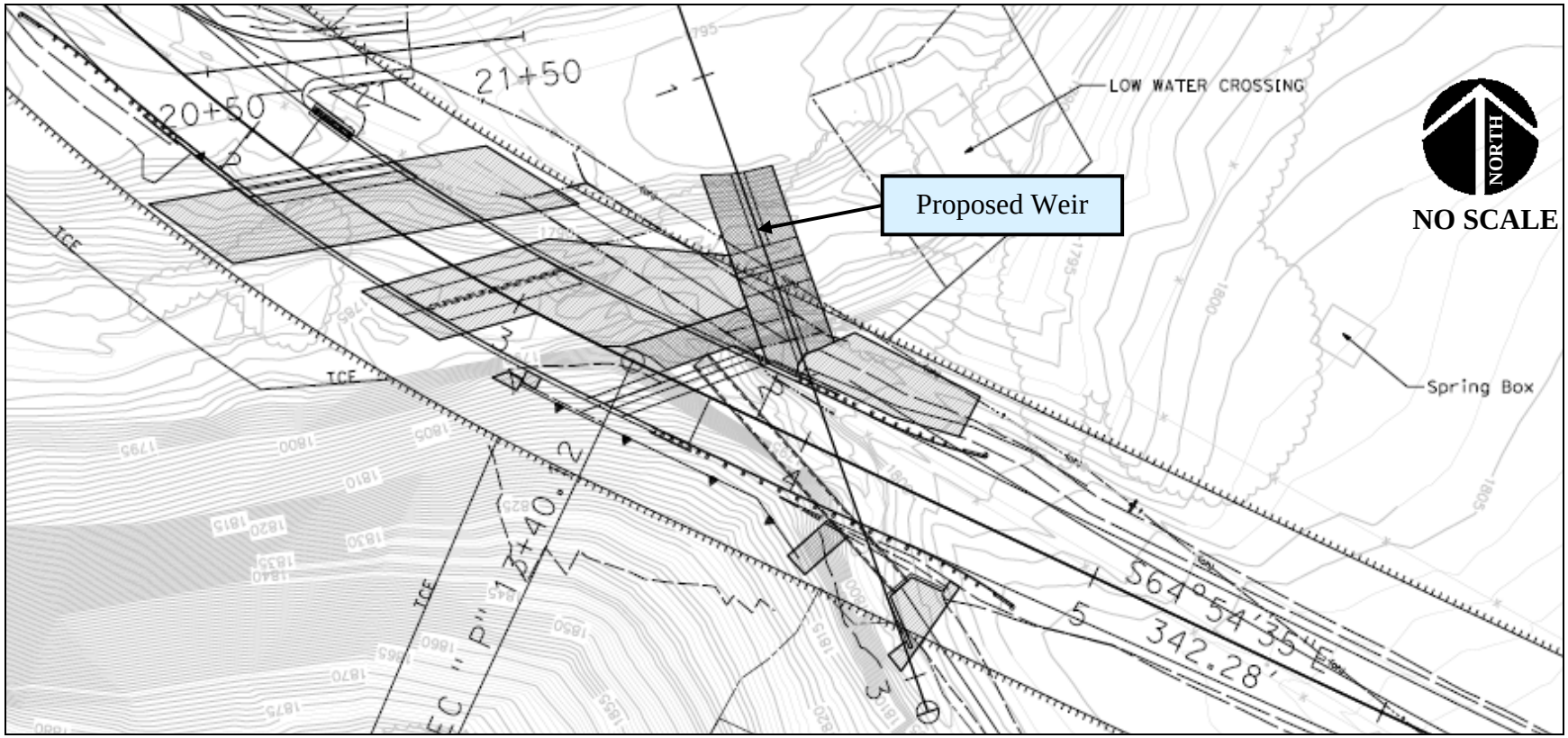

Figure 5. Proposed Rock Weir Location

Source: Quincy Engineering, Inc.

2 HYDROLOGIC AND HYDRAULIC DATA

2.1 Floodplain Map

Tres Pinos Creek was not studied using detailed methods by FEMA. Numerous flooding sources in San Benito County were studied by approximate methods by FEMA, and summarized in the FIS. Approximate analyses were used to study areas having a low development potential or minimal flood hazards.

Within the Project limits, the Panoche Road bridge location is within floodplains that have been defined by FEMA. The 100-year base floodplains are defined to be in flood hazard zone designation Zone A, which corresponds to the one percent (1%) annual chance floodplains that are mapped by approximate methods. Base flood elevations were not determined.

The FIRM that depicts this floodplain is Map Number 06069C0400D (FEMA 2009), and is shown in Figure 6. The proposed bridge alignment is shown in Figure 7 showing the areas that are potentially prone to the 100-year flood.

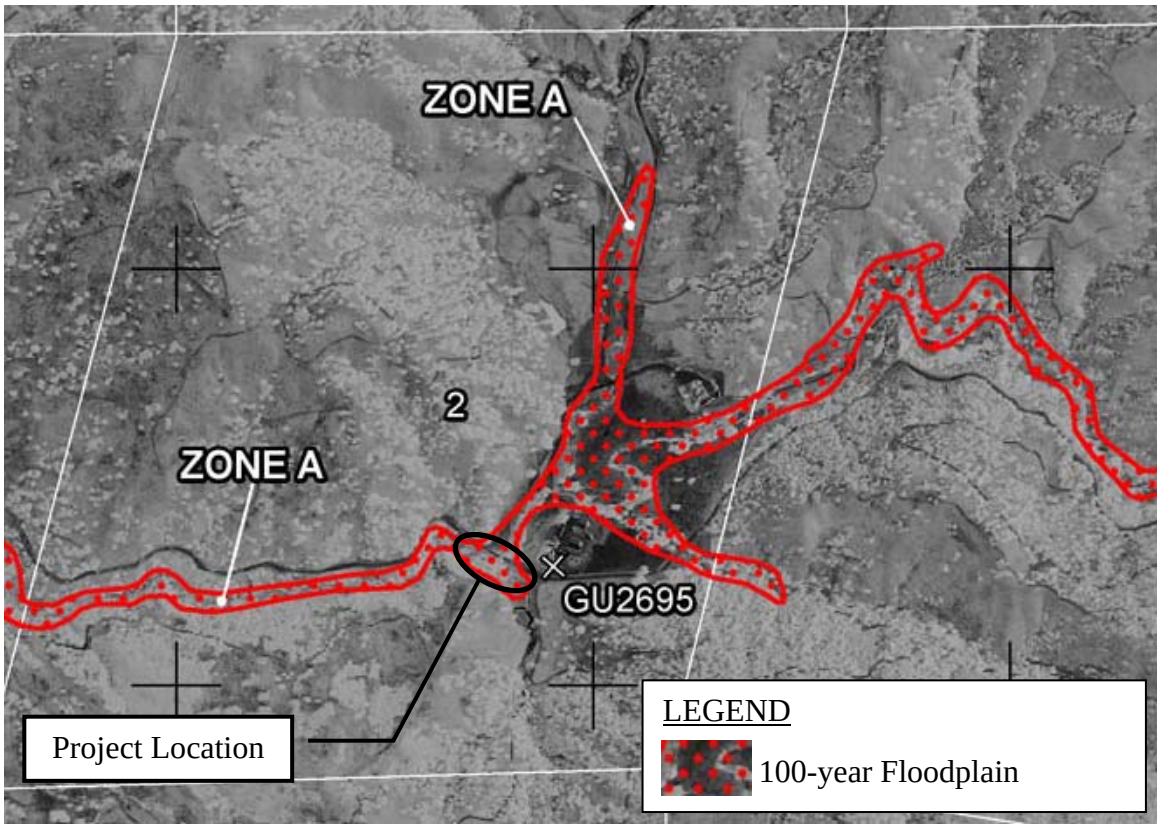

Figure 6. Tres Pinos Creek Floodplain at Existing Panoche Road Bridge Site
Source: FEMA

