PUBLIC NOTICE

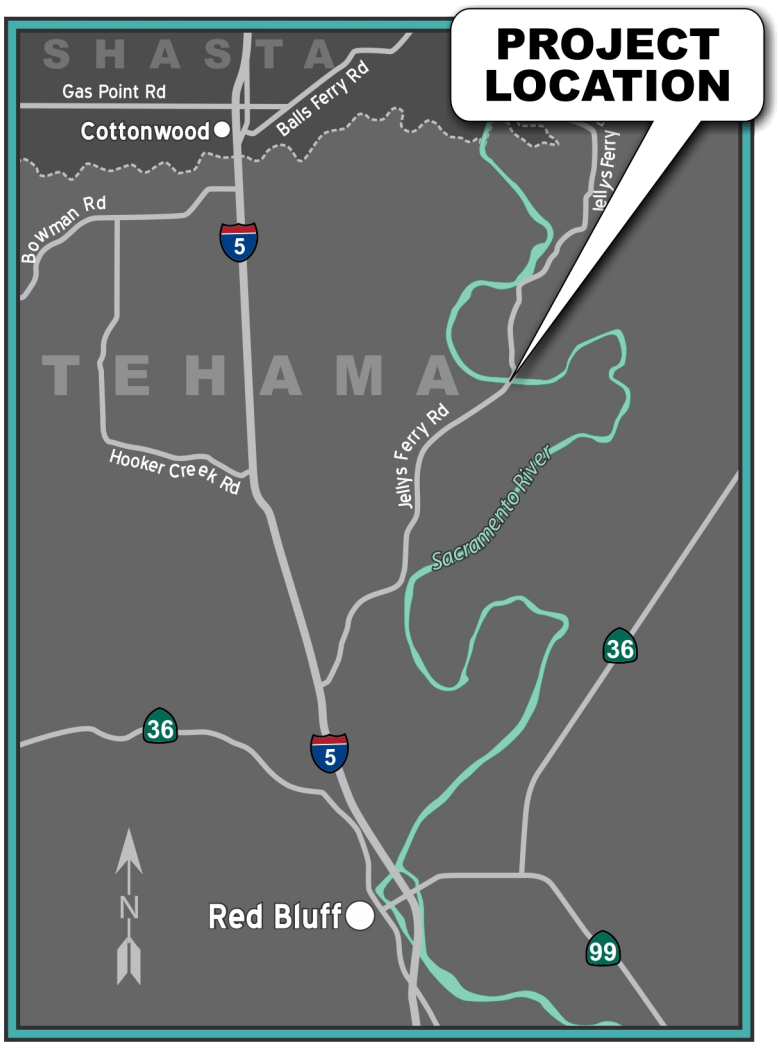
JELLYS FERRY ROAD BRIDGE REPLACEMENT PROJECT

Bridge replacement project construction activities will not significantly affect public use of BLM recreational resources

What is Being Planned

Tehama County Public Works, in coordination with Caltrans and the Federal Highway Administration (FHWA), is proposing to replace the Sacramento River Bridge at Jellys Ferry Road (Bridge No. 8C-0043). The existing Sacramento River Bridge serves as a crossing for Jelly's Ferry Road over the Sacramento River and is located 7.5 miles north from the Junction of Jelly's Ferry Road with Interstate 5. The proposed bridge replacement project is along the Sacramento River, within northern Tehama County, northwest of Table Mountain, approximately 9 miles north of Red Bluff and approximately 5 miles south of Shasta County (see location map, right). Construction of this project is scheduled to begin in summer of 2015.

Tehama County has studied the effects that this project may have on the environment. The studies show the proposed project will not significantly affect the quality of the environment.



Purpose of Notification

The Bureau of Land Management (BLM) Sacramento River Bend Area of Critical Environmental Concern surrounds the northern section of the bridge and approach roadway; this fact triggers the FHWA's Section 4(f) - a law which stipulates that the FHWA and other transportation agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:

- There is no feasible and prudent alternative to the use of land.
- The action includes all possible planning to minimize harm to the property resulting from use.

This notice serves to inform you: Under 49 USC 303(d), Caltrans has determined, and BLM has concurred, that the proposed project would result in a de minimis impact (no adverse effect to the activities, features or attributes qualifying the resource for protection under section 4(f)) to the Recreation Area for purposes of Section 4(f). Existing activities, such as use of the Yana Trail, the boat ramp and general public recreation will continue during bridge construction. The Jellys Ferry River Access road and parking facilities will be replaced and access to the river will not be affected, except for a brief period during demolition of the existing bridge structure.

Available Information

Maps and other project information are available for review and copying at the Tehama County Public Works office located at 9380 San Benito Avenue, Gerber, CA on weekdays from 8:00 AM to 5:00 PM.

For more information about this determination or other project related matters, please call Caltrans Environmental Planner, Chris Fazzari at (530) 225-3367 or Kevin Rosser, Tehama County Public Works Senior Civil Engineer, at (530) 385-1462 extension 3051

For individuals with disabilities, we will provide assistive services such as assistive listening devices, sign language interpreting, real-time captioning, note takers, reading or writing assistance, or training/meeting materials in Braille, large print, on audiocassette, or on compact disc. To obtain such services or copies in one of these alternate formats, please call or write, a minimum or 20 working days prior to the event, to request these needed reasonable modifications: Department of Transportation Attn: Equal Employment Opportunity Officer, 1657 Riverside Drive, Redding, CA 96001 (530) 225-3163 Voice, TTY 711

FHWA

EQUAL OPPORTUNITY EMPLOYER

REQUEST FOR PROPOSALS

CONSTRUCTABILITY REVIEW FOR JELLYS FERRY ROAD @ SACRAMENTO RIVER BRIDGE

Tehama County Department of Public Works seeks proposals for a one year contract to perform a constructability review, plan check, and specification review for Jellys Ferry Road @ Sacramento River Bridge Project. This Request for Proposal (RFP) solicits input from interested persons, corporations, or partnerships in assisting the County Public Works Department with reducing quantity overruns and potential change orders.

These services are federally funded and proposers must have a good understanding of the general requirements and project benchmarks associated with federal-aid projects such as Disadvantaged Business Enterprise (DBE) and federal lobbying restrictions; the DBE contract goal for this project is 0%.

The project is federally and state funded through MAP 21, the State Transportation Improvement Program, and the Local Safety Seismic Bridge Retrofit Program. The proposed project consists of replacement of the existing bridge with a new bridge approximately 1264 ft in length, construction of an overflow bridge approximately 685 ft in length, realignment of approximately 3300 ft of Jellys Ferry Road, and relocation of a portion of the Bureau of Land Management (BLM) recreational facilities.

Interested parties can access the RFP and 65% plans on the Tehama County Public Works website at www.tehamacountypublicworks.ca.gov, pick one up at the Public Works Office (address below), by mail (fees apply), or by emailing nbethurem@tcpw.ca.gov. Questions can be directed to Kevin Rosser, Senior Civil Engineer, at (530) 385-1462 extension 3051.

Proposals are due no later than 4:00 PM September 11th, 2015 at Tehama County Public Works Department offices, 9380 San Benito Avenue, Gerber, CA 96035.

Print August 21 and August 28, 2015

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		1	138

TEHAMA COUNTY

DEPARTMENT OF PUBLIC WORKS

PROJECT PLANS FOR CONSTRUCTION ON

JELLYS FERRY ROAD

IN TEHAMA COUNTY
ON JELLYS FERRY ROAD
SACRAMENTO RIVER BRIDGE Br. No. 08C-0374
SACRAMENTO RIVER OVERFLOW BRIDGE Br. No. 08C-0378
FROM 0.15 MILES NORTH OF RIVERS EDGE DRIVE
TO SARON FRUIT COLONY ROAD
FEDERAL-AID BRIDGE REPLACEMENT BRLSZD-5908 (031)
EA 0244004L

TO BE SUPPLEMENTED BY STATE OF CALIFORNIA STANDARD PLANS DATED 2010

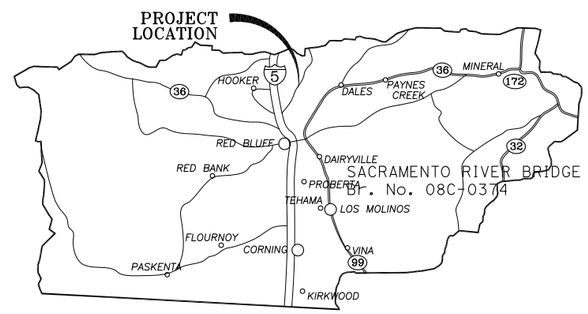
INDEX OF PLANS

SHEET No.	PLAN SHEET ID	DESCRIPTION
1	T-1	TITLE SHEET
2-6	X-1 TO X-5	TYPICAL CROSS SECTIONS
7-8	K-1 TO K-2	KEY MAP AND LINE INDEX
9	PC-1	PROJECT CONTROL
10-15	L-1 TO L-6	LAYOUT
16-25	PS-1 TO PS-10	PROFILE & SUPERELEVATION DIAGRAM
26-35	C-1 TO C-10	CONSTRUCTION DETAILS
36-41	G-1 TO G-6	CONTOUR GRADING
42	GD-1	CONTOUR GRADING DETAILS
43-46	EC-1 TO EC-4	EROSION CONTROL
47	ECD-1	EROSION CONTROL DETAILS
48-50	DP-1 TO DP-3	DRAINAGE PROFILES
51-53	DD-1 TO DD-3	DRAINAGE DETAILS AND QUANTITIES
54	CAS-1	CONSTRUCTION AREA SIGNS
55-61	SC-1 TO SC-7	STAGE CONSTRUCTION PLAN
62-66	SCD-1 TO SCD-5	STAGE CONSTRUCTION DETAILS
67-73	TH-1 TO TH-7	TRAFFIC HANDLING PLAN
74	THD-1	TRAFFIC HANDLING DETAILS
75-77	Q-1 TO Q-3	SUMMARY OF QUANTITIES
78-81	R-1 TO R-4	RETAINING WALL

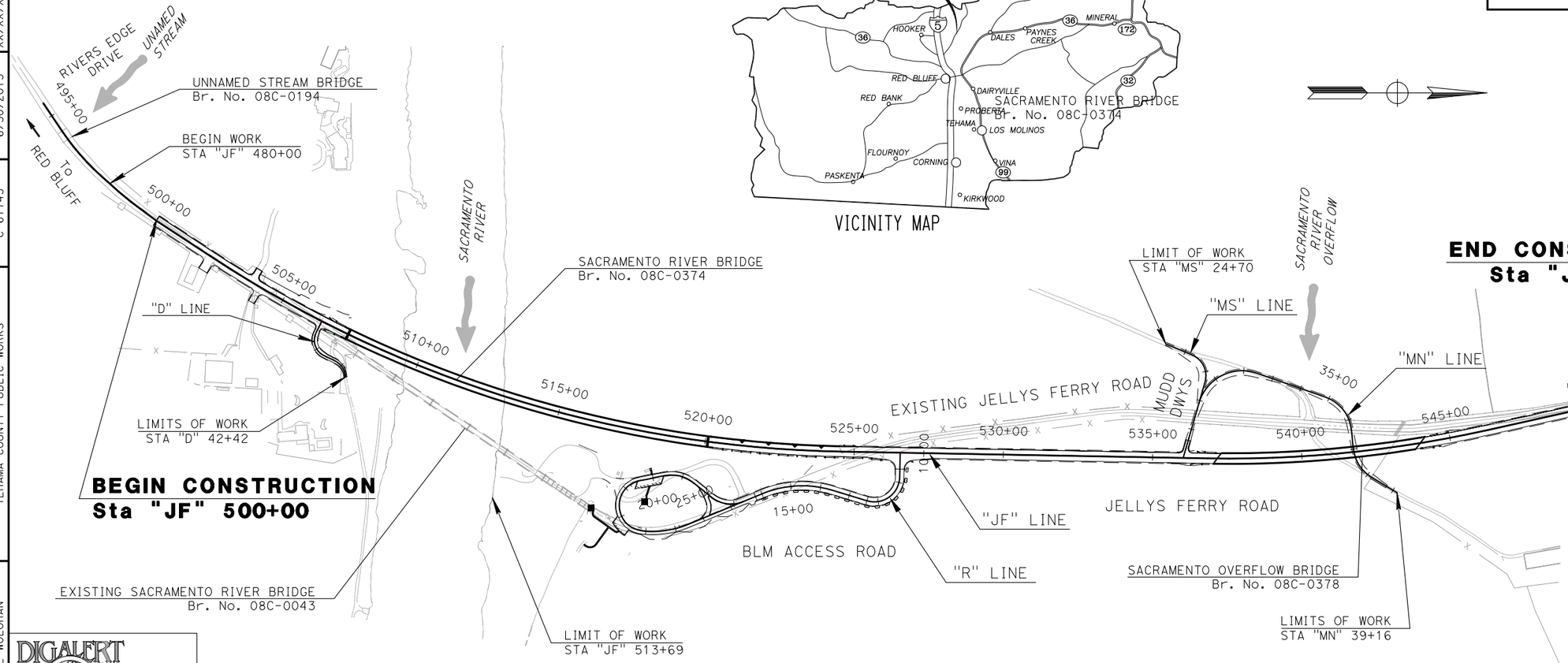
STRUCTURE PLANS

82-114	SACRAMENTO RIVER BRIDGE, Br. No. 08C-0374
115-138	SACRAMENTO OVERFLOW BRIDGE, Br. No. 08C-0378

LOCATION MAP



VICINITY MAP



APPROVED BY:

GARY ANTONE — DATE
DIRECTOR OF PUBLIC WORKS

PROJECT ENGINEER — DATE
REGISTERED CIVIL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — MICHAEL WOLOHAN — No. C 67743 — Exp. 6/30/15 — CIVIL — STATE OF CALIFORNIA

T. Y. LIN INTERNATIONAL OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

65% SUBMITTAL, NOT FOR CONSTRUCTION

DIGALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF NORTHERN CALIFORNIA

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

NO SCALE

T·Y·LIN INTERNATIONAL
1601 RESPONSE RD, SUITE 260
SACRAMENTO, CA 95815

TEHAMA COUNTY PUBLIC WORKS
9380 SAN BENITO AVENUE
GERBER, CA 96035-9701

CONTRACT No. 301691

LAST REVISION XX/XX/XXXX

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

APPROVED AS TO IMPACT ON LOCAL FACILITIES AND CONFORMANCE WITH APPLICABLE LOCAL STANDARDS AND PRACTICES AND THAT TECHNICAL OVERSIGHT WAS PERFORMED.

LOCAL AGENCY OVERSIGHT APPROVAL	REGISTRATION No.	LICENSE Exp DATE	DATE SIGNED
TEHAMA COUNTY PUBLIC WORKS	C 67743	6/30/2015	XX/XX/XXXX

PROJECT ENGINEER: MICHAEL WOLOHAN

XRef List: | 054-X-LANDNET | 054-X-TP | 054-C-RD | 054-Drainage | 054-Corridor |
Mar 20, 2015 - 09:04:46 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-T.dwg Updated By: kbewsey

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		2	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATION.
3. SUPERELEVATIONS ARE SHOWN ON THE SUPERELEVATION DIAGRAMS
4. EXACT LOCATIONS AND TYPES OF DIKES, GUARD RAILING AND CONCRETE BARRIERS ARE SHOWN ON THE LAYOUT SHEETS AND THE SUMMARY OF QUANTITIES SHEETS.

JELLYS FERRY DESIGN DESIGNATION

ADT (2005)	350	D	-
ADT (2035)	1205	T	10%
DHV	-	V	55 mph
ESAL	-	TI_{20}	7.0

MAJOR COLLECTOR (RURAL)(ROLLING)

BLM ACCESS ROAD DESIGN DESIGNATION

ADT (2009)	20	D	50%
ADT (2035)	35	T	0%
DHV	-	V	15 mph
ESAL	-	TI_{20}	5.0

RECREATIONAL (RURAL)(ROLLING)

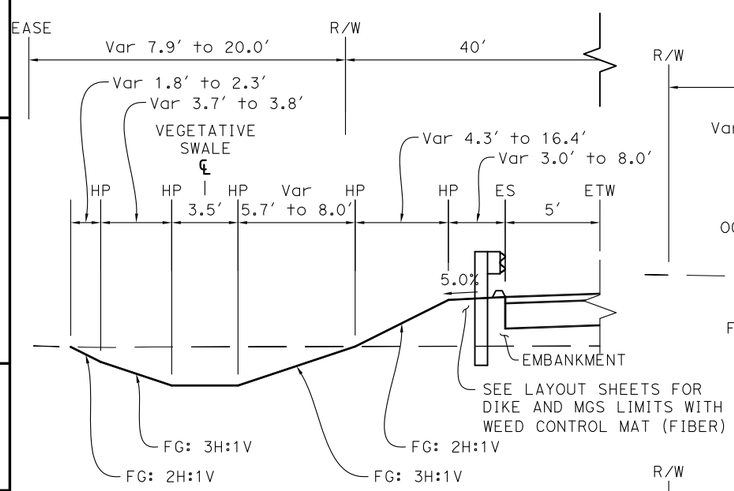
LEGEND

ABBREVIATIONS

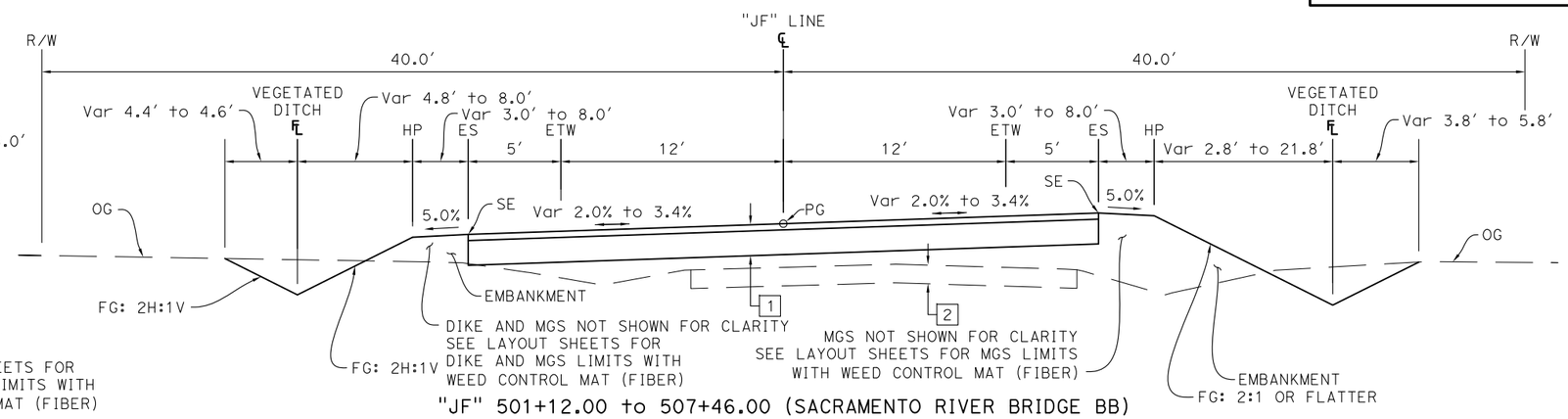
MGS	MIDWEST GUARDRAIL SYSTEM
SE	SAFETY EDGE

PAVEMENT CLIMATE REGION

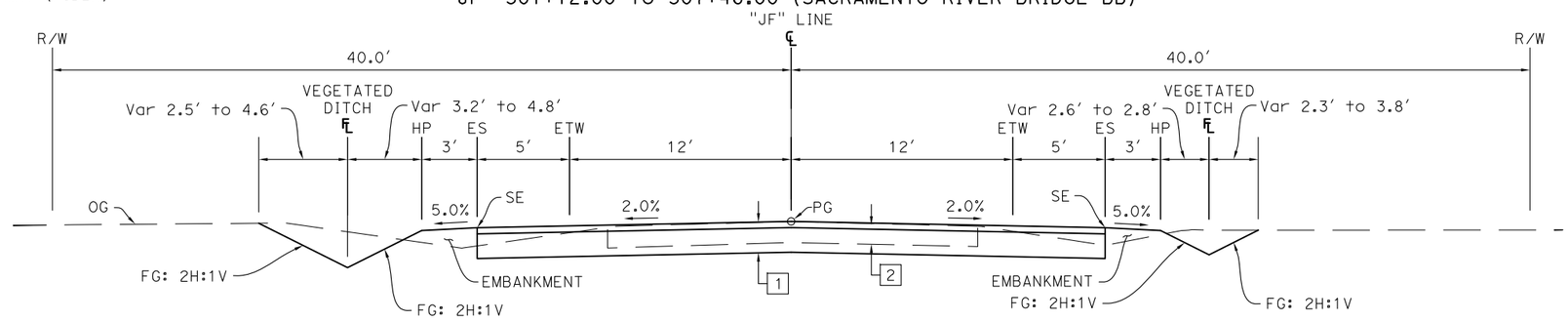
INLAND VALLEY



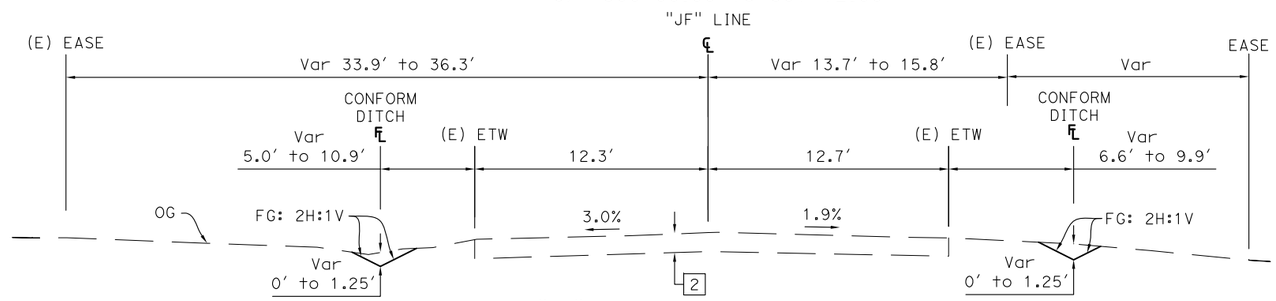
"JF" 505+45.09 to 507+34.33



"JF" 501+12.00 to 507+46.00 (SACRAMENTO RIVER BRIDGE BB)



"JF" 500+00.00 to 501+12.00



"JF" 499+33.65 to 500+00.00

JELLYS FERRY ROAD

TYPICAL PAVEMENT STRUCTURAL SECTIONS

1	0.35' HMA (TYPE A) 0.85' AB (CLASS 2)
2	EXIST 1"-2" AC 1" AB
3	0.25' HMA (TYPE A) 0.55' AB (CLASS 2)
4	1.20' AB (CLASS 2)
5	0.33' HMA (TYPE A) 0.66' AB (CLASS 2)
6	0.33' TEMPORARY HMA (TYPE A) 0.66' TEMPORARY AB (CLASS 2)

TYPICAL CROSS SECTIONS

NO SCALE

X-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR |
Mar. 19, 2015 - 20:16:27 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-X.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		3	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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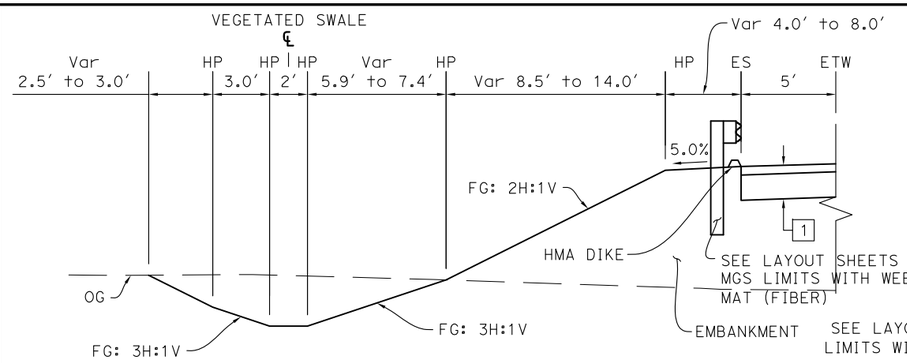
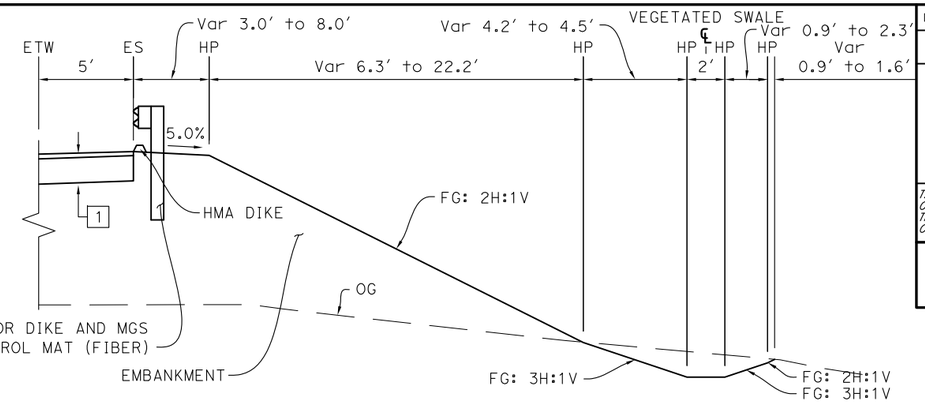
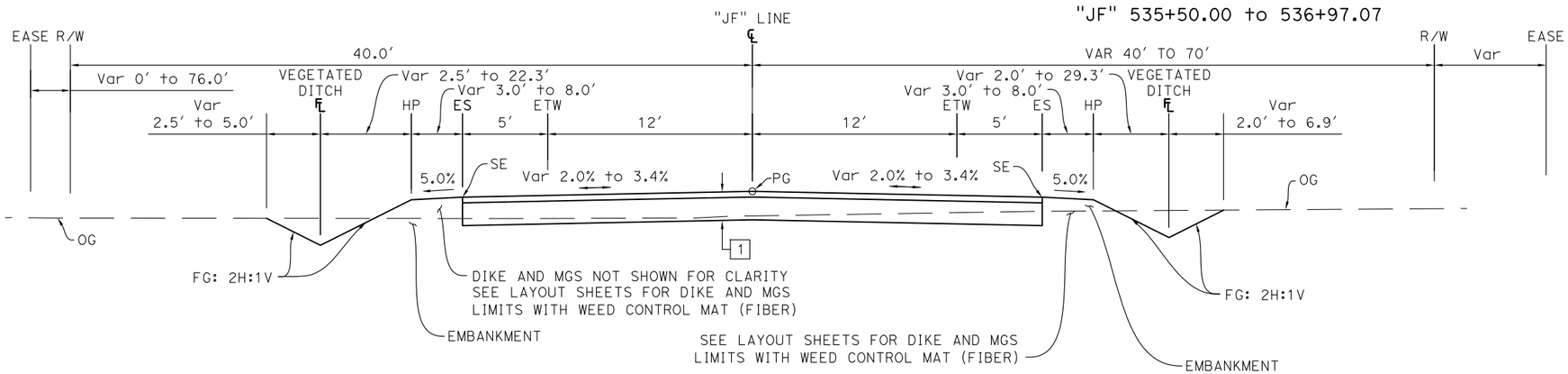


"JF" 536+33.62 to 537+45.30



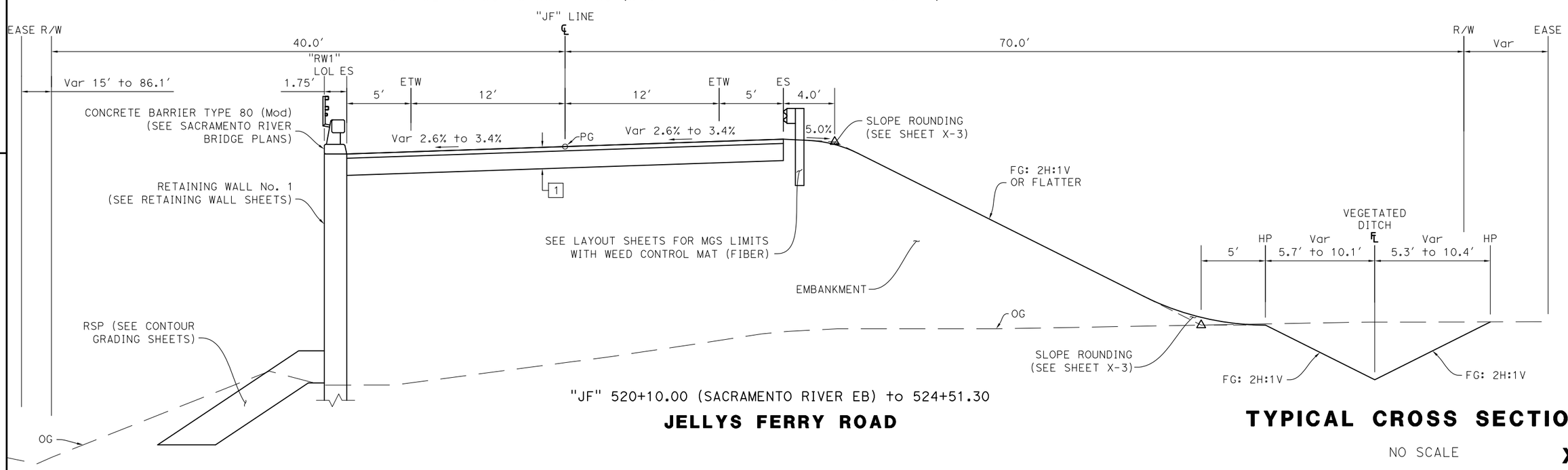
"JF" 535+50.00 to 536+97.07



"JF" 524+51.30 to 537+16.50 (SACRAMENTO RIVER OVERFLOW BRIDGE BB)

NOTES:

1. SEE SHEET X-1 FOR NOTES AND LEGEND.



"JF" 520+10.00 (SACRAMENTO RIVER EB) to 524+51.30

JELLYS FERRY ROAD

TYPICAL CROSS SECTIONS

NO SCALE

X-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

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Mar. 19, 2015 - 20:16:27 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-X.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		4	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

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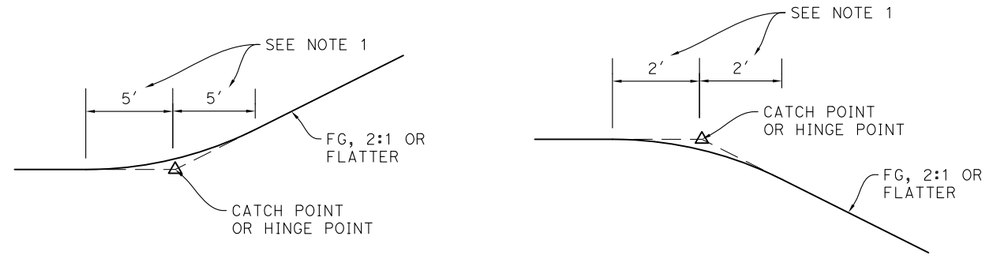
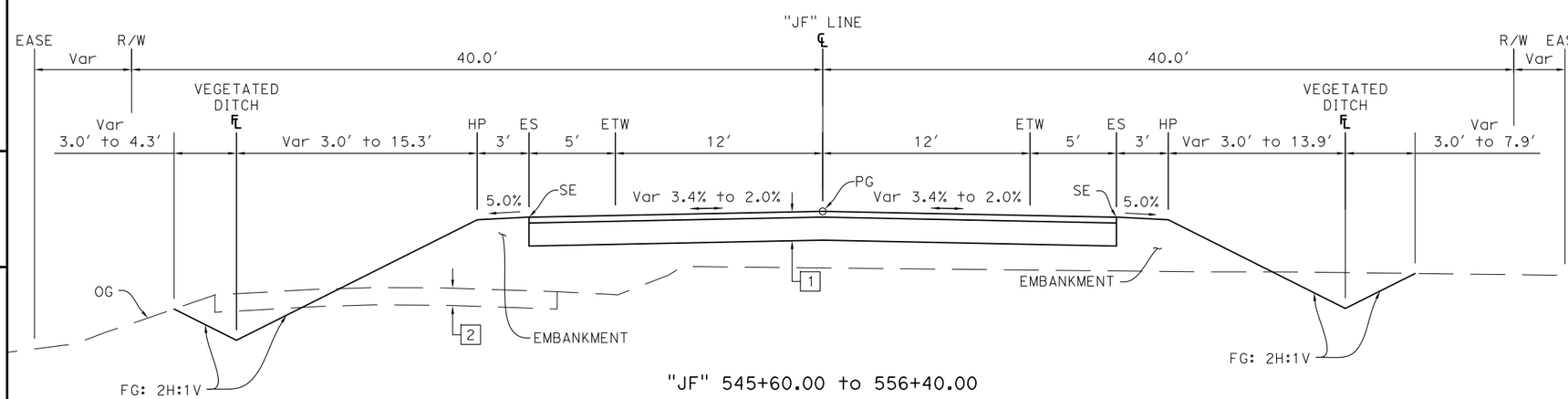


SLOPE ROUNDING DETAIL

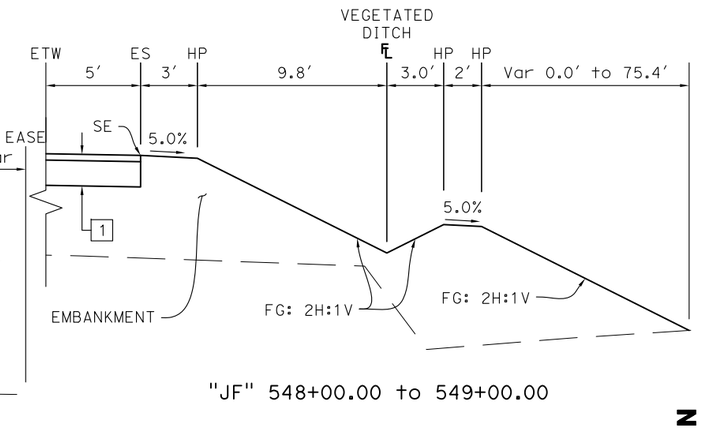
NO SCALE

NOTES:

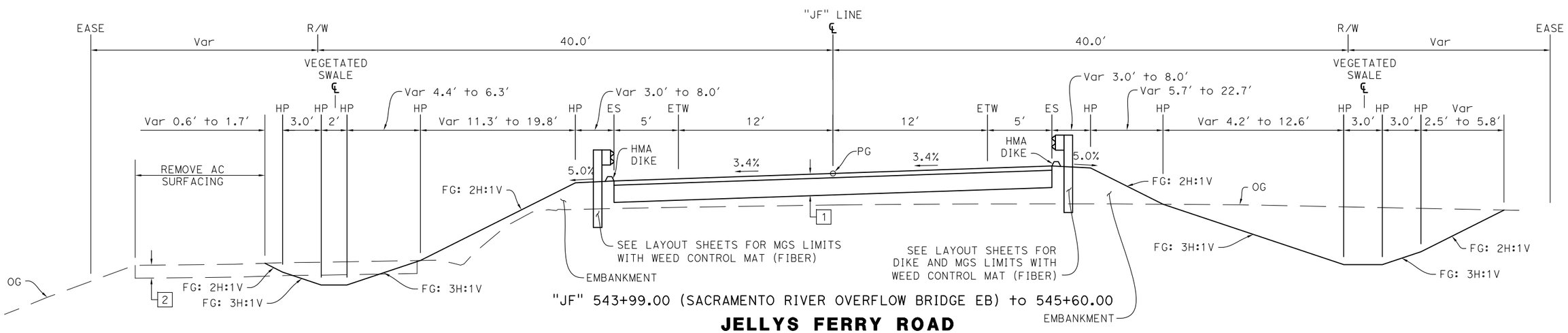
1. SPACE PERMITTING OR AS INSTRUCTED BY THE ENGINEER.



"JF" 545+60.00 to 556+40.00



"JF" 548+00.00 to 549+00.00



"JF" 543+99.00 (SACRAMENTO RIVER OVERFLOW BRIDGE EB) to 545+60.00

JELLYS FERRY ROAD

TYPICAL CROSS SECTIONS

NO SCALE

X-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef list: | 054-BRGR |
Mar. 19, 2015 - 20:16:27 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-X.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		5	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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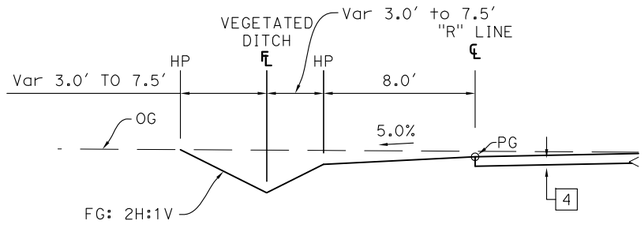
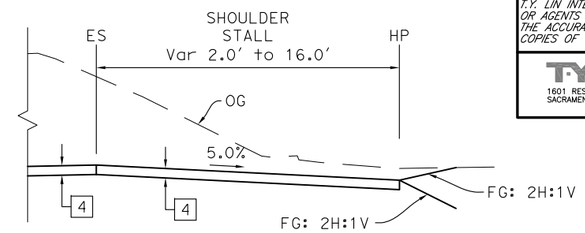
T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

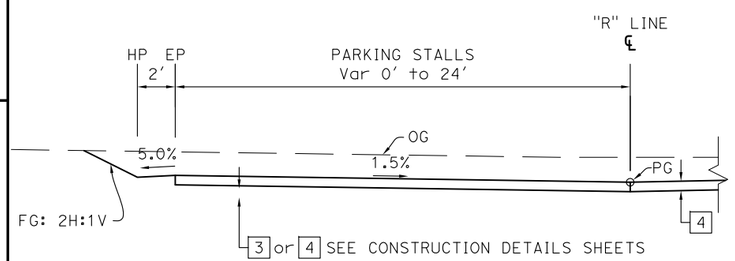
1. SEE SHEET X-1 FOR NOTES AND LEGEND.



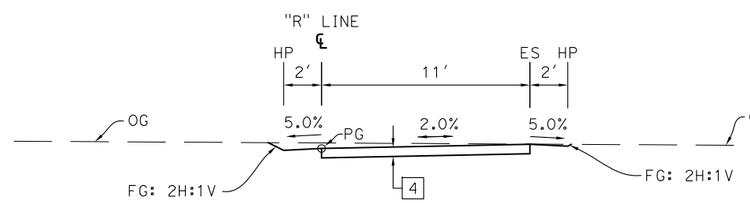
"R" 20+80.00 to 24+15.00



"R" 22+84.81 to 23+94.99
"R" 24+10.42 to 25+29.15
"R" 25+45.15 to 16+55.39

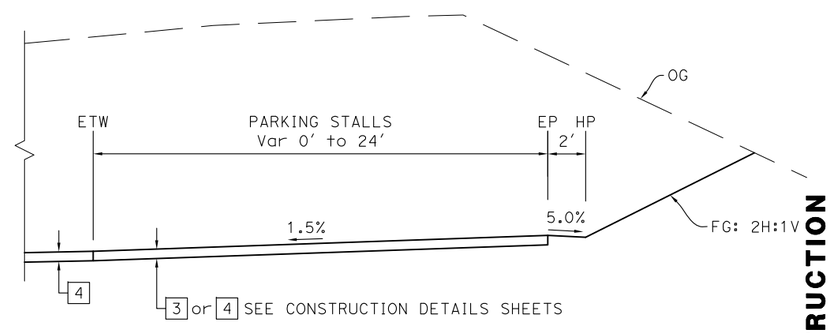


"R" 19+63.20 to 20+76.89

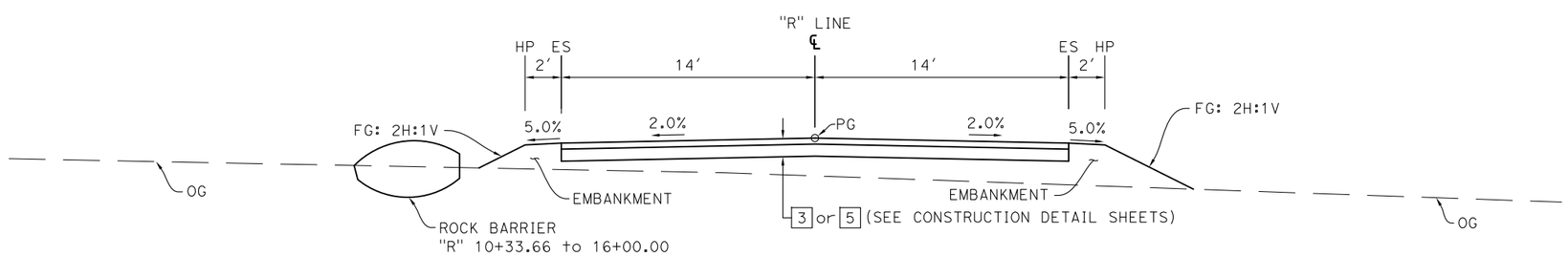


"R" 16+68.78 to 26+43.91

BLM CIRCULATION ROAD



"R" 21+94.23 to 22+47.70



"R" 10+00.00 to 16+68.78

BLM ACCESS ROAD

TYPICAL CROSS SECTIONS

NO SCALE

X-4

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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2	TEH	JF		6	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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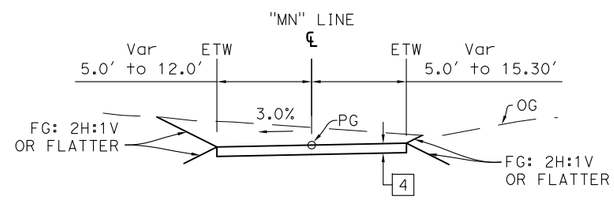
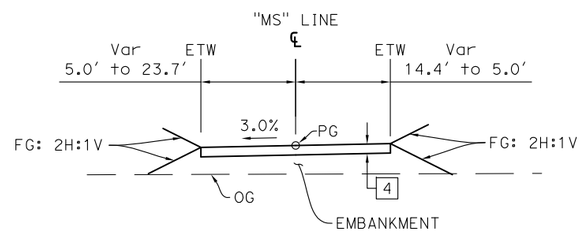


"MN" 30+00.00 to 38+74.73

MUDD NORTH ROAD



"MS" 20+61.14 to 24+69.94

MUDD SOUTH ROAD

TYPICAL CROSS SECTIONS

NO SCALE

X-5

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3	
REVISED BY	
DATE REVISED	
CALCULATED-DESIGNED BY	K. BEWSEY/ D. ZURCHER
CHECKED BY	KEITH RHODES
PROJECT ENGINEER	MICHAEL WOLOHAN
TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS	
JELLYS FERRY IMPROVEMENT PROJECT	

XRef List: | 054-BRDR |
Mar. 19, 2015 – 20:16:27 DWG Name: P:\710054 – Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-X.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		7	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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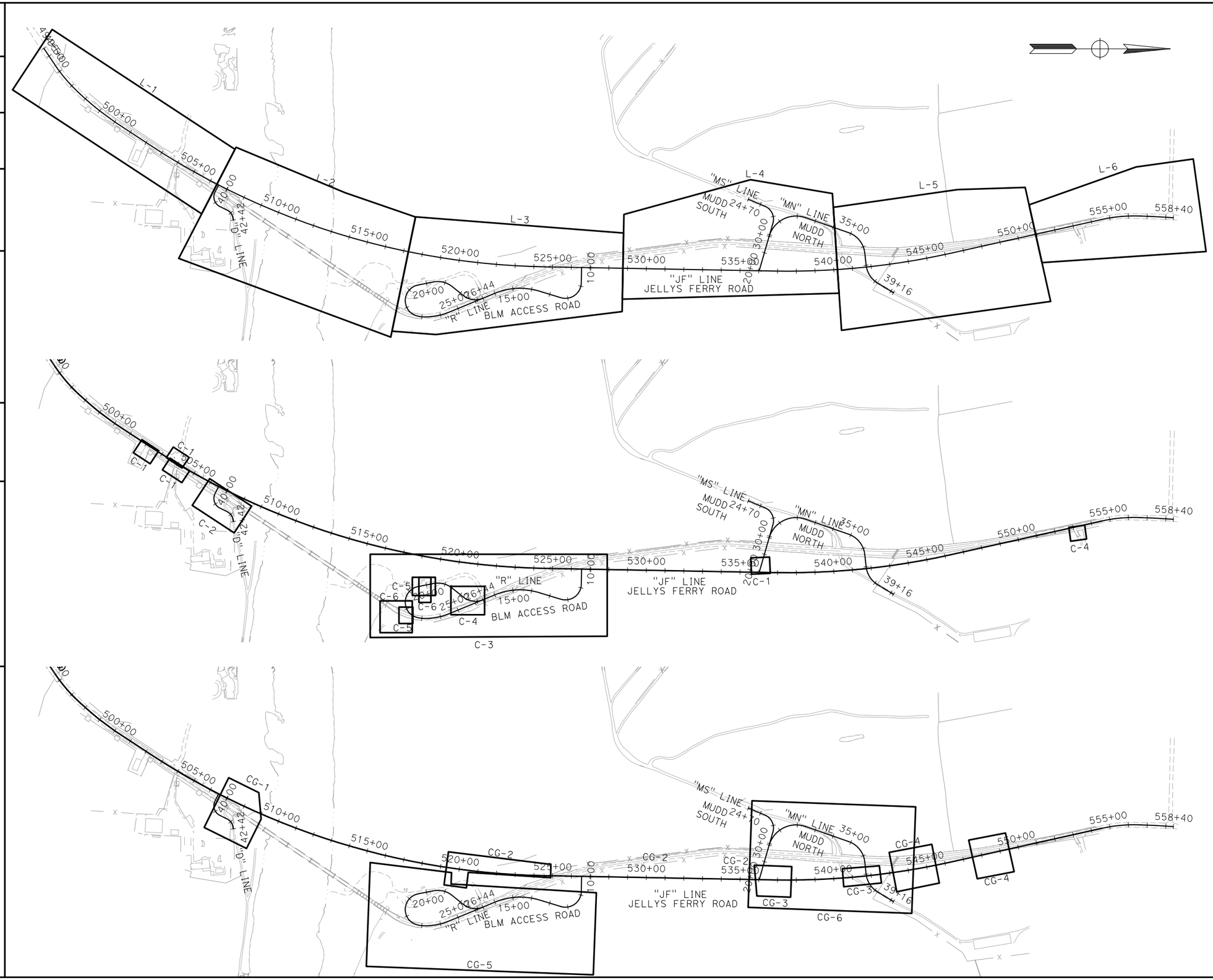
SACRAMENTO, CA 95815



NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.

KEY MAP AND LINE INDEX

SCALE 1"=250'

K-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-X-TP |
Mar. 19, 2015 - 21:25:25 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-K.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		8	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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SACRAMENTO, CA 95815

NOTES:

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KEY MAP AND LINE INDEX

SCALE 1"=250'

K-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	K. BEWSEY/ D. ZURCHER
DATE REVISED	
CALCULATED-DESIGNED BY	K. BEWSEY/ D. ZURCHER
CHECKED BY	KEITH RHODES
PROJECT ENGINEER	MICHAEL WOLOHAN

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef list: | 054-BRDR | 054-X-TP |
Mar. 19, 2015 - 21:25:25 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-K.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		9	138

REGISTERED LAND SURVEYOR DATE

PLANS APPROVAL DATE

LICENSED LAND SURVEYOR XXXXXXXXX No. XXXXX STATE OF CALIFORNIA

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3301 C STREET, BUILDING 100-M
SACRAMENTO, CA 95816

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. ANY EXISTING MONUMENT SHALL BE RESET OR RELOCATED AND A RECORD OF SURVEY FILED IF DISTURBED.

LEGEND

△ CONTROL POINT

∘ POINT OF CURVE

DATUM

HORIZONTAL: CALIFORNIA COORDINATE SYSTEM, ZONE 1, NORTH AMERICAN DATUM OF 1983 (NAD83), US SURVEY FEET, EPOCH 2007.00

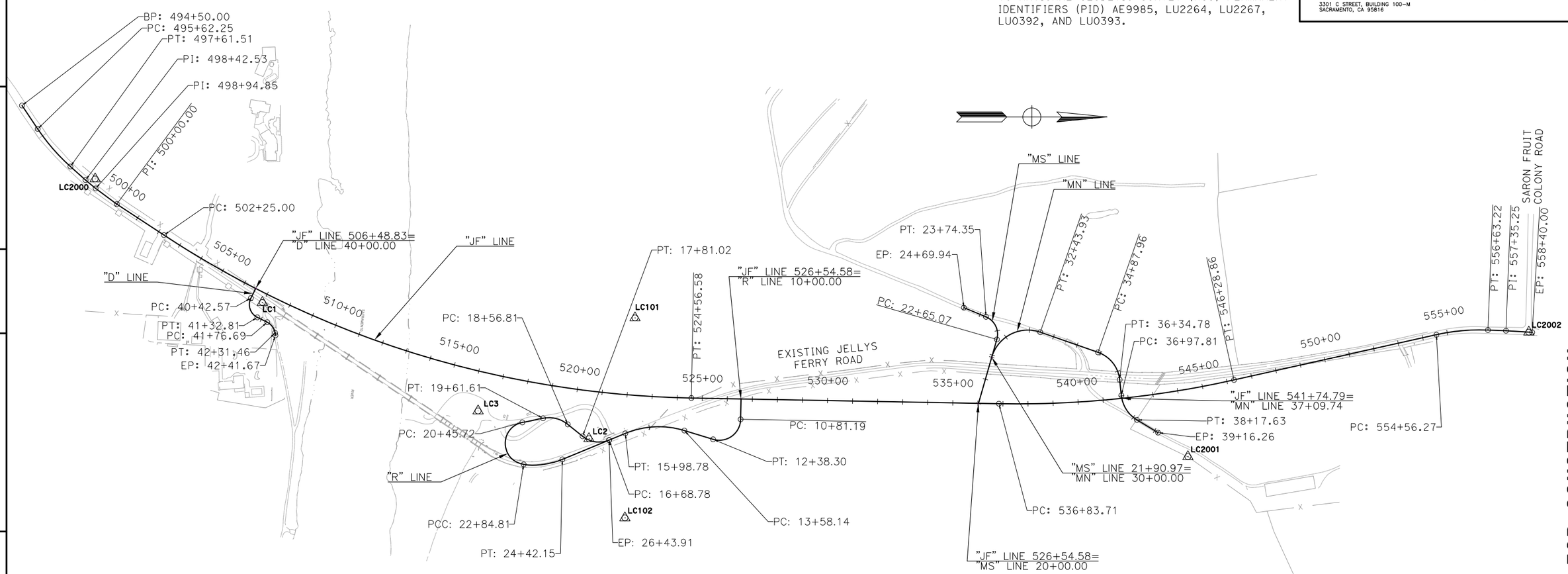
VERTICAL: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

HORIZONTAL CONTROL STATEMENT

THE HORIZONTAL PROJECT DATUM IS BASED UPON GPS TIES TO NATIONAL GEODETIC SURVEY (NGS) PERMANENT IDENTIFIERS (PID) AE9298, AE9985, AND DH6582.

VERTICAL CONTROL STATEMENT

THE VERTICAL PROJECT DATUM IS BASED ON TIES TO NATIONAL GEODETIC SURVEY (NGS) PERMANENT IDENTIFIERS (PID) AE9985, LU2264, LU2267, LU0392, AND LU0393.



LOCAL CONTROL						
No.	STATION	OFFSET	NORTHING	EASTING	ELEVATION	DESCRIPTION
LC1	"JF" 506+97.30	37.63′ R†	1998485.28	6508527.81	361.05	FD MAG NAIL W/PSOMAS WASHER FLUSH W/AC, 0.7FT W. OF EP, +/- 100FT S OF BRIDGE
LC2	"JF" 520+68.91	189.29′ R†	1999788.40	6509070.81	343.05	FD REBAR W/PSOMAS CONTROL CAP FLUSH IN GROUND AT W. SIDE OF BARRICADE @ NORTH ENTRANCE
LC3	"JF" 516+32.70	155.53′ R†	1999345.85	6508960.19	332.54	FD REBAR W/PSOMAS CONTROL CAP FLUSH IN GROUND IN BOAT LAUNCH AREA
LC101	"JF" 522+06.17	308.06′ L†	1999971.97	6508589.29	330.19	FD REBAR W/PSOMAS CONTROL CAP FLUSH IN GROUND
LC102	"JF" 522+28.17	489.85′ R†	1999931.68	6509386.50	341.15	FD REBAR W/PSOMAS CONTROL CAP FLUSH IN GROUND IN FIELD EAST OF ROAD N. SIDE OF RIVER
LC2000	"JF" 498+68.70	27.80′ L†	1997818.18	6508035.26	360.00	SET 60D NAIL ON W. SIDE OF ROAD
LC2001	"JF" 543+97.89	265.50′ R†	2002177.97	6509142.44	356.44	2-1/2" BRASS CAP EAST OF PRIVATE DRIVEWAY ALONG FENCE
LC2002	"JF" 558+26.69	1.97′ R†	2003538.35	6508646.06	358.61	1-1/2" ALUMINUM CAP NEAR INTERSECTION OF JELLYS FERRY ROAD AND SARON FRUIT COLONY ROAD

PROJECT CONTROL AND MONUMENTATION

1" = 200′

PC-1

THIS PLAN ACCURATE FOR PROJECT CONTROL INFORMATION ONLY.

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

CALCULATED- K. BEWSEY/ D. ZURCHER
DESIGNED BY KEITH RHODES
CHECKED BY

PROJECT ENGINEER MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IN INCHES 0 1 2 3

Updated By: DZurcher

DWG Name: \\SSACFIL001\Prj_File\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-PC.dwg

XRef List: | 054-BRDR-PC |
May. 23, 2014 - 17:06:38

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		10	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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SACRAMENTO, CA 95815

NOTES:

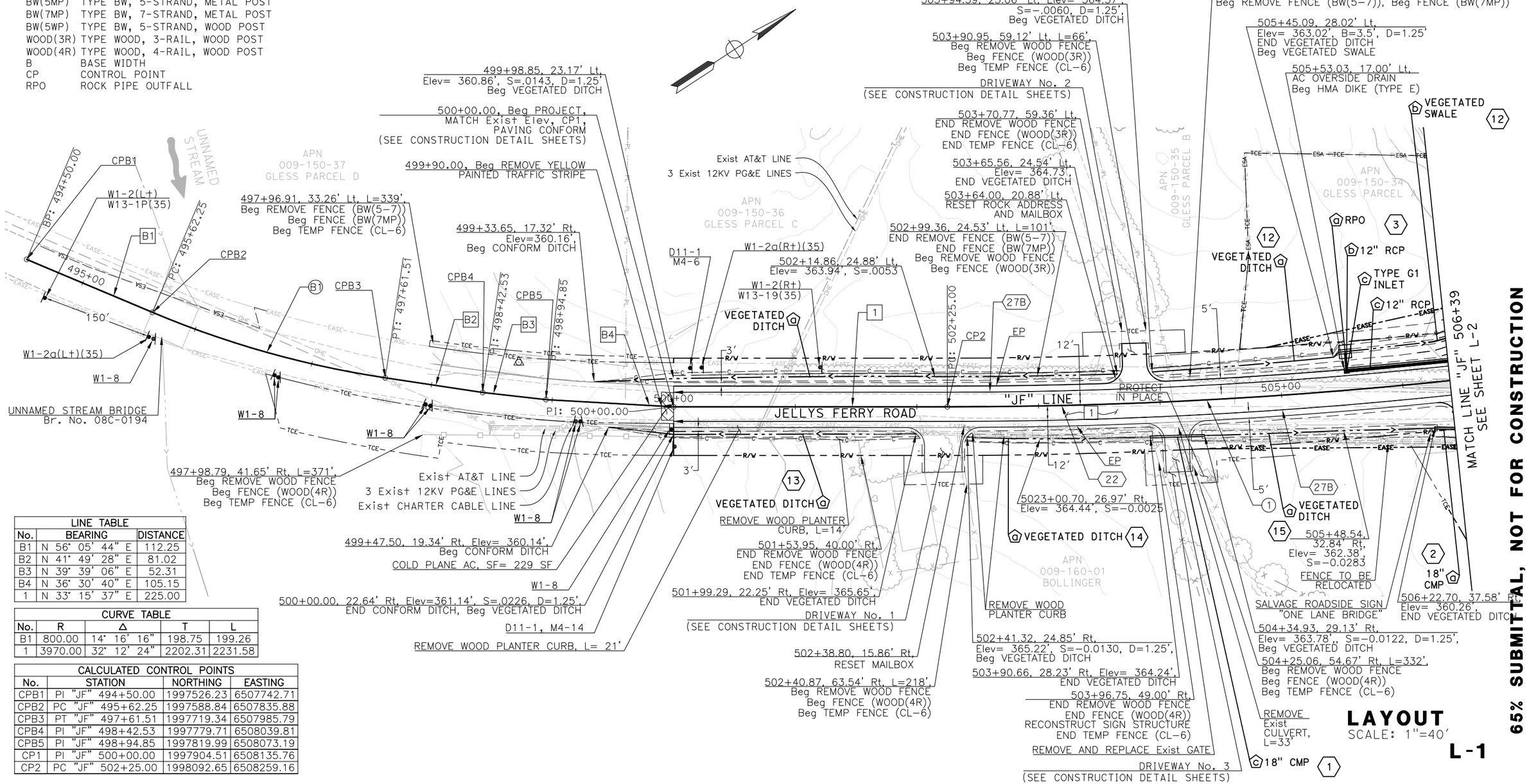
1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.
3. ALL STATIONING IS ALONG THE "JF" LINE UNLESS OTHERWISE SPECIFIED.

ABBREVIATIONS:

BW(3-4)	TYPE BW, 3-4 WIRE
BW(5-7)	TYPE BW, 5-7 WIRE
BW(3MP)	TYPE BW, 3-STRAND, METAL POST
BW(4MP)	TYPE BW, 4-STRAND, METAL POST
BW(5MP)	TYPE BW, 5-STRAND, METAL POST
BW(7MP)	TYPE BW, 7-STRAND, METAL POST
BW(5WP)	TYPE BW, 5-STRAND, WOOD POST
WOOD(3R)	TYPE WOOD, 3-RAIL, WOOD POST
WOOD(4R)	TYPE WOOD, 4-RAIL, WOOD POST
B	BASE WIDTH
CP	CONTROL POINT
RPO	ROCK PIPE OUTFALL

LEGEND

- CONTROL POINT
- DRAINAGE SYSTEM
- DRAINAGE COMPONENT
- LINE NUMBER, SEE LINE TABLE
- CURVE NUMBER, SEE CURVE TABLE
- STRUCTURAL SECTION, SEE SHEET X-1
- COLD PLANE AC PAVEMENT
- REMOVE AC SURFACING
- HINGE
- FILL
- CUT
- ROCK BARRIER
- RIGHT OF WAY
- TEMPORARY CONSTRUCTION EASEMENT
- METAL BEAM GUARD RAIL
- Exist WIRE FENCE
- Exist WOOD FENCE
- Exist FLOWLINE
- Exist UNDERGROUND ELECTRIC
- Exist OVERHEAD ELECTRIC
- Exist UNDERGROUND TELEPHONE
- Exist OVERHEAD TELEPHONE
- Exist OVERHEAD CABLE
- Exist GUY WIRE
- Exist JOINT, POWER, OR TELEPHONE POLE
- REMOVE SIGN AND SALVAGE TO PROPERTY OWNER
- CALTRANS DETAIL NUMBER
- BEGIN OR END CURVE
- ANGLE POINT
- BEGIN / END DELINEATION
- INSTALL ROADSIDE SIGN
- REMOVE ROADSIDE SIGN, AS NOTED
- EXISTING SIGN TO PROTECT IN PLACE
- RELOCATE/RESET SIGN FROM TO



LINE TABLE		
No.	BEARING	DISTANCE
B1	N 56° 05' 44" E	112.25
B2	N 41° 49' 28" E	81.02
B3	N 39° 39' 06" E	52.31
B4	N 36° 30' 40" E	105.15
1	N 33° 15' 37" E	225.00

CURVE TABLE				
No.	R	Δ	T	L
B1	800.00	14° 16' 16"	198.75	199.26
1	3970.00	32° 12' 24"	2202.31	2231.58

CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CPB1	PI "JF" 494+50.00	1997526.23	6507742.71
CPB2	PC "JF" 495+62.25	1997588.84	6507835.88
CPB3	PT "JF" 497+61.51	1997719.34	6507985.79
CPB4	PI "JF" 498+42.53	1997779.71	6508039.81
CPB5	PI "JF" 498+94.85	1997819.99	6508073.19
CP1	PI "JF" 500+00.00	1997904.51	6508135.76
CP2	PC "JF" 502+25.00	1998092.65	6508259.16

LAYOUT
SCALE: 1"=40'

L-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED- K. BEWSEY/ D. ZURCHER
DESIGNED BY
CHECKED BY KEITH RHODES

PROJECT ENGINEER MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef list: | 054-BRGR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Drainage | 054-Proposed ROW | 054-Corridor | 054-Overflow Bridge Foundation |
Mar. 20, 2015 - 00:06:46 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-L.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		11	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

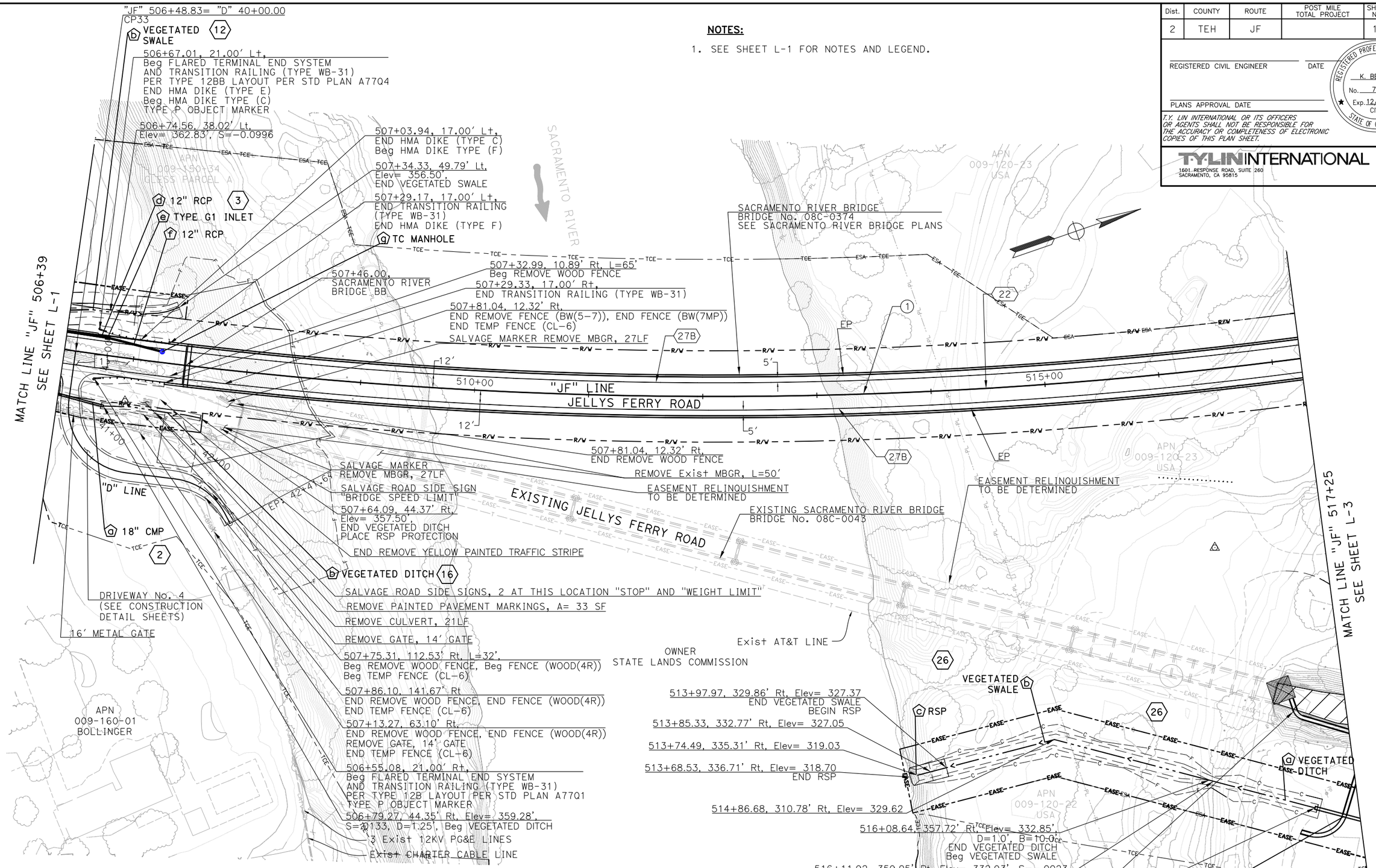
REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

T.Y. LIN INTERNATIONAL OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET L-1 FOR NOTES AND LEGEND.



CURVE TABLE				
No.	R	Δ	T	L
1	3970.00	32° 12' 24"	1146.13	2231.58

CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CP33	BP "D" 40+00.00	1998458.77	6508472.27

LAYOUT
SCALE: 1"=40'

L-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

PROJECT ENGINEER MICHAEL WOLOHAN

CALCULATED-DESIGNED BY K. BEWSEY/ D. ZURCHER
CHECKED BY KEITH RHODES

REVISED BY
DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Drainage | 054-Proposed ROW | 054-Corridor | 054-Overflow Bridge Foundation |
Mar. 20, 2015 - 00:06:46 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-L.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		12	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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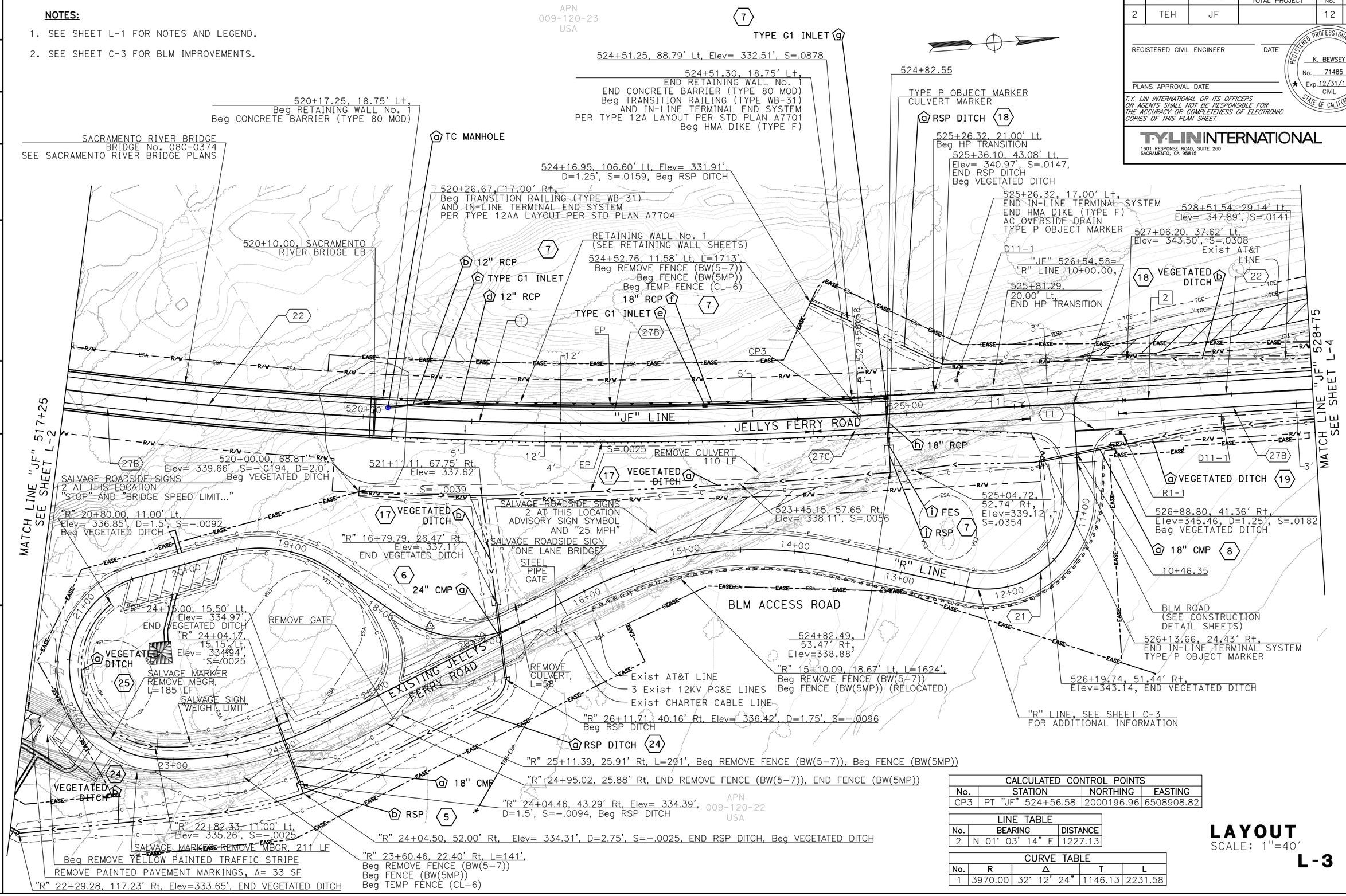
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET L-1 FOR NOTES AND LEGEND.
2. SEE SHEET C-3 FOR BLM IMPROVEMENTS.



CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CP3	PT "JF" 524+56.58	2000196.96	6508908.82

LINE TABLE		
No.	BEARING	DISTANCE
2	N 01° 03' 14" E	1227.13

CURVE TABLE				
No.	R	Δ	T	L
1	3970.00	32° 12' 24"	1146.13	2231.58

LAYOUT
SCALE: 1"=40'

L-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRGR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Drainage | 054-Proposed ROW | 054-Corridor | 054-Overflow Bridge Foundation | Mar. 20, 2015 - 00:06:46 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-L.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		13	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

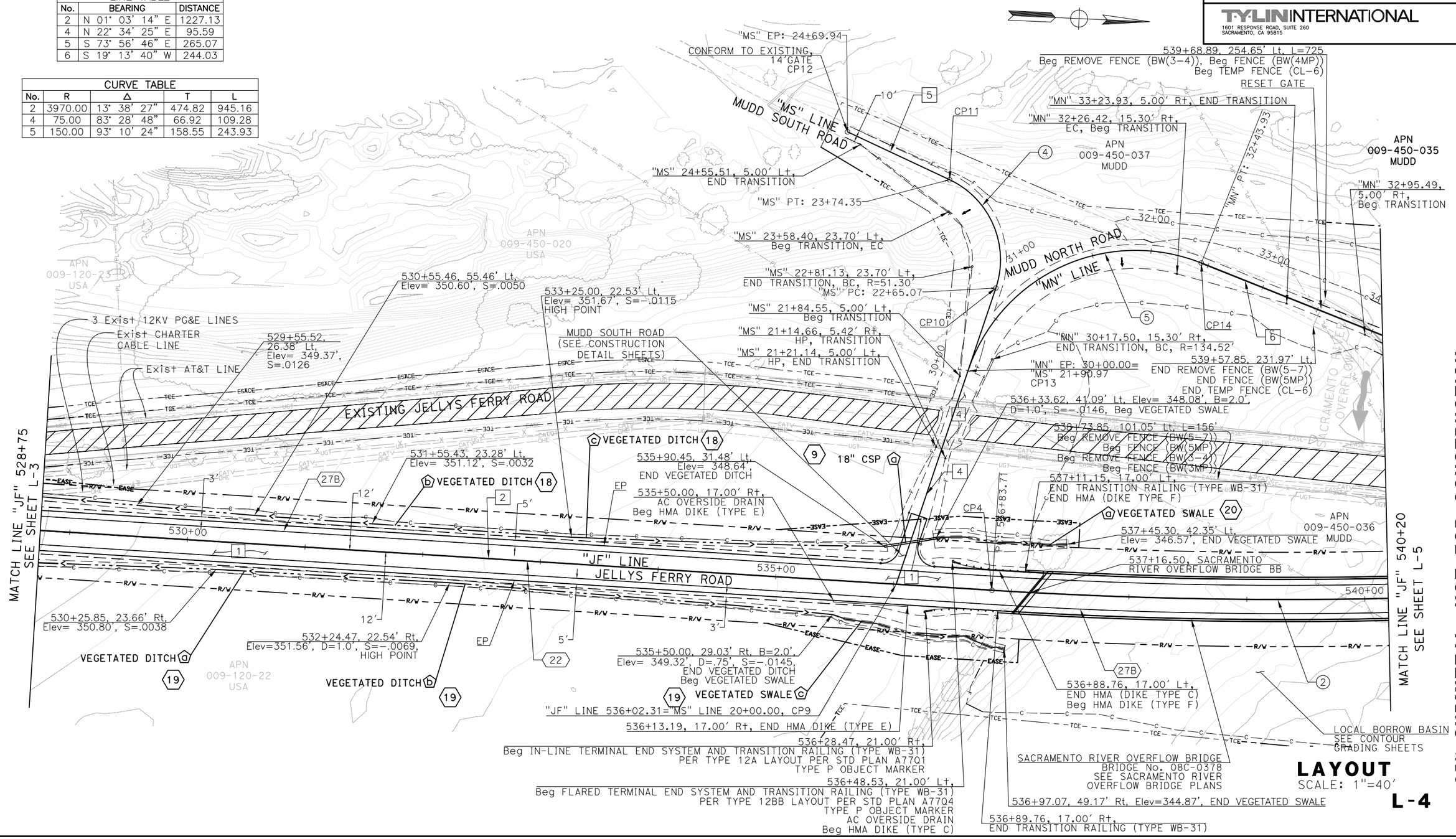
CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CP4	PC "JF" 536+83.71	2001423.88	6508931.39
CP9	BP "JF" 536+02.31	2001342.49	6508929.89
CP10	PC "MS" 22+65.07	2001415.80	6508675.16
CP11	PT "MS" 23+74.35	2001372.51	6508585.16
CP12	EP "MS" 24+69.94	2001284.24	6508548.47
CP13	BP "MN" 30+00.00	2001395.30	6508746.37
CP14	PT "MN" 32+43.93	2001588.85	6508646.22

LINE TABLE		
No.	BEARING	DISTANCE
2	N 01° 03' 14" E	1227.13
4	N 22° 34' 25" E	95.59
5	S 73° 56' 46" E	265.07
6	S 19° 13' 40" W	244.03

CURVE TABLE				
No.	R	Δ	T	L
2	3970.00	13° 38' 27"	474.82	945.16
4	75.00	83° 28' 48"	66.92	109.28
5	150.00	93° 10' 24"	158.55	243.93

NOTES:

1. SEE SHEET L-1 FOR NOTES AND LEGEND.



LAYOUT
SCALE: 1"=40'

L-4

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED		
K. BEWSEY/ D. ZURCHER	KEITH RHODES		
CALCULATED-DESIGNED BY	CHECKED BY		
PROJECT ENGINEER	MICHAEL WOLOHAN		
TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS			
JELLYS FERRY IMPROVEMENT PROJECT			

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Drainage | 054-Proposed ROW | 054-Corridor | 054-Overflow Bridge Foundation |
Mar. 20, 2015 - 00:06:46 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-L.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		14	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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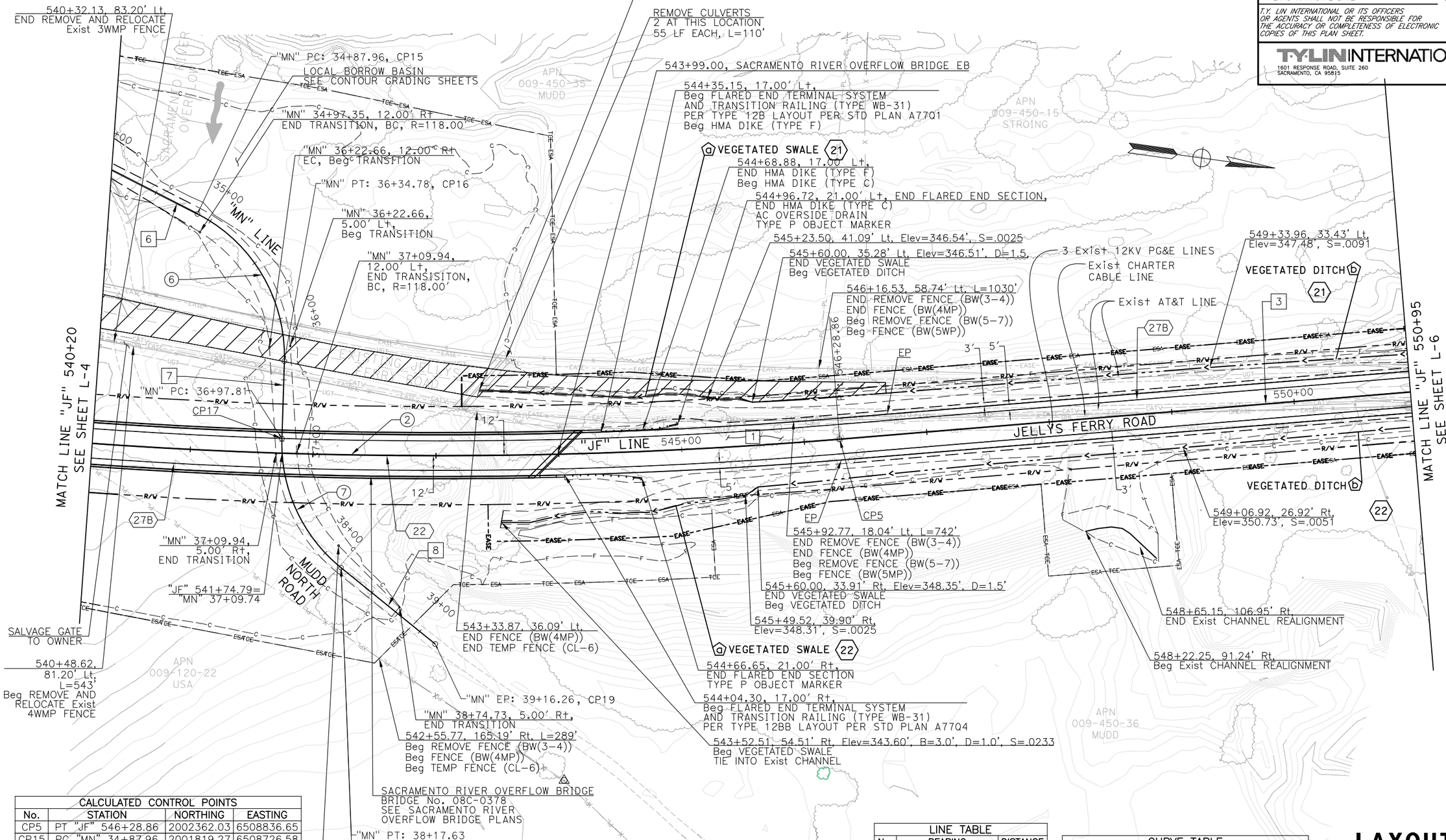
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET L-1 FOR NOTES AND LEGEND.



CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CP5	PT "JF" 546+28.86	2002362.03	6508836.65
CP15	PC "MN" 34+87.96	2001819.27	6508726.58
CP16	PT "MN" 36+34.78	2001905.73	6508835.60
CP17	PC "MN" 36+97.81	2001912.39	6508898.28
CP18	PT "MN" 38+17.63	2001974.46	6508995.84
CP19	EP "MN" 39+16.26	2002058.88	6509046.82

LINE TABLE		
No.	BEARING	DISTANCE
3	N 12° 35' 13" W	827.41
6	N 19° 13' 40" E	244.03
7	N 83° 56' 17" E	63.03
8	N 31° 07' 43" E	98.62

CURVE TABLE				
No.	R	Δ	T	L
2	3970.00	13° 38' 27"	474.82	945.16
6	130.00	64° 42' 38"	82.36	146.82
7	130.00	52° 48' 35"	64.55	119.82

LAYOUT
SCALE: 1"=40'

L-5

65% SUBMITTAL, NOT FOR CONSTRUCTION

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

PROJECT ENGINEER MICHAEL WOLOHAN

CALCULATED-DESIGNED BY K. BEWSEY/ D. ZURCHER
CHECKED BY KEITH RHODES

REVISED BY
DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTL | 054-X-LANDNET | 054-Drainage | 054-Proposed ROW | 054-Corridor | 054-Overflow Bridge Foundation |
Mar. 20, 2015 - 00:06:46 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-L.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		15	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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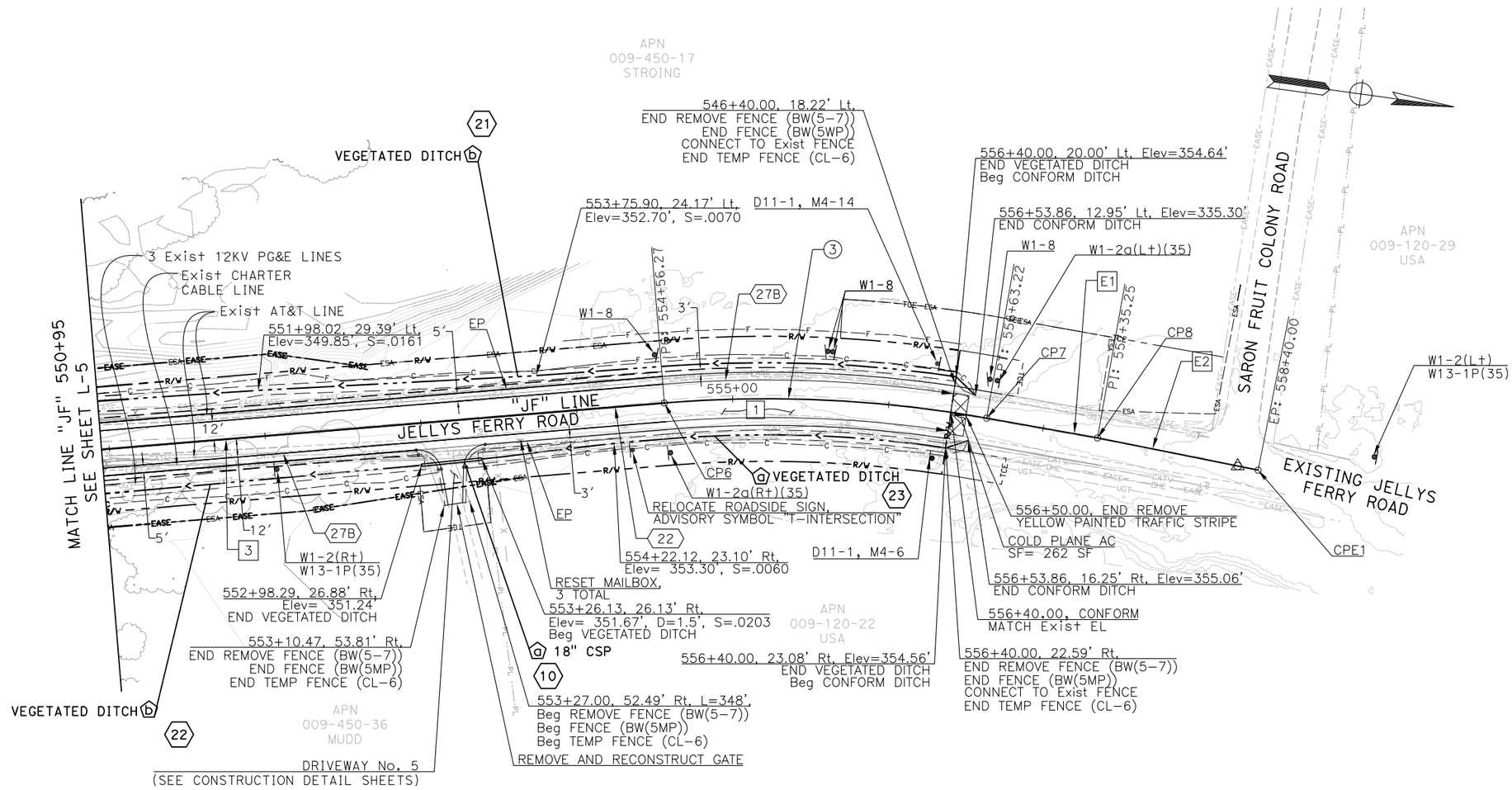
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET L-1 FOR NOTES AND LEGEND.



CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CP6	PC "JF" 554+56.27	2003169.56	6508656.34
CP7	PT "JF" 556+63.22	2003375.09	6508637.72
CP8	EP "JF" 557+35.25	2003447.06	6508640.53
CPE1	PI "JF" 558+40.00	2003551.62	6508646.86

LINE TABLE		
No.	BEARING	DISTANCE
3	N 12° 35' 13" W	827.41
E1	N 02° 14' 06" E	72.02
E2	N 03° 27' 57" E	104.75

CURVE TABLE				
No.	R	Δ	T	L
3	800.00	14° 49' 19"	104.06	206.95

LAYOUT
SCALE: 1"=40'
L-6

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER
CHECKED BY: KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Drainage | 054-Proposed ROW | 054-Corridor | 054-Overflow Bridge Foundation |
Mar. 20, 2015 - 00:06:46 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-L.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		16	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

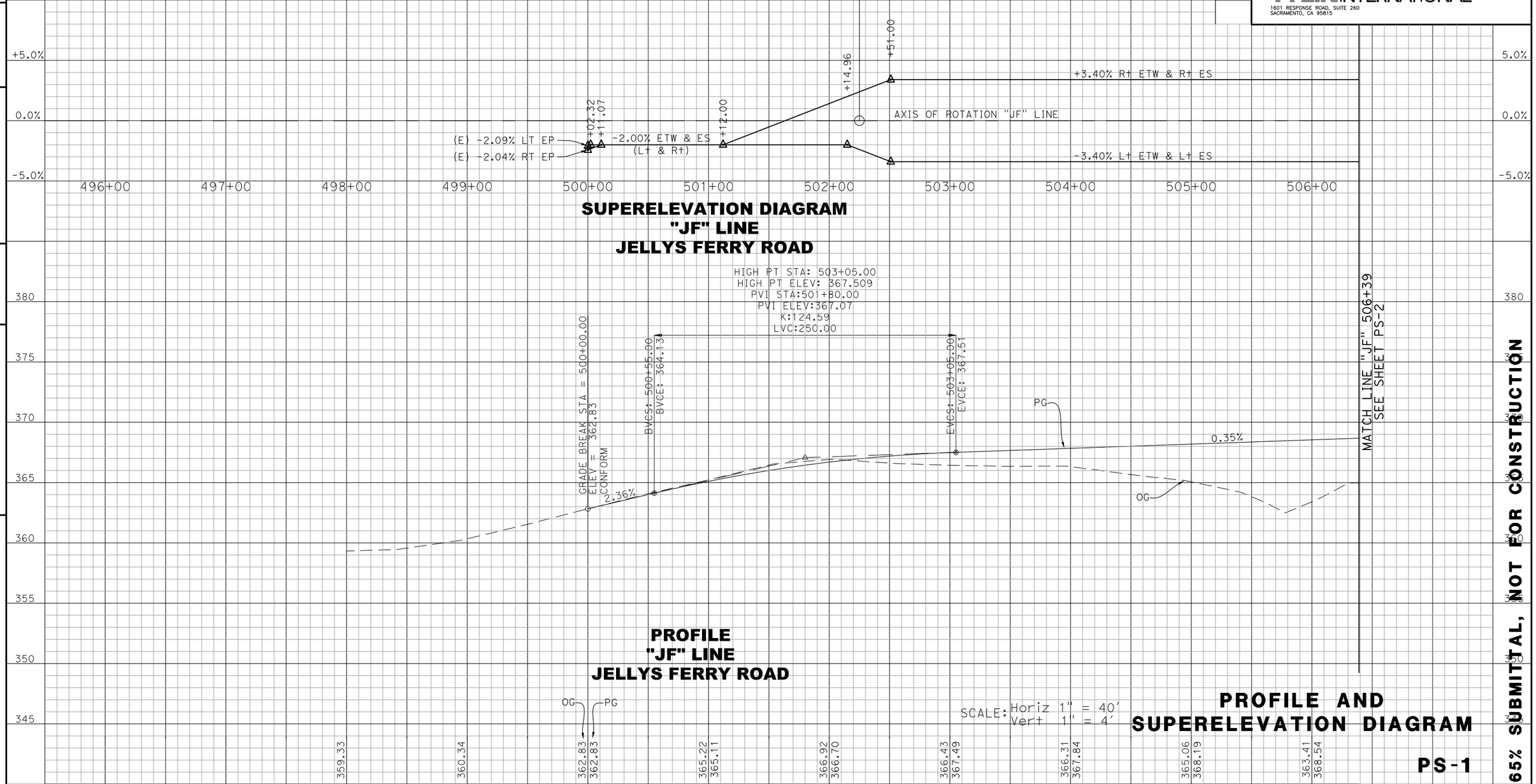
REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

T.Y. LIN INTERNATIONAL OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. ALL STATIONING ALONG "JF" LINE UNLESS OTHERWISE NOTED.
3. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.



PROFILE AND SUPERELEVATION DIAGRAM

PS-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

PROJECT ENGINEER: MICHAEL WOLOHAN

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER

CHECKED BY: KEITH RHODES

REVISED BY

DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		17	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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SACRAMENTO, CA 95815

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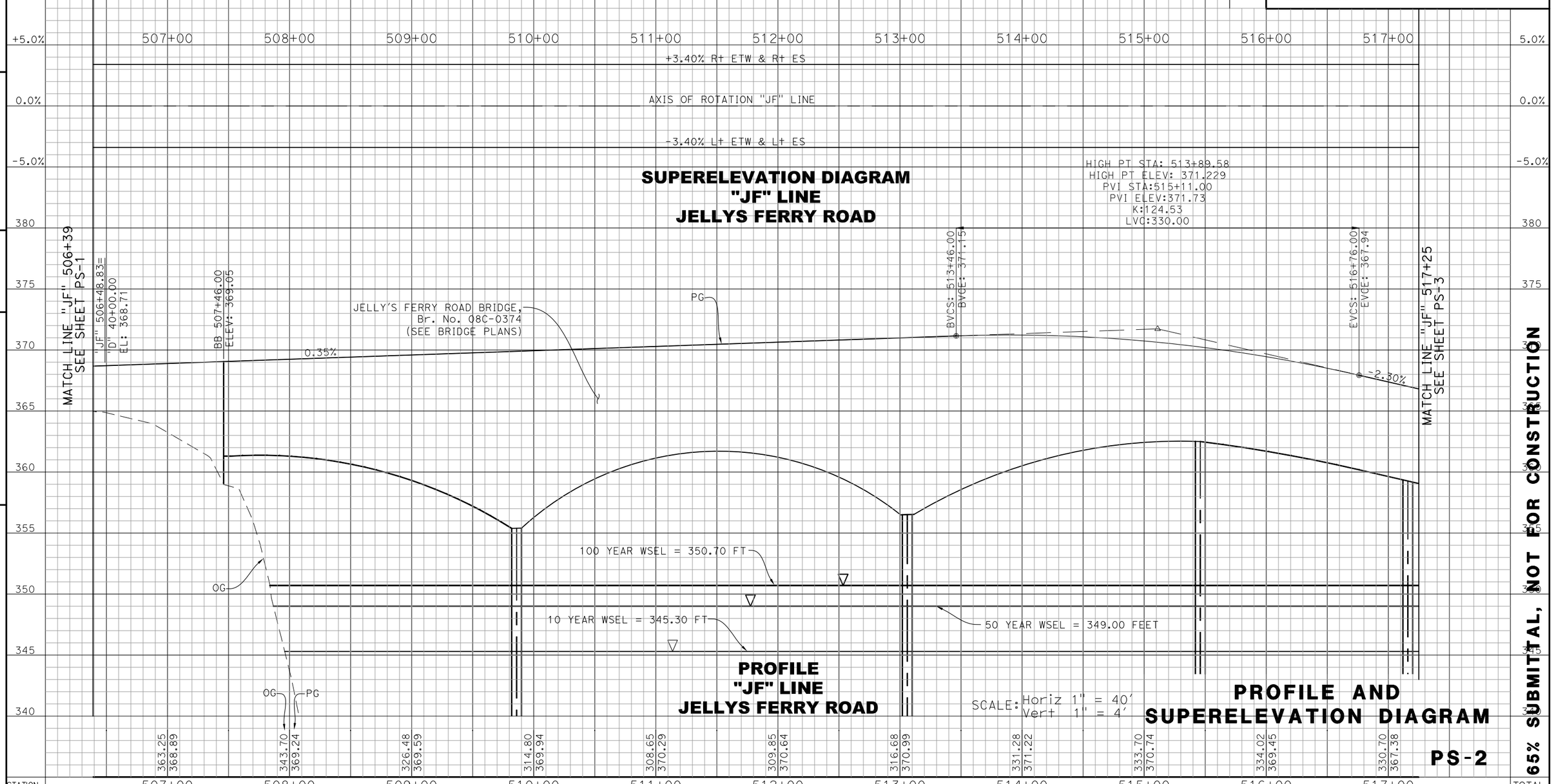

PS-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		18	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

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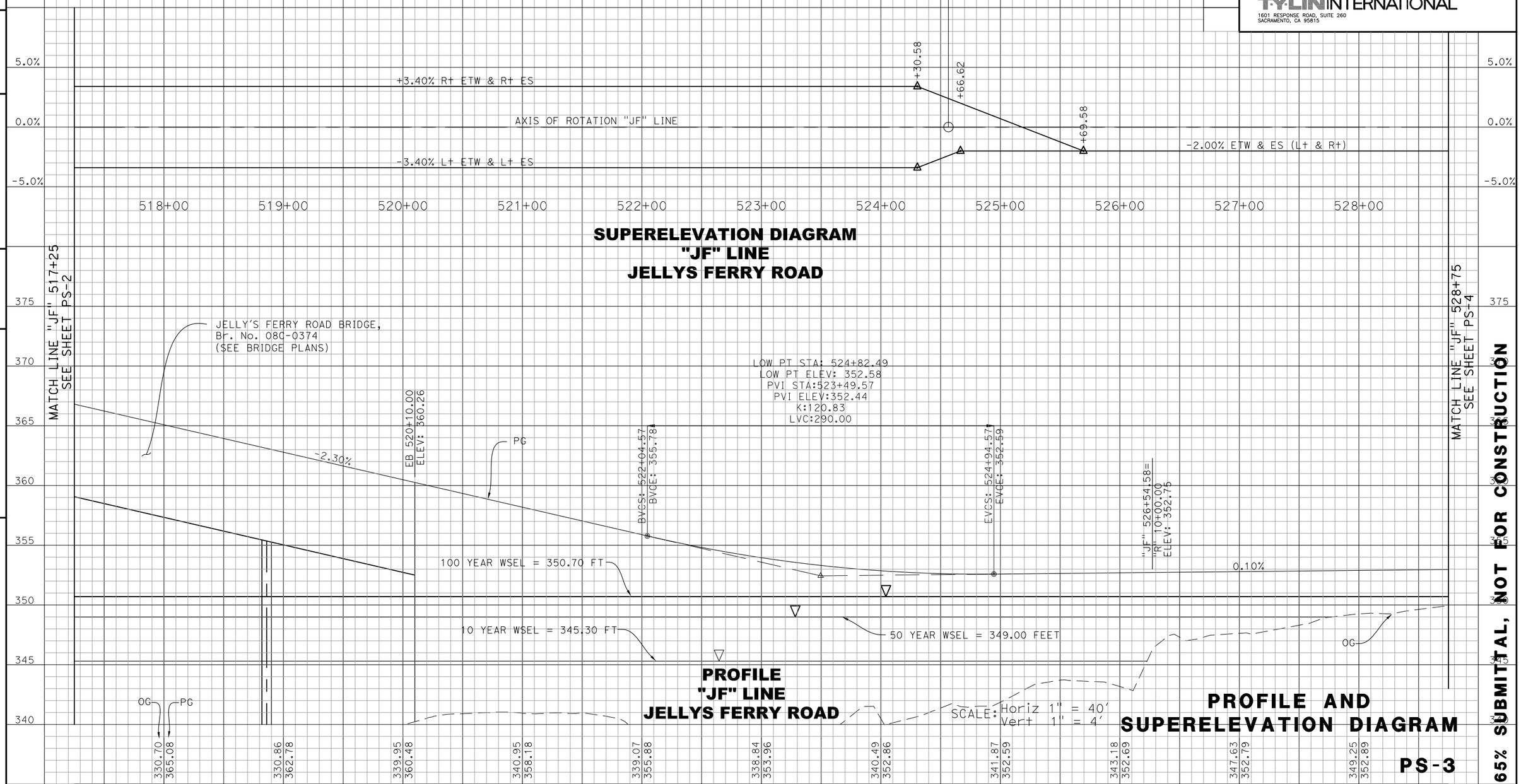

PROFILE AND SUPERELEVATION DIAGRAM

PS-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		19	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

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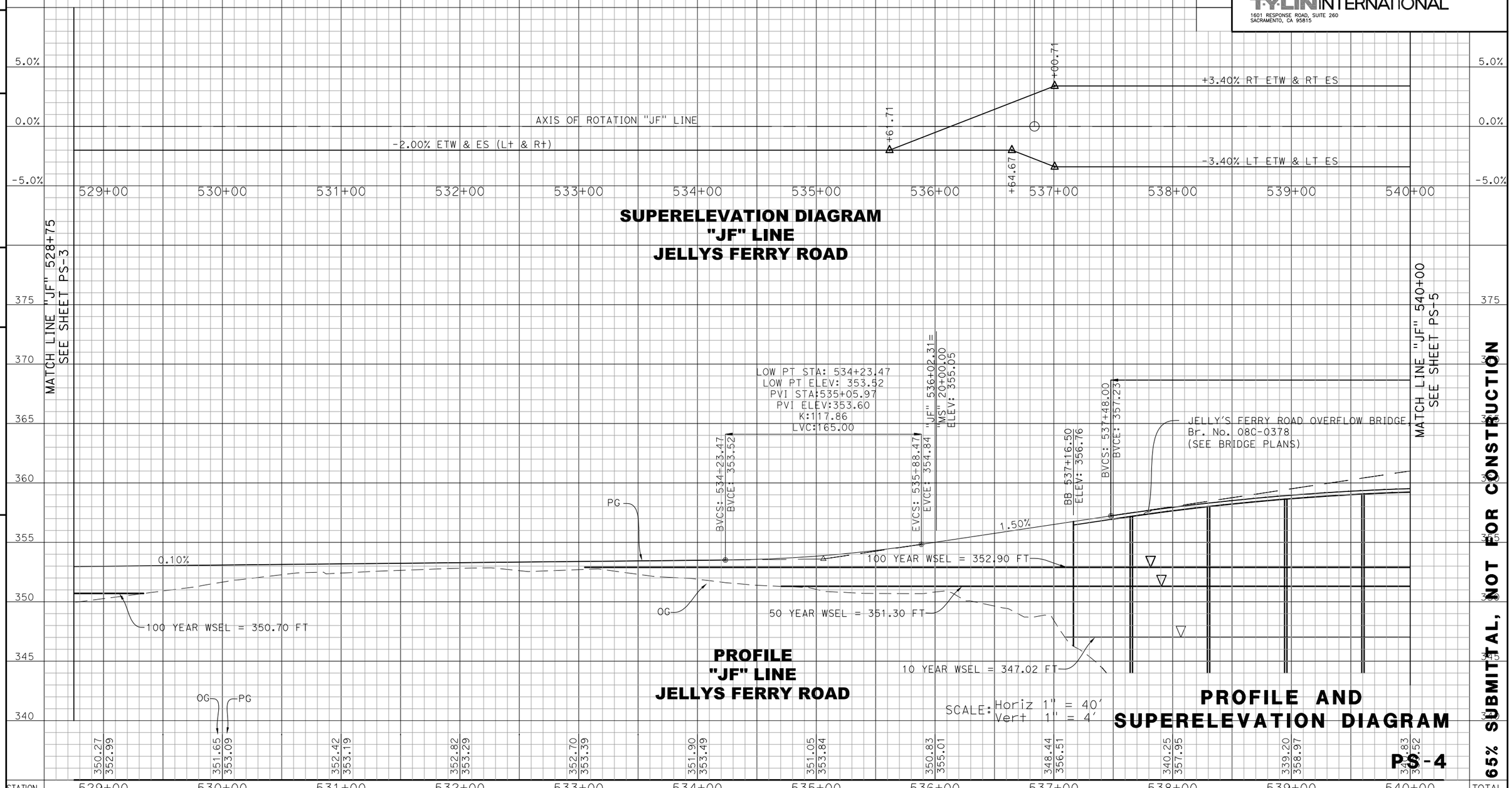

PS-4

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		20	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

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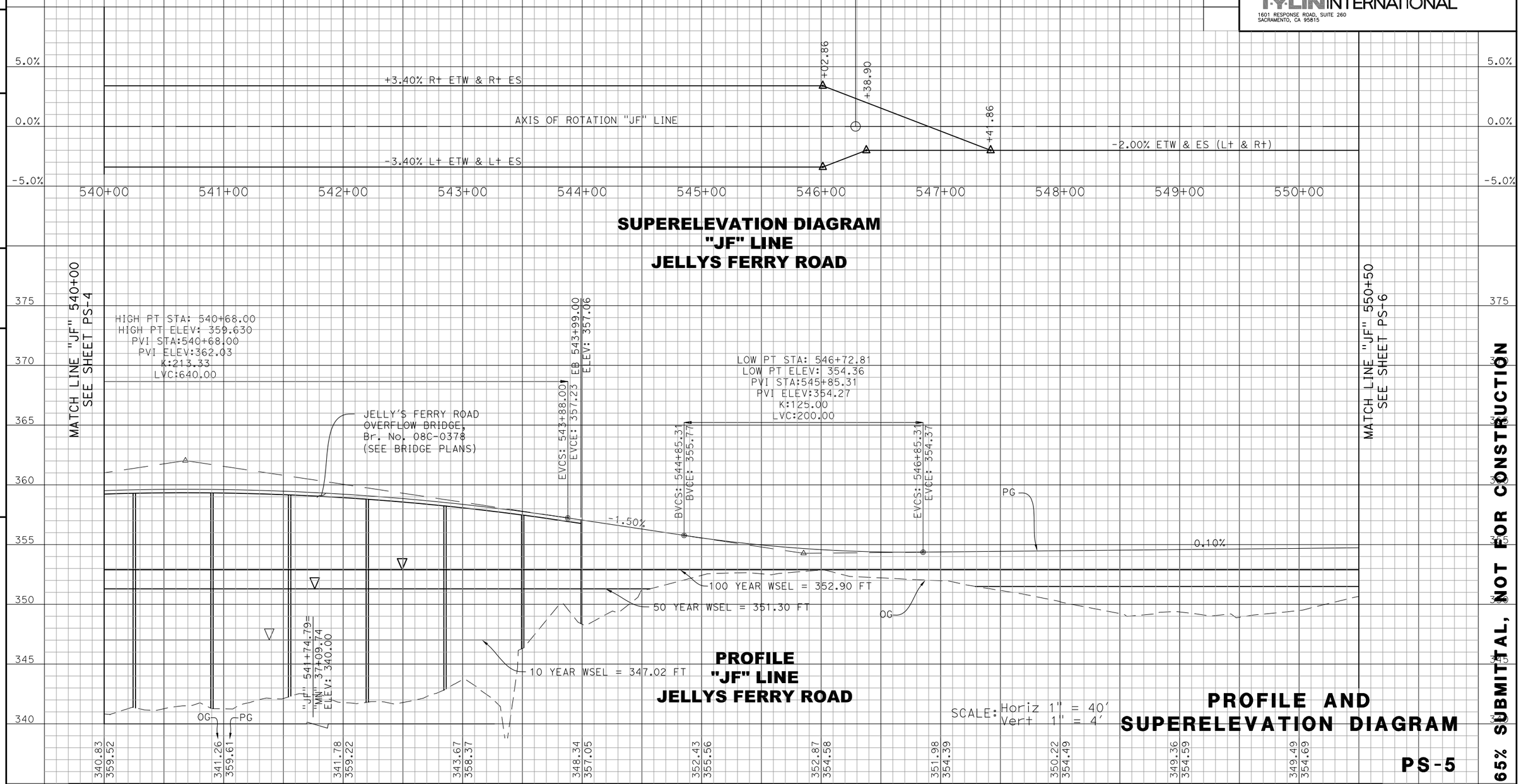

PROFILE AND SUPERELEVATION DIAGRAM

PS-5

65% SUBMITTAL, NOT FOR CONSTRUCTION

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

PROJECT ENGINEER MICHAEL WOLOHAN

CALCULATED-DESIGNED BY K. BEWSEY/ D. ZURCHER
CHECKED BY KEITH RHODES

REVISED BY
DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		21	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

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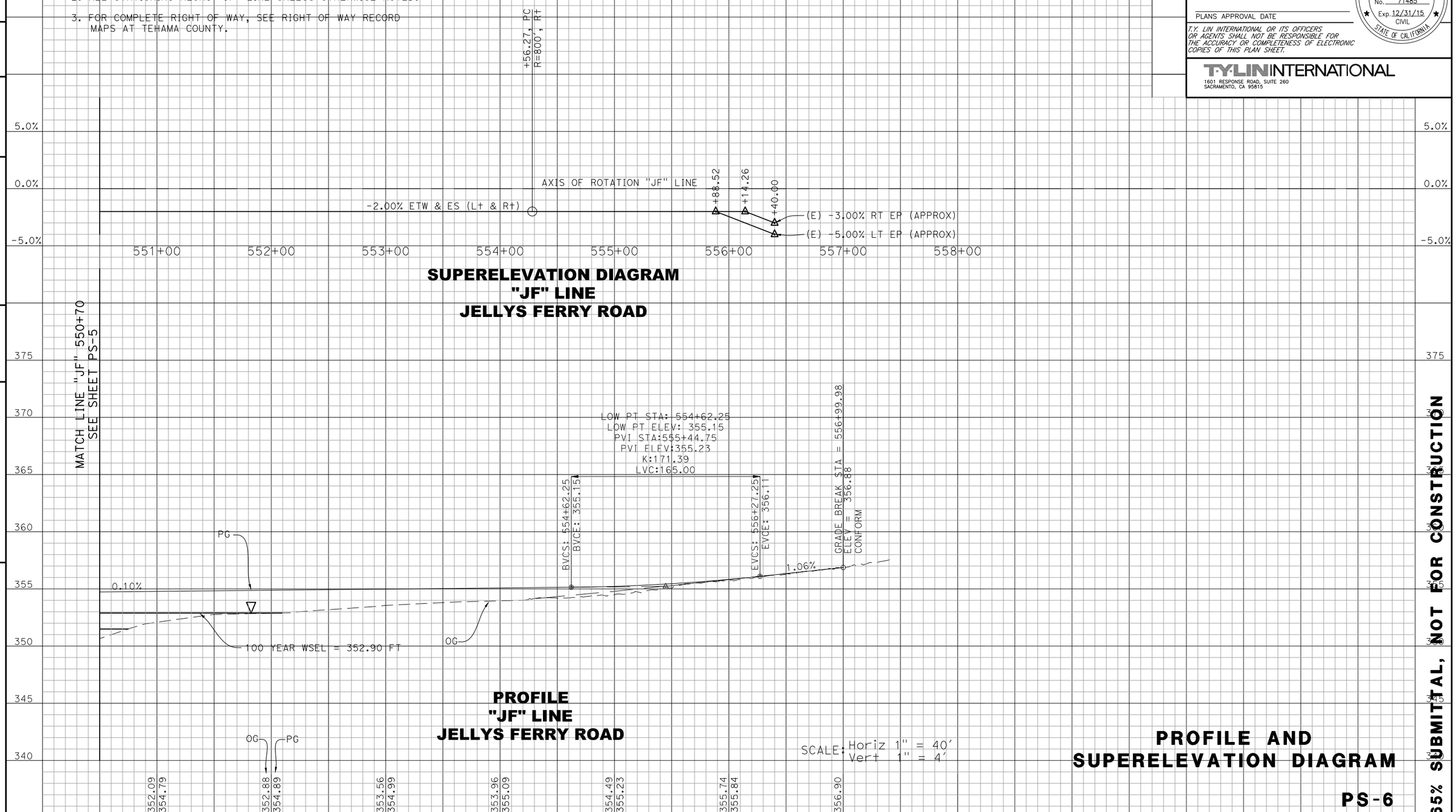

PROFILE AND SUPERELEVATION DIAGRAM

PS-6

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		22	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

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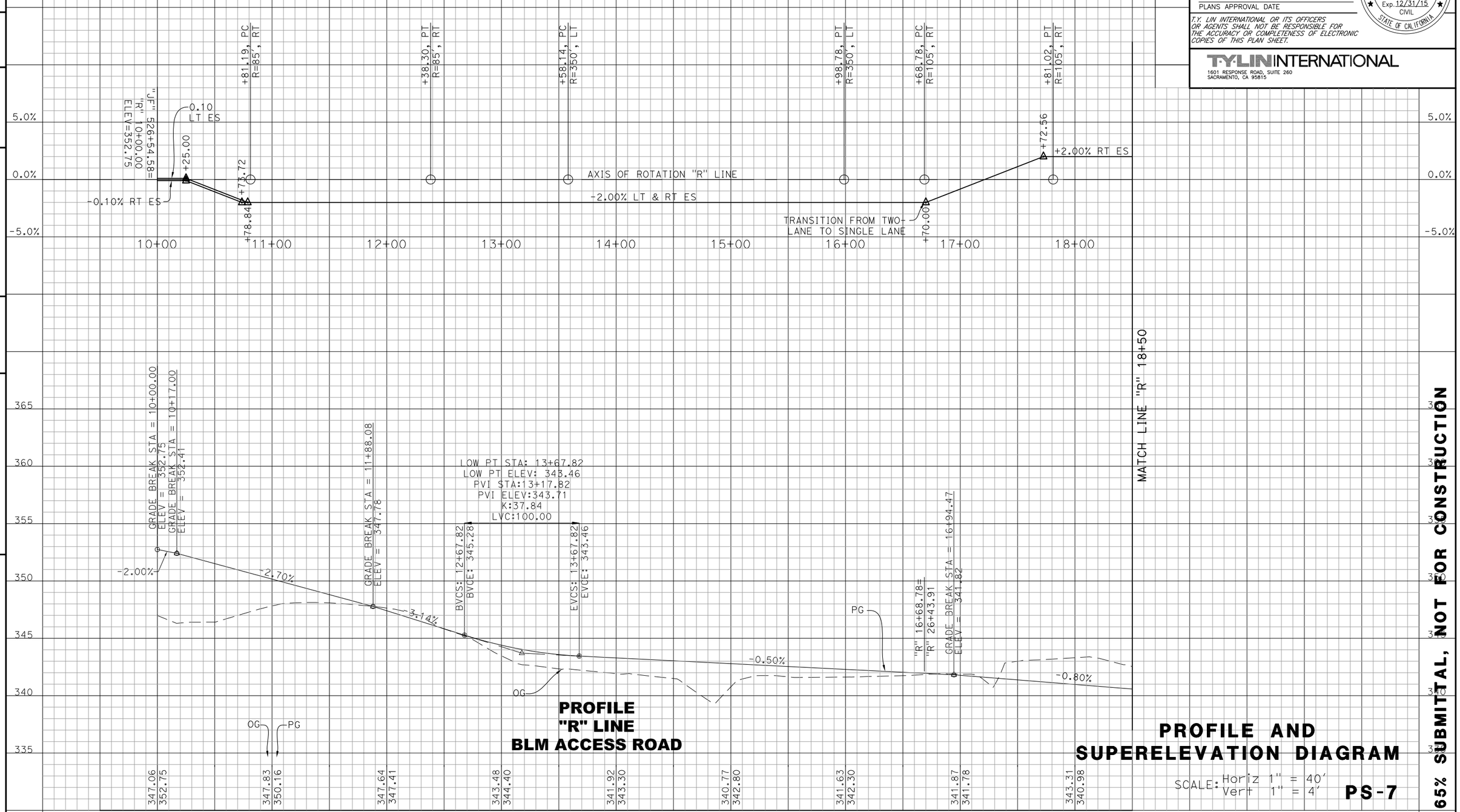
2. ALL STATIONING ALONG "R" LINE UNLESS OTHERWISE NOTED.
3. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.



PROFILE
"R" LINE
BLM ACCESS ROAD

PROFILE AND SUPERELEVATION DIAGRAM

SCALE: Horiz 1" = 40'
Vert 1" = 4'

PS-7

65% SUBMITTAL, NOT FOR CONSTRUCTION

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

PROJECT ENGINEER MICHAEL WOLOHAN

CALCULATED-DESIGNED BY K. BEWSEY/ D. ZURCHER
CHECKED BY KEITH RHODES

REVISED BY
DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		23	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

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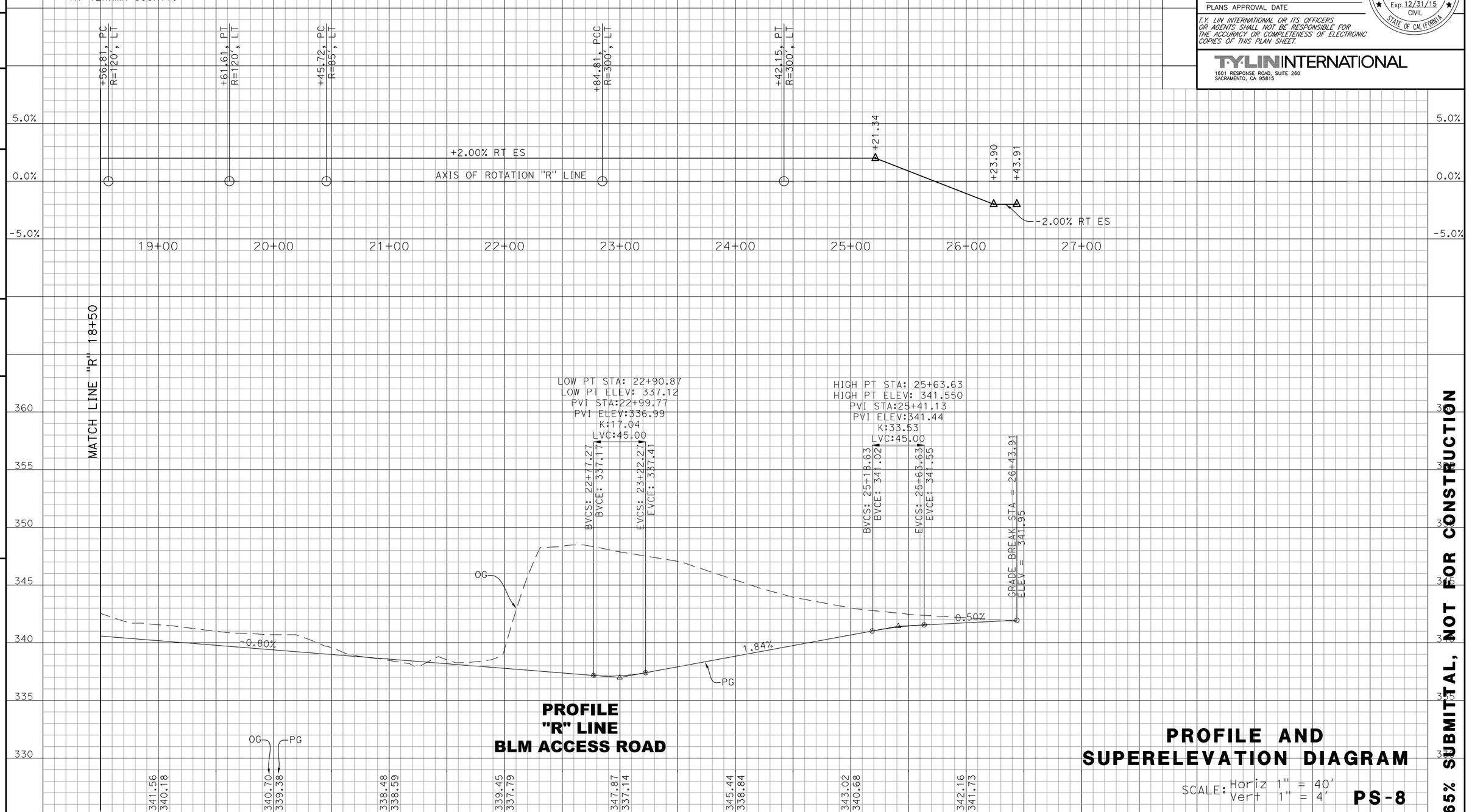

PROFILE
"R" LINE
BLM ACCESS ROAD

PROFILE AND SUPERELEVATION DIAGRAM

SCALE: Horiz 1" = 40'
Vert 1" = 4'

PS-8

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		24	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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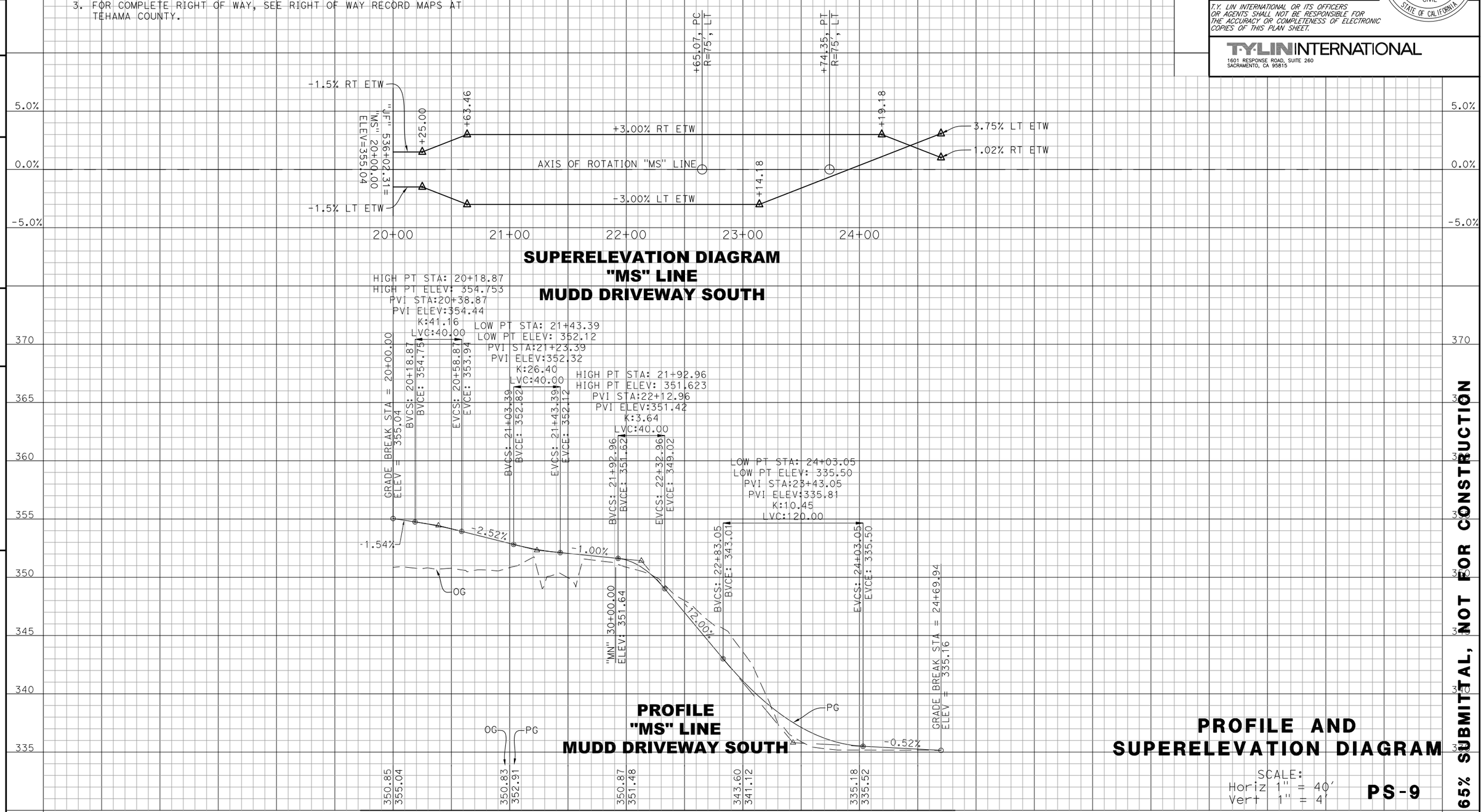
T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. ALL STATIONING ALONG PERSPECTIVE DRIVEWAY LINE UNLESS OTHERWISE NOTED.
3. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.