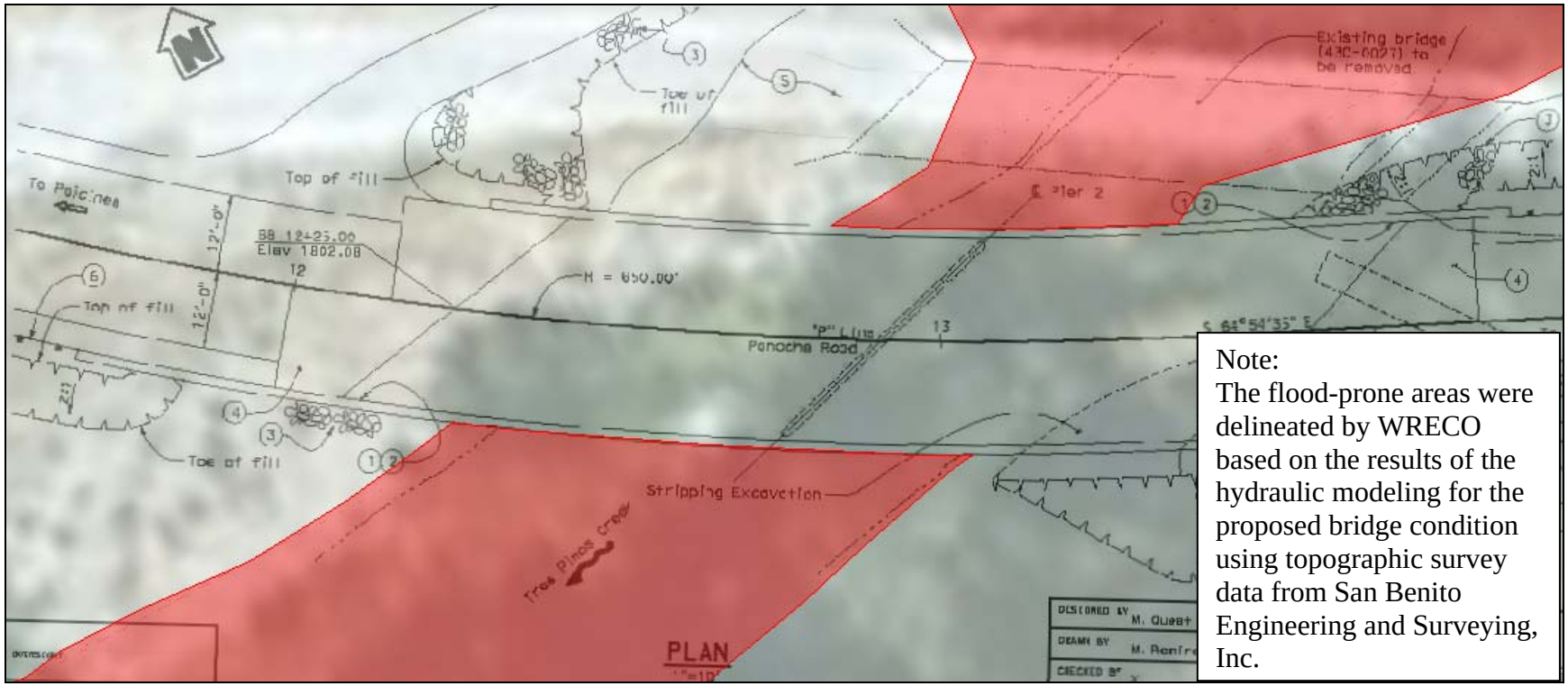

Figure 7. Proposed Bridge Alignment with Proposed 100-Year Flood-Prone Areas

Source: Quincy Engineering, Inc. (Proposed Bridge Plan), Google Earth (Background Aerial Image)

2.2 Design Discharges

Design discharges at the Project site were assessed using the USGS regional flood-frequency equations. The design discharges were verified with statistical analyses using gaging station records and applying a basin transfer to adjust the flows to the Project site. Three statistical distribution methods were used to estimate the flows: Log-Pearson Type III, generalized extreme value), and Wakeby.

The flows that were estimated using the USGS Regional Flood-Frequency Equations were more conservative and were adopted for this study.

The 100-year design discharge at the Project site was estimated to be:

- 4,020 cfs for Tres Pinos Creek
- 260 cfs for the unnamed tributary

The *Bridge Design Hydraulic Study Report* that was prepared for this Project by WRECO includes additional details regarding the hydrology at the Project site.

2.3 Hydraulic Assessment

The hydraulics at the Project site were evaluated using the Hydrologic Engineering Center River Analysis System (HEC-RAS) Version 4.1.0, which is hydraulic modeling software that was developed by the U.S. Army Corps of Engineers (USACE). The analyses were performed for the existing and proposed widening conditions for Panoche Road.

The results of the analysis indicated that the proposed replacement bridge would have the capacity to convey the 100-year design discharge. The existing bridge structure has a hydraulic opening of approximately 61 feet and has two piers in the channel. The replacement bridge would have a hydraulic opening of 92 feet with only one pier in the channel. The larger hydraulic opening in the proposed condition would allow for greater conveyance capacity, which would lower the water surface elevation and result in reduced backwater upstream of the bridge.

The water surface elevations upstream of the existing and proposed bridges are shown in Table 1. The two cross sections are shown to compare the water surface elevations at common locations, because the proposed bridge will be at a different alignment from the existing bridge.

Table 1. Water Surface Elevations in the Vicinity of the Panoche Road Bridge

River Station	Location	100-Year Water Surface Elevation (feet NGVD 29)	
		Existing Condition	Proposed Condition
1192	Upstream of the Existing Bridge	1,800.4	1,795.5
1137	Upstream of Proposed Bridge	1,796.9	1,795.0

The proposed bridge would result in reduced backwater and increased average channel velocities upstream of the bridge (relative to existing conditions). Increased channel velocities could negatively affect the soils on the east bank by increasing their erosive potential. The erosion of these soils could in turn have the potential to negatively affect the adjacent spring water box, which is used by the Wattis' ranch as a water source. Therefore, a rock weir was proposed to be constructed to more or less mimic the existing conditions. Different weir placements and dimensions were modeled to evaluate the hydraulic characteristics. The selected configuration is located near the existing bridge location and transverse to the flow direction. This location was selected through coordination with Quincy Engineering, Inc.

The 100-year water surface profile is shown in Figure 8, and the cross section at the upstream face of the proposed bridge is shown in Figure 9. The location of the weir was optimized such that it would not affect the hydraulics at the proposed bridge location. Further hydraulic discussions are detailed in the *Bridge Design Hydraulic Study Report* that was prepared for this Project by WRECO.

The lowest soffit elevation of the proposed bridge would be 1,798.7 feet NGVD 29, and the lowest soffit elevation of the existing bridge is 1,792.7 feet NGVD 29. The existing bridge currently does not meet the FHWA's freeboard criteria, while the proposed bridge would meet the FHWA's freeboard criteria of passing both the 100-year flood under the bridge and the 50-year flood with 2 feet of freeboard.