PROFILE AND SUPERELEVATION DIAGRAM

SCALE:
Horiz 1" = 40'
Vert 1" = 4'

PS-9

65% SUBMITTAL, NOT FOR CONSTRUCTION

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

PROJECT ENGINEER MICHAEL WOLOHAN

CALCULATED-DESIGNED BY K. BEWSEY/ D. ZURCHER
CHECKED BY KEITH RHODES

REVISED BY
DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		25	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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SACRAMENTO, CA 95815

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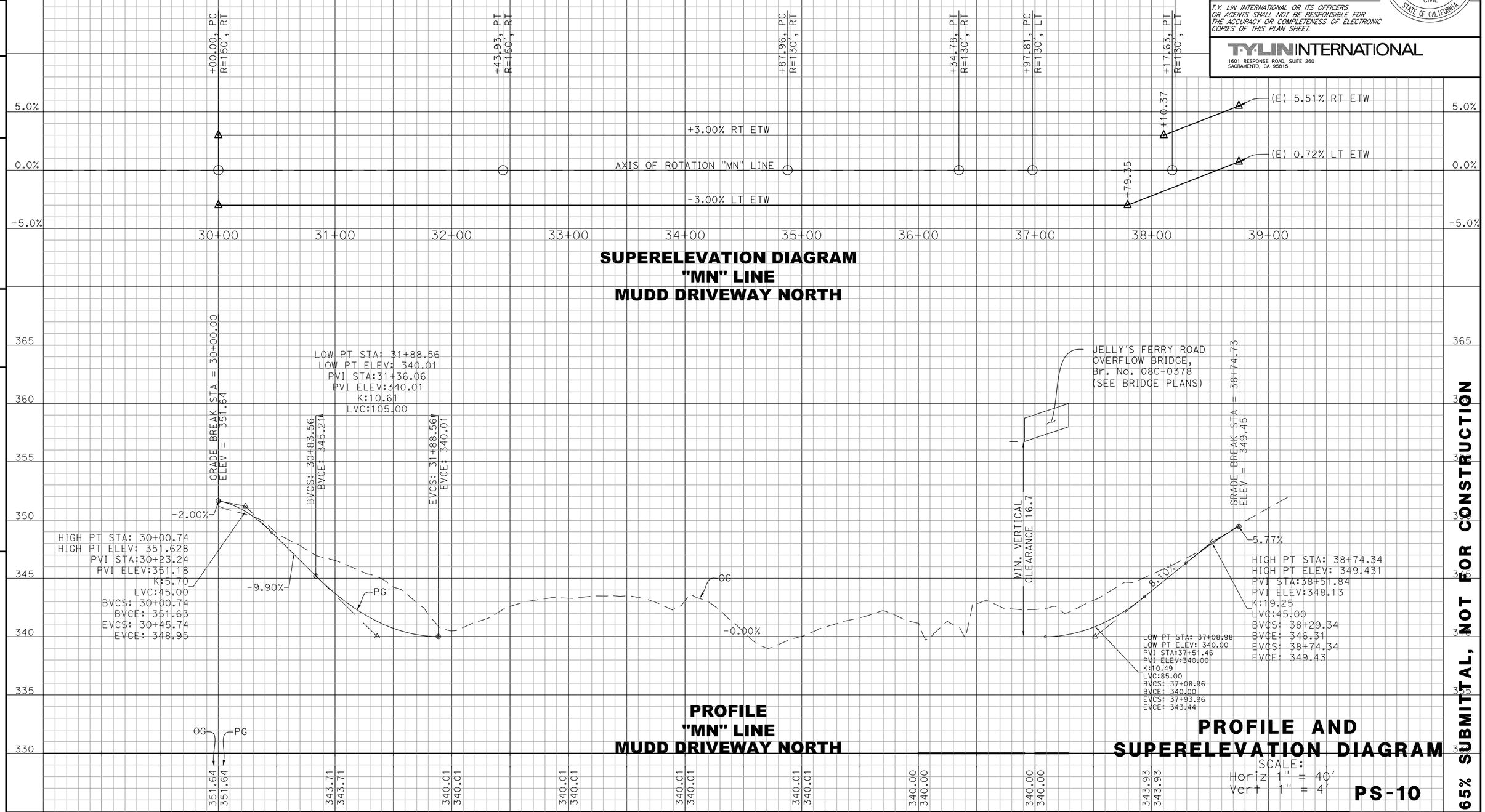

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		26	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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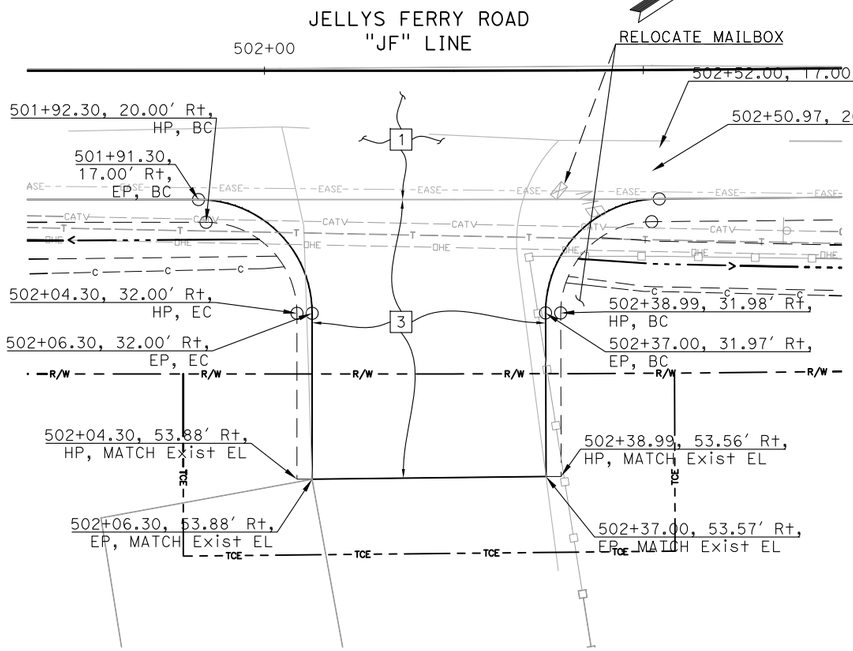
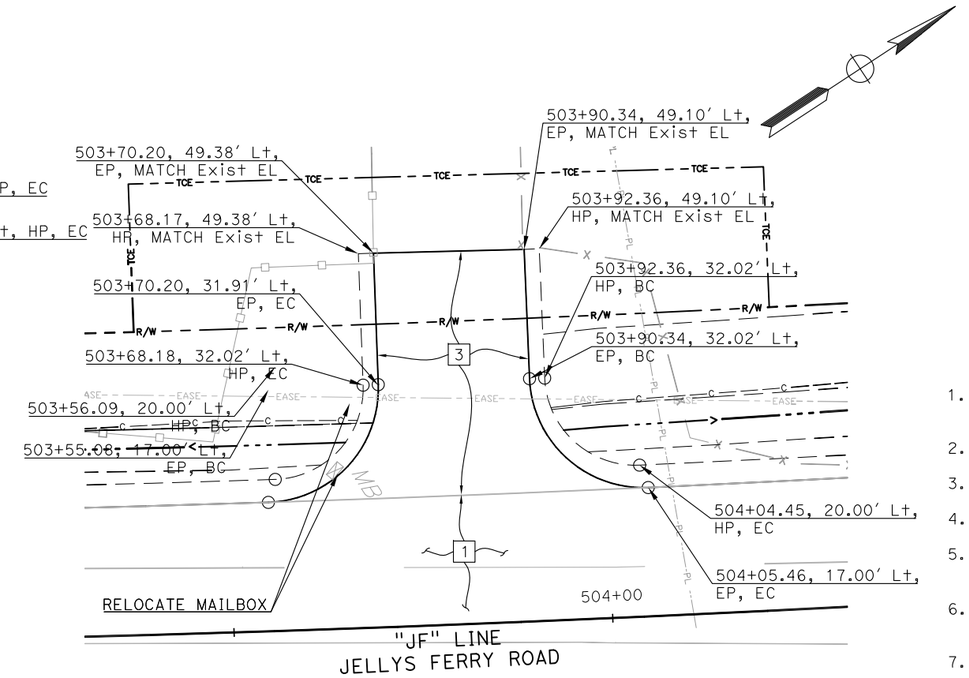
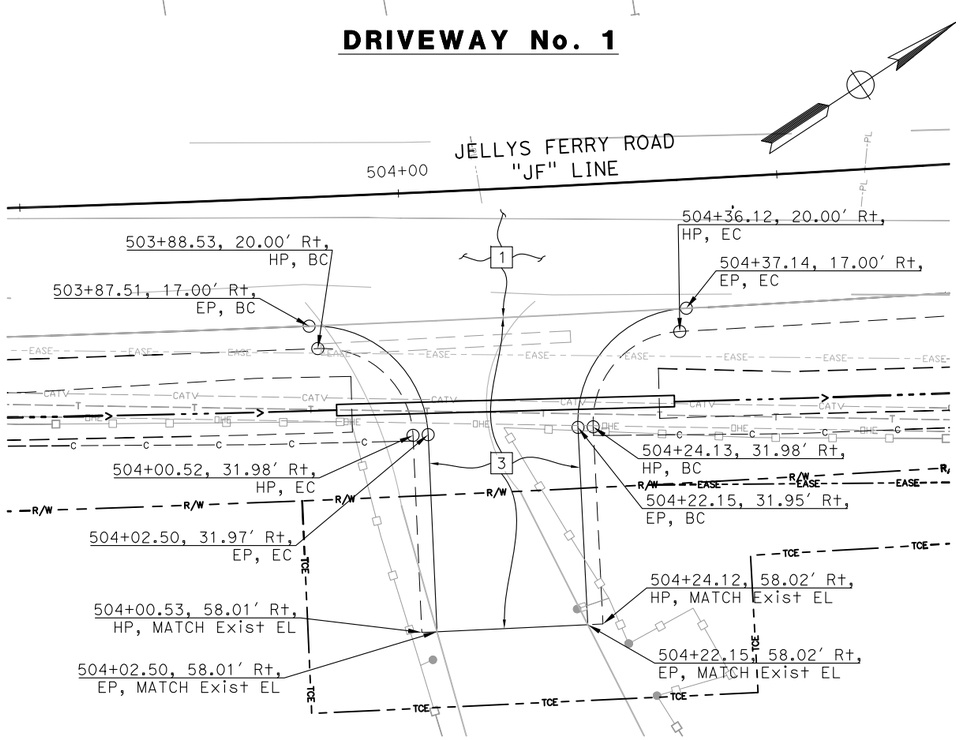


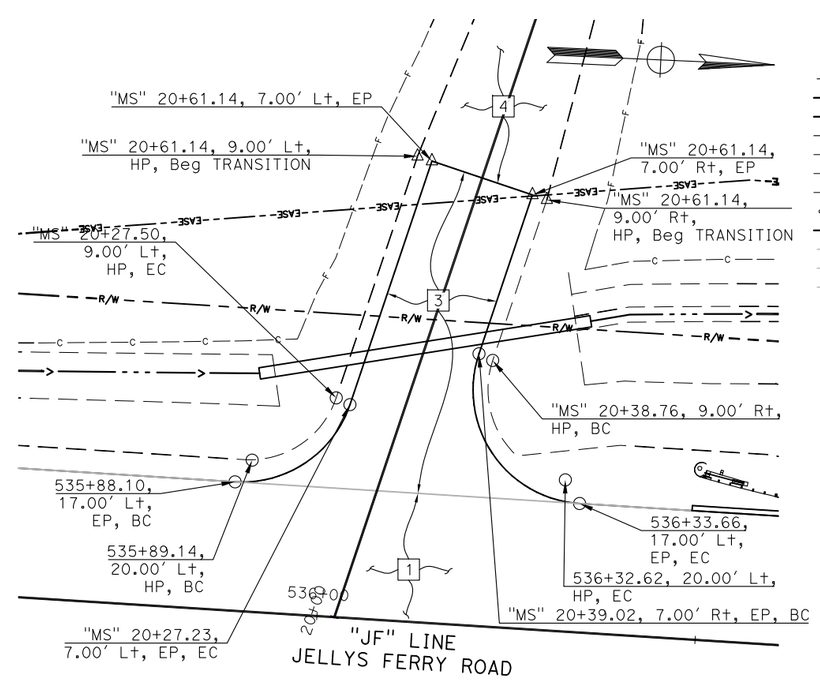
DRIVEWAY No. 1



DRIVEWAY No. 2



DRIVEWAY No. 3



MUDD SOUTH ROAD

NOTES:

1. FG SLOPE AT CONFORM SHALL BE WITHIN 5% OF THE OG SLOPE BEHIND THE CONFORM.
2. MAXIMUM GRADE BREAK = 5%.
3. SEE SHEET X-1 FOR STRUCTURAL SECTIONS.
4. SEE SHEET C-5 FOR GENERAL DRIVEWAY DATA.
5. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
6. ALL STATIONING IS ALONG THE "JF" LINE UNLESS OTHERWISE SPECIFIED.
7. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.

LEGEND

- X — LINE NUMBER, SEE LINE TABLE
- X — CURVE NUMBER, SEE CURVE TABLE
- D — STRUCTURAL SECTION, SEE SHEET X-1
- R/W — RIGHT OF WAY
- TCE — TEMPORARY CONSTRUCTION EASEMENT
- EASE — TEMPORARY CONSTRUCTION EASEMENT
- METAL BEAM GUARD RAIL
- HINGE
- F — FILL
- C — CUT
- ROCK BARRIER
- FLOWLINE
- X — Exist WIRE FENCE
- Exist WOOD FENCE
- Exist FLOWLINE
- RS — REMOVE SIGN AND SALVAGE TO PROPERTY OWNER
- BEGIN OR END CURVE
- ANGLE POINT
- INSTALL ROADSIDE SIGN
- REMOVE ROADSIDE SIGN, AS NOTED
- Exist SIGN TO PROTECT IN PLACE
- RELOCATE SIGN — FROM / TO

CONSTRUCTION DETAILS

SCALE: 1"=10'

C-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
Mar. 20, 2015 - 01:27:02 DWG Name: P:\170054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-C.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		27	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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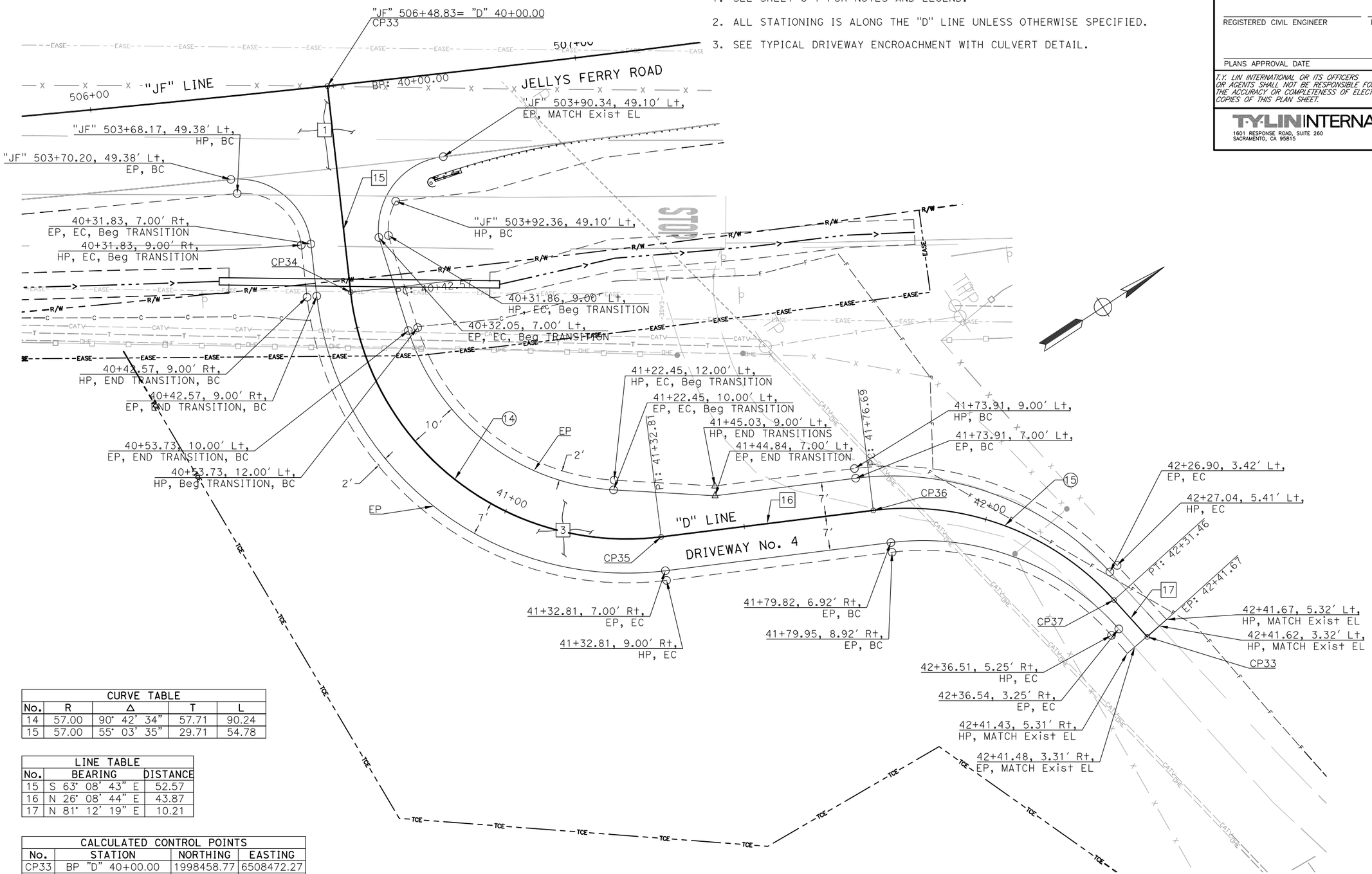
T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET C-1 FOR NOTES AND LEGEND.
2. ALL STATIONING IS ALONG THE "D" LINE UNLESS OTHERWISE SPECIFIED.
3. SEE TYPICAL DRIVEWAY ENCROACHMENT WITH CULVERT DETAIL.



CURVE TABLE				
No.	R	Δ	T	L
14	57.00	90° 42' 34"	57.71	90.24
15	57.00	55° 03' 35"	29.71	54.78

LINE TABLE		
No.	BEARING	DISTANCE
15	S 63° 08' 43" E	52.57
16	N 26° 08' 44" E	43.87
17	N 81° 12' 19" E	10.21

CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CP33	BP "D" 40+00.00	1998458.77	6508472.27
CP34	PC "D" 40+42.57	1998439.54	6508510.25
CP35	PT "D" 41+32.81	1998465.28	6508587.16
CP36	PC "D" 41+76.69	1998504.66	6508606.50
CP37	PT "D" 42+31.46	1998535.88	6508648.95
CP38	EP "D" 42+41.67	1998537.44	6508659.04

DRIVEWAY No. 4

CONSTRUCTION DETAILS

SCALE: 1"=10'

C-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY | DATE REVISED

K. BEWSEY/ D. ZURCHER | KEITH RHODES

CALCULATED-DESIGNED BY | CHECKED BY

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
Mar 20, 2015 - 01:27:02 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\S11_CADD\SHEETS\054-C.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		28	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

T.Y. LIN INTERNATIONAL OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

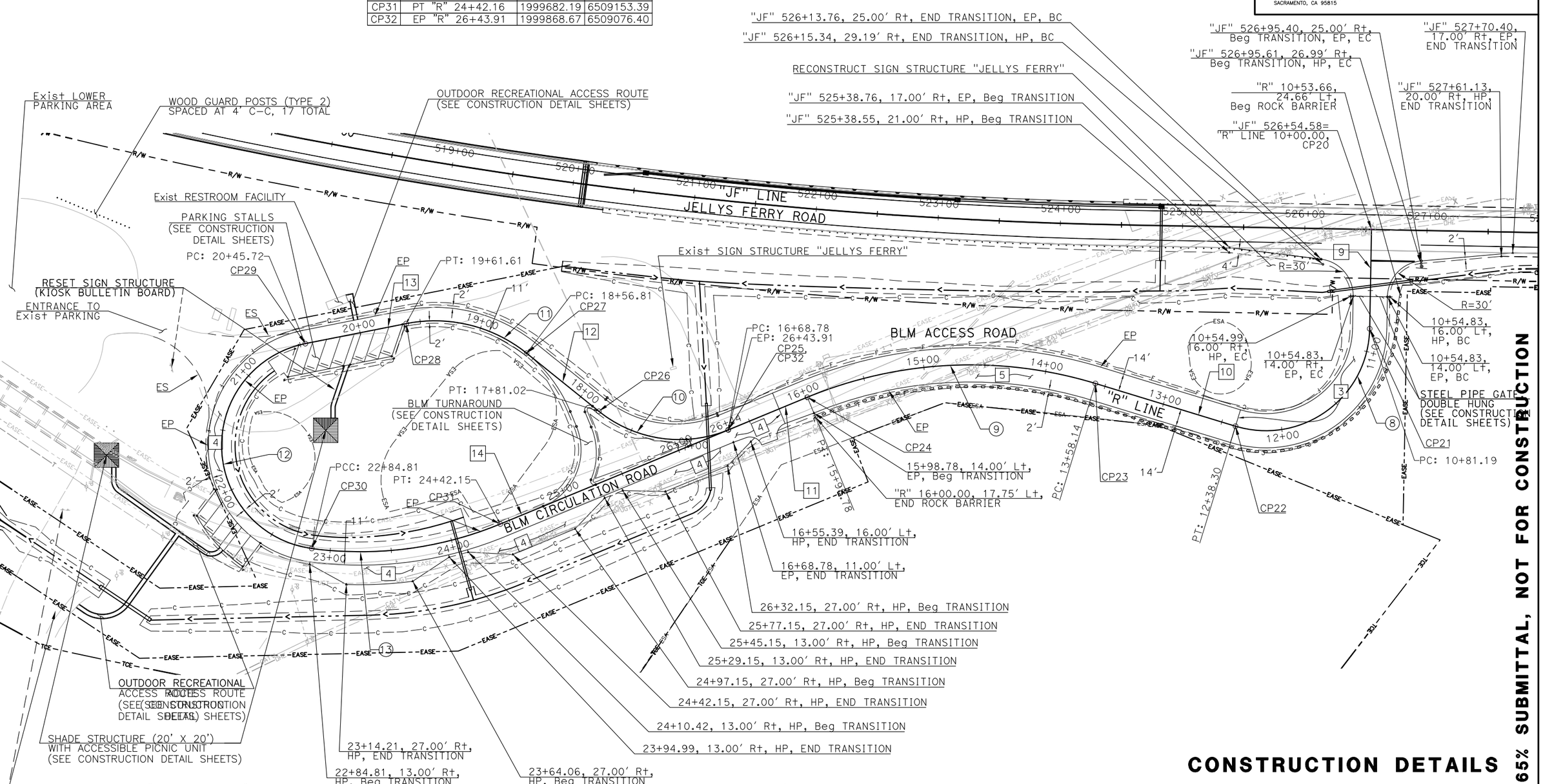
NOTES:

1. SEE SHEET C-1 FOR NOTES AND LEGEND.
2. ALL STATIONING IS ALONG THE "R" LINE UNLESS OTHERWISE SPECIFIED.

CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CP20	BP "R" 10+00.00	2000394.92	6508912.46
CP21	PC "R" 10+81.19	2000393.43	6508993.64
CP22	PT "R" 12+38.30	2000283.65	6509073.38
CP23	PC "R" 13+58.14	2000169.03	6509038.42
CP24	PT "R" 15+98.77	1999933.38	6509049.68
CP25	PC "R" 16+68.78	1999868.67	6509076.40
CP26	PT "R" 17+81.02	1999762.78	6509061.16
CP27	PC "R" 18+56.81	1999703.73	6509013.65
CP28	PT "R" 19+61.61	1999605.16	6508989.45
CP29	PC "R" 20+45.73	1999522.65	6509005.82
CP30	PCC "R" 22+84.81	1999527.94	6509173.44
CP31	PT "R" 24+42.16	1999682.19	6509153.39
CP32	EP "R" 26+43.91	1999868.67	6509076.40

LINE TABLE		
No.	BEARING	DISTANCE
9	N 88° 56' 46" W	81.19
10	S 16° 57' 36" W	119.84
11	S 22° 25' 59" E	70.00
12	S 38° 48' 57" W	75.69
13	S 11° 13' 27" E	75.69
14	N 22° 25' 59" W	201.75

CURVE TABLE				
No.	R	Δ	T	L
8	85.00	105° 54' 22"	112.61	157.11
9	350.00	39° 23' 35"	125.29	240.64
10	105.00	61° 14' 56"	62.16	112.24
11	120.00	50° 02' 24"	56.01	104.80
12	85.00	161° 09' 29"	512.28	239.08
13	300.00	30° 03' 04"	80.53	157.35



BLM ROAD

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

CONSTRUCTION DETAILS

SCALE: 1"=40'

C-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES	0 1 2 3
REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
Mar 20, 2015 - 01:27:02 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\S11_CADD\SHEETS\054-C.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		29	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

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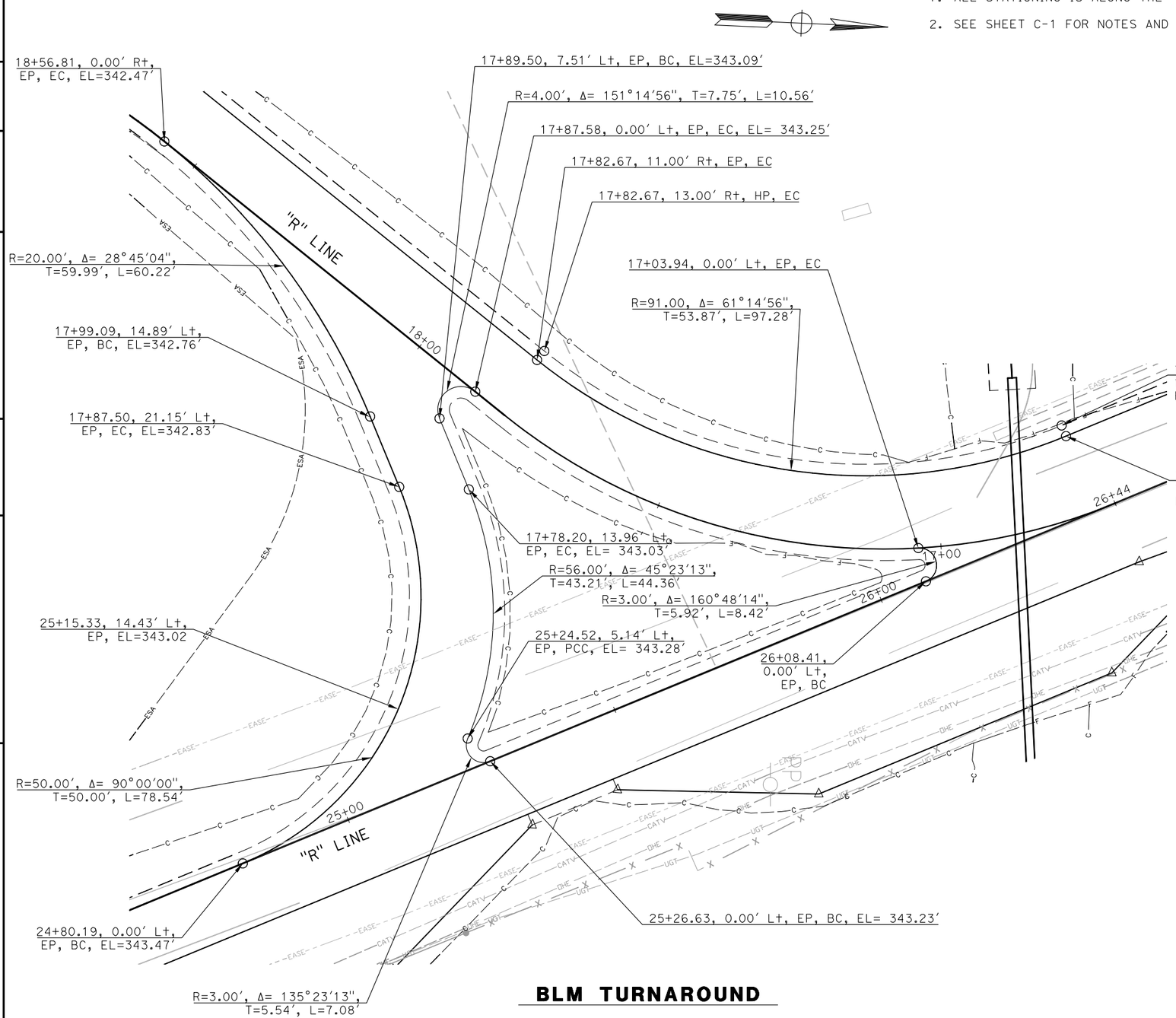
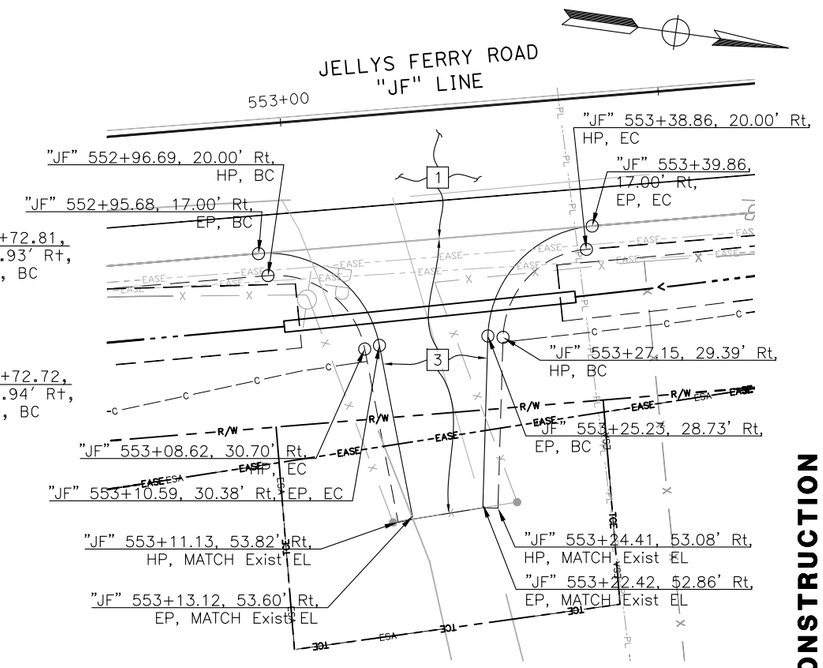
2. SEE SHEET C-1 FOR NOTES AND LEGEND.



BLM TURNAROUND



DRIVEWAY No. 5

CONSTRUCTION DETAILS

SCALE: 1"=10′

C-4

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER
CHECKED BY: KEITH RHODES
PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
Mar 20, 2015 - 01:27:02 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-C.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		30	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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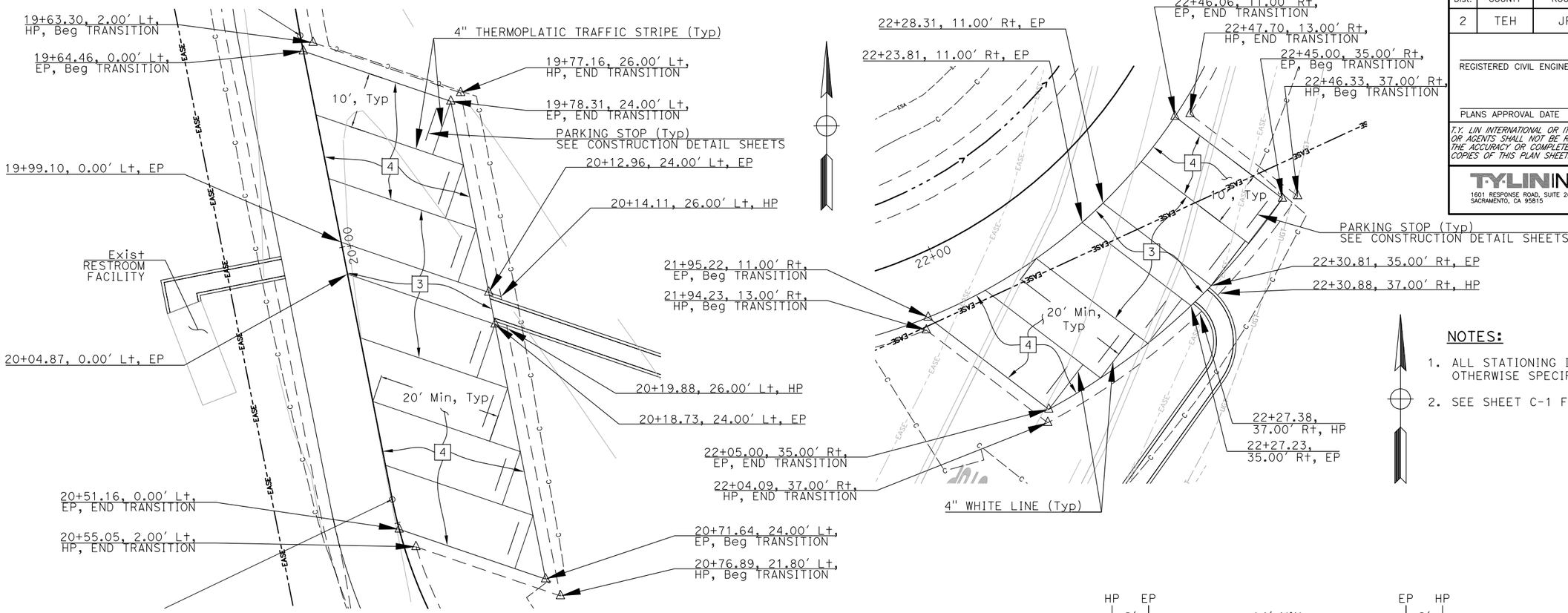
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

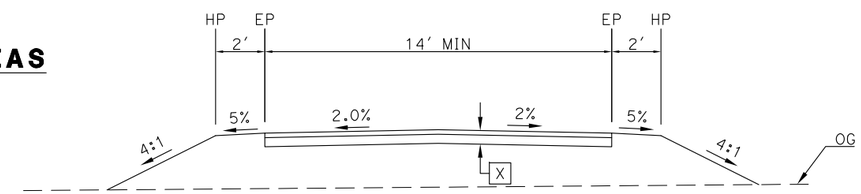


BLM PARKING AREAS

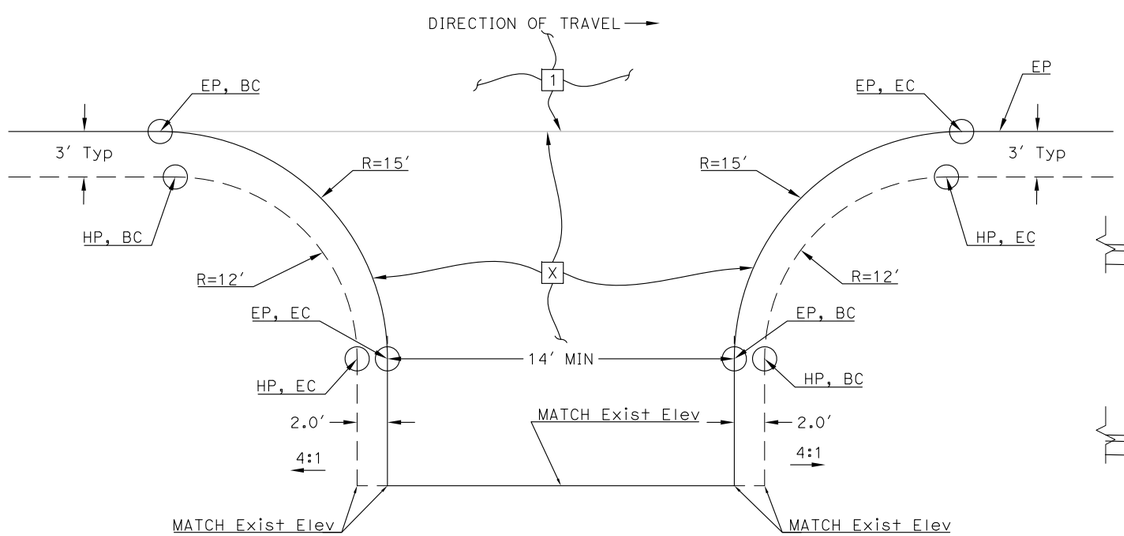
SCALE: 1"=10′

NOTES:

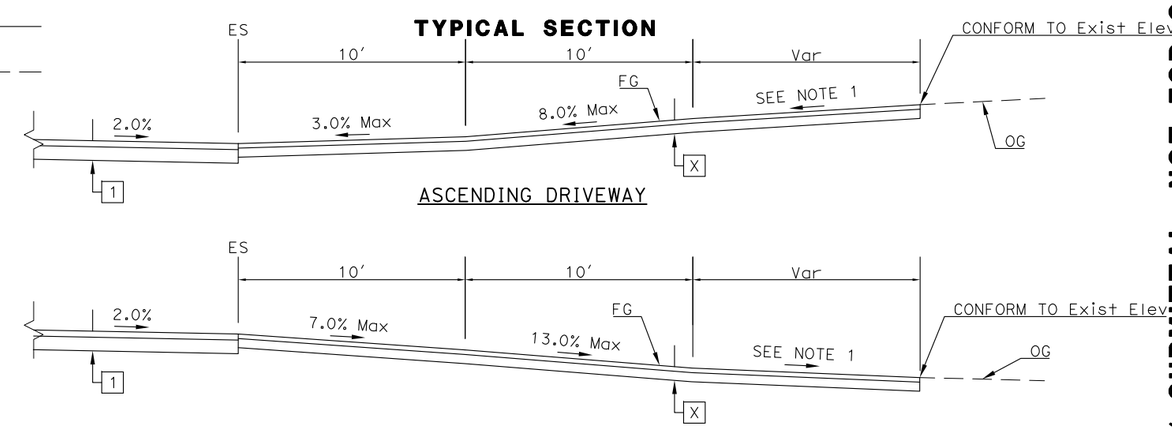
1. ALL STATIONING IS ALONG THE "R" LINE UNLESS OTHERWISE SPECIFIED.
2. SEE SHEET C-1 FOR NOTES AND LEGEND.



TYPICAL SECTION



PLAN



PROFILE

TYPICAL DRIVEWAY ENCROACHMENT WITH CULVERT

NO SCALE

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

CONSTRUCTION DETAILS

65% SUBMITTAL, NOT FOR CONSTRUCTION

C-5

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
Mar. 20, 2015 - 01:27:02 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-C.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		31	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

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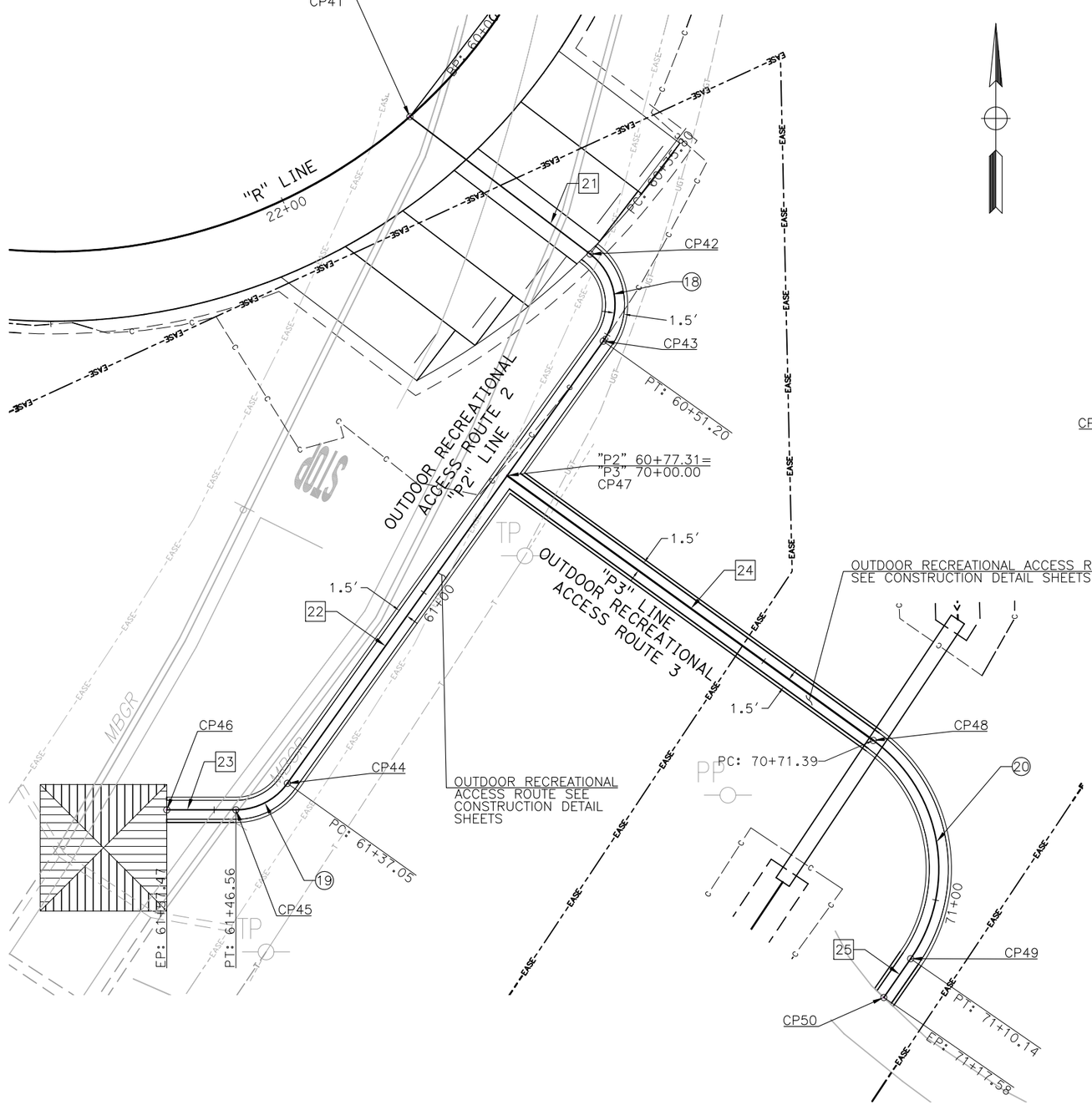

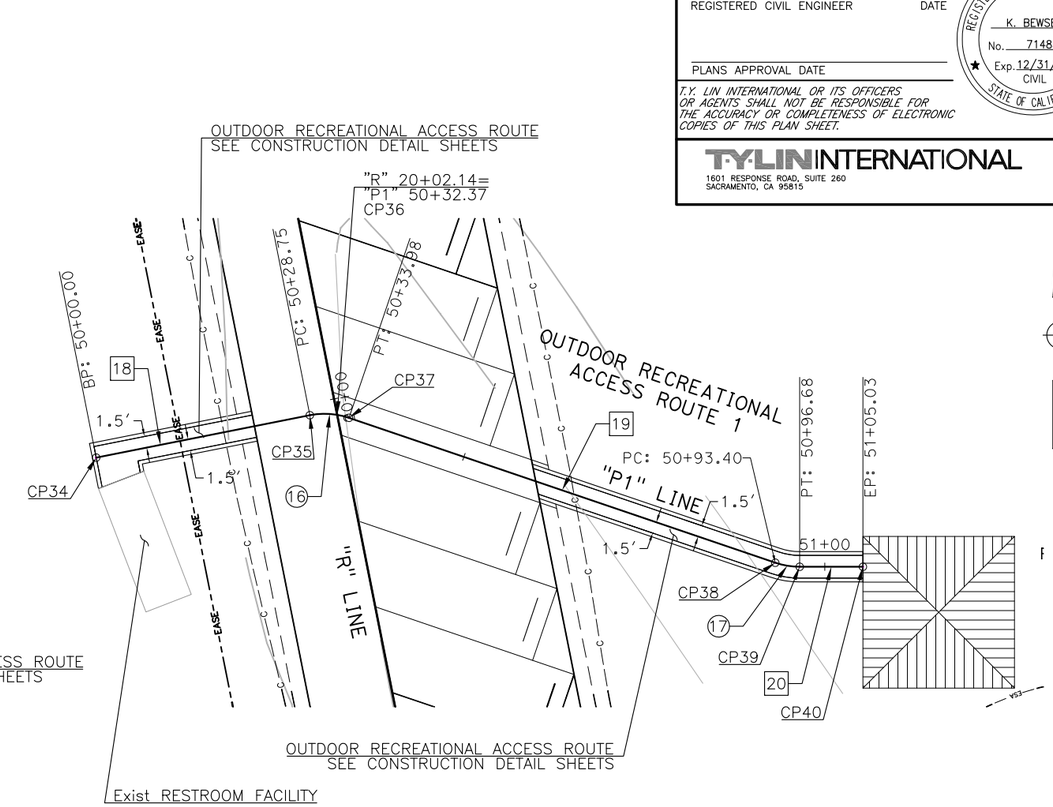

CALCULATED CONTROL POINTS			
No.	STATION	NORTHING	EASTING
CP34	BP "P1" 50+00.00	1999559.76	6508965.54
CP35	PC "P1" 50+28.75	1999565.36	6508993.73
CP36	"P1" 50+32.37	1999565.41	6508997.33
CP37	PT "P1" 50+33.98	1999565.02	6508998.90
CP38	PC "P1" 50+93.40	1999545.89	6509055.16
CP39	PT "P1" 50+96.68	1999545.36	6509058.38
CP40	EP "P1" 51+05.03	1999545.36	6509066.72
CP41	BP "P2" 60+00.00	1999475.53	6509145.51
CP42	PC "P2" 60+35.80	1999453.83	6509173.98
CP43	PT "P2" 60+51.20	1999440.06	6509176.05
CP44	PC "P2" 61+37.05	1999370.19	6509126.16
CP45	PT "P2" 61+46.56	1999366.01	6509118.02
CP46	EP "P2" 61+57.47	1999366.01	6509107.11
CP47	BP "P3" 70+00.00	1999418.81	6509160.88
CP48	PC "P3" 70+71.39	1999376.97	9509218.71
CP49	PT "P3" 71+10.14	1999342.48	6509224.62
CP50	EP "P3" 71+17.58	1999336.36	6509220.38

LINE TABLE		
No.	BEARING	DISTANCE
18	N 78° 46' 33" E	28.75
19	S 71° 13' 27" E	59.42
20	N 90° 00' 00" E	8.35
21	S 52° 40' 59" E	35.80
22	S 35° 31' 48" W	85.85
23	N 90° 00' 00" W	10.91
24	S 54° 07' 03" E	71.39
25	S 34° 41' 26" W	7.45

CURVE TABLE				
No.	R	Δ	T	L
16	10.00	30° 00' 00"	2.68	5.24
17	10.00	18° 46' 33"	1.65	3.28
18	10.00	88° 12' 46"	9.49	15.40
19	10.00	54° 28' 12"	5.15	9.51
20	25.00	88° 48' 29"	24.49	38.75

OUTDOOR RECREATIONAL ACCESS ROUTE LAYOUTS

NO SCALE

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

CONSTRUCTION DETAILS

SCALE AS SHOWN

C-6

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED-DESIGNED BY	K. BEWSEY/ D. ZURCHER
CHECKED BY	KEITH RHODES
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
Mar. 20, 2015 - 01:27:02 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-C.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		32	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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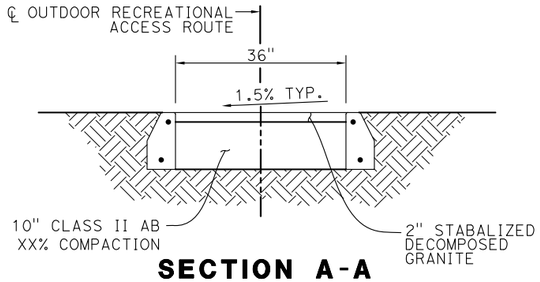
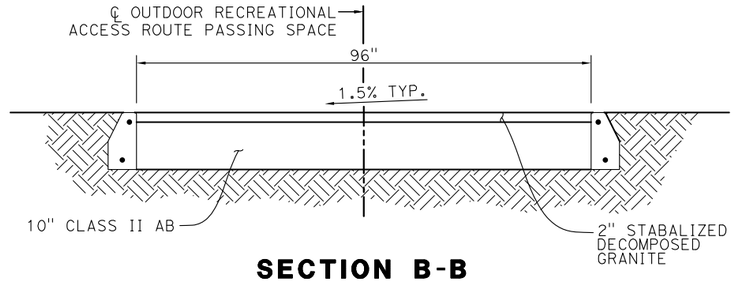
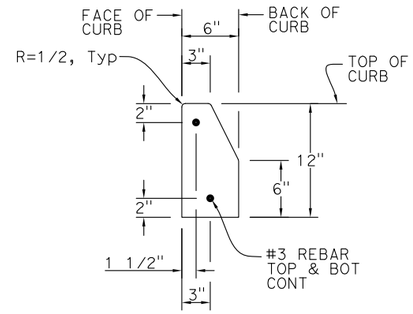
SACRAMENTO, CA 95815



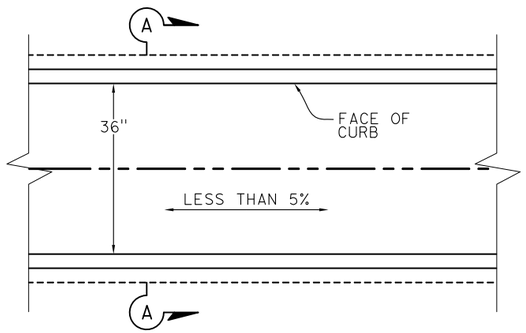
SECTION A-A
NO SCALE



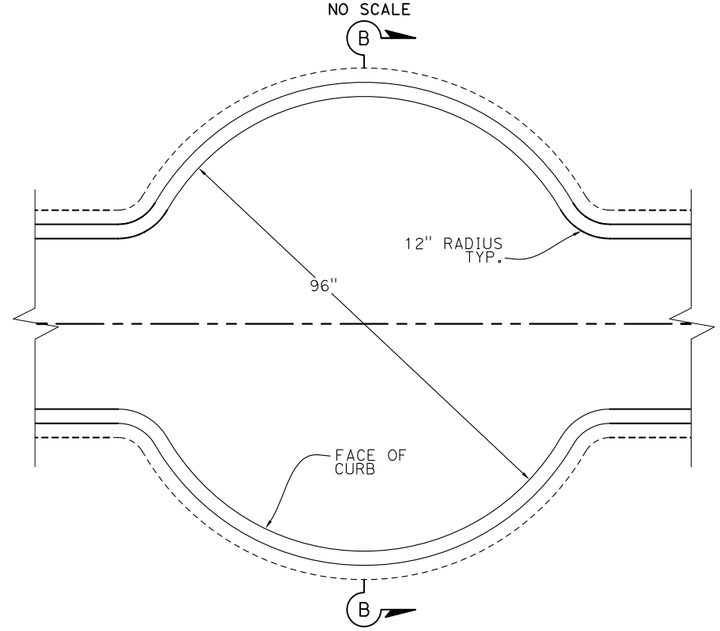
SECTION B-B
NO SCALE



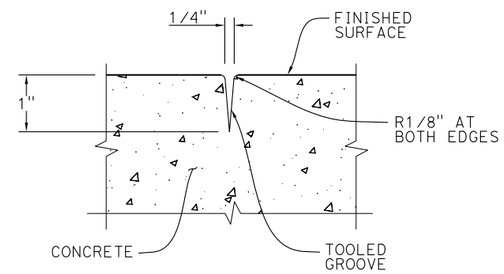
TYPICAL CURB DETAILS
NO SCALE



OUTDOOR RECREATIONAL ACCESS ROUTE
NO SCALE

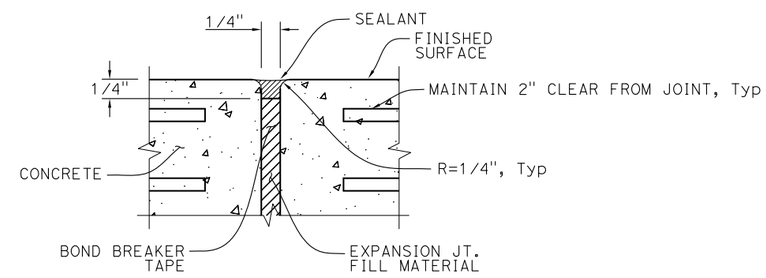


OUTDOOR RECREATIONAL ACCESS ROUTE PASSING SPACE
NO SCALE



NOTE: CUSTOM FABRICATE GROOVING TOOL IF REQUIRED.

TOOLED CONTROL JOINT
NO SCALE



NOTE: BACKER ROD WILL NOT BE PERMITTED.

EXPANSION JOINT SEALANT
NOTE: BACKER ROD WILL NOT BE PERMITTED.
NO SCALE

NOTES:

1. PROVIDE PASSING SPACE EVERY 200 FT OR LESS.
2. PROVIDE EXPANSION JOINT EVERY 20 FT AND TOOLED CONTROL JOINTS SPACED EVENLY BETWEEN.

CONSTRUCTION DETAILS
SCALE AS SHOWN

C-7

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
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2	TEH	JF		33	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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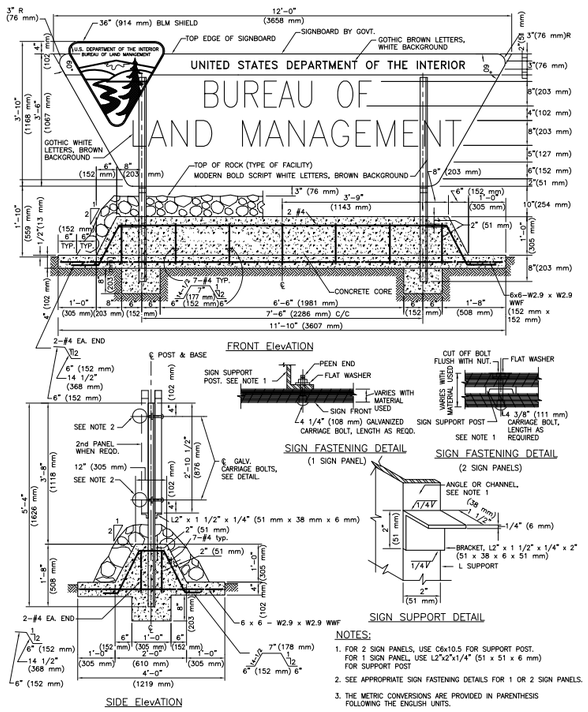
T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.

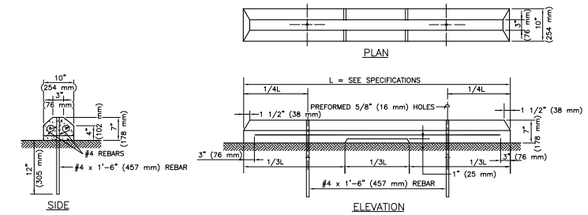


NOTES:

1. FOR 2 SIGN PANELS, USE C6x10.5 FOR SUPPORT POST. FOR 1 SIGN PANEL, USE L2"x2"x1/4" (51 x 51 x 6 mm) FOR SUPPORT POST
2. SEE APPROPRIATE SIGN FASTENING DETAILS FOR 1 OR 2 SIGN PANELS.
3. THE METRIC CONVERSIONS ARE PROVIDED IN PARENTHESIS FOLLOWING THE ENGLISH UNITS.

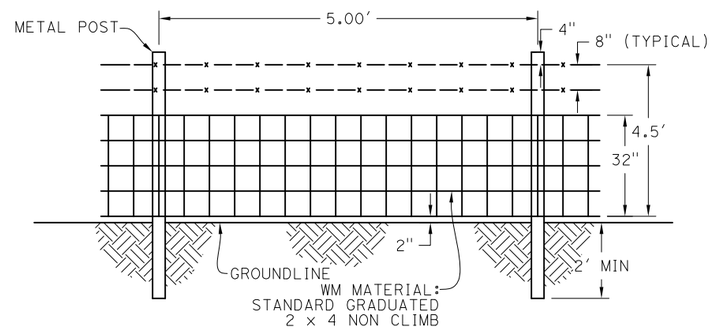
SIGN STRUCTURE "JELLYS FERRY"

NO SCALE



PARKING STOP

NO SCALE

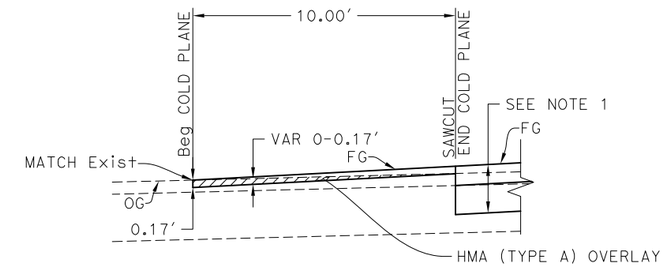


FENCE (TYPE WM)

NO SCALE

NOTES:

1. SEE STD PLAN A86 FOR WIRE MESH FENCE DETAILS NOT SHOWN HERE.

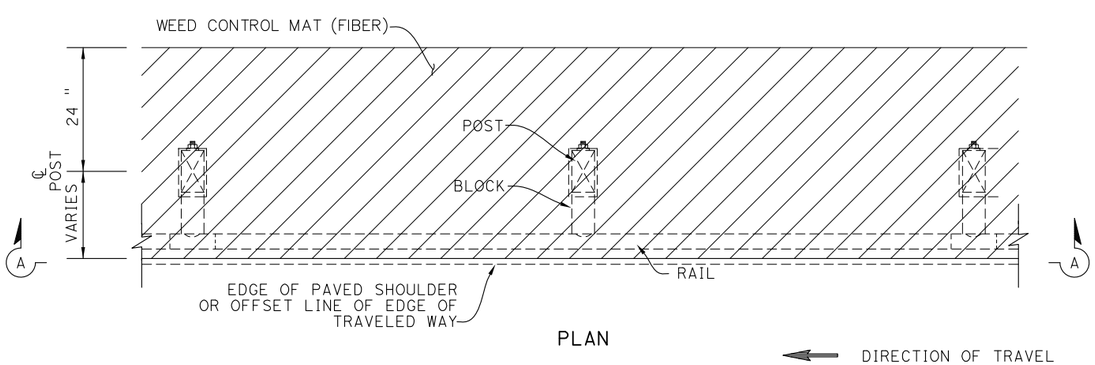


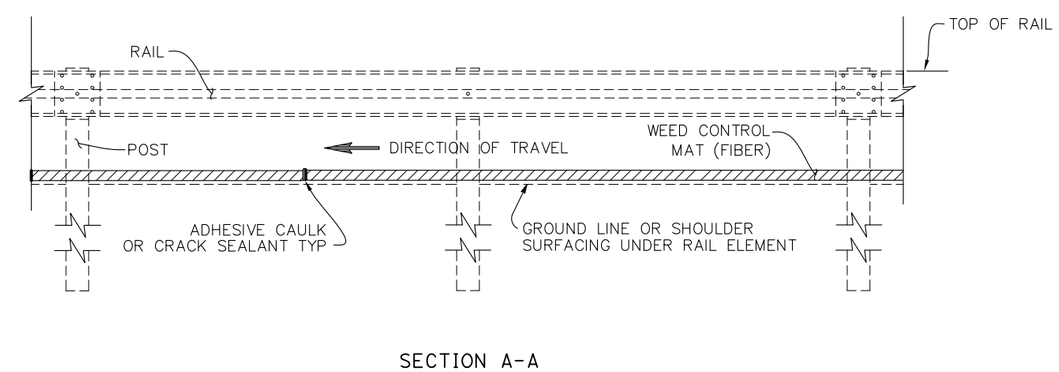
COLD PLANE AC PAVEMENT (CONFORM)

NO SCALE

NOTES:

1. PROVIDE NEAT VERTICAL EDGE AT Beg COLD PLANE.





NOTES:

1. TRIM WEED CONTROL MAT FLUSH WITH EDGE OF SHOULDER, OR PAVEMENT.
2. APPLIES TO ALL LOCATIONS INCLUDING TRANSITIONS, TERMINAL SYSTEMS AND THE RECOMMENDED T-INTERSECTION SYSTEM.

WEED CONTROL MAT (FIBER)

NO SCALE

CONSTRUCTION DETAILS

SCALE AS SHOWN

C-8

65% SUBMITTAL, NOT FOR CONSTRUCTION

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REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
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TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
Mar. 20, 2015 - 01:27:02 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-C.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		34	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

T.Y. LIN INTERNATIONAL OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

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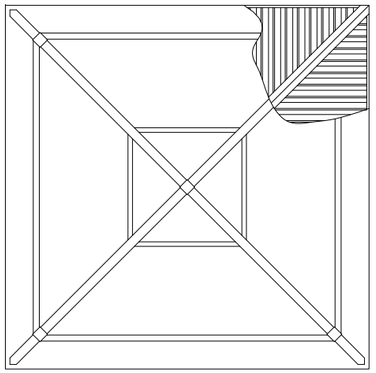
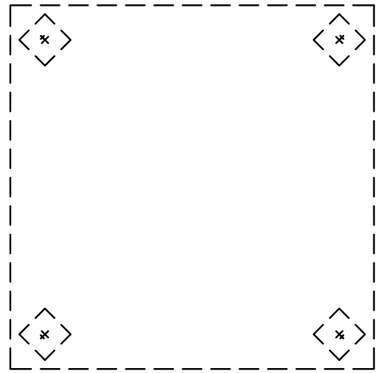
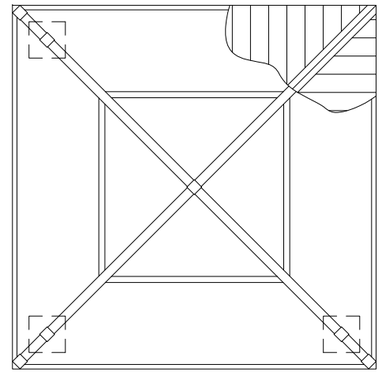
SACRAMENTO, CA 95815



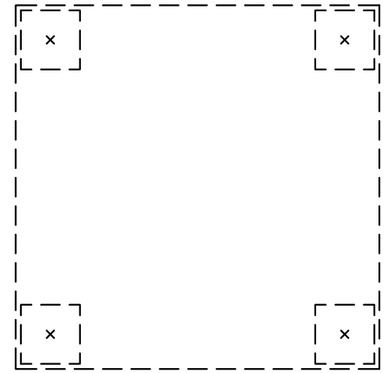
PLAN



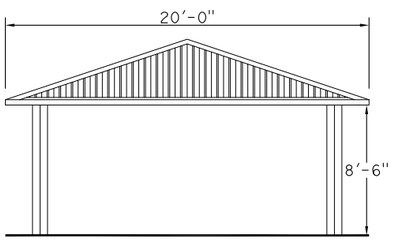
FOUNDATION LAYOUT



PLAN

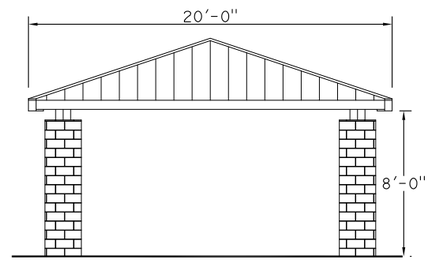


FOUNDATION LAYOUT



ELEVATION

SHADE STRUCTURE WITH EXPOSED COLUMNS



ELEVATION

SHADE STRUCTURE WITH CMU ENCLOSED STEEL COLUMNS

SHADE STRUCTURE (20' X 20') FOR ACCESSIBLE PICNIC UNIT

NO SCALE

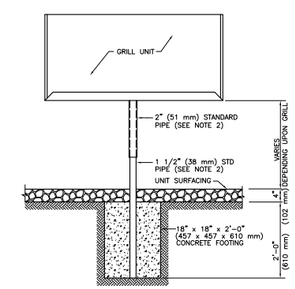
NOTES:

1. 2 PICNIC TABLE UNITS PER ACCESSIBLE PICNIC UNIT.
2. 1 GRILL UNIT PER ACCESSIBLE PICNIC UNIT.

DETAIL TO BE PROVIDED WITH 90% PLANS SHOWING LAYOUT OF ACCESSIBLE PICNIC TABLE AND GRILL UNIT

ACCESSIBLE PICNIC UNIT

NO SCALE



MOUNTING DETAIL

NOTES:

1. SEE SPECIFICATIONS FOR TYPE OF GRILL & UNIT SURFACING TO BE USED.
2. FOR SOME MODELS PIPE DIAMETER MAY VARY AND ONLY ONE PIPE WILL BE USED TO CONNECT GRILL TO THE FOOTING.
3. THE METRIC CONVERSIONS ARE PROVIDED IN PARENTHESIS FOLLOWING THE ENGLISH UNITS.

ACCESSIBLE GRILL UNIT

NO SCALE

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

CONSTRUCTION DETAILS

SCALE AS SHOWN

C-9

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	K. BEWSEY/ D. ZURCHER
CHECKED BY	KEITH RHODES
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Proposed ROW | 054-X-LANDNET | 054-X-UTIL | 054-Corridor | 054-Drainage |
Mar 20, 2015 - 01:27:02 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-C.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		35	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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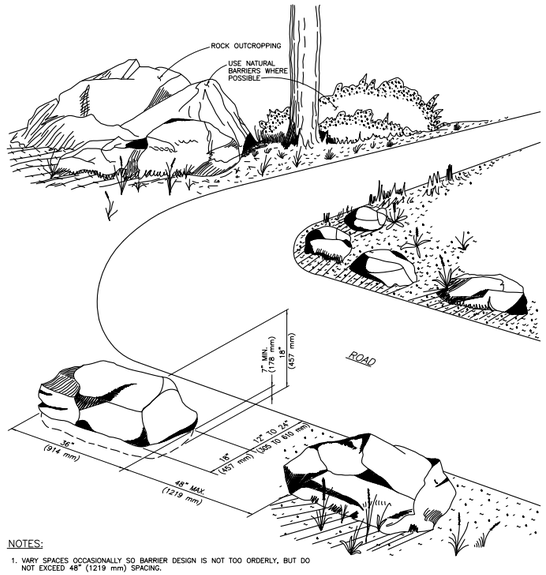
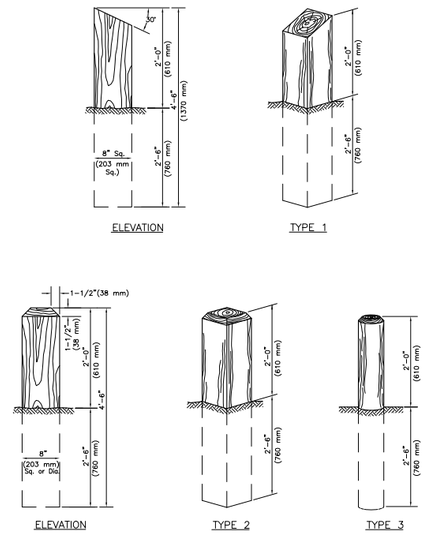
SACRAMENTO, CA 95815



NOTES:

1. VARY SPACES OCCASIONALLY SO BARRIER DESIGN IS NOT TOO ORDERLY, BUT DO NOT EXCEED 48" (1219 mm) SPACING.
2. THE IDEAL ROCK SIZE SHALL BE 18" x 18" x 36" (457 x 457 x 914 mm) AT A MINIMUM WEIGHT OF 400 LBS. (180 kg); OTHER SIZES SHALL BE AS SPECIFIED.
3. PLACE ROCK WITH WEATHERED SIDE EXPOSED.
4. THE METRIC CONVERSIONS ARE PROVIDED IN PARENTHESIS FOLLOWING THE ENGLISH UNITS.

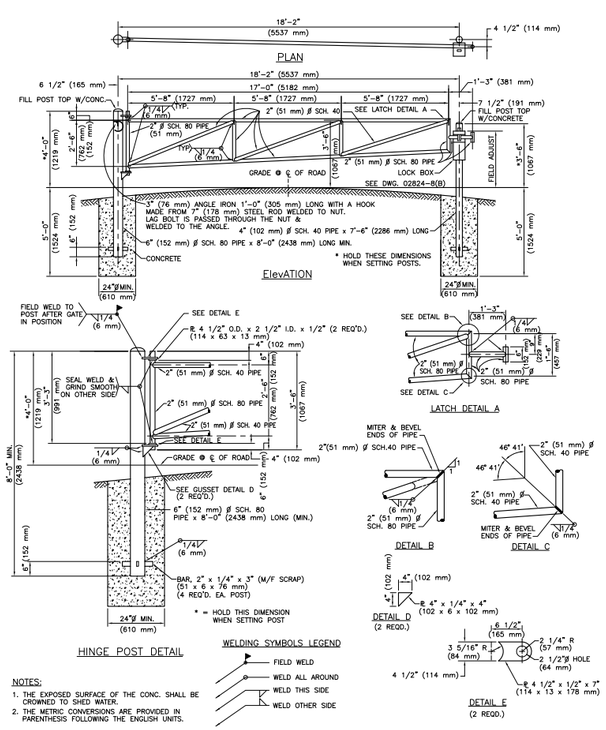
ROCK BARRIER
NO SCALE



NOTE:

1. THE METRIC CONVERSIONS ARE PROVIDED IN PARENTHESIS FOLLOWING THE ENGLISH UNITS.

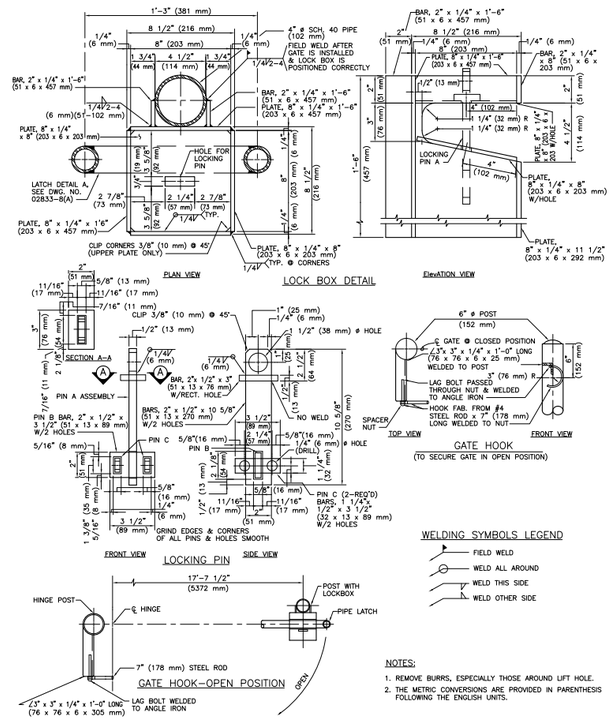
WOOD GUARD POSTS
NO SCALE



NOTES:

1. THE EXPOSED SURFACE OF THE CONC. SHALL BE CROWNED TO SHED WATER.
2. THE METRIC CONVERSIONS ARE PROVIDED IN PARENTHESIS FOLLOWING THE ENGLISH UNITS.

STEEL PIPE GATE
NO SCALE



NOTES:

1. REMOVE BURRS, ESPECIALLY THOSE AROUND LIFT HOLE.
2. THE METRIC CONVERSIONS ARE PROVIDED IN PARENTHESIS FOLLOWING THE ENGLISH UNITS.

STEEL PIPE GATE LOCKBOX AND LOCKING PINS
NO SCALE

THIS PLAN ACCURATE FOR DRIVEWAY LAYOUT, PAVEMENT ELEVATIONS, AND MISCELLANEOUS DETAILS ONLY

DETAIL TO BE PROVIDED WITH 90% PLANS

ACCESSIBLE PICNIC TABLE
NO SCALE

CONSTRUCTION DETAILS
SCALE AS SHOWN

C-10

65% SUBMITTAL, NOT FOR CONSTRUCTION

CALCULATED-DESIGNED BY	K. BEWSEY/ D. ZURCHER
CHECKED BY	KEITH RHODES
REVISED BY	
DATE REVISED	

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

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Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		36	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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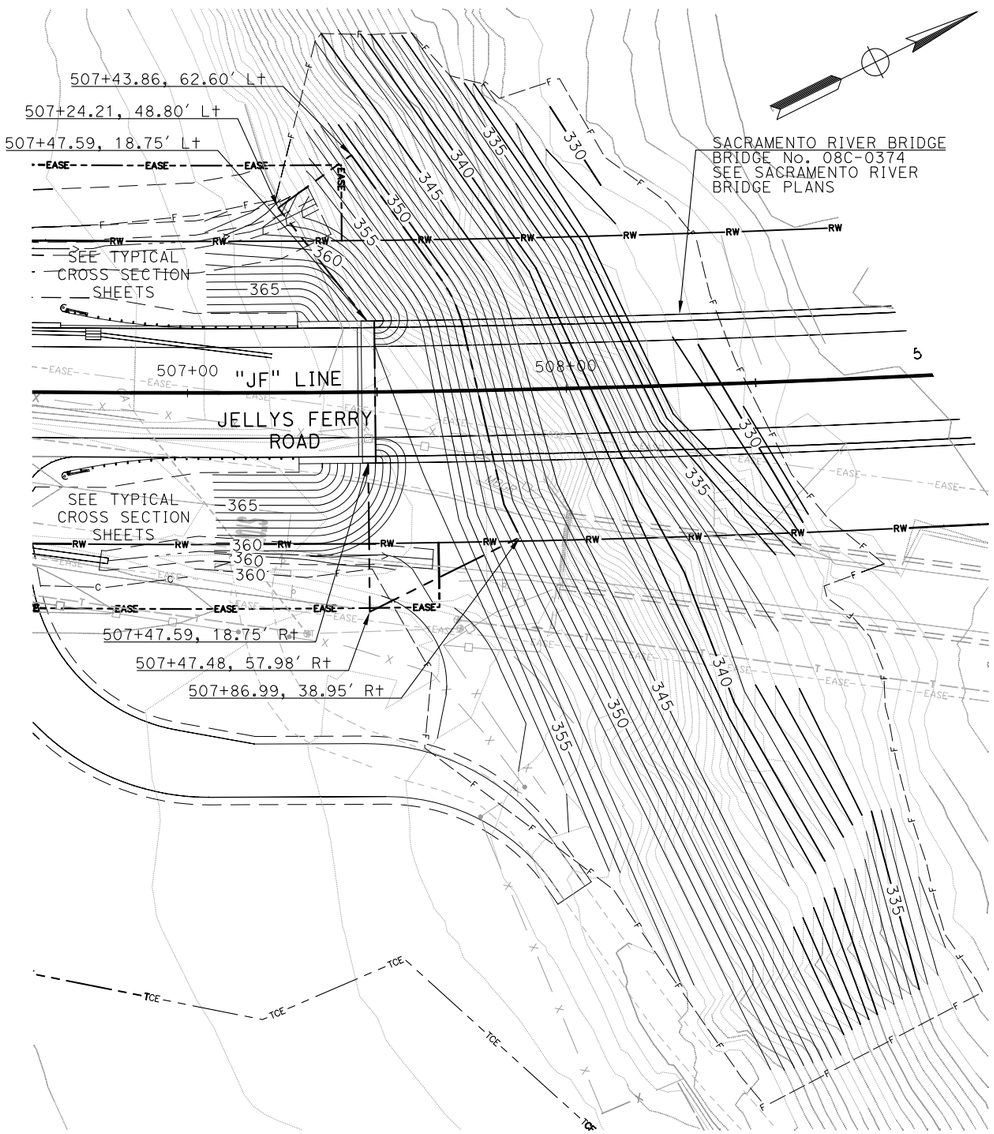
T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

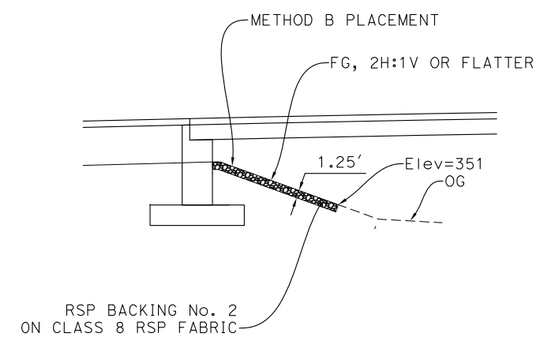
NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.
3. ALL STATIONING IS ALONG THE "JF" LINE UNLESS OTHERWISE SPECIFIED.