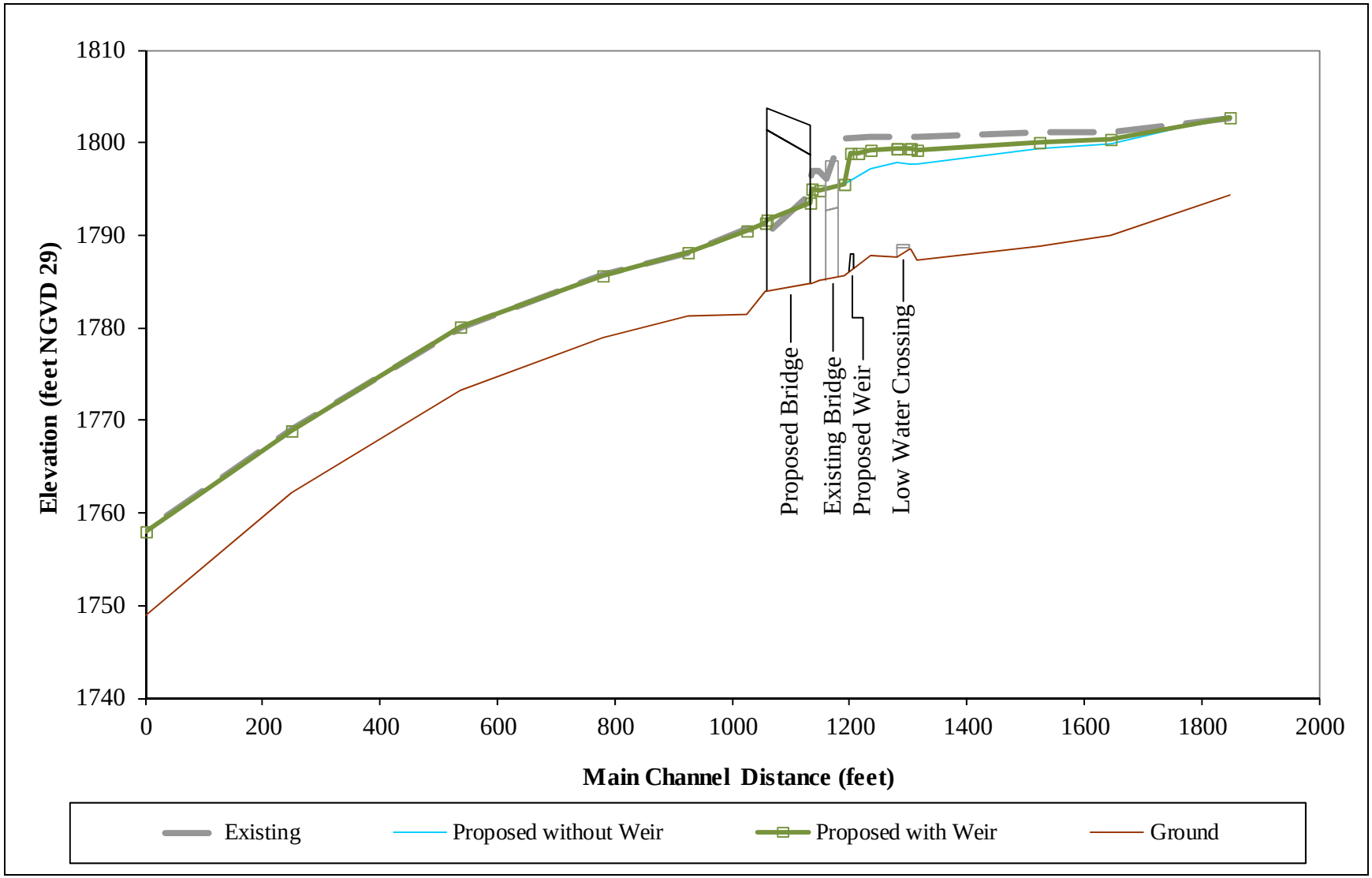

Figure 8. 100-Year Water Surface Profile for Tres Pinos Creek

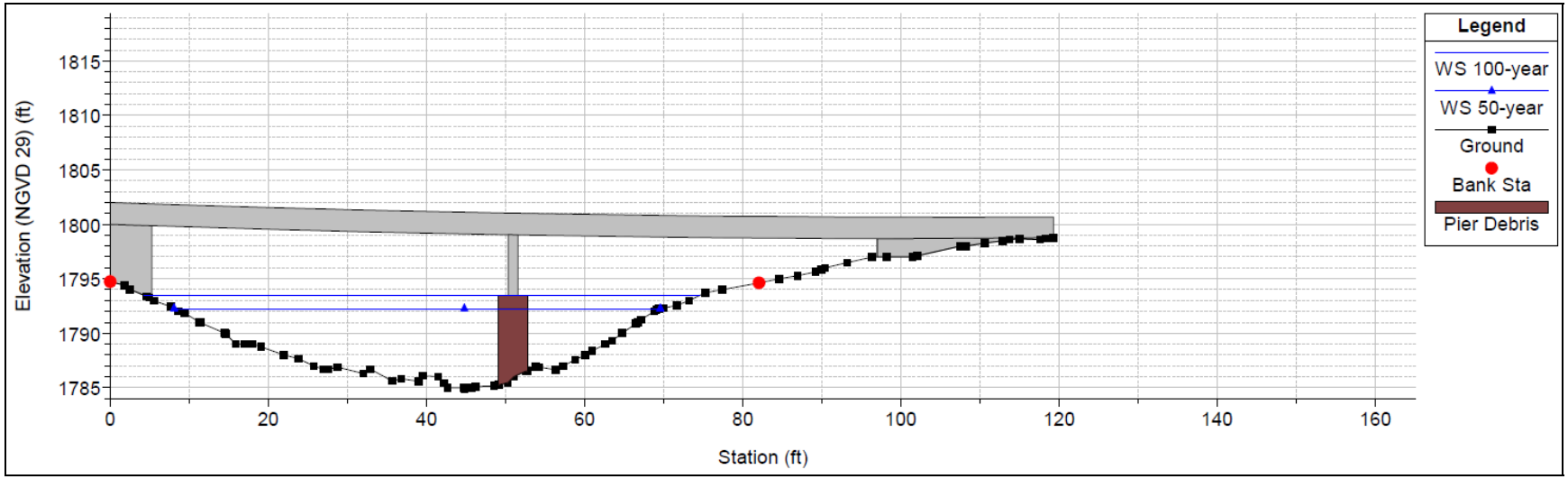

Figure 9. Upstream Face of Proposed Bridge

3 PROJECT EVALUATION

The existing Panoche Road bridge over Tres Pinos Creek does not meet the current standards for design speed or road/bridge width. The replacement bridge will be realigned downstream (southerly) of the existing bridge to improve the roadway geometry and maintain traffic on the existing alignment during construction.

Executive Order 11988 (Floodplain Management) directs all federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Requirements for compliance are outlined in Title 23, Code of Federal Regulations, Part 650, Subpart A (23 CFR 650A) titled "Location and Hydraulic Design of Encroachment on Floodplains."

The impacts to the floodplains were evaluated by comparing the hydraulics from the existing condition model with the hydraulics from the proposed condition model; see Section 2.3.

3.1 Risk Associated with Implementation of the Action

As defined by the FHWA, risk shall mean the consequences associated with the probability of flooding attributable to an encroachment. It shall include the potential for property loss and hazard to life during the service life of the bridge and roadway.

The potential risk associated with the implementation of the proposed action includes but is not limited to: 1) change in land use, 2) change in impervious surface areas, 3) fill inside the floodplain, or 4) change in the 100-year water surface elevation.

The potential adverse effects to the floodplain for the proposed condition would be minimal.

- The Project does not propose to change the land uses within the Project limits.

- The proposed bridge would result in increases in impervious surface areas because the bridge will be wider than existing conditions. However, the added impervious surface areas would be insignificant when compared to the overall watershed of Tres Pinos Creek.

- There will be some fill in the floodplain due to the placement of the proposed bridge pier and abutments. Compared to the existing bridge, the proposed bridge will have fewer piers (one in the proposed condition vs. two in the existing condition) and the bridge deck will be above the 100-year base flood while the existing bridge deck is overtopped by the base flood.

- The potential floodplain impacts resulting from the removal of the existing bridge and the construction of the proposed replacement bridge were assessed. The

proposed bridge would not result in an increase in water surface elevation in the floodplains. The results of the hydraulic modeling indicated that with the proposed bridge, there is a decrease in water surface elevation when compared to the existing bridge (see Section 2.3).

Therefore, the overall level of risk associated with the Project is considered to be low.

3.2 Impacts on Natural and Beneficial Floodplain Values

Natural and beneficial floodplain values include, but are not limited to: fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and ground water recharge.

Wetlands, waters, and habitats for sensitive species are anticipated to be impacted by the Project. The *Natural Environmental Study* prepared for the Project indicates that the Biological Study Area (BSA) defined for the Project consist of 4.43 ac. The natural lands in the BSA include the perennial Tres Pinos Creek, its associated willow riparian corridor, mixed oak woodland, California annual grassland, and pasture. Approximately 0.58 ac of annual grassland, arroyo willow riparian, and mixed oak woodland vegetation will be permanently impacted; temporary impacts to these same vegetation communities total approximately 1.11 ac. Special-status wildlife species that may occur in the BSA include Cooper's hawk, western burrowing owl, prairie falcon, least Bell's vireo (LBV), Pacific pond turtle, San Joaquin whipsnake, coast horned lizard, California tiger salamander (CTS), California red-legged frog (CRLF), and South Central California Coast steelhead (SCCC steelhead). Nesting birds are also likely to be present on or under the bridge or in vegetation within the BSA. Several of the species listed above are federally listed species under the Federal Endangered Species Act (FESA). The proposed Project may affect, but is not likely to adversely affect, CTS and LBV; both species are listed as threatened under FESA. The proposed Project may affect, and is likely to adversely affect, CRLF and SCCC steelhead; both species are listed as threatened under FESA. The Project will result in minor permanent and temporary impacts to riparian, wetland, and aquatic habitat.

The measures proposed to restore and preserve these natural and beneficial floodplain values are discussed in Section 3.5.

3.3 Support of Probable Incompatible Floodplain Development

As defined by the FHWA, the support of incompatible base floodplain development will encourage, allow, serve, or otherwise facilitate incompatible base floodplain development, such as commercial development or urban growth.

The purpose of the Project is to replace the bridge for improved roadway geometry. The replacement bridge will be designed to meet the FHWA freeboard criteria, and to meet current standards for design speed and road/bridge width. The proposed Project is not

intended to increase the capacity of the road, or encourage additional development in the Project area.

Therefore, the Project is not anticipated to support probable incompatible floodplain development.

3.4 Measures to Minimize Floodplain Impacts Associated with the Action

The design of the proposed bridge is such that floodplain impacts would be minimized. The proposed bridge was modeled to study the effects on the water surface elevations. The hydraulic modeling indicated that the proposed bridge would result in a lowering of water surface elevation.

There are no significant floodplain impacts associated with the Project. The impact that the proposed structure will have on base flood elevations will be negligible. Therefore, impacts to the floodplain are not anticipated. Because the Project impacts are minimal, no special measures would be required.

However, Best Management Practices (BMPs) should still be considered to minimize stormwater quality impacts. The implementation of these BMPs would help to reduce erosion, promote infiltration, and collect and treat roadway runoff.

3.5 Measures to Restore and Preserve the Natural and Beneficial Floodplain Values Impacted by this Action

Avoidance and minimization measures are proposed, including but not limited to standard BMPs, revegetation, implementing erosion control measures, implementing in-stream work windows, the installation and maintenance of Environmentally Sensitive Area fencing, restoration measures to pre-project conditions in temporary impact areas, or other requirements that are part of the Project's permit conditions. Project construction, including removal of the existing bridge and construction of the new bridge, is scheduled for June 1 to October 31, and will last for one season. Work within the live channel of Tres Pinos Creek will be limited to the period of July 15 through October 15. Permits or approvals may be required from the USACE, the California Department of Fish and Wildlife, and the Regional Water Quality Control Board.

3.6 Practicability of Alternatives to any Significant Encroachments

The FHWA defines a "significant encroachment" as a highway encroachment, and any direct support of likely base floodplain development, that would involve one or more of the following construction or flood-related impacts: 1) significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or provides a community's only evacuation route; 2) a significant risk; or 3) a significant adverse impact on the natural and beneficial floodplain values (1994).

Because this Project is not considered a significant encroachment, other alternatives were not evaluated.

3.7 Practicability of Alternatives to any Longitudinal Encroachments

As defined by the FHWA, a longitudinal encroachment is an action within the limits of the base floodplain that is longitudinal to the normal direction of the floodplain.