LEGEND

- HINGE
- FILL
- CUT
- RIGHT OF WAY
- TEMPORARY CONSTRUCTION EASEMENT
- ORDINARY HIGH WATER MARK, JURISDICTIONAL LIMIT
- RETAINING WALL
- METAL BEAM GUARD RAIL
- RSP LIMITS
- RETAINING WALL RSP EXCAVATION LIMITS
- LOCAL BORROW BASIN (SEE SHEET CG-6)





SACRAMENTO RIVER BRIDGE - ABUTMENT 1
SLOPE PROTECTION
NTS

SACRAMENTO RIVER BRIDGE
ABUTMENT 1

CONTOUR GRADING
SCALE 1"=20'

G-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR CONTOUR GRADING AND SLOPE PROTECTION WORK ONLY

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

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Mar. 20, 2015 - 09:43:14 DWG Name: P:\710\054 - Jellys Ferry Bridge\500_Engineering\510_Civil\51_CADD\SHEETS\054-G.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		37	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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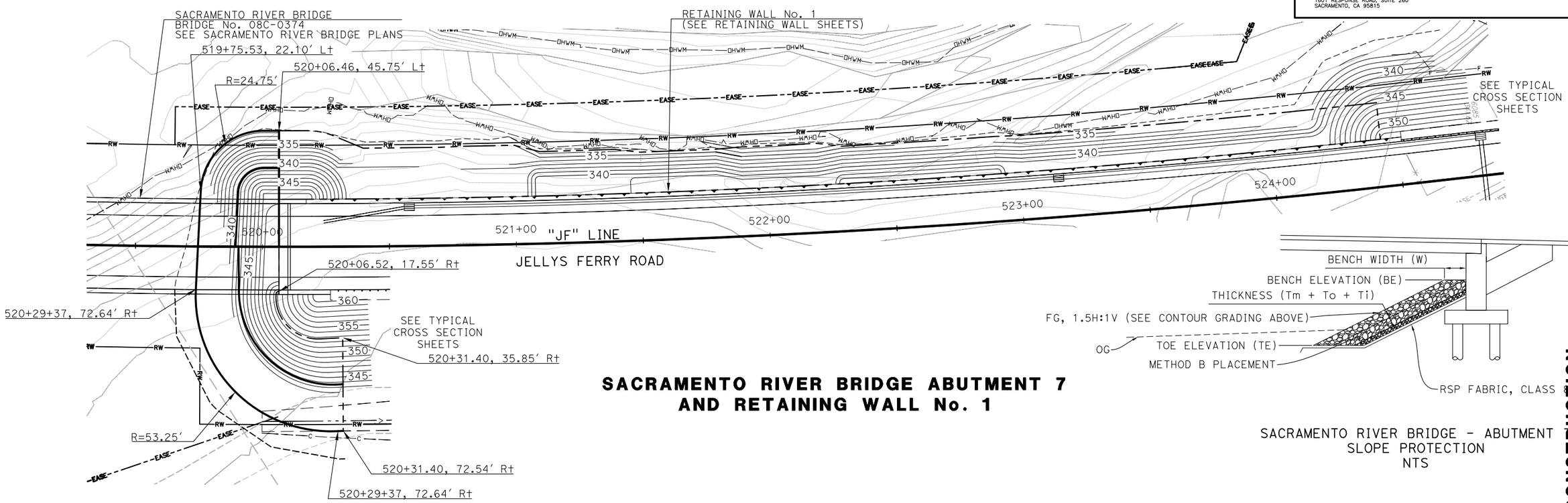
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

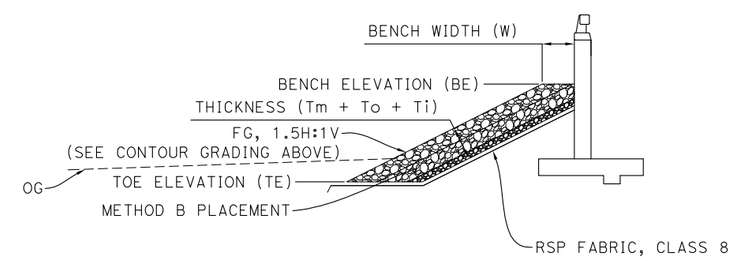
NOTES:

1. SEE SHEET CG-1 FOR GENERAL NOTES AND LEGEND



SACRAMENTO RIVER BRIDGE ABUTMENT 7 AND RETAINING WALL No. 1

SACRAMENTO RIVER BRIDGE - ABUTMENT
SLOPE PROTECTION
NTS



RETAINING WALL No. 1
SLOPE PROTECTION
NTS

COUNTOUR GRADING AND RSP DATA

GRADING LOCATION	BE (FT)	W (FT)	TE (FT)	Tm (FT)	To (FT)	Tm & To RSP CLASS	Ti (FT)	Ti RSP CLASS	SLOPE (XH:1V)
ABUT 7 "JF" 520+06 TO 520+31, RT	350.15	0.00	331.50	3	4.3	1/2 T	1.8	FACING	1.5
ABUT 7 ALONG RIGHT EDGE OF DECK	350.15	0.00	331.50	3	4.3	1/2 T	1.8	FACING	1.5
ABUT 7 ALONG LEFT EDGE OF DECK	348.87	4.75	331.50	2.75	4.3	1/2 T	1.8	FACING	1.5
RW - "JF" 520+10 to 520+30	343.00	9.87	330.00	2.5	4.3	1/2 T	1.8	FACING	1.5
RW - "JF" 520+40 to 520+70	338.50	11.75	333.00	3.47	1.8	FACING	0	-	1.5
RW - "JF" 520+80 to 521+00	338.50	10.50	332.00	3.47	1.8	FACING	0	-	1.5
RW - "JF" 521+10 to 521+40	340.00	7.75	333.50	3.61	1.8	FACING	0	-	1.5
RW - "JF" 521+50 to 521+80	341.79	4.82	334.29	3.47	1.8	FACING	0	-	1.5
RW - "JF" 521+90 to 522+91	341.39	3.15	332.39	2.22	1.8	FACING	0	-	1.5
RW - "JF" 523+01 to 524+11	343.48	1.29	334.48	3.34	1.8	FACING	0	-	1.5
RW - "JF" 524+40 to 524+51.3	343.48	1.29	334.48	3.34	1.8	FACING	0	-	1.5

NOTES:

1. FOR RSP, PROVIDE A LINEAR TRANSITION BETWEEN DEFINED RANGES DESCRIBED ABOVE.

THIS PLAN ACCURATE FOR CONTOUR GRADING AND SLOPE PROTECTION WORK ONLY

CONTOUR GRADING

SCALE 1"=20'

G-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

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Mar. 20, 2015 - 09:43:14 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-G.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		38	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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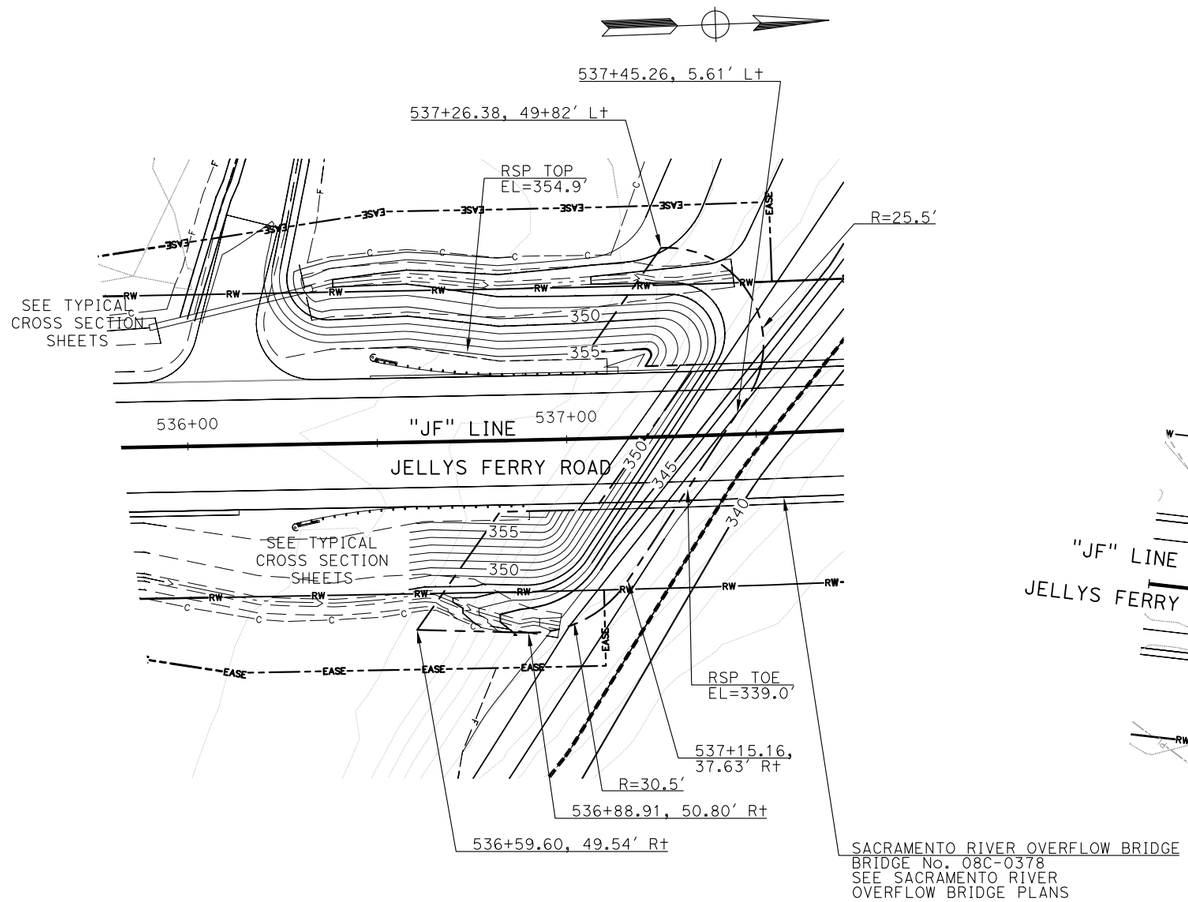
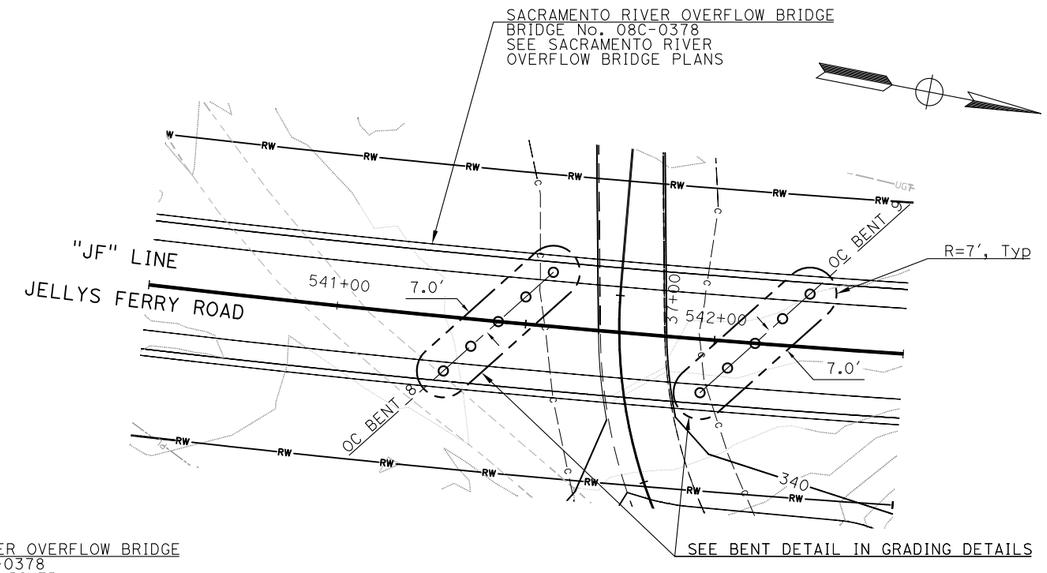
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

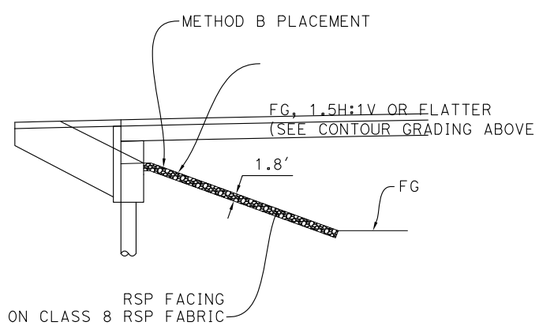
1. SEE SHEET CG-1 FOR NOTES & LEGEND.



SACRAMENTO RIVER OVERFLOW BRIDGE ABUTMENT 1



SACRAMENTO RIVER OVERFLOW BRIDGE BENT 8&9



SACRAMENTO RIVER OVERFLOW BRIDGE - ABUTMENT 1
SLOPE PROTECTION
NTS

THIS PLAN ACCURATE FOR CONTOUR GRADING AND SLOPE PROTECTION WORK ONLY

CONTOUR GRADING
SCALE 1"=20'
G-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

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SACRAMENTO, CA 95815

NOTES:

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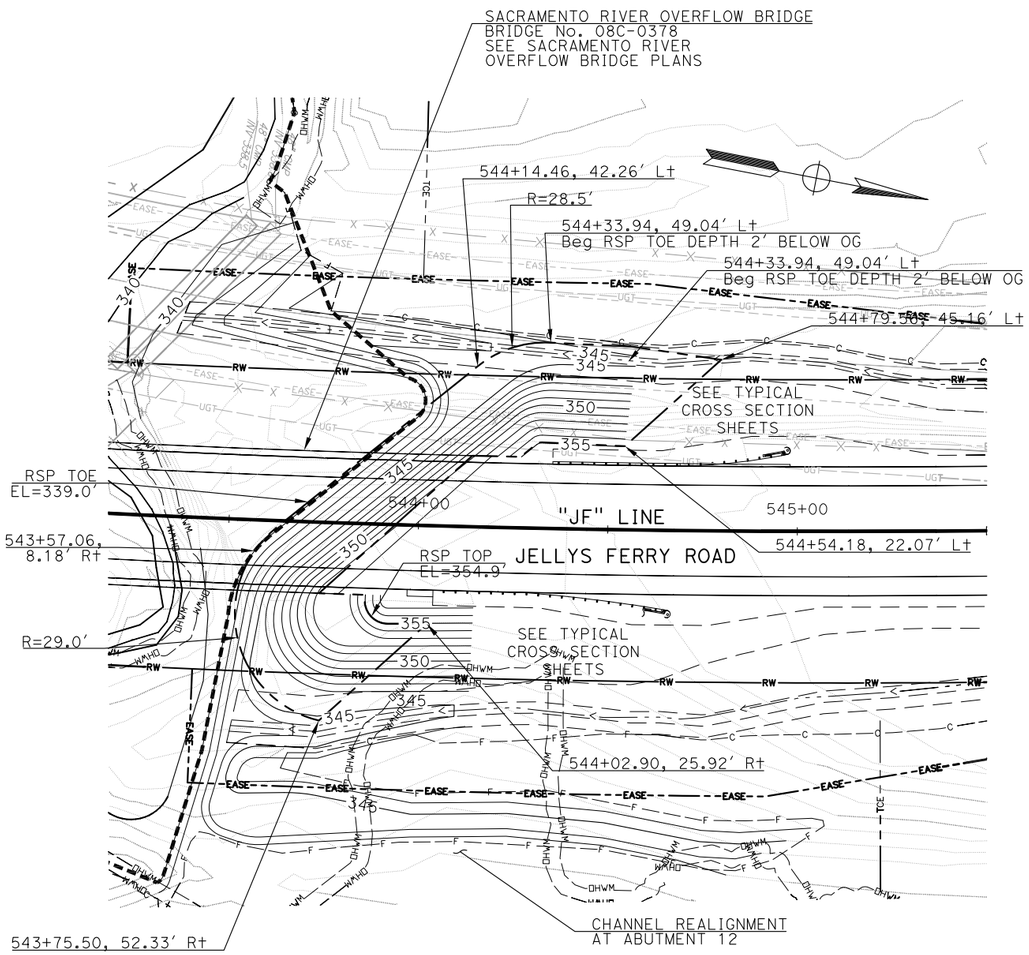
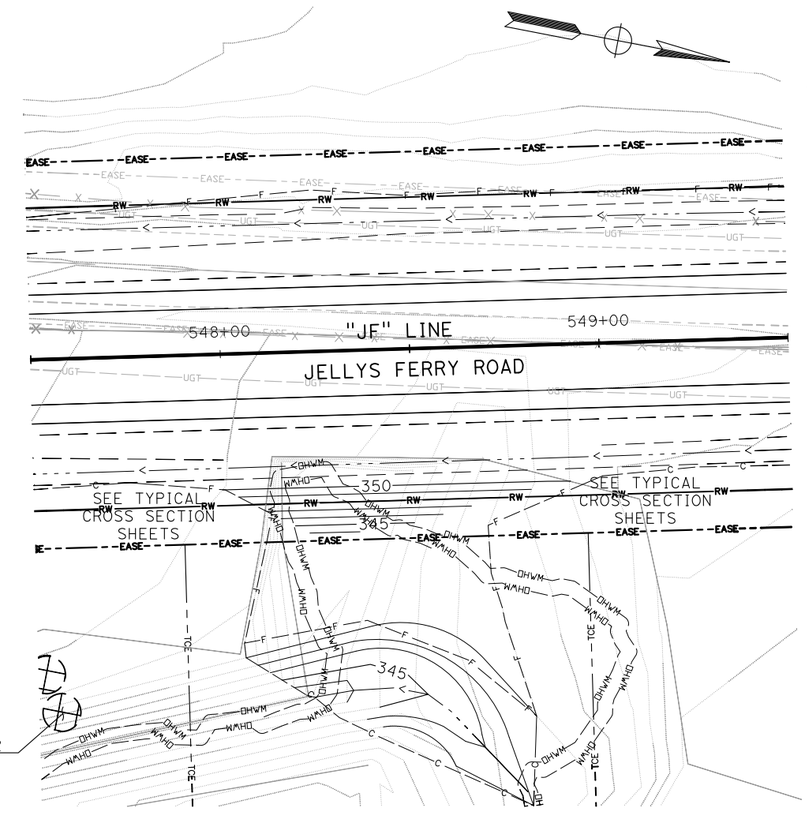
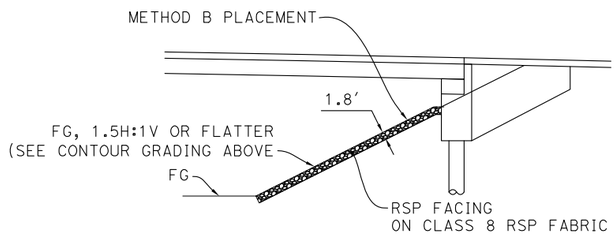


SACRAMENTO RIVER OVERFLOW BRIDGE - ABUTMENT 12



CHANNEL REALIGNMENT



SACRAMENTO RIVER OVERFLOW BRIDGE - ABUTMENT 12
SLOPE PROTECTION
NTS

CONTOUR GRADING
SCALE 1"=20'

G-4

THIS PLAN ACCURATE FOR CONTOUR GRADING AND SLOPE PROTECTION WORK ONLY

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-CG-D | 054-C-RD | 054-Corridor | 054-Drainage | 054-ENV |
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Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		40	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

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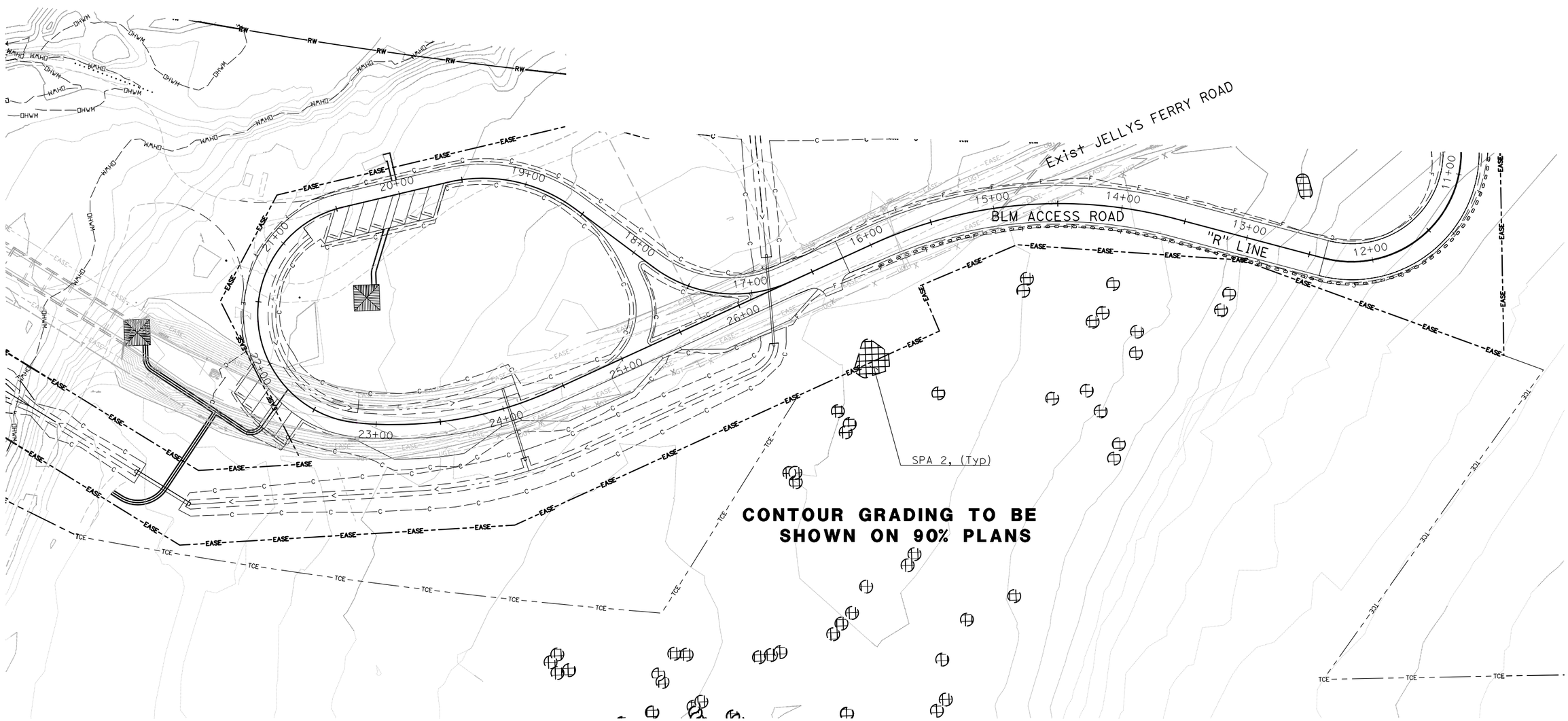


JELLYS FERRY RECREATIONAL SITE

CONTOUR GRADING
SCALE 1"=40'

G-5

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR CONTOUR GRADING WORK ONLY

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER
MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-CG-D | 054-C-RD | 054-Corridor | 054-Drainage | 054-ENV |
Mar. 20, 2015 - 09:43:14 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-G.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		41	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

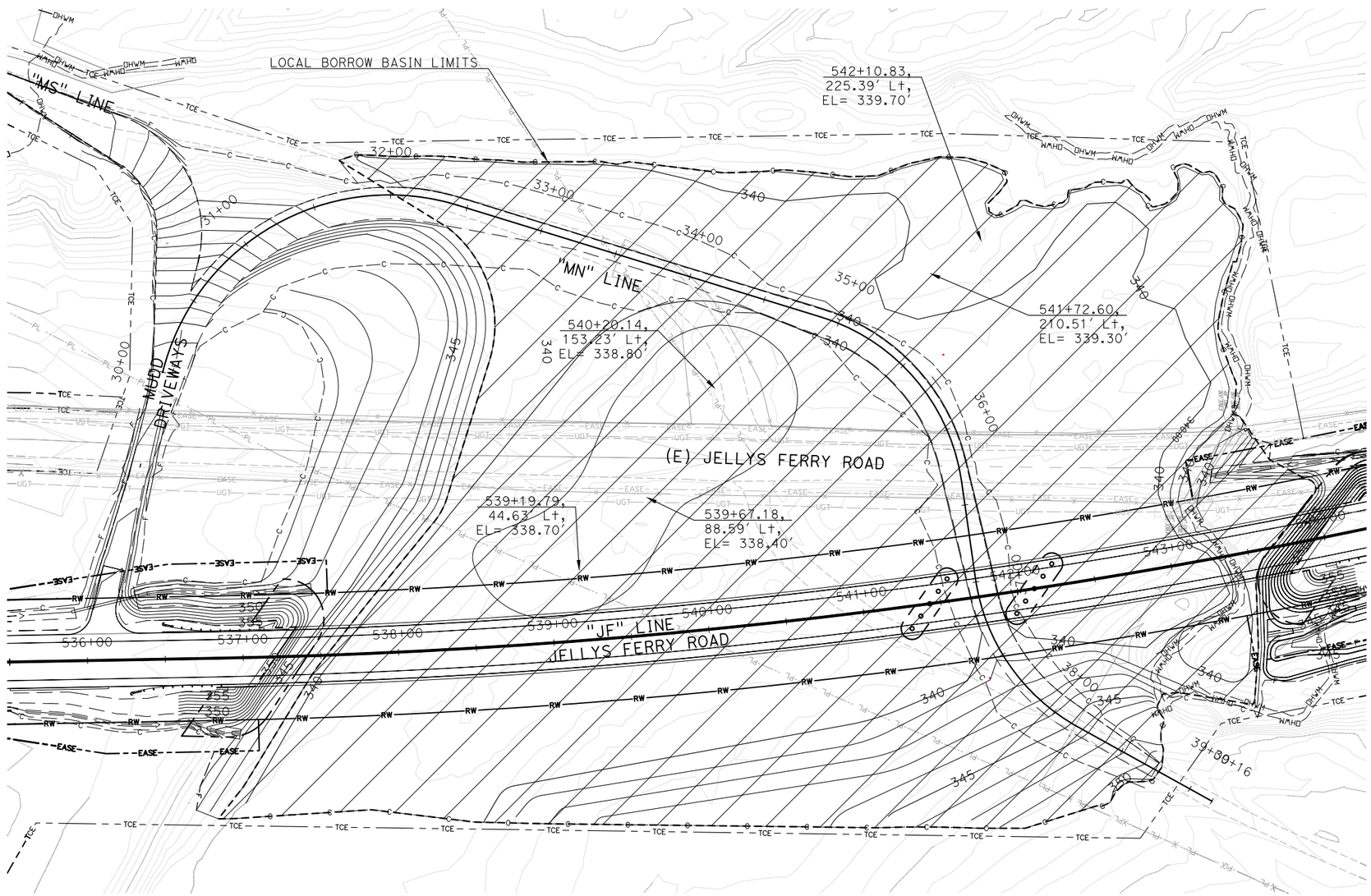
REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

T.Y. LIN INTERNATIONAL OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET CG-1 FOR NOTES & LEGEND.



LOCAL BORROW BASIN

CONTOUR GRADING
SCALE 1"=40'
G-6

63% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR CONTOUR GRADING WORK ONLY

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3	
REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-CG-D | 054-C-RD | 054-Corridor | 054-Drainage | 054-ENV |
Mar. 20, 2015 - 09:43:14 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-G.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		42	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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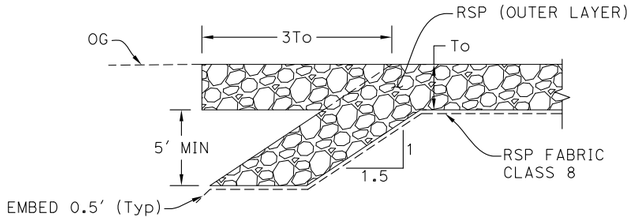
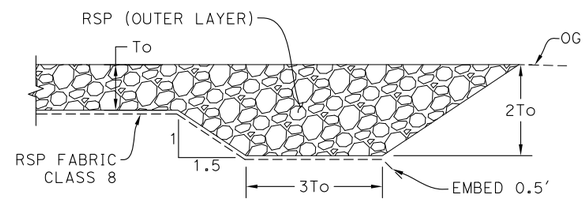
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

ABBREVIATIONS:

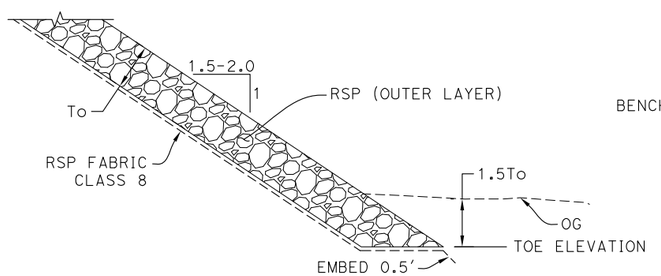
Tm THICKNESS OF MOUNTED TOE LAYER OF RSP
To THICKNESS OF OUTSIDE LAYER OF RSP
Ti THICKNESS OF INNER LAYER OF RSP



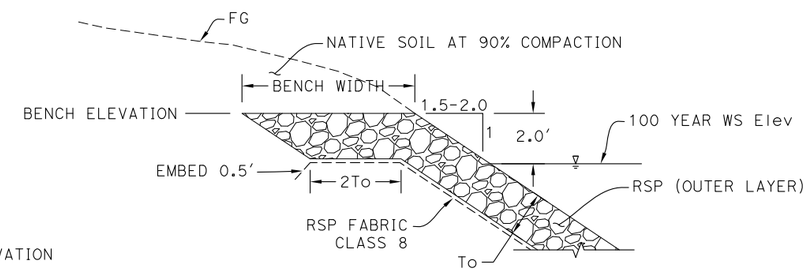
UPSTREAM FLANK DETAIL
SEE LOCATIONS ON PLANS
NO SCALE



DOWNSTREAM FLANK DETAIL
SEE LOCATIONS ON PLANS
NO SCALE



TYPICAL TOE DETAIL
SEE LOCATIONS ON PLANS
NO SCALE



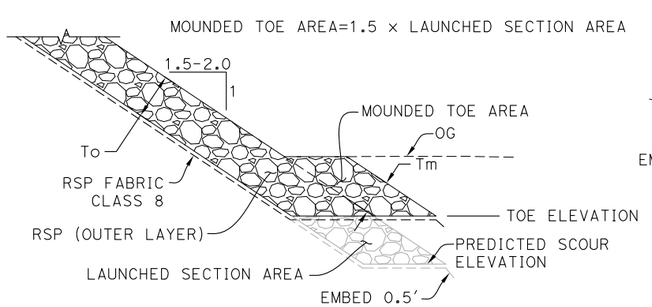
TOP KEY DETAIL
SEE LOCATIONS ON PLANS
NO SCALE

NOTES:

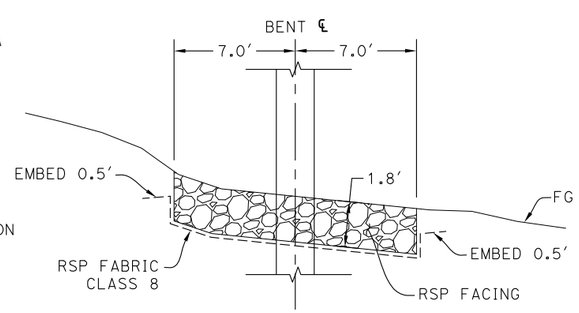
1. NATIVE SOIL MAY BE OMITTED WHEN TOP OF RSP IS BELOW 100 YEAR WS Elev.
2. TOP KEY SHALL BE OMITTED WHEN THE KEY WOULD PENETRATE A PROPOSED OR EXISTING IMPROVEMENT SUCH AS A RETAINING WALL OR ABUTMENT.

RSP QUANTITIES

LOCATION	ROCK SLOPE PROTECTION (½ TON, METHOD B)	ROCK SLOPE PROTECTION (FACING, METHOD B)	ROCK SLOPE PROTECTION (No. 2, METHOD B)	ROCK SLOPE PROTECTION FABRIC (CLASS 8)
	CY	CY	CY	SY
SRO ABUT 1	###	###	###	###
SRO ABUT 7 - LEFT EDGE OF DECK	###	###	###	###
SRO ABUT 7 - RIGHT EDGE OF DECK	###	###	###	###
RW - "JF" 520+10 to 520+30	###	###	###	###
RW - "JF" 520+30 to 524+51	###	###	###	###
RW - "JF" 520+80 to 521+00	###	###	###	###
SROB ABUT 1	###	###	###	###
SROB BENT 8 & 9	###	###	###	###
SROB ABUT 12	###	###	###	###
TOTAL	###	###	###	###



MOUNDED TOE DETAIL
SEE LOCATIONS ON PLANS
NO SCALE



BENT DETAIL
SEE LOCATIONS ON PLANS
NO SCALE

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. SEE DRAINAGE SHEETS FOR DRAINAGE IMPROVEMENTS.
3. SEE RETAINING WALL PLANS FOR RETAINING WALL.
4. RSP INNER LAYER NOT SHOWN FOR CLARITY.

CONTOUR GRADING DETAILS

SCALE 1"=20'

GD-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR SLOPE PROTECTION WORK ONLY

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

PROJECT ENGINEER: MICHAEL WOLOHAN
CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER
CHECKED BY: KEITH RHODES
REVISED BY / DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-CG-D | 054-C-RD | 054-Corridor | 054-Drainage | 054-ENV |
Mar. 20, 2015 - 09:43:14 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-G.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		43	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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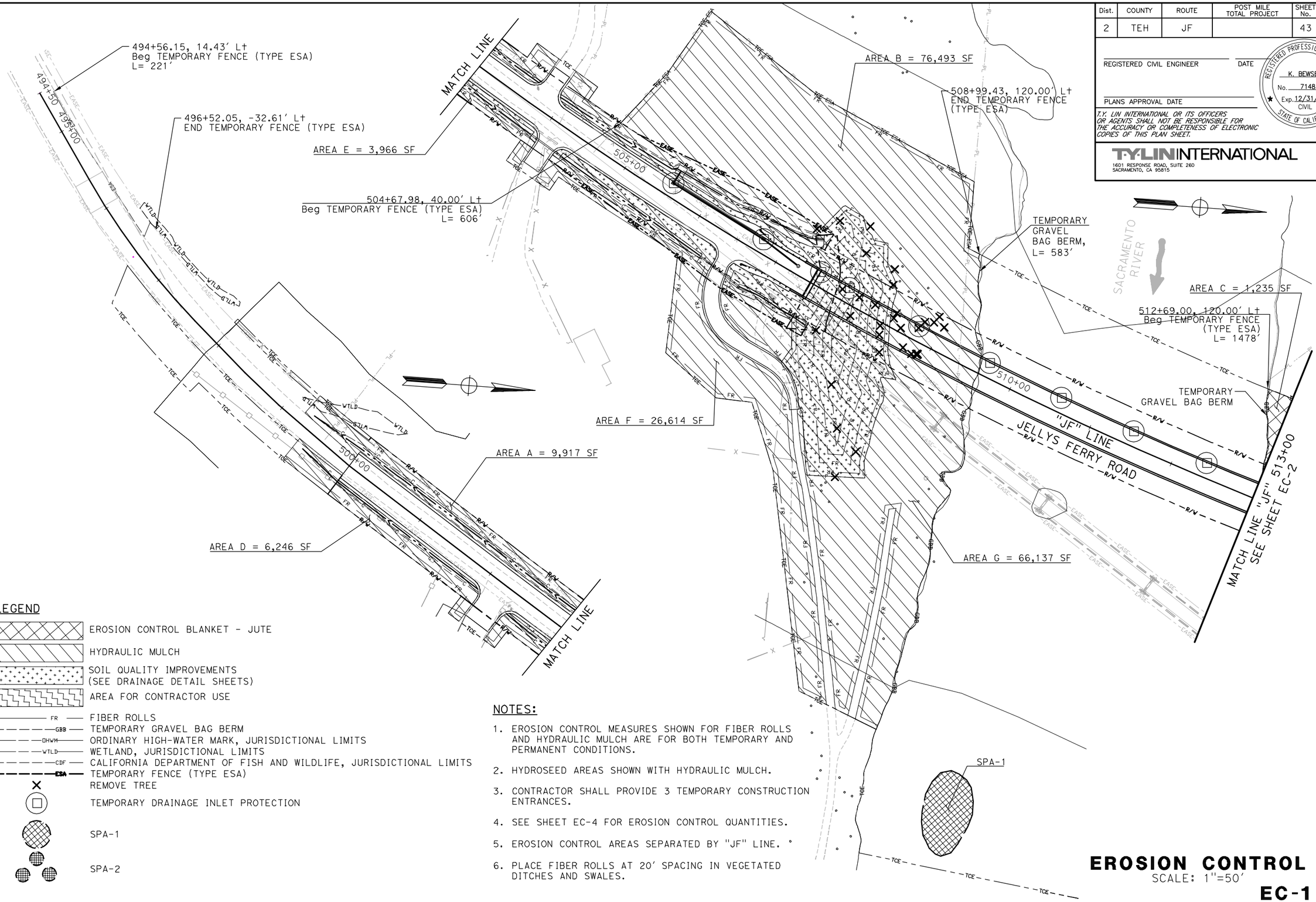
SACRAMENTO, CA 95815



LEGEND

- EROSION CONTROL BLANKET - JUTE
- HYDRAULIC MULCH
- SOIL QUALITY IMPROVEMENTS (SEE DRAINAGE DETAIL SHEETS)
- AREA FOR CONTRACTOR USE
- FR — FIBER ROLLS
- GBB — TEMPORARY GRAVEL BAG BERM
- OHWM — ORDINARY HIGH-WATER MARK, JURISDICTIONAL LIMITS
- WTLD — WETLAND, JURISDICTIONAL LIMITS
- CDF — CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, JURISDICTIONAL LIMITS
- ESA — TEMPORARY FENCE (TYPE ESA)
- REMOVE TREE
- TEMPORARY DRAINAGE INLET PROTECTION
- SPA-1
- SPA-2

NOTES:

1. EROSION CONTROL MEASURES SHOWN FOR FIBER ROLLS AND HYDRAULIC MULCH ARE FOR BOTH TEMPORARY AND PERMANENT CONDITIONS.
2. HYDROSEED AREAS SHOWN WITH HYDRAULIC MULCH.
3. CONTRACTOR SHALL PROVIDE 3 TEMPORARY CONSTRUCTION ENTRANCES.
4. SEE SHEET EC-4 FOR EROSION CONTROL QUANTITIES.
5. EROSION CONTROL AREAS SEPARATED BY "JF" LINE.
6. PLACE FIBER ROLLS AT 20' SPACING IN VEGETATED DITCHES AND SWALES.

THIS PLAN ACCURATE FOR EROSION CONTROL WORK ONLY

EROSION CONTROL

SCALE: 1"=50'

EC-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

PROJECT ENGINEER: MICHAEL WOLOHAN

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER

CHECKED BY: KEITH RHODES

REVISED BY | DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-Drainage | 054-Corridor | 054-CG-D | 054-ENV |
Mar. 20, 2015 - 10:18:32 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-EC.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		44	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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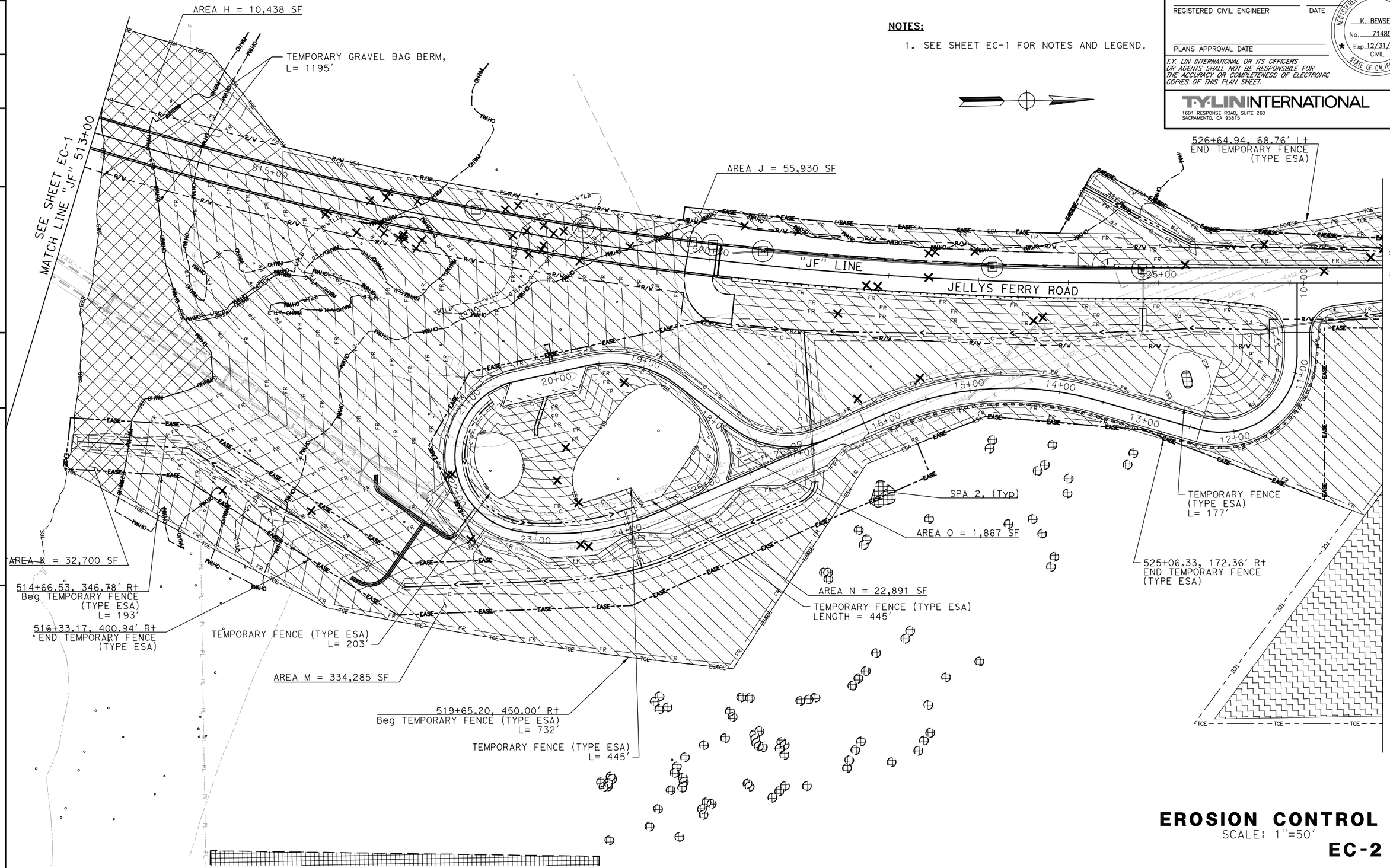
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET EC-1 FOR NOTES AND LEGEND.



THIS PLAN ACCURATE FOR EROSION CONTROL WORK ONLY

EROSION CONTROL

SCALE: 1"=50'

EC-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES	0 1 2 3
REVISED BY	
DATE REVISED	
CALCULATED-DESIGNED BY	K. BEWSEY/ D. ZURCHER
CHECKED BY	KEITH RHODES
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-Drainage | 054-Corridor | 054-CG-D | 054-ENV |
Mar. 20, 2015 – 10:18:32 DWG Name: P:\710054 – Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-EC.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		45	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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SACRAMENTO, CA 95815

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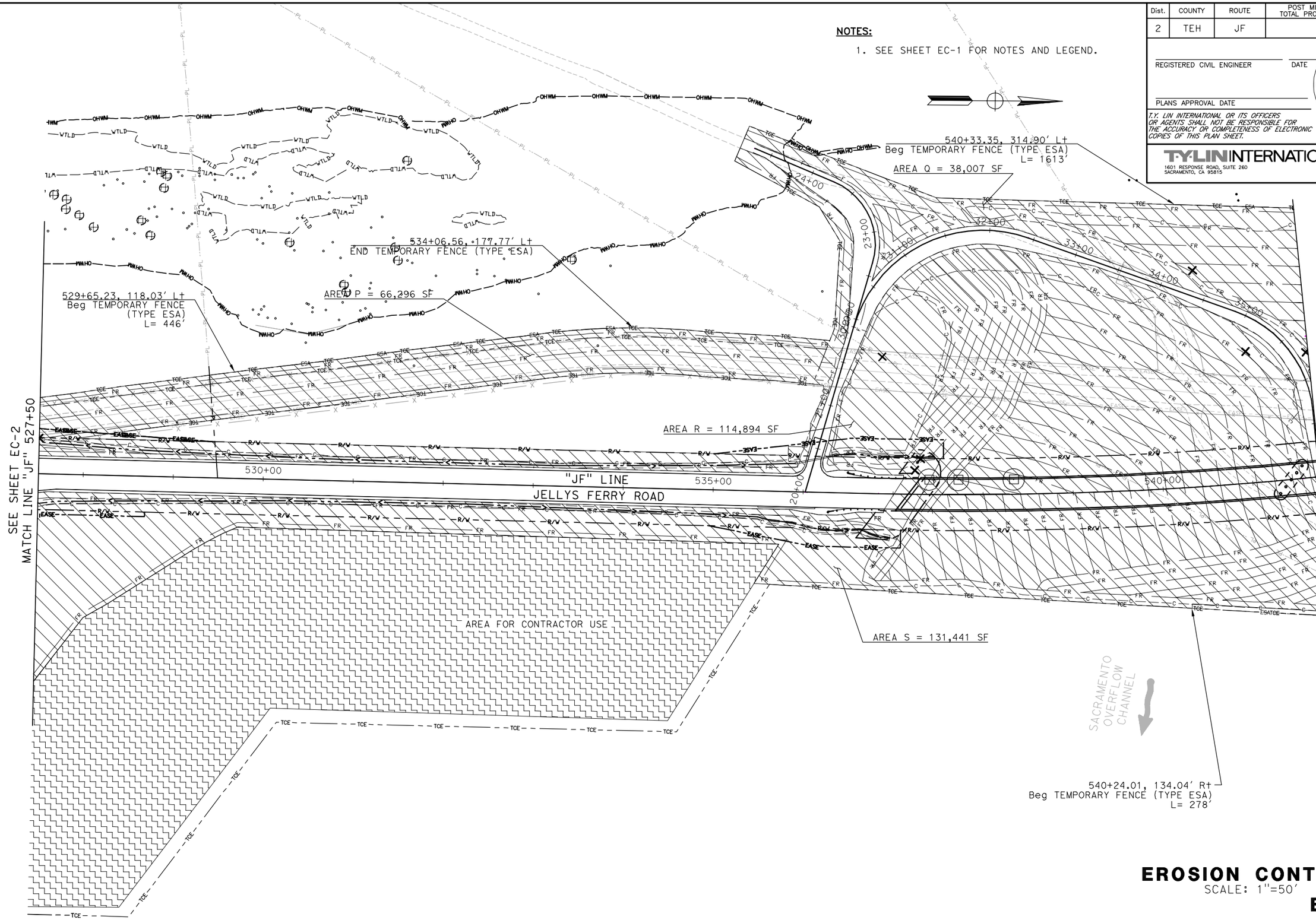

EROSION CONTROL
SCALE: 1"=50'
EC-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR EROSION CONTROL WORK ONLY

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-Drainage | 054-Corridor | 054-CG-D | 054-ENV |
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Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		46	138

REGISTERED CIVIL ENGINEER DATE

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SACRAMENTO, CA 95815

NOTES:

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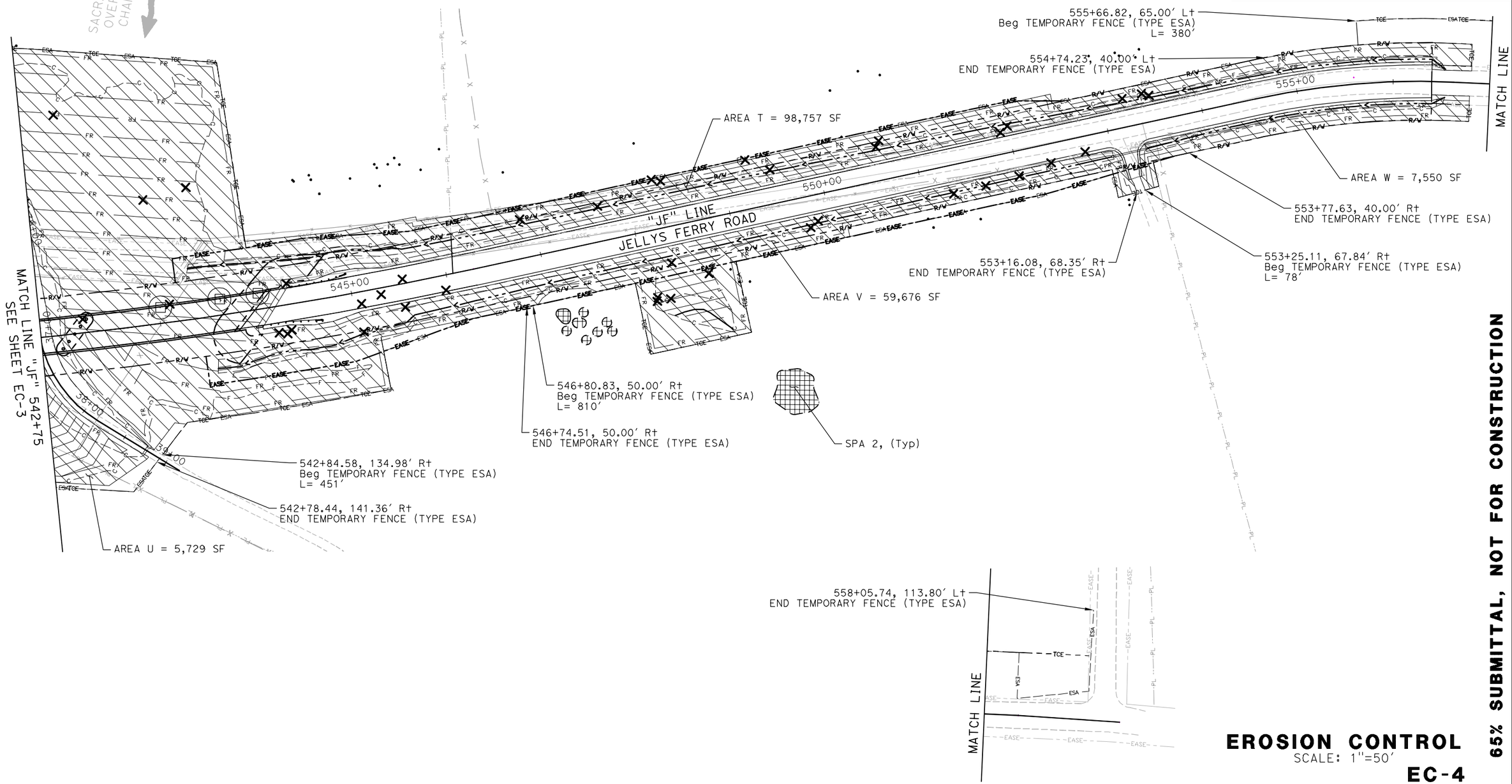

EROSION CONTROL
SCALE: 1"=50′

EC-4

65% SUBMITTAL, NOT FOR CONSTRUCTION

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REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER
MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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Mar. 20, 2015 – 10:18:32 DWG Name: P:\710054 – Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-EC.dwg Updated By: DZurcher

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2	TEH	JF		47	138

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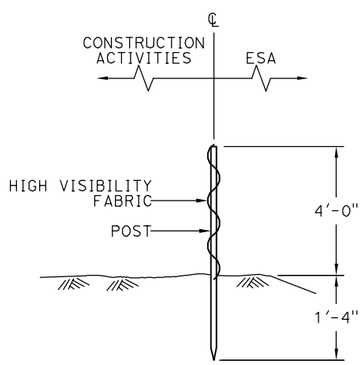
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

EROSION CONTROL QUANTITIES

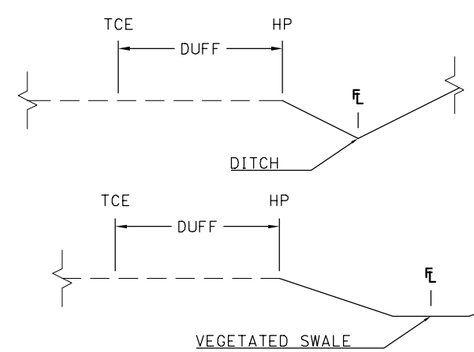
	TEMPORARY FIBER ROLL	TEMPORARY EROSION CONTROL (HYDRAULIC MULCH)	TEMPORARY GRAVEL BAG BERM	FIBER ROLL	EROSION CONTROL (HYDRAULIC MULCH)	ROLLED EROSION CONTROL BLANKET (TYPE A)	FENCE (TYPE ESA)	DUFF	TREE REMOVAL	TEMPORARY INLET PROTECTION	DRAINAGE INLET MARKER
AREA	LF	SF	LF	LF	SF	SF	LF	AC	EA	EA	EA
A	461	9,917		461	9,917	0	0	0	0	0	0
B	1,827	76,493		1,827	76,493	0	0	0	17	0	0
C						1,235	0	0	0	0	0
D	292	6,246		292	6,246	0	0	0	0	0	0
E	214	3,966		214	3,966	0	0	0	0	0	0
F	1,314	26,614		1,314	26,614	0	0	0	0	0	0
G	2,960	66,137		2,960	66,137	0	0	0	15	0	0
H						10,438	0	0	0	0	0
J	3,540	55,930		3,540	55,930	0	0	0	21	0	0
K						32,700	0	0	0	0	0
M	15,023	334,285		15,023	334,285	0	0	0	30	0	0
N	1,470	22,891		1,470	22,891	0	0	0	4	0	0
O	119	1,867		119	1,867	0	0	0	1	0	0
P	1,251	64,436		3,900	66,296	0	0	0	0	0	0
Q	2,357	38,007		2,357	38,007	0	0	0	2	0	0
R	7,066	114,894		7,066	114,894	0	0	0	4	0	0
S	6,833	131,441		6,833	131,441	0	0	0	0	0	0
T	5,979	98,757		5,979	98,757	0	0	0	20	0	0
U	532	5,729		532	5,729	0	0	0	0	0	0
V	3,742	59,676		3,742	59,676	0	0	0	20	0	0
W	755	7,550	1195	755	7,550	0	0	0	0	0	0
MISC	0					0	8033	0	20	22	22
TOTAL	55,735	1,124,836	1,195	58,384	1,126,696	44,373	8,033	0	154	22	22

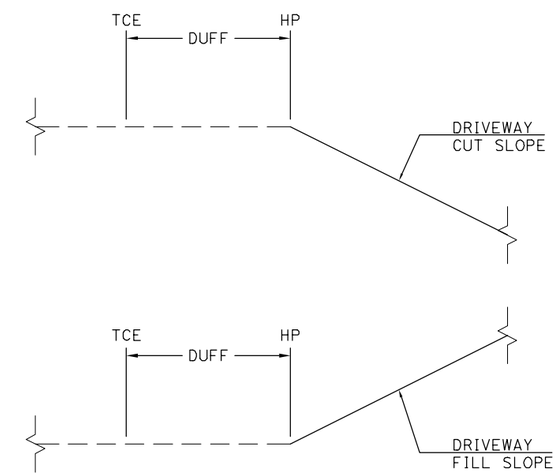
NOTES:

1. SEE SHEET EC-1 FOR NOTES AND LEGEND.

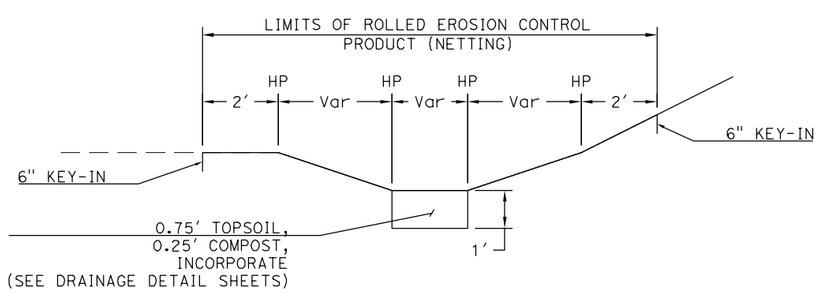


TEMPORARY FENCE (TYPE ESA)
NO SCALE

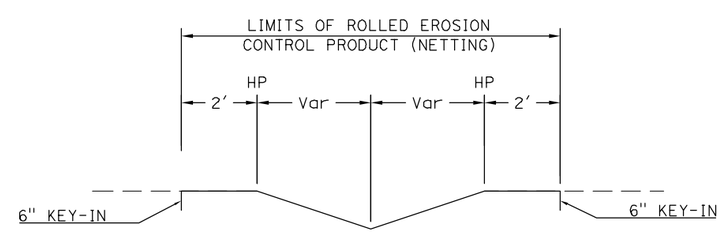




DUFF PLACEMENT
NO SCALE



TRAPEZOIDAL VEGETATED SWALE SECTION
NO SCALE



V-SHAPED VEGETATED SWALE SECTION
NO SCALE

EROSION CONTROL DETAILS

SCALE: 1"=50'

ECD-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR EROSION CONTROL WORK ONLY

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

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Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		48	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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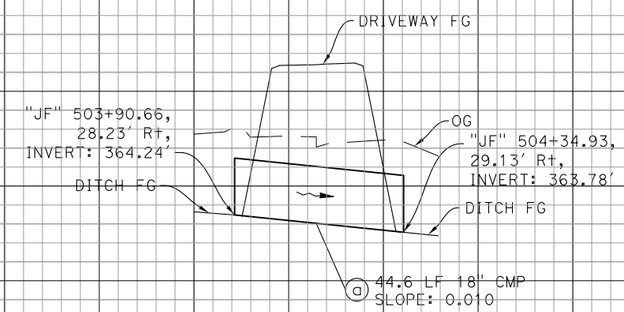
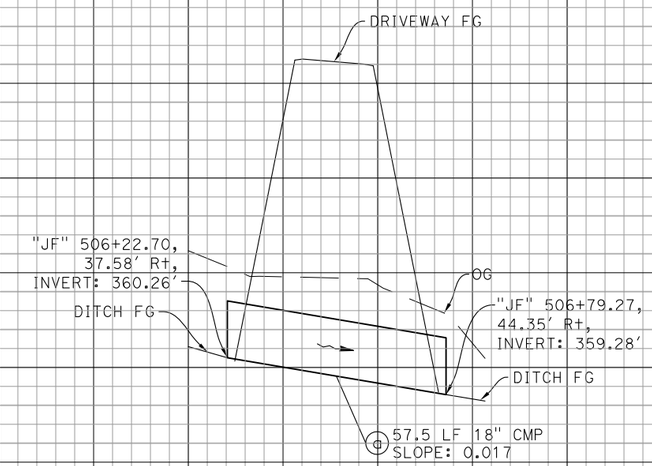


DRAINAGE SYSTEM No. 1



DRAINAGE SYSTEM No. 2

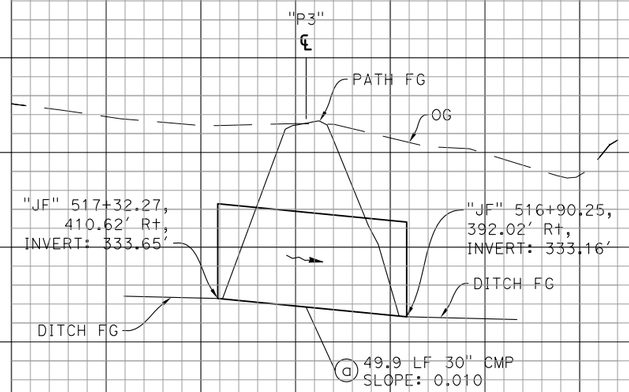
NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. ALL STATIONING ALONG "JF" LINE UNLESS OTHERWISE NOTED.
3. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.

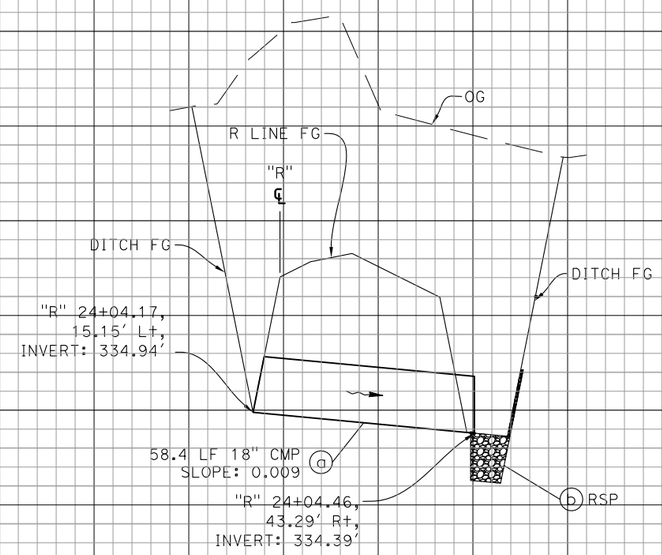
LEGEND

(#) DRAINAGE SYSTEM No.

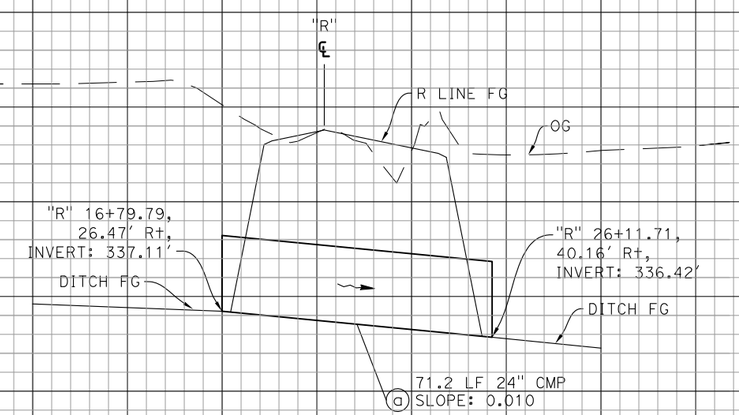
(x) DRAINAGE UNIT No.



DRAINAGE SYSTEM No. 4



DRAINAGE SYSTEM No. 5



DRAINAGE SYSTEM No. 6

DRAINAGE PROFILES

SCALE: Horiz 1" = 20'
Vert 1" = 2'

DP-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

STATION		TOTAL
CY	Exc	
	Emb	

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-C-RD | 054-BRDR | 054-Drainage |
Mar. 20, 2015 - 11:13:29 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-DP.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		49	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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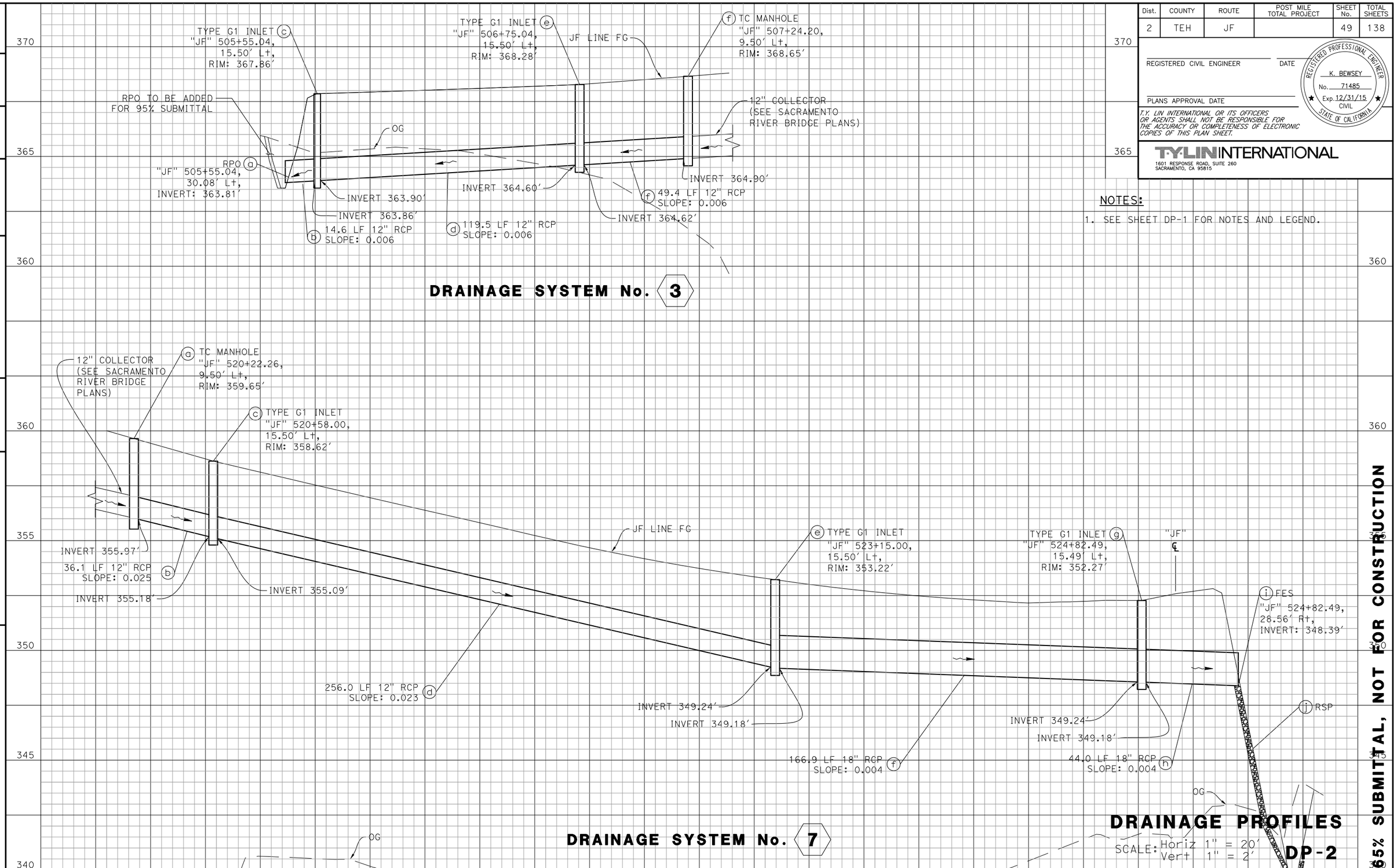
SACRAMENTO, CA 95815



NOTES:

1. SEE SHEET DP-1 FOR NOTES AND LEGEND.

STATION		340	345	350	355	360	365	370	TOTAL
CY	Exc								
	Emb								

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER
MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-C-RD | 054-BRDR | 054-Drainage |
Mar. 20, 2015 – 11:13:29 DWG Name: P:\710054 – Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-DP.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		50	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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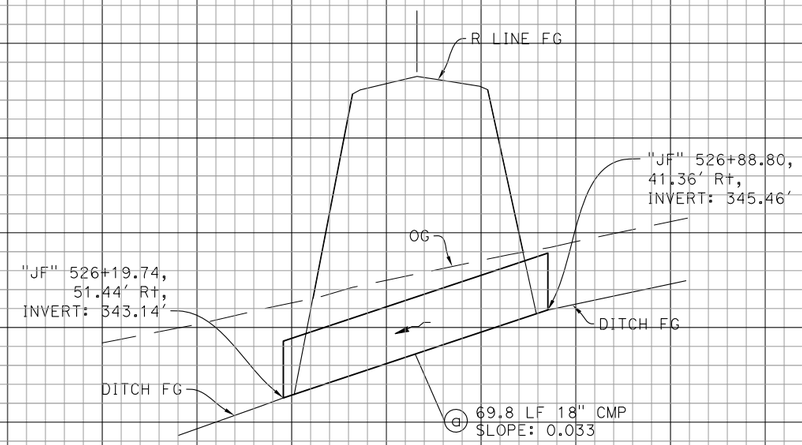
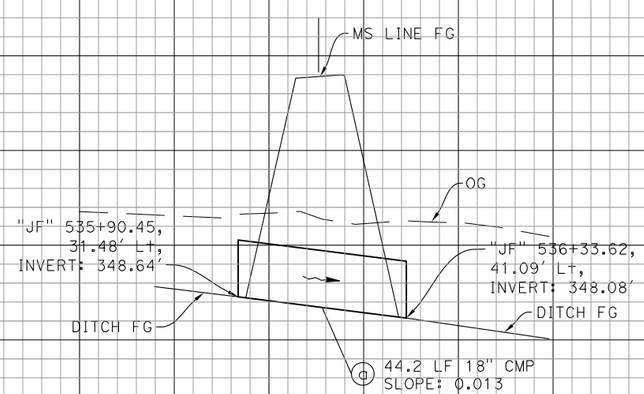
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

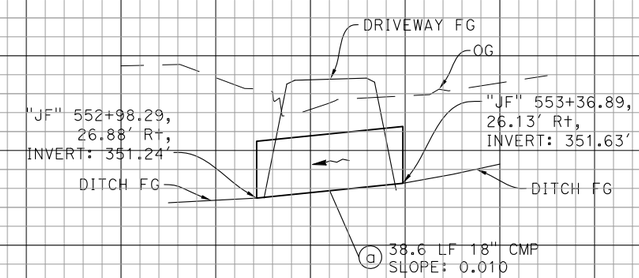
1. SEE SHEET DP-1 FOR NOTES AND LEGEND.



DRAINAGE SYSTEM No. 8



DRAINAGE SYSTEM No. 9



DRAINAGE SYSTEM No. 10

DRAINAGE PROFILES

SCALE: Horiz 1" = 20'
Vert 1" = 2'

DP-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

STATION		TOTAL
CY	Exc	
	Emb	

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-C-RD | 054-BRDR | 054-Drainage |
Mar. 20, 2015 – 11:13:29 DWG Name: P:\710054 – Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-DP.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		51	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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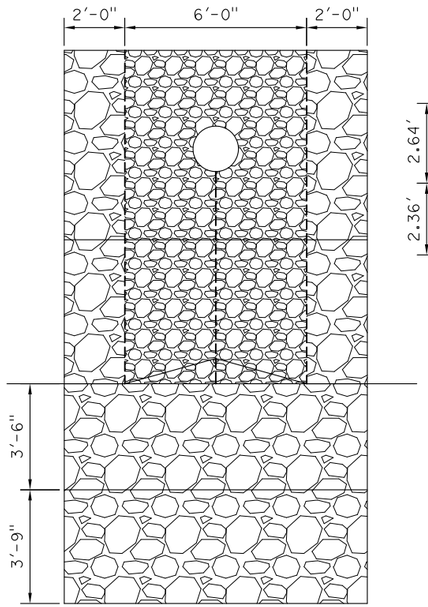
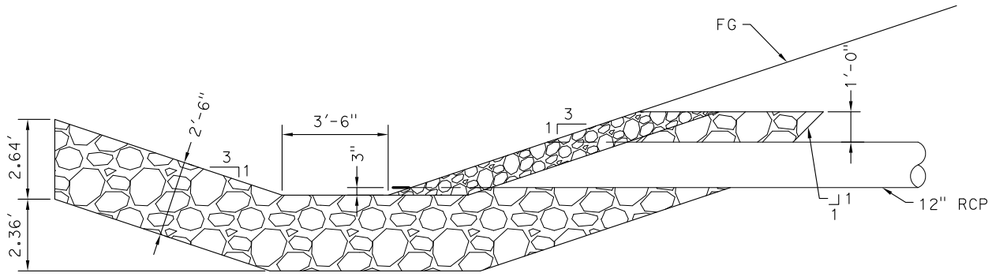
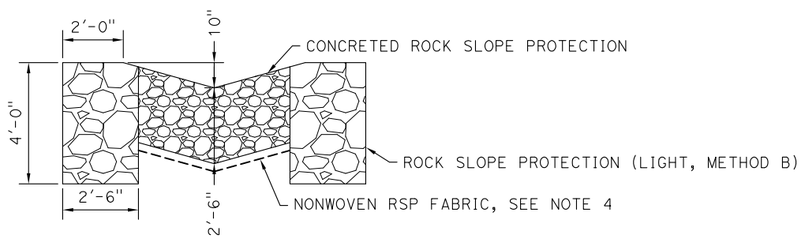
SACRAMENTO, CA 95815



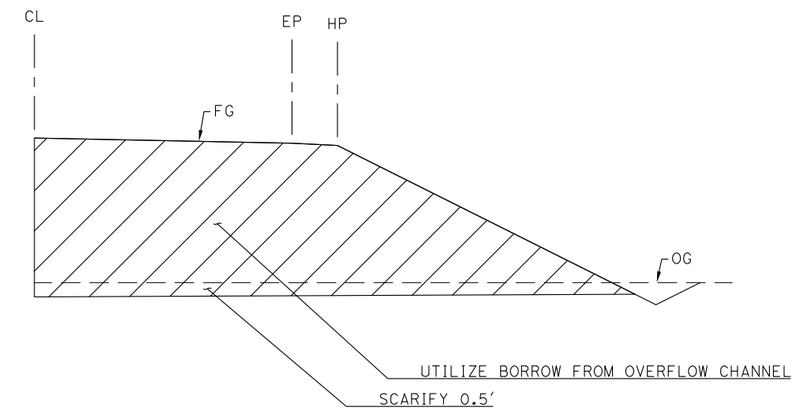




NOTES:

1. CONCRETED-ROCK SLOPE PROTECTION AND ROCK SLOPE PROTECTION SHALL CONFORM TO THE STATE STANDARD SPECIFICATIONS. UNLESS OTHERWISE SPECIFIED, THE ROCK CLASS SHALL BE LIGHT, METHOD B PLACEMENT.
2. LAP ROCK SLOPE PROTECTION FABRIC IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS.
3. CONCRETE SHALL BE PLACED IN ACCORDANCE WITH STATE STANDARD SPECIFICATIONS.
4. FABRIC SHALL COMPLY TO STATE STANDARD SPECIFICATION 72-2 "ROCK SLOPE PROTECTION".

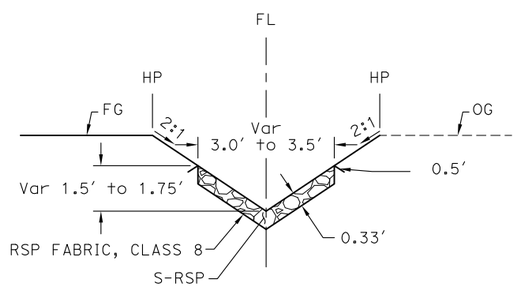
ROCK PIPE OUTFALL



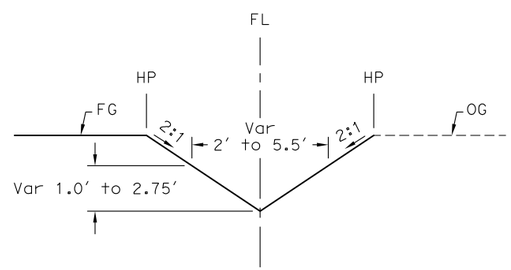
NOTES:

1. FROM BP TO SACRAMENTO RIVER BRIDGE BB.

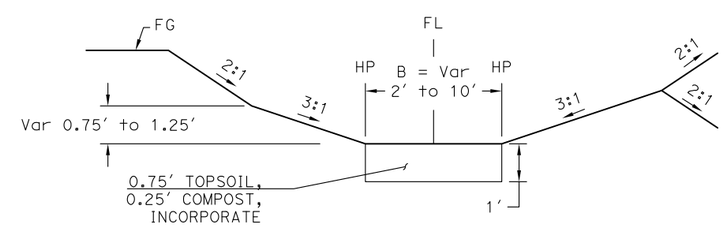
SOIL QUALITY IMPROVEMENTS



RSP DITCH SECTION



VEGETATED DITCH SECTION



TRAPEZOIDAL VEGETATED SWALE SECTION

DRAINAGE DETAILS

NO SCALE

DD-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR DRAINAGE DETAILS ONLY

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR |
Mar. 20, 2015 – 11:19:54 DWG Name: P:\710054 – Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-DD.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		52	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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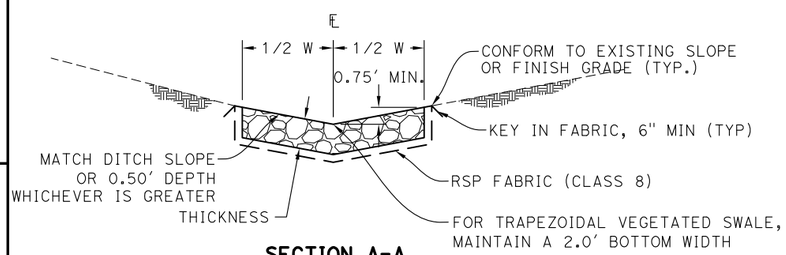
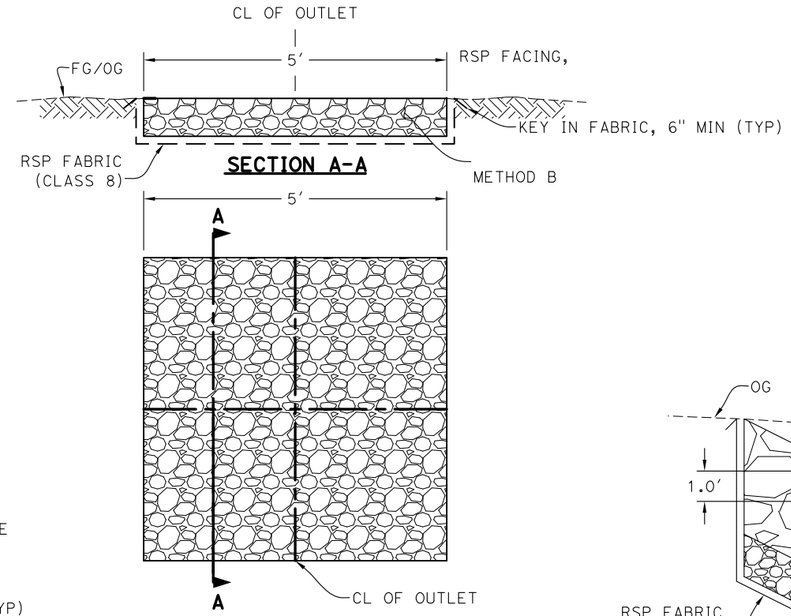
SACRAMENTO, CA 95815