A longitudinal encroachment is "[a]n encroachment that is parallel to the direction of flow. Example: A highway that runs along the edge of a river is, usually considered a longitudinal encroachment." The requirement for consideration of avoidance alternatives must be included in a Location Hydraulic Study by including an evaluation and a discussion of the practicability of alternatives to any significant encroachment or any support of incompatible floodplain development.

The Project would be constructed roughly perpendicular to the direction of the flow of Tres Pinos Creek. Longitudinal encroachments due to the Project are not anticipated. Therefore, special alternatives to address longitudinal encroachment were not considered.

3.8 Coordination with Local, State, and Federal Water Resources and Floodplain Management Agencies

A floodplain map revision is not anticipated due to the negligible changes in water surface elevation resulting from the Project. Therefore, a Letter of Map Revision is not anticipated. Regulatory permits and approvals, as mentioned in Section 3.5, would be required as the Project enters into the final design phase.

4 REFERENCES

Google Earth. (2011). (Last accessed: December 7, 2011).

Federal Emergency Management Agency. (2009). *Flood Insurance Rate Map* for San Benito County, California and Incorporated Areas. Map Number 06069C0400D. Panel 400 of 955.

Federal Emergency Management Agency. (2009). *Flood Insurance Study* for San Benito County, California and Incorporated Areas. Flood Insurance study Number 06069CV000A.

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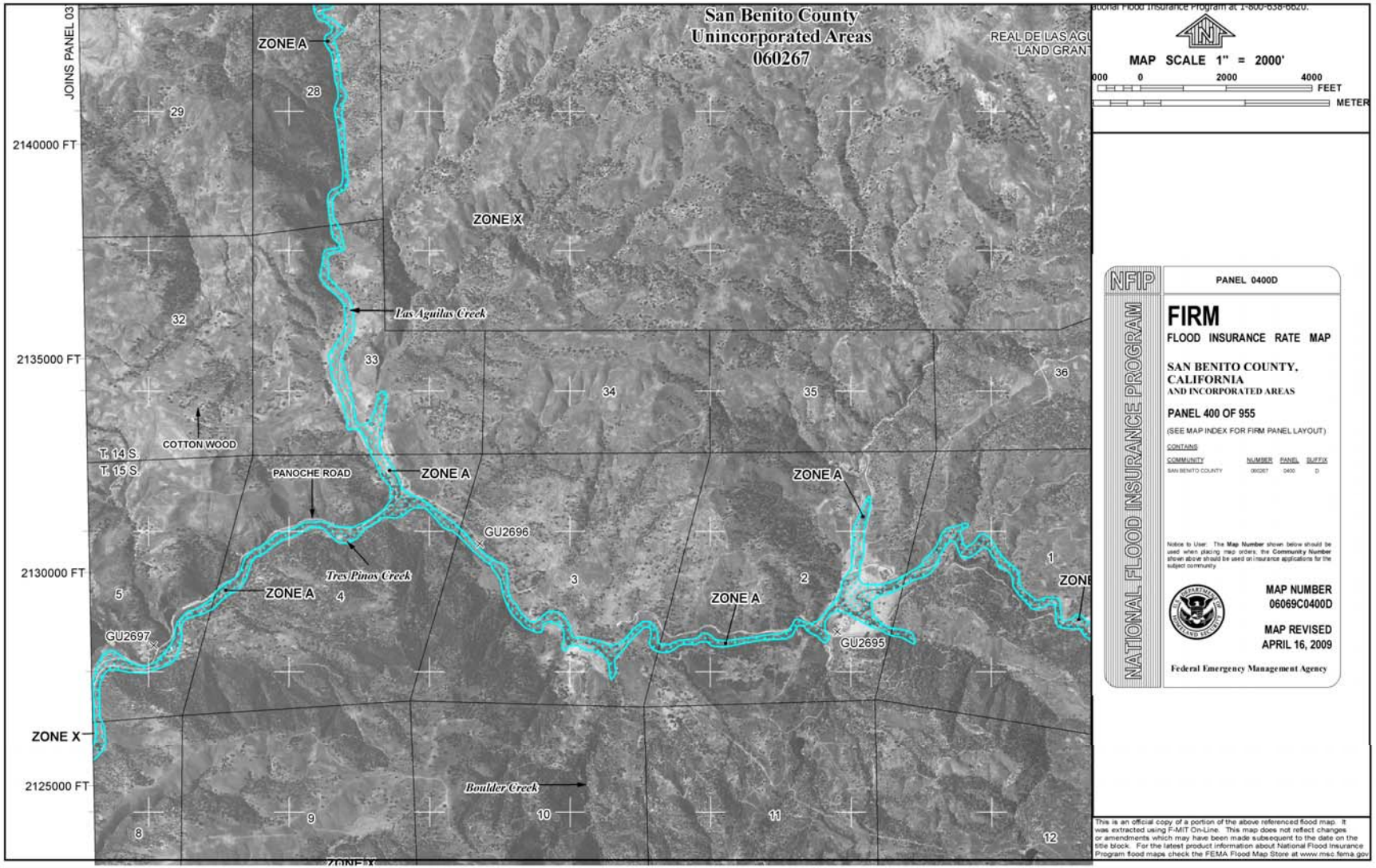
San Benito Engineering and Surveying, Inc. (2011). Topographic survey. May 2011.

United States Geological Survey. (2001). *California: Seamless USGS Topographic Maps (CDROM, Version 2.6.8, 2001, Part Number: 113-100-004*). National Geographic Holdings, Inc.

WRECO. (2013). *Bridge Design Hydraulic Study Report:* Panoche Road at Tres Pinos Creek Bridge Replacement Project. San Benito County, California. Bridge No. 43C-0027.

Appendix A Federal Emergency Management Agency Flood Insurance Rate Maps


San Benito County
Unincorporated Areas
060267
JOINS PANEL 03
ZONE A
ZONE X
Las Aguilas Creek
COTTON WOOD
T. 14 S.
T. 15 S.
PANOCHE ROAD
ZONE A
GU2696
Tres Pinos Creek
ZONE A
ZONE A
GU2697
GU2695
ZONE X
Boulder Creek
2140000 FT
2135000 FT
2130000 FT
2125000 FT
MAP SCALE 1" = 2000'
FEET
METER
NFIP
PANEL 0400D
FIRM
FLOOD INSURANCE RATE MAP
SAN BENITO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 400 OF 955
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
SAN BENITO COUNTY 060267 0400 D
MAP NUMBER
06069C0400D
MAP REVISED
APRIL 16, 2009
Federal Emergency Management Agency
NATIONAL FLOOD INSURANCE PROGRAM

1243 Alpine Road, Suite 108
Walnut Creek, CA 94596
Phone: 925.941.0017
Fax: 925.941.0018
www.wreco.com

Memorandum

Date: **October 8, 2021**

To: **Carolyn Davis – Quincy Engineering, Inc.**

From: **Han-Bin Liang and Wana Chiu – HDR|WRECO**

Project: **Panoche Road at Tres Pinos Creek Bridge Replacement Project**
San Benito County, California
Federal Aid Project Number: BRLS-5943(056); San Benito County Project Number: 698; Existing Bridge No. 43C0027

Subject: **Supplemental Location Hydraulic Study**

Introduction

The purpose of this *Memorandum* is to supplement the *Location Hydraulic Study Report* (WRECO, 2013) for the Panoche Road at Tres Pinos Creek Bridge Replacement Project (Project). The hydraulic analysis was revised to address comments from the California Department of Transportation (Caltrans) and resource agencies, which resulted in revised rock slope protection (RSP) in the area upstream (north) of the proposed bridge.

Hydraulic Analysis

The hydraulic assessment was performed using the Hydrologic Engineering Center River Analysis System (HEC-RAS) Version 5.0.7 (United States Army Corps of Engineers [USACE], 2019). Mounded RSP was modeled at River Stations (RS) 1525 and 1316 by modifying the cross sectional geometry. Based on the results of the previous hydraulic analysis, the proposed bridge resulted in reduced backwater effects upstream of the bridge, or a lowering of water surface elevations relative to the existing condition. Based on the results of the updated hydraulic analysis of the proposed bridge with the mounded RSP, there would also be reduced backwater effects upstream of the bridge, or a lowering of water surface elevations, relative to the existing condition (see Figure 1).

1243 Alpine Road, Suite 108
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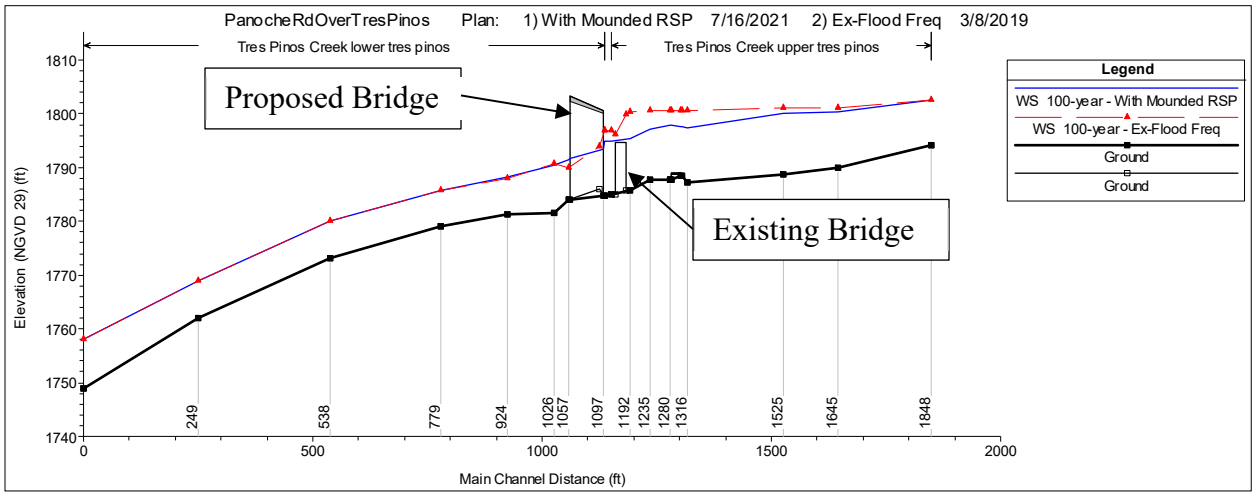

Figure 1. 100-year Water Surface Profile Comparison

The hydraulic model indicates that the existing bridge is overtopped during the 100-year flow, and the proposed bridge would clear the 100-year flow (see Figure 2 for the existing bridge cross section and Figure 3 for the proposed bridge cross section).

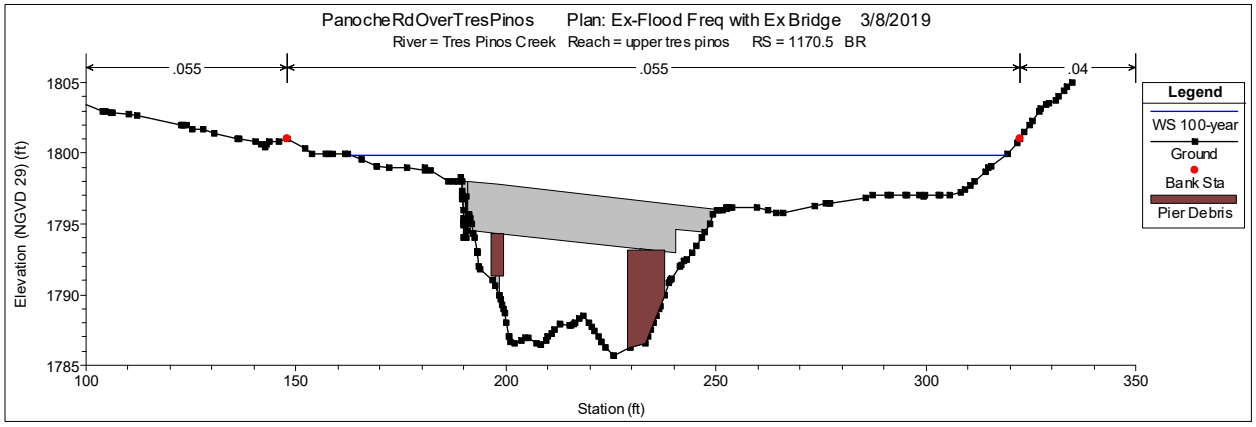

Figure 2. Existing Bridge Cross Section (Facing Downstream/Southwest)

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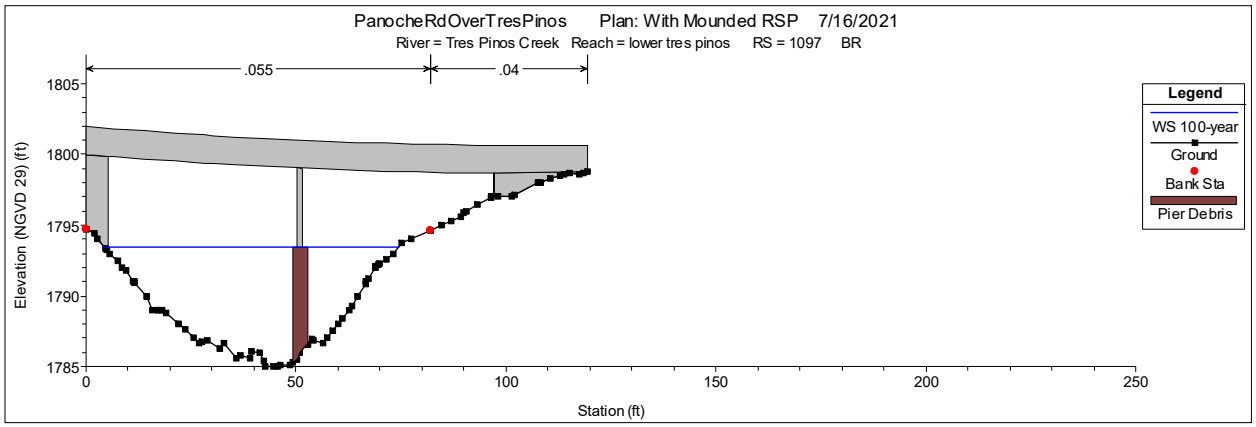

Figure 3. Proposed Bridge Cross Section (Facing Downstream/Southwest)

Project Evaluation

Based on the hydraulic analysis, the Project Evaluation from the *Location Hydraulic Study Report* (WRECO, 2013) is unchanged. The updated Technical Information for Location Hydraulic Study and Floodplain Evaluation Report Summary are included in the appendix.

References

WRECO. (2013). *Location Hydraulic Study Report*. Panoche Road at Tres Pinos Creek Bridge Bridge Replacement Project.

United States Army Corps of Engineers - Hydrologic Engineering Center. (2019). River Analysis System. HEC-RAS. (Version 5.0.7) [Computer software]. March 2019. Available from: <https://www.hec.usace.army.mil/software/hec-ras/download.aspx>

Appendices

- Technical Information for Location Hydraulic Study
- Floodplain Evaluation Report Summary

TECHNICAL INFORMATION FOR LOCATION HYDRAULIC STUDY

Dist. 5 Co. San Benito Rte. Panoche Road Project ID N/A
Federal-Aid Project Number: BRLS-5943(056)

Floodplain Description:
The Project is located within a Zone A floodplain, which is an area that is subject to inundation by a 1%-annual-chance floodplain. These areas are mapped by approximate methods.

1. Description of Proposal *(include any physical barriers i.e. concrete barriers, sound walls, etc. and design elements to minimize floodplain impacts)*
The project proposes to replace the existing bridge with a new longer and wider bridge on an improved roadway alignment. The proposed scope of work for this project includes bridge demolition, channel slope protection, approach roadway work, bridge construction, metal beam guard rails, bridge railing, temporary traffic control, right-of-way acquisition and temporary construction easements, utility relocation, and environmental mitigation. The total length of the project is approximately 685 feet, which includes approximately 550 feet of roadway work beyond the bridge abutments. The roadway work consists of realigning the roadway downstream (southerly) of the existing bridge. The proposed bridge will have two equal spans and will be approximately 132 feet long by 34 feet, 10 inches wide. The existing bridge structure has a hydraulic opening of approximately 61 feet and has two piers in the channel. The replacement bridge would have a hydraulic opening of approximately 92 feet with only one pier in the channel. The larger hydraulic opening in the proposed condition would allow for greater conveyance capacity, which would lower the water surface elevation and result in reduced backwater upstream of the bridge. Rock slope protection is also included upstream of the bridge to protect the upstream east bank.

2. ADT: Current 800 (2010) Projected 1,024 (2036)

3. Hydraulic Data: Base Flood Q100= 4,020 CFS
WSE100= 1,796.9 ft NGVD 29 (existing); 1,795.0 ft NGVD 29 (proposed) *The flood of record, if greater than Q100:*
Q= N/A CFS WSE= N/A
Overtopping flood Q= N/A CFS WSE= N/A

Are NFIP maps and studies available? NO ____ YES ✓

4. Is the highway location alternative within a regulatory floodway?
NO ✓ YES ____

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain.

Potential Q100 backwater damages:

A.	Residences?	NO ✓	YES ____
B.	Other Bldgs?	NO ✓	YES ____
C.	Crops?	NO ✓	YES ____
D.	Natural and beneficial Floodplain values?	NO ✓	YES ____

"Natural and beneficial flood-plain values" shall include but are not limited to fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.

6. Type of Traffic:

A.	Emergency supply or evacuation route?	NO ____ YES ✓
B.	Emergency vehicle access?	NO ____ YES ✓
C.	Practicable detour available?	NO ✓ YES ____
D.	School bus or mail route?	NO ____ YES ✓

7. Estimated duration of traffic interruption for 100-year event hours: N/A

TECHNICAL INFORMATION FOR LOCATION HYDRAULIC STUDY cont.

Dist. 5 Co. San Benito Rte. Panoche Road P.M. N/A
Federal-Aid Project Number: BRLS-5943(056)
Project ID N/A Bridge No. 43C0027

8. Estimated value of Q100 flood damages (if any) – moderate risk level.

A.	Roadway	$ N/A
B	Property	$ N/A
	Total	$ N/A

9. Assessment of Level of Risk

Low ✓
Moderate
High

For High Risk projects, during design phase, additional Design Study Risk Analysis may be necessary to determine design alternative.

PREPARED BY:

Signature:
I certify that I have conducted a Location Hydraulic Study consistent with 23 CFR 650 and that the information summarized in items numbers 3, 4, 5, 7, and 9 of this form is accurate.

_____ *Date* _____
District Hydraulic Engineer *(capital and 'on' system projects)*

_____ *Date* _____
Local Agency/Consulting Hydraulic Engineer *(local assistance projects)*

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible Floodplain development? NO ✓ YES

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

I certify that item numbers 1, 2, 6 and 8 of this Location Hydraulic Study Form are accurate and will ensure that Final PS&E reflects the information and recommendations of said report:

_____ *Date* _____
District Project Engineer *(capital and 'on' system projects)*

_____ *Date* _____
Local Agency Project Engineer (*local assistance projects)*

CONCURRED BY:
I have reviewed the quality and adequacy of the floodplain submittal consistent with the attached checklist, and concur that the submittal is adequate to meet the mandates of 23 CFR 650.

_____ *Date* _____
District Project Manager *(capital and 'on' system projects)*

_____ *Date* _____
Local Agency Project Manager *(Local Assistance projects)*

TECHNICAL INFORMATION FOR LOCATION HYDRAULIC STUDY cont.

Dist. 5 Co. San Benito Rte. Panoche Road P.M. N/A
Federal-Aid Project Number: BRLS-5943(056)
Project ID N/A Bridge No. 43C0027

_____ *Date* _____
District Local Assistance Engineer *(or District Hydraulic Branch for very complex projects or when required expertise is unavailable. Note: District Hydraulic Branch review of local assistance projects shall be based on reasonableness and concurrence with the information provided).*

I concur that the natural and beneficial floodplain values are consistent with the results of other studies prepared pursuant to 23 CFR 771, and that the NEPA document or determination includes environmental mitigation consistent with the Floodplain analysis.

_____ *Date* _____
District Senior Environmental Planner *(or Designee)*

Note: If a significant floodplain encroachment is identified as a result of floodplains studies, FHWA will need to approve the encroachment and concur in the Only Practicable Alternative Finding.

FLOODPLAIN EVALUATION REPORT SUMMARY

Dist. 5 Co. San Benito Rte. Panoche Road K.P. N/A
Federal-Aid Project Number *(Local Assistance)* BRLS-5943(056)
Project No.: 698 Bridge No. 43C0027
Limits: The limits of the Project work are at the bridge and 550 ft of approach roadway. The total length of the Project is approximately 685 ft.

Floodplain Description: The Project is located within a Zone A floodplain, which is an area that is subject to inundation by a 1%-annual-chance floodplain. These areas are mapped by approximate methods.

		No	Yes
1.	Is the proposed action a longitudinal encroachment of the base floodplain?	✓	
2.	Are the risks associated with the implementation of the proposed action significant?	✓	
3.	Will the proposed action support probable incompatible floodplain development?	✓	
4.	Are there any significant impacts on natural and beneficial floodplain values?	✓	
5.	Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain.	✓	
6.	Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q).	✓	
7.	Are Location Hydraulic Studies that document the above answers on file? If not explain.		✓

PREPARED BY:

_____ *Date* _____
District Project Engineer *(capital and 'on' system projects)*

_____ *Date* _____
Local Agency/Consulting Hydraulic Engineer *(local assistance projects)*

CONCURRED BY:

_____ *Date* _____
District Project Manager *(capital and 'on' system projects)*

_____ *Date* _____
District Local Assistance Engineer *(Local Assistance projects)*

I concur that impacts to natural and beneficial floodplain values are consistent with the results of other studies prepared pursuant to 23 CFR 771, and that the NEPA document or determination includes environmental mitigation consistent with the Floodplain analysis.

_____ *Date* _____
District Senior Environmental Planner *(or Designee)*

Note: If a significant floodplain encroachment is identified as a result of floodplains studies, FHWA will need to approve the encroachment and concur in the Only Practicable Alternative Finding.

APPENDIX F

TECHNICAL NOISE MEMORANDUM

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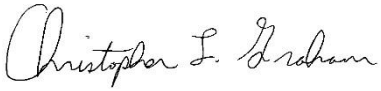
TECHNICAL NOISE MEMORANDUM

PANOCHE ROAD BRIDGE REPLACEMENT PROJECT RESTART

SAN BENITO COUNTY, CALIFORNIA

BRLSZ-5938(176)

PREPARED BY:



CHRIS GRAHAM
SENIOR ENVIRONMENTAL PLANNER
LSA
201 CREEKSIDE RIDGE COURT #250
ROSEVILLE, CALIFORNIA 95678

FOR:

KELSO VIDAL
ENVIRONMENTAL PLANNER
CALTRANS D5: ENVIRONMENTAL STEWARDSHIP BRANCH

February 2021

INTRODUCTION

San Benito County, with funding administered through the Federal Highway Administration, and in coordination with the California Department of Transportation (Caltrans), proposes to replace the Panoche Road Bridge (43C-0027) over Tres Pinos Creek with a longer and wider bridge.

The proposed Project is located in a rural portion of San Benito County along Panoche Road approximately 9.5 miles east of Airline Highway and approximately 25 miles west of Interstate 5. The Project site is located on one privately owned parcel, APN 0271500030, and San Benito County has a prescriptive easement for Panoche Road through the parcel. **Figure 1: Regional Location** and **Figure 2: Project Vicinity and Sensitive Receptor Location** shows the location of the proposed Project on a regional and local basis (and sensitive receptor), respectively. The majority of the land surrounding the site is vacant of development and is in a natural, vegetated state. A portion of the parcel is occupied by a single-family residential unit, ancillary ranch style storage buildings, and a pump house located on a natural spring, adjacent to Tres Pinos Creek.

The Project is needed as the existing bridge does not meet current design standards for speed or width. The purpose of the Project is to:

- Provide long-term safe vehicular access across Tres Pinos Creek.
- Comply with County, Caltrans, and American Association of State Highway and Transportation Officials design standards for design and construction of the approach roadways and replacement bridge.
- Additional objectives include avoiding or minimizing environmental impacts, reducing right-0f-way and land use impacts, meeting average daily traffic (ADT) requirements, and protecting against bank erosion.

PROJECT ALTERNATIVES

The environmental documentation for the proposed Project evaluates one Build Alternative. A No Project/No Build Alternative is also evaluated as required by the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

No Build Alternative

In the No Build Alternative, no improvements to Panoche Road Bridge would be implemented. Panoche Road Bridge would remain in its current state and thus would continue to not meet current design standards for speed or width.

Build Alternative (Proposed Project)

The Build Alternative would include bridge replacement and roadway approach modification as well as existing bridge demolition.

Actions associated with the proposed Project includes the following: existing bridge demolition; channel rock slope protection (RSP) in Tres Pinos Creek; new bridge construction; approach roadway work; metal beam guard rail installation; bridge railing installation; various construction activities;

temporary traffic control during construction activities; right-of-way acquisition and temporary construction easement acquisition; and, utility relocation. The total length of the proposed Project will be approximately 685 feet, which includes approximately 550 feet of roadway work beyond the bridge abutments. The Project area will total approximately 3.2 acres.

The new bridge will be approximately 132 feet long with two equal spans, by approximately 35 feet wide (two 12-foot wide lanes with adjacent 4-foot wide paved shoulders on each side). A shorter length alternative crash cushion system will be installed at the northwest corner of the new bridge to maintain access to a residential gated driveway located adjacent to the Project boundary. A stream diversion will be implemented during construction of the bridge pier, as water in this section of Tres Pinos Creek generally flows year-round, fed mostly by underground springs in the summer months. The new bridge type is a cast-in-place (CIP) pre-stressed concrete slab with a structure depth of 2 feet. Bridge construction will require falsework in the Tres Pinos Creek channel spanning over the wetted creek area.

Roadway work would consist of realigning the roadway downstream (southerly) of the existing bridge to allow construction of the new bridge in one stage while maintaining traffic flow on the existing alignment during construction. The proposed shifted roadway alignment would improve roadway geometry by eliminating the slight "S" curve over the existing bridge.

Demolition of the existing bridge will require construction of a temporary decking or other system over the creek channel to avoid dropping debris into the water. The existing bridge will be removed after construction of the new bridge is completed. Scour countermeasures will be used leaving either all or a portion of the existing east abutment in place and removing the west abutment. The creek bank will be re-graded to remove a portion of the artificial fill material that was placed during construction of the existing bridge.

An unnamed tributary channel runs east to west on the west bank of Tres Pinos Creek adjacent to the existing bridge. This tributary discharges into Tres Pinos Creek. The channel currently runs between the southern edge of Panoche Road and the toe of a steep hillside adjacent to the road, past the existing east bridge abutment and into the creek. Because the alignment of the roadway is shifting to the south, this channel will be covered by the construction of the new road bed; as such, a new channel will be graded along the south edge of the realigned road. A portion of the realigned channel will be rectangular in shape, and bound between the vertical wing wall of the bridge (at the southeast corner of the bridge) and a vertical retaining wall that will retain a new cut slope in the adjacent hillside. The portion of channel realignment will be approximately 130 feet long. A retaining will be constructed against the hillside east of the creek and south of the roadway to minimize excavation into the hillside. The wall will allow the unnamed tributary to remain as an open channel and minimize biological impacts by allowing for wildlife passage. The wall length is estimated to be 140 feet long.

A natural spring located on the private parcel, east of the Project site, provides significant water supply for a large ranch operation. The landowner has a spring box and pump house located approximately 80 feet northeast of the Project site. Construction activities at the Project site will be monitored to avoid impacts to the property owner's natural spring and the supplying aquifer. Rock slope protection will be placed on the banks of Tres Pinos Creek to protect the abutment from

hydraulic scour. The rock slope protection blanket will continue upstream on the east bank to mitigate for increased channel velocities (in the vicinity of the natural spring) that result from removing the existing bridge and widening the channel with the longer bridge. The rock slope protection blanket will be placed on the existing bank surface, without excavating into the bank, in order to avoid affecting the natural spring.

REGULATORY REQUIREMENTS

Caltrans Protocol Requirements

The Caltrans Traffic Noise Analysis Protocol[1], which supports 23 Code of Federal Regulations (CFR) 772.5, identifies a project as Type I that involves one or more of the following:

1. The construction of a highway on a new location; or

2. The physical alteration of an existing highway where there is either:

    a. Substantial horizontal alteration: A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition, or

    b. Substantial vertical alteration: A project that removes shielding thereby exposing the line-of-sight between the receptor and the traffic noise source. This is done by altering either the vertical alignment of the highway or the topography between the highway traffic noise source and the receptor; or

3. The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a high-occupancy vehicle (HOV) lane, high-occupancy toll (HOT) lane, bus lane, or truck climbing lane; or

4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or

5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or

6. Restriping existing pavement for the purpose of adding a through traffic lane or an auxiliary lane; or

7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

A project that does not meet one or more of the requirements mentioned above is considered a Type III project. While a Type III project does not require an operation related noise analysis, a

[1] State of California, California State Transportation Agency, Department of Transportation, 2011. *Traffic Noise Analysis Protocol*. May.

memo presenting the noise impacts associated with construction activities is typically completed. The proposed Project is considered a Type III project because of the following:

- The Project does not involve construction of a highway on a new location;
- The Project would not halve the horizontal distance between the existing bridge and nearest sensitive receptor;
- The Project does not incorporate a substantial vertical alteration;
- The Project does not include the addition of a through-traffic lane;
- The Project does not include the addition of auxiliary lane;
- The Project does not include addition or relocation of interchange lanes or ramps;
- The Project does not include restriping existing pavement for the purpose of adding a through – or auxiliary-traffic lane;
- The Project does not include the addition or alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

Construction Standards

Caltrans Standard Specifications in Section 14-8.02 would be required to minimize construction noise impacts on sensitive land uses near the Project site. Caltrans Standard Specifications requires noise levels from the Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., to be at or below 86 A-weighted decibels (dBA) maximum instantaneous noise level (L_{max}) at a distance of 50 feet from the job site.[2]

San Benito County Noise Standards

County Code. Chapter 19.39.051(H) and Chapter 25.37.035(E)(2) of the San Benito County Code exempts temporary construction, demolition or maintenance of structures between the hours of 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays. As such, construction noise generated by the Project would be exempt to Chapter 19.39 Noise Control Regulations and Chapter 25.37 of the County Code as long as construction activities occur Monday through Saturday between 7:00 a.m. and 7:00 p.m.[3]

EXISTING NOISE SENSITIVE RECEPTORS

The Project study area is located in a rural portion of San Benito County and is mainly occupied by natural terrain, a creek, and a single-family residential unit on parcel number APN 0271500030. The single-family residential unit is the nearest sensitive receptor to the Project study area. The closest general construction activities associated with the proposed Project would occur within 140 feet of the nearest sensitive receptor. **Figure 2** shows the location of the sensitive receptor in comparison to the location of the nearest area of the Project where construction activity will occur.

[2] State of California, California State Transportation Agency, Department of Transportation, 2018. *Standard Specifications*.

[3] San Benito County Code of Ordinances, Chapter 19.39 Noise Control Regulations, Section 19.39.051(H) Exemptions.

LONG-TERM OPERATIONAL NOISE IMPACTS

No Build Alternative

Under the No Build Alternative, no improvements to the proposed Project would be made other than routine bridge and roadway maintenance. Noise-sensitive receptors located within the Project area would not be exposed to a new traffic noise impact.

Build Alternative

Since the construction of the proposed Project does not meet any of the Type I requirements described in the Traffic Noise Protocol, a detailed Type I long-term operational noise analysis is not required for the proposed Project. Rather, the proposed Project is classified as a Type III project which only requires an analysis of noise associated with Project construction.

This technical noise memorandum is provided to identify Project-related construction noise impacts and prescribe appropriate avoidance, minimization, and/or mitigation measures in order to comply with Caltrans Standard Specification in Section 14-8.02, Chapter 19.39 of the San Benito County Code (Noise Control Regulations) and the San Benito County General Plan Noise Element.

CONSTRUCTION NOISE IMPACTS

No Build Alternative

No construction activities would occur under the No Build Alternative and no short-term noise impacts would result.

Build Alternative

Two types of short-term noise impacts would occur during Project construction, including: 1) equipment delivery and construction worker commutes; and 2) Project construction operations.

The first type of short-term construction noise would result from transport of construction equipment and materials to the Project site and construction worker commutes. These transportation activities would incrementally raise noise levels on access roads leading to the site. It is expected that larger trucks used in equipment delivery will generate higher noise impacts than trucks associated with worker commutes. The single-event noise from equipment trucks passing at a distance of 50 feet from a sensitive noise receptor would reach a maximum level of 84 dBA L_{max}. However, the pieces of heavy equipment for grading and construction activities would be moved on-site just one time, then would remain for the duration of each construction phase. This one time trip, when heavy construction equipment is moved on and off-site, would not add to the daily traffic noise in the Project vicinity. Furthermore, the projected traffic from the construction worker commutes would be minimal when compared to existing traffic volumes on Panoche Road and other affected streets, and its associated long-term noise level change would not be perceptible. Therefore, equipment transport noise and construction-related worker commute impacts would be short-term and would not be substantial.

The second type of short-term noise impact is related to noise generated during Project construction. Construction is performed in discrete steps, each having its own mix of equipment

and, consequently, its own noise characteristics. These various sequential phases will change the character of the noise generated, as well as the noise levels in the study area as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. **Table A: Typical Construction Equipment Noise Levels** lists typical construction equipment noise levels (L_{max}) recommended for noise impact assessments based on a distance of 50 feet between the equipment and a noise receptor.

Table A: Typical Construction Equipment Noise Levels

Equipment Description	Maximum Noise Level (L_{max}) at 50 Feet [1]
Backhoes	80
Compactor (ground)	80
Cranes	85
Dozers	85
Dump Trucks	84
Excavators	85
Flat Bed Trucks	84
Front-end Loaders	80
Graders	85
Impact Pile Drivers	95
Jackhammers	85
Pick-up Truck	55
Pneumatic Tools	85
Pumps	77
Rock Drills	85
Rollers	85
Scrapers	85
Tractors	84

Source: *Federal Highway Administration Roadway Construction Noise Model* (January 2006).

[1] Maximum noise levels were developed based on Spec 721.560 from the Central Artery/Tunnel (CA/T) program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.

Note: Noise levels reported in this table are rounded to the nearest whole number.

L_{max} = maximum instantaneous sound level

Normal construction operations, specifically during the site preparation phase, which includes excavation and grading, may generate high noise levels from an active construction area. Earthmoving equipment includes excavating machinery such as excavators, bulldozers, and front-end loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings.

Noise associated with the use of earthmoving construction equipment is estimated between 55 and 85 dBA L_{max} at a distance of 50 feet from each piece of equipment. As seen in **Table A**, the maximum noise level generated by each excavator, bulldozer and pick-up truck is assumed to be approximately 85 dBA $L_{max,}$ 85 dBA $L_{max,}$ and 55 dBA L_{max} at 50 feet, respectively. Each piece of

construction equipment operates as an individual point source. Utilizing the following equation, a composite noise level can be calculated when multiple sources of noise operate simultaneously:

$$Lmax\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

The conservative composite noise level during this phase of construction would be 88 dBA L_{max} at a distance of 50 feet from an active construction area. Once composite noise levels are calculated, reference noise levels can then be adjusted for distance using the following equation:

$$Lmax\ (at\ distance\ X) = Lmax\ (at\ 50\ feet) - 20 * \log_{10}\left(\frac{X}{50}\right)$$

In general, this equation shows that doubling the distance would decrease noise levels by 6 dBA while a halving the distance would increase noise levels by 6 dBA.

The closest residential unit, the single-family home on parcel APN 0271500030, 140 feet from the nearest general construction activity. The results of the equations above show that this residential unit may be subject to short-term noise reaching 79.1 dBA L_{max} generated by general construction activities. The short-term construction related noise levels that the single-family residential unit would be exposed to does not exceed Caltrans construction noise thresholds and would be exempt from the San Benito County Code based on Section 19.39.051(H) as long as construction activities occur only between 7:00 a.m. to 7:00 p.m. Monday through Saturday, as described above. Mitigation measures would not be required to reduce construction noise levels in order to comply with County and Caltrans noise requirements; however, standard construction noise avoidance and minimization measures are suggested to reduce noise levels generated by construction equipment in the general area of the Project.

CONSTRUCTION AVOIDANCE, MINIMIZATOIN AND MITTIGATION MEASURES

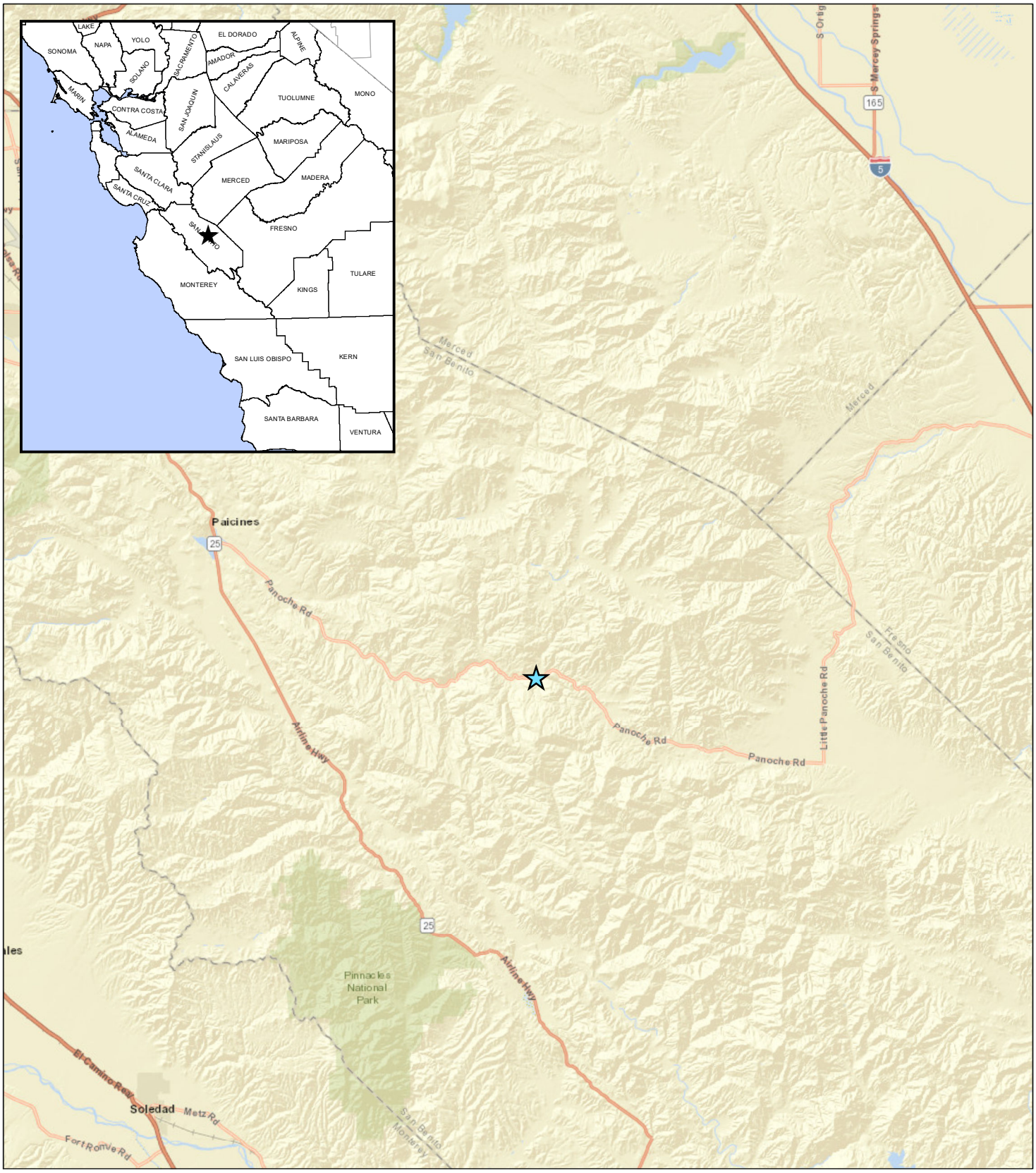
The following minimization measures shall be incorporated to reduce construction noise to surrounding receptors:

1. Construction activities on the Project site shall occur Monday through Saturday between the hours of 7:00 a.m. and 7:00 p.m. to comply with construction noise exemptions set forth by County Code Chapters 19.39 and 25.37. No construction activity may occur on the Project site outside of these hours, on a Sunday, or on federal/state holidays.

2. The Contractor shall equip all internal combustion engines with the manufacturer-recommended muffler and shall not operate any internal combustion engine on the job site without its appropriate muffler.

These minimization measures will reduce construction noise levels at the nearest sensitive receptor.

Attachments: Figure 1: Regional Location
Figure 2: Project Vicinity and Sensitive Receptor Location



LEGEND

Project Location

FIGURE 1

Panoche Road Bridge (No. 43C0027) over
Tres Pinos Creek Replacement Project
San Benito County, California; Caltrans District 5
Federal Project No. BRLO-5943(056)

Regional Location

N

0 2.5 5

Miles

SOURCE: ESRI World Street Map (05/2020)

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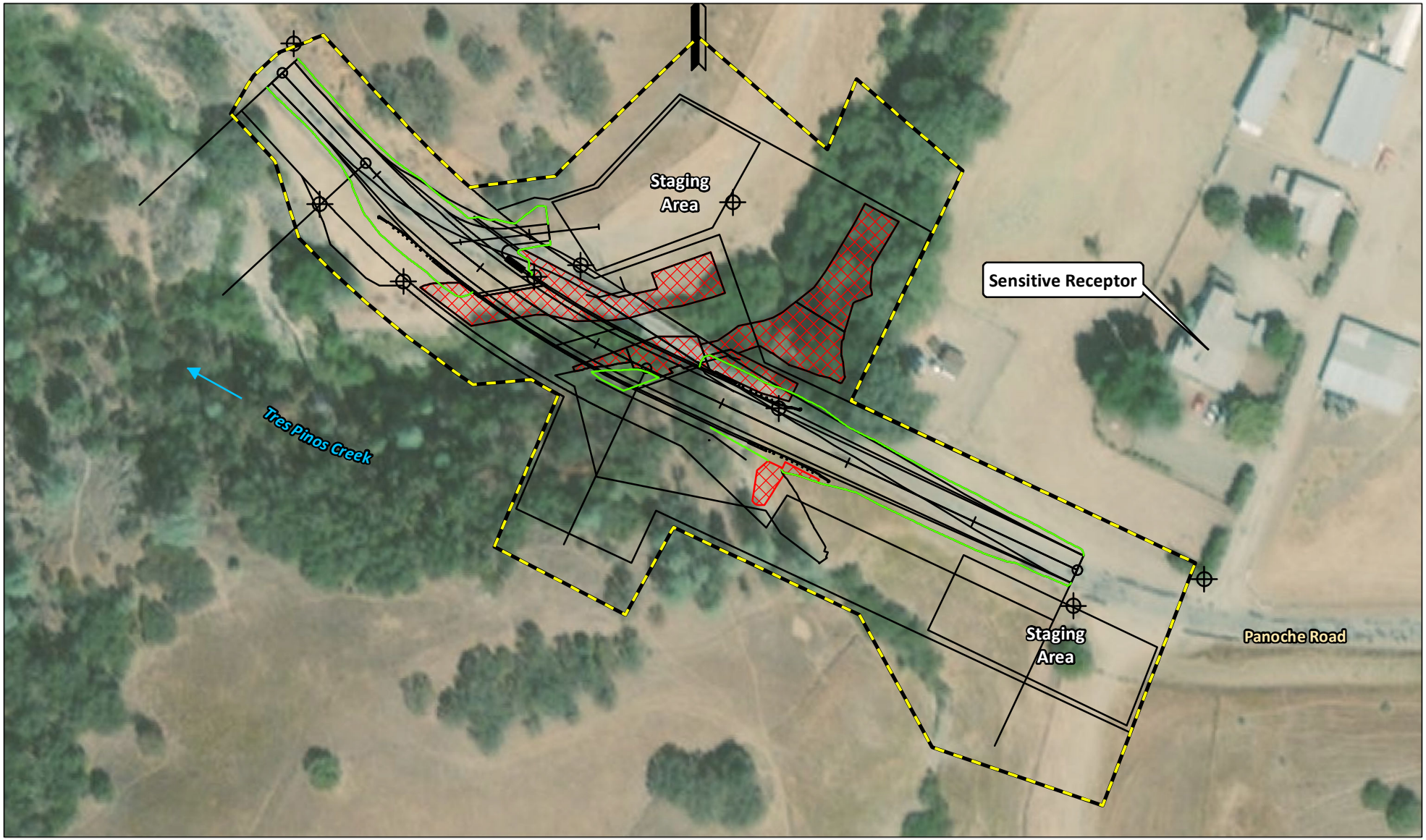

LEGEND

- Project Boundary - (3.66 ac)
- Project Design
- Rock Slope Protection
- Cut and Fill

0 50 100
FEET

SOURCE: Basemap - ESRI World Imagery (10/2018); Design - Quincy Engineering (12/2020)

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FIGURE 2

Panoche Road Bridge (No. 43C0027) over
Tres Pinos Creek Replacement Project
San Benito County, California; Caltrans District 5
Federal Project No. BRLO-5943(056)

Project Boundary and Design