ROCK SLOPE PROTECTION

DRAINAGE SYSTEM No.	LENGTH, L (FT)	WIDTH, W (FT)		THICKNESS, T (FT)
		UPPER	LOWER	
7i	9	4.0	4.5	1.25



SECTION A-A

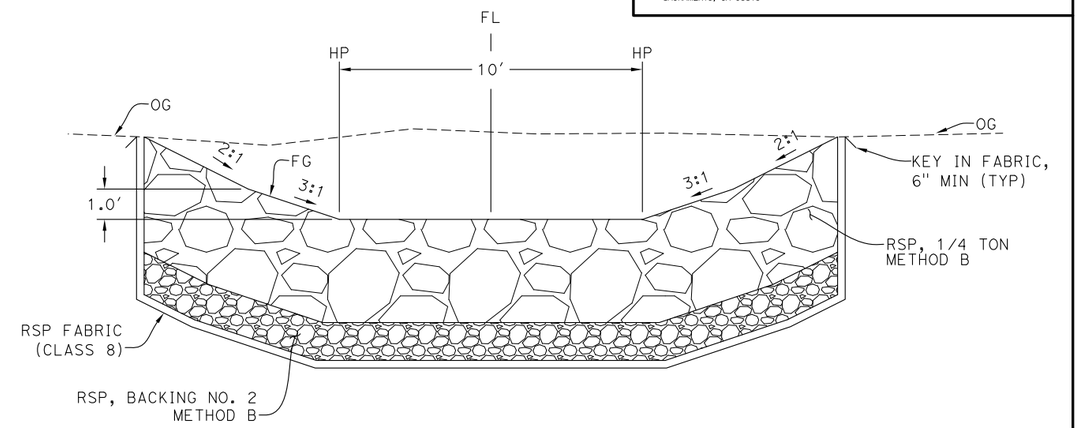


SECTION A-A

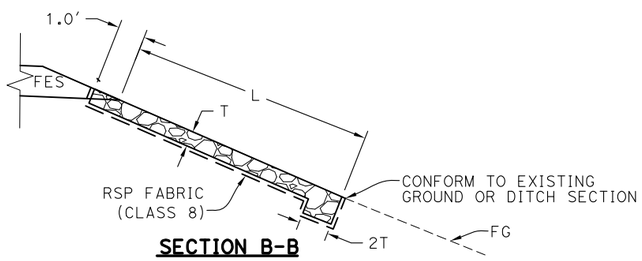
PLAN

ROCK SLOPE PROTECTION AT DECK DRAIN

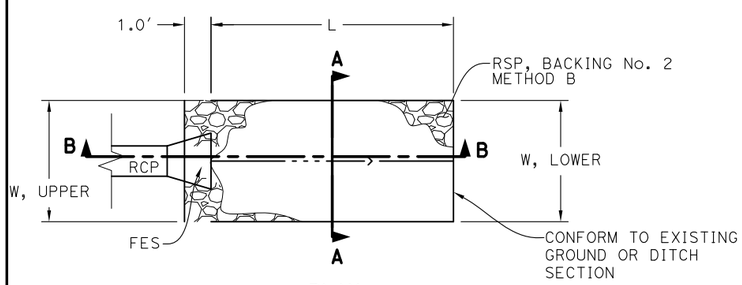
NO SCALE



SECTION A-A



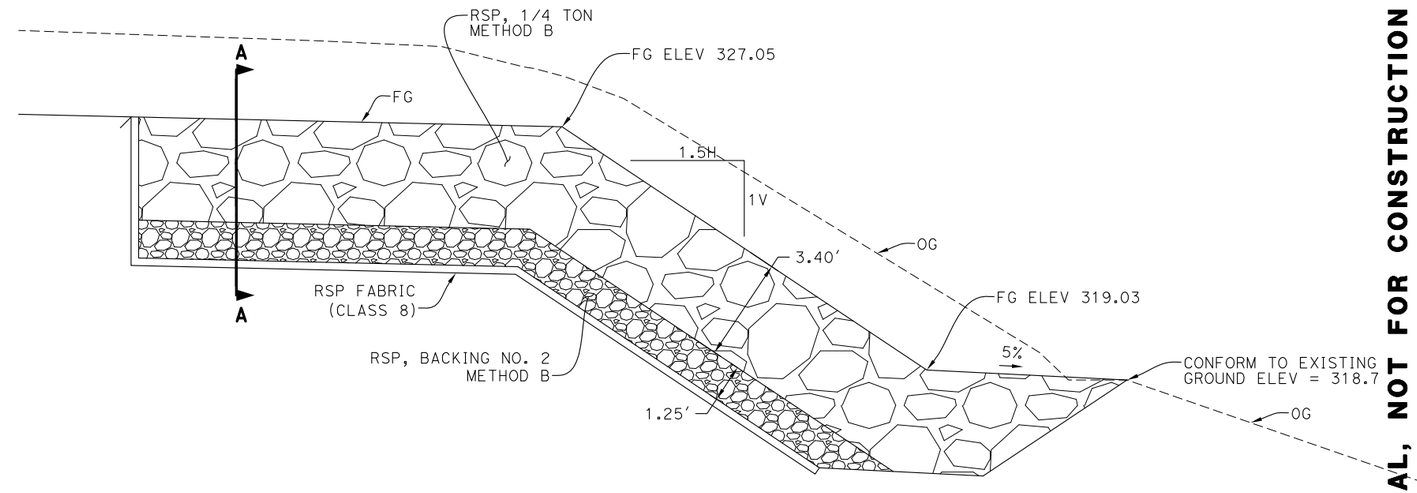
SECTION B-B



PLAN

ROCK SLOPE PROTECTION

NO SCALE



ELEVATION AT FLOWLINE

ROCK SLOPE PROTECTION AT THE SACRAMENTO RIVER

NO SCALE

DRAINAGE DETAILS

NO SCALE

DD-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR DRAINAGE DETAILS ONLY

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR |
Mar. 20, 2015 – 11:19:54 DWG Name: P:\710054 – Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-DD.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		53	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

DRAINAGE QUANTITIES

LAYOUT PLAN SHEET NUMBER	DRAINAGE SYSTEM NUMBER ⬡	DRAINAGE UNIT NUMBER ◯	12" RCP	18" RCP	18" CSP	24" CSP	30" CSP	ROCK SLOPE PROTECTION (¼ TON, METHOD B)	ROCK SLOPE PROTECTION (NO. 2, METHOD B)	ROCK SLOPE PROTECTION (LIGHT, METHOD B)	ROCK SLOPE PROTECTION (FACING, METHOD B)	SMALL-ROCK SLOPE PROTECTION (4")	CONCRETED-ROCK SLOPE PROTECTION (LIGHT, METHOD B)	ROCK SLOPE PROTECTION FABRIC (CLASS 8)	INCORPORATE MATERIALS	LOCAL TOPSOIL (N)	COMPOST	TYPE G1 INLET	INLET FRAME AND GRATE (TYPE 24-13)	TC MANHOLE	MISCELLANEOUS IRON AND STEEL (N)	HEIGHT OF INLET (N)	CONCRETE FLARED END SECTION	ROCK PIPE OUTFALL (RPO) (N)	DRAINAGE INLET MARKER	DESCRIPTION	STATION
			LF	LF	LF	LF	LF	CY	CY	CY	CY	CY	CY	SY	SF	CY	SF	EA	EA	EA	EA	EA	EA	EA	EA		
L-1	1	a			46																					18" CMP	503+90.66 to 504+34.93
L-1/2	2	a			58																					18" CMP	506+22.70 to 506+79.27
	3	a								#			#	#										1		RPO	505+55.04
		b	16																						1	12" RCP	505+55.04
		c																1	1		#	#				TYPE G1 INLET	505+55.04
		d	120																							12" RCP	505+55.04 to 506+75.04
		e																1	1		#	#			1	TYPE G1 INLET	506+75.04
		f	50																							12" RCP	506+75.04 to 507+24.20
		g																		1						TC MANHOLE	507+24.20
L-2/3	4	a					50																			30" CMP	517+32.27 to 516+90.25
L-3	5	a			60																					18" CMP	"R" 24+04.17 to "R" 24+04.46
		b							#					#												8.7' RSP DITCH, D=1.50'	"R" 24+04.46
	6	a				72																				24" CMP	"R" 16+79.79 to "R" 26+11.71
	7	a																		1						TC MANHOLE	520+22.26
		b	38																							12" RCP	520+22.26 to 520+58.00
		c																1	1		#	#			1	TYPE G1 INLET	520+58.00
		d	256																							12" RCP	520+58.00 to 523+15.00
		e																1	1		#	#			1	TYPE G1 INLET	523+15.00
		f		168																						18" RCP	523+15.00 to 524+82.49
		g																1	1		#	#			1	TYPE G1 INLET	524+82.49
		h		44																						18" RCP	524+82.49
		i																					1			FES	524+82.49
		j							#					#												RSP	524+82.49
	8	a			70																					18" CMP	526+19.74 to 526+88.80
L-4	9	a			46																					18" CMP	535+90.45 to 536+33.62
L-6	10	a			40																					18" CMP	552+98.29 to 553+36.89
L-1	11	a																								364.7' VEGETATED DITCH, D=1.25'	499+98.85 to 503+65.56
L-1	12	a																								149.5' VEGETATED DITCH, D=1.25'	503+94.59 to 504+45.09
L-1/2		b													#											191.0' VEGETATED SWALE, B=3.25', D=1.25'	504+45.09 to 507+34.33
L-1	13	a																								199.3' VEGETATED DITCH, D=1.25'	500+00.00 to 501+99.29
	14	a																								150.4' VEGETATED DITCH, D=1.25'	502+41.32 to 503+90.66
	15	a																								189.5' VEGETATED DITCH, D=1.25'	504+34.93 to 506+22.70
L-2	16	a																								86.0' VEGETATED DITCH, D=1.25'	506+79.27 to 507+64.09
L-3	17	a																								627.4' VEGETATED DITCH, D=2.00'	520+00.00 to 526+19.74
		b																								100.0' VEGETATED DITCH, D=2.00'	521+11.11 to "R" 16+79.79
L-3	18	a																								134.2' RSP DITCH, D=1.50'	524+16.95 to 525+36.10
L-3/4		b																								789.4' VEGETATED DITCH, D=1.50'	525+36.10 to 533+25.00
L-4		c																								265.6' VEGETATED DITCH, D=1.25'	533+25.00 to 535+90.45
L-3/4	19	a																								537.1' VEGETATED DITCH, D=1.25'	526+88.80 to 532+24.47
L-4		b																								325.1' VEGETATED DITCH, D=1.00'	532+24.47 to 535+50.00
		c													#											150.2' VEGETATED SWALE, B=2.0', D=0.75'	535+50.00 to 536+97.07
	20	a													#											111.6' VEGETATED SWALE, B=2.0', D=1.00'	536+33.74 to 537+45.30
L-5	21	a													#											223.3' VEGETATED SWALE, B=2.0', D=1.00'	543+35.70 to 545+60.00
L-5/6		b																								1084.8' VEGETATED DITCH, D=1.50'	545+60.00 to 556+40.00
L-5	22	a													#											213.2' VEGETATED SWALE, B=3.0', D=1.00'	543+52.51 to 545+60.00
L-5/6		b																								738.9' VEGETATED DITCH, D=1.50'	545+60.00 to 552+98.29
L-6	23	a																								297.9' VEGETATED DITCH, D=1.50'	553+26.13 to 556+40.00
L-3	24	a							#					#												217.9' RSP DITCH, D=1.75'	"R" 26+11.71 to "R" 24+04.50
		b																								265.3' VEGETATED DITCH, D=2.75'	"R" 24+04.50 to "R" 22+29.28
	25	a																								302.9' VEGETATED DITCH, D=1.50'	"R" 20+80.00 to "R" 24+15.00
L-2	26	a																								95.7' VEGETATED DITCH, D=2.75'	516+90.25 to 516+08.64
		b																								260.0' VEGETATED SWALE, B=10.0', D=1.00'	516+08.64 to 513+78.20
		c							#					#	#											RSP	513+78.20
	SUBTOTAL		480	212	320	72	50	#	#	#	#	#	#	#	#	#	#	5	5	2	#	#	1	1	5		

(N) - NOT A SEPARATE PAY ITEM, FOR INFORMATION ONLY

THIS PLAN ACCURATE FOR DRAINAGE DETAILS ONLY

DRAINAGE DETAILS
NO SCALE

DD-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY | DATE REVISED

K. BEWSEY/ D. ZURCHER | KEITH RHODES

CALCULATED-DESIGNED BY | CHECKED BY

PROJECT ENGINEER MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR |
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Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		54	138

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SACRAMENTO, CA 95815

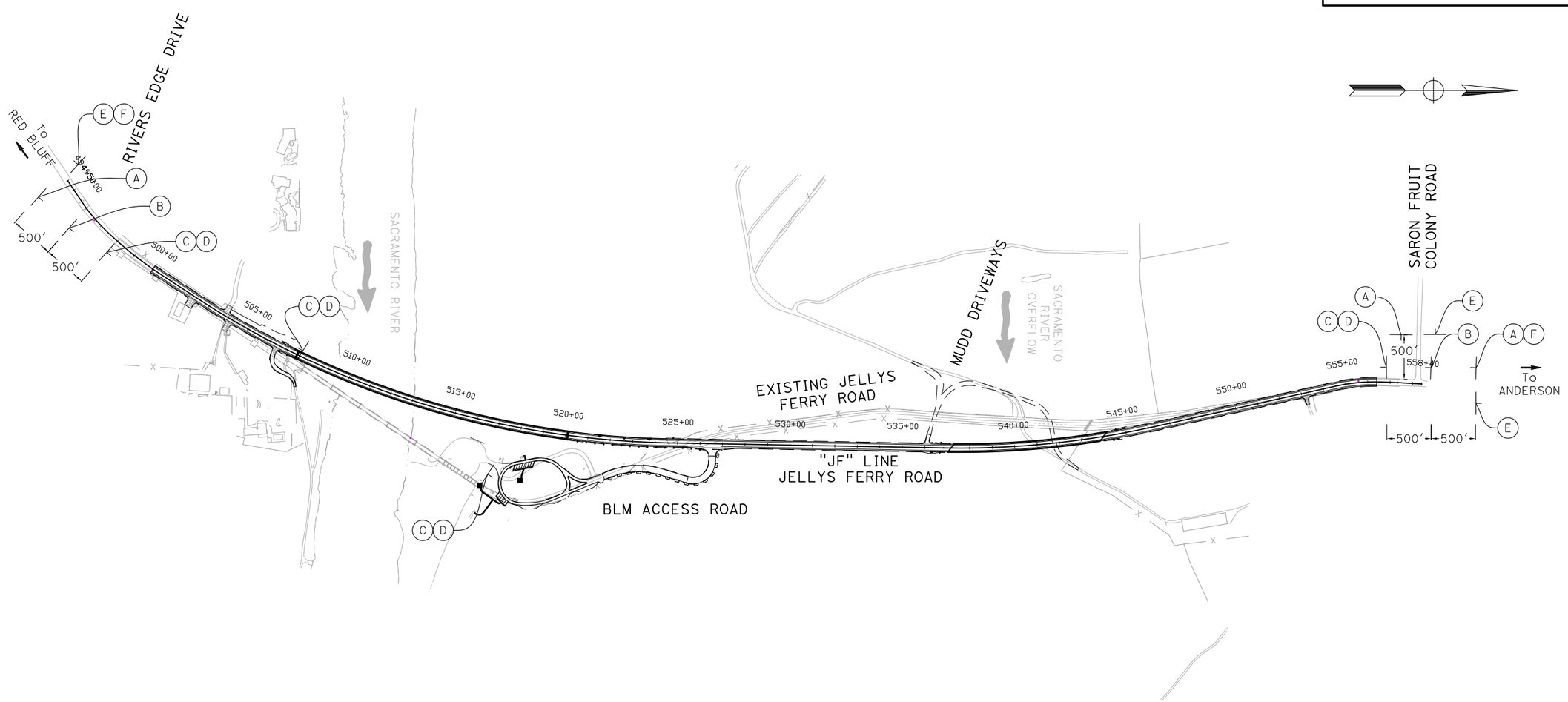
NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. SIGN LOCATIONS SHOWN ARE APPROXIMATE. EXACT LOCATIONS TO BE DETERMINED BY THE ENGINEER.
3. GENERAL CONSTRUCTION AREA SIGNS SHOWN ON CS-1 TO BE INSTALLED PRIOR TO STAGE 1 AND TO REMAIN THROUGHOUT THE DURATION OF PROJECT CONSTRUCTION.

LEGEND:

(A) SIGN NUMBER

┤ SIGN LOCATION, ONE POST



CONSTRUCTION AREA SIGN QUANTITIES

SIGN NO.	SIGN CODE	SIGN MESSAGE	POSTS	SIGN SIZE (INCHES)	# OF SIGN INSTALLATIONS	POST SIZE (INCHES)
(A)	W20-1	ROAD WORK AHEAD	1	36x36	3	4x6
(B)	W3-5A	25 MPH SPEED ZONE AHEAD	1	36x36	2	4x6
(C)	G20-5AP	WORK ZONE	1	24x18	4	4x6
(D)	R2-1	SPEED LIMIT 25	N/A	24x30	4	N/A
(E)	G20-2	END ROAD WORK	1	36x18	3	4x4
(F)	"DUST INFORMATION SIGN"		N/A	N/A	2	4x8

THIS PLAN ACCURATE FOR CONSTRUCTION AREA SIGN WORK ONLY

CONSTRUCTION AREA SIGNS

SCALE: 1"=250'

CAS-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER
CHECKED BY: KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-Corridor |
Mar. 20, 2015 – 11:38:07 DWG Name: P:\710054 – Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-CAS.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		55	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

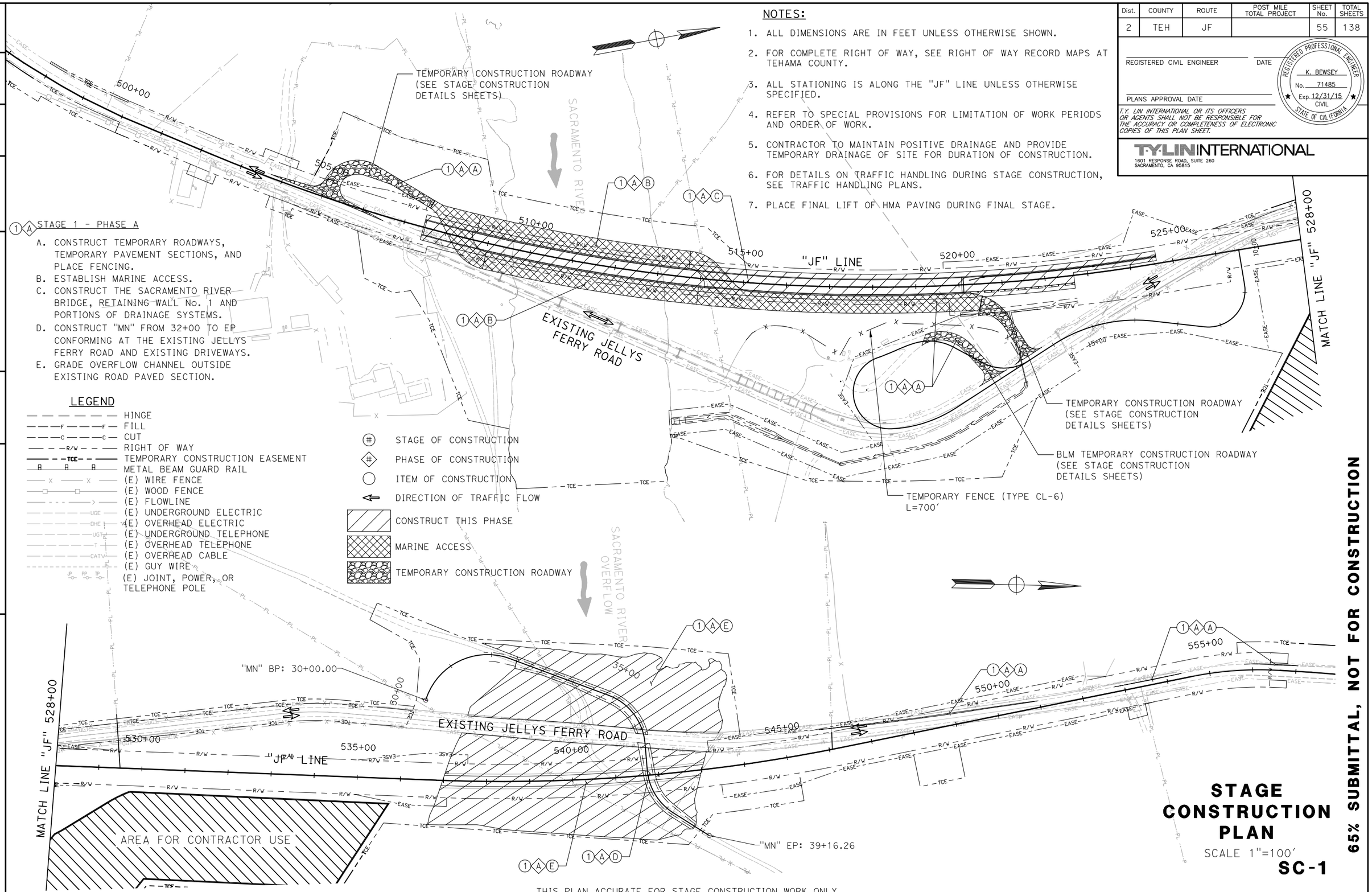
REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

T.Y. LIN INTERNATIONAL OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.
3. ALL STATIONING IS ALONG THE "JF" LINE UNLESS OTHERWISE SPECIFIED.
4. REFER TO SPECIAL PROVISIONS FOR LIMITATION OF WORK PERIODS AND ORDER OF WORK.
5. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AND PROVIDE TEMPORARY DRAINAGE OF SITE FOR DURATION OF CONSTRUCTION.
6. FOR DETAILS ON TRAFFIC HANDLING DURING STAGE CONSTRUCTION, SEE TRAFFIC HANDLING PLANS.
7. PLACE FINAL LIFT OF HMA PAVING DURING FINAL STAGE.



1 A STAGE 1 - PHASE A

A. CONSTRUCT TEMPORARY ROADWAYS, TEMPORARY PAVEMENT SECTIONS, AND PLACE FENCING.
B. ESTABLISH MARINE ACCESS.
C. CONSTRUCT THE SACRAMENTO RIVER BRIDGE, RETAINING WALL No. 1 AND PORTIONS OF DRAINAGE SYSTEMS.
D. CONSTRUCT "MN" FROM 32+00 TO EP CONFORMING AT THE EXISTING JELLYS FERRY ROAD AND EXISTING DRIVEWAYS.
E. GRADE OVERFLOW CHANNEL OUTSIDE EXISTING ROAD PAVED SECTION.

LEGEND

- HINGE
- FILL
- CUT
- RIGHT OF WAY
- TEMPORARY CONSTRUCTION EASEMENT
- METAL BEAM GUARD RAIL
- (E) WIRE FENCE
- (E) WOOD FENCE
- (E) FLOWLINE
- (E) UNDERGROUND ELECTRIC
- (E) OVERHEAD ELECTRIC
- (E) UNDERGROUND TELEPHONE
- (E) OVERHEAD TELEPHONE
- (E) OVERHEAD CABLE
- (E) GUY WIRE
- (E) JOINT, POWER, OR TELEPHONE POLE
- STAGE OF CONSTRUCTION
- PHASE OF CONSTRUCTION
- ITEM OF CONSTRUCTION
- DIRECTION OF TRAFFIC FLOW
- CONSTRUCT THIS PHASE
- MARINE ACCESS
- TEMPORARY CONSTRUCTION ROADWAY

STAGE CONSTRUCTION PLAN

SCALE 1"=100'

SC-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRGR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP. Road | 054-CONSTRUCTION ACCESS | 054-Corridor |
Apr. 20, 2015 - 12:02:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-SC.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		56	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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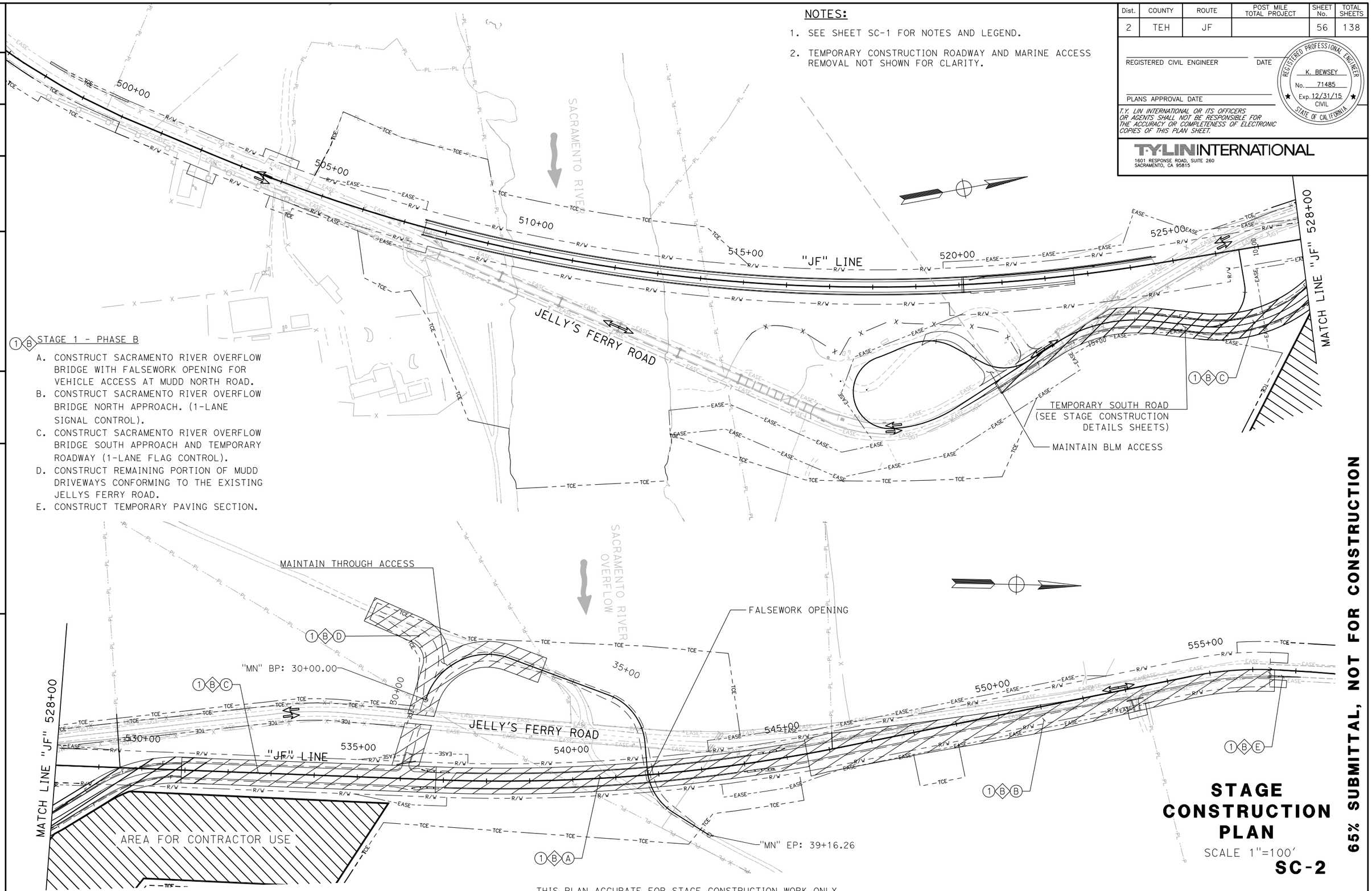
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET SC-1 FOR NOTES AND LEGEND.
2. TEMPORARY CONSTRUCTION ROADWAY AND MARINE ACCESS REMOVAL NOT SHOWN FOR CLARITY.



1 B STAGE 1 - PHASE B

A. CONSTRUCT SACRAMENTO RIVER OVERFLOW BRIDGE WITH FALSEWORK OPENING FOR VEHICLE ACCESS AT MUDD NORTH ROAD.
B. CONSTRUCT SACRAMENTO RIVER OVERFLOW BRIDGE NORTH APPROACH. (1-LANE SIGNAL CONTROL).
C. CONSTRUCT SACRAMENTO RIVER OVERFLOW BRIDGE SOUTH APPROACH AND TEMPORARY ROADWAY (1-LANE FLAG CONTROL).
D. CONSTRUCT REMAINING PORTION OF MUDD DRIVEWAYS CONFORMING TO THE EXISTING JELLYS FERRY ROAD.
E. CONSTRUCT TEMPORARY PAVING SECTION.

STAGE CONSTRUCTION PLAN

SCALE 1"=100'

SC-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-CONSTRUCTION ACCESS | 054-Drainage | 054-Corridor |
Apr 20, 2015 - 12:02:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-SC.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		57	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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SACRAMENTO, CA 95815

NOTES:

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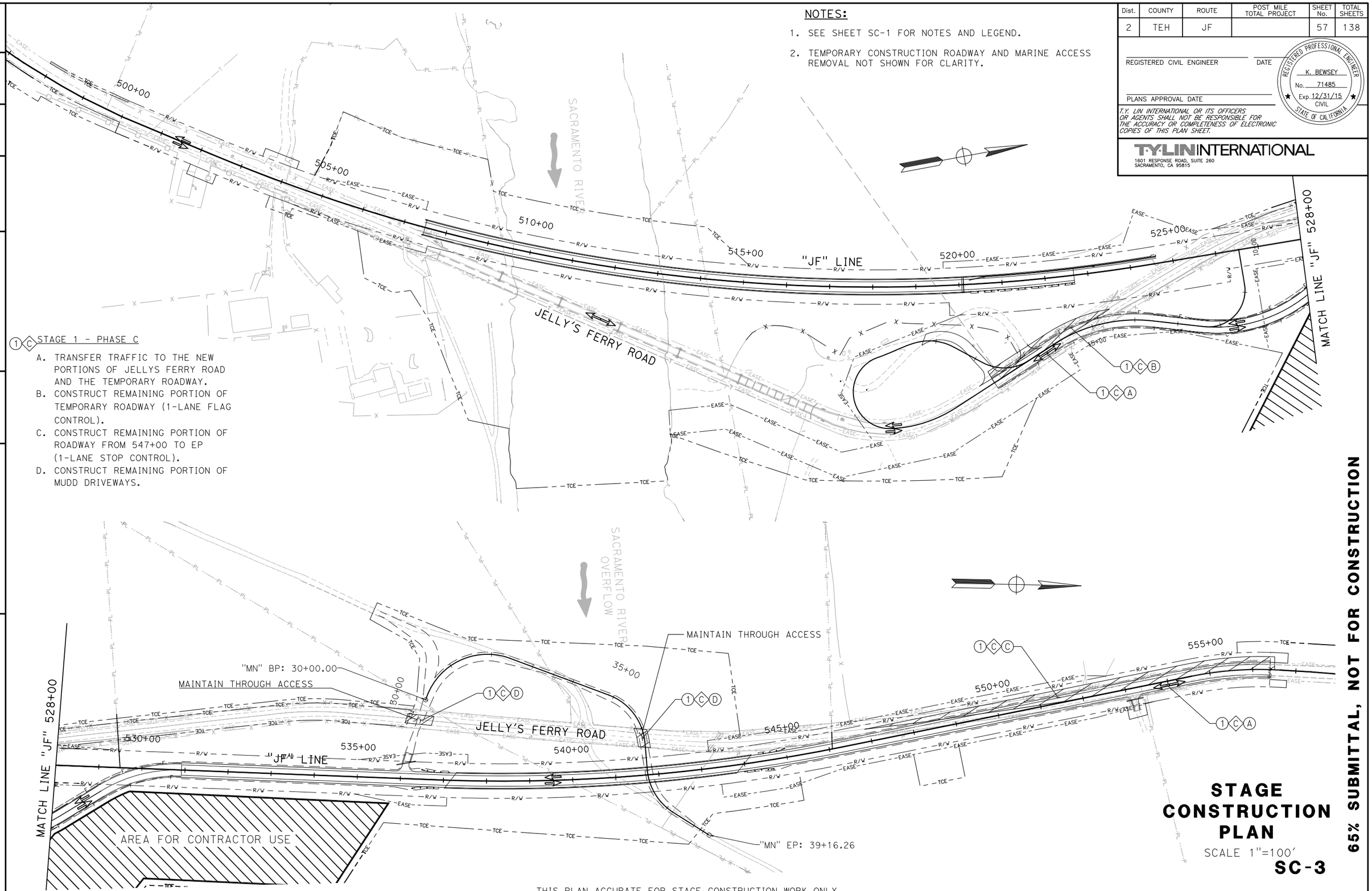

1 C STAGE 1 - PHASE C

A. TRANSFER TRAFFIC TO THE NEW PORTIONS OF JELLYS FERRY ROAD AND THE TEMPORARY ROADWAY.
B. CONSTRUCT REMAINING PORTION OF TEMPORARY ROADWAY (1-LANE FLAG CONTROL).
C. CONSTRUCT REMAINING PORTION OF ROADWAY FROM 547+00 TO EP (1-LANE STOP CONTROL).
D. CONSTRUCT REMAINING PORTION OF MUDD DRIVEWAYS.

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

STAGE CONSTRUCTION PLAN

SCALE 1"=100'

SC-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-CONSTRUCTION ACCESS | 054-Drainage | 054-Corridor |
Apr 20, 2015 - 12:02:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-SC.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		58	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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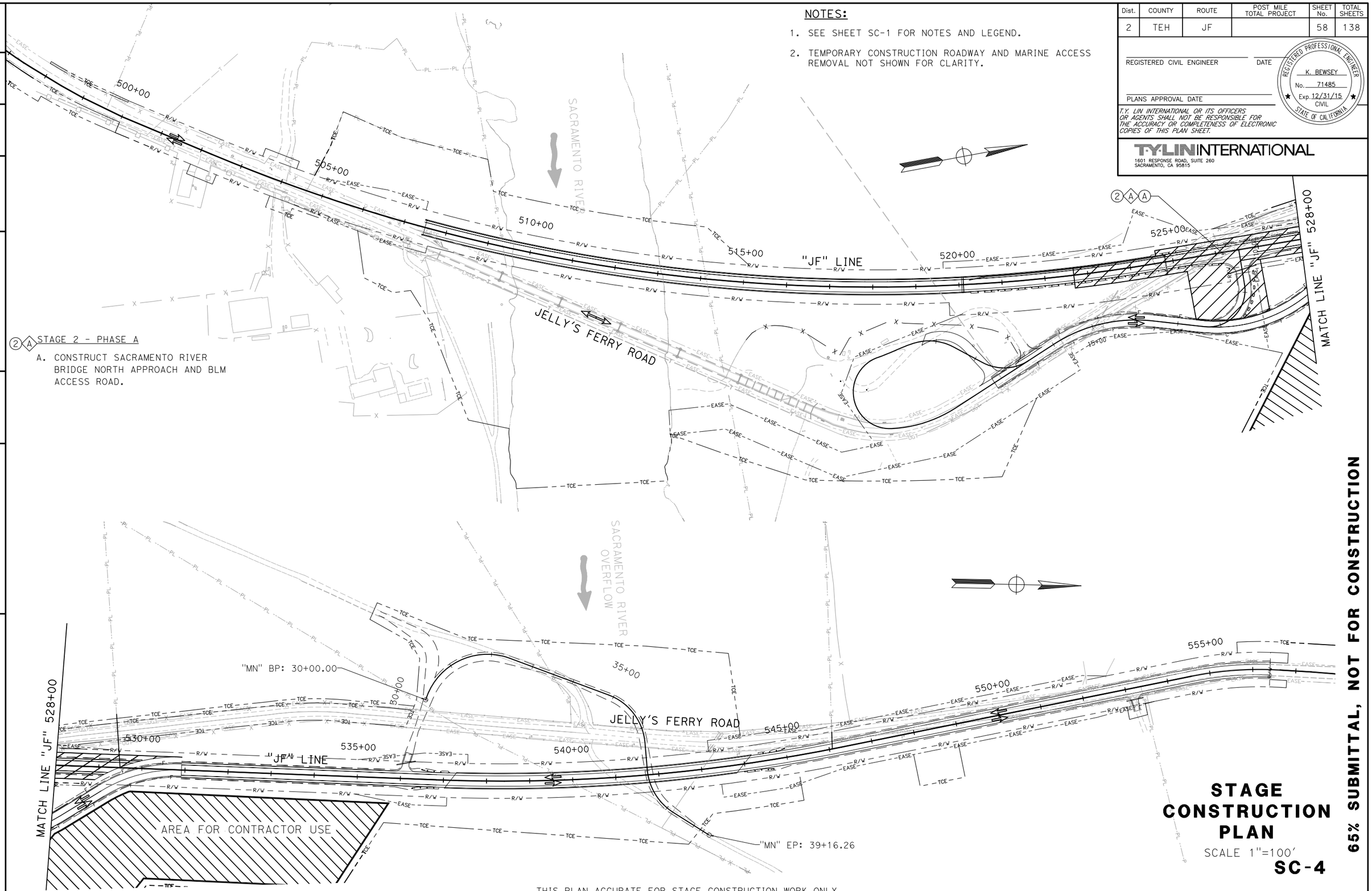
2. TEMPORARY CONSTRUCTION ROADWAY AND MARINE ACCESS REMOVAL NOT SHOWN FOR CLARITY.



THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

STAGE CONSTRUCTION PLAN

SCALE 1"=100'

SC-4

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	
MICHAEL WOLOHAN	

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-CONSTRUCTION ACCESS | 054-Drainage | 054-Corridor |
Apr 20, 2015 - 12:02:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-SC.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		59	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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SACRAMENTO, CA 95815

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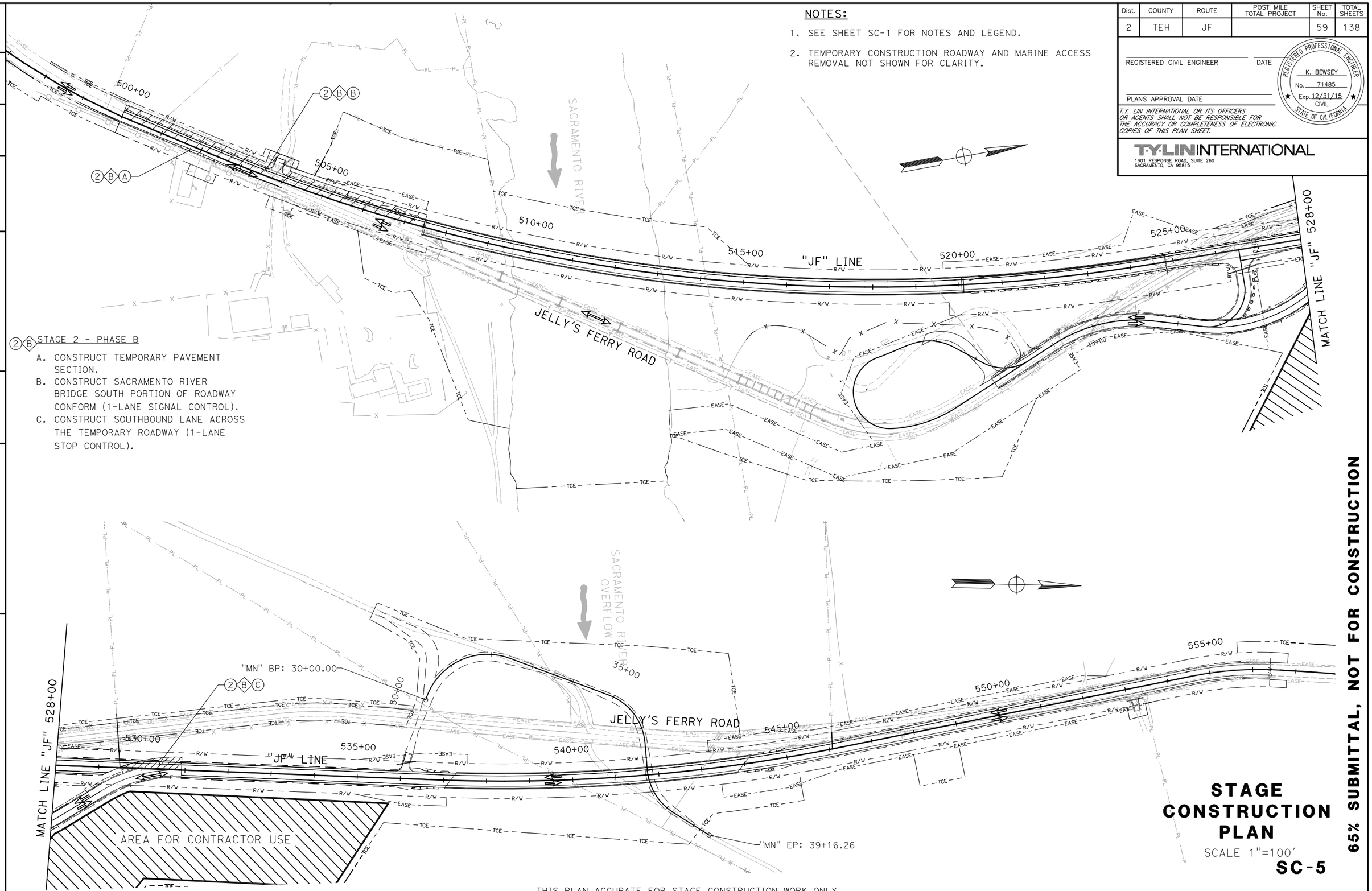

2 B STAGE 2 - PHASE B

A. CONSTRUCT TEMPORARY PAVEMENT SECTION.
B. CONSTRUCT SACRAMENTO RIVER BRIDGE SOUTH PORTION OF ROADWAY CONFORM (1-LANE SIGNAL CONTROL).
C. CONSTRUCT SOUTHBOUND LANE ACROSS THE TEMPORARY ROADWAY (1-LANE STOP CONTROL).

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

STAGE CONSTRUCTION PLAN

SCALE 1"=100'

SC-5

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-CONSTRUCTION ACCESS | 054-Drainage | 054-Drainage |
Apr 20, 2015 - 12:02:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-SC.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		60	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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SACRAMENTO, CA 95815

NOTES:

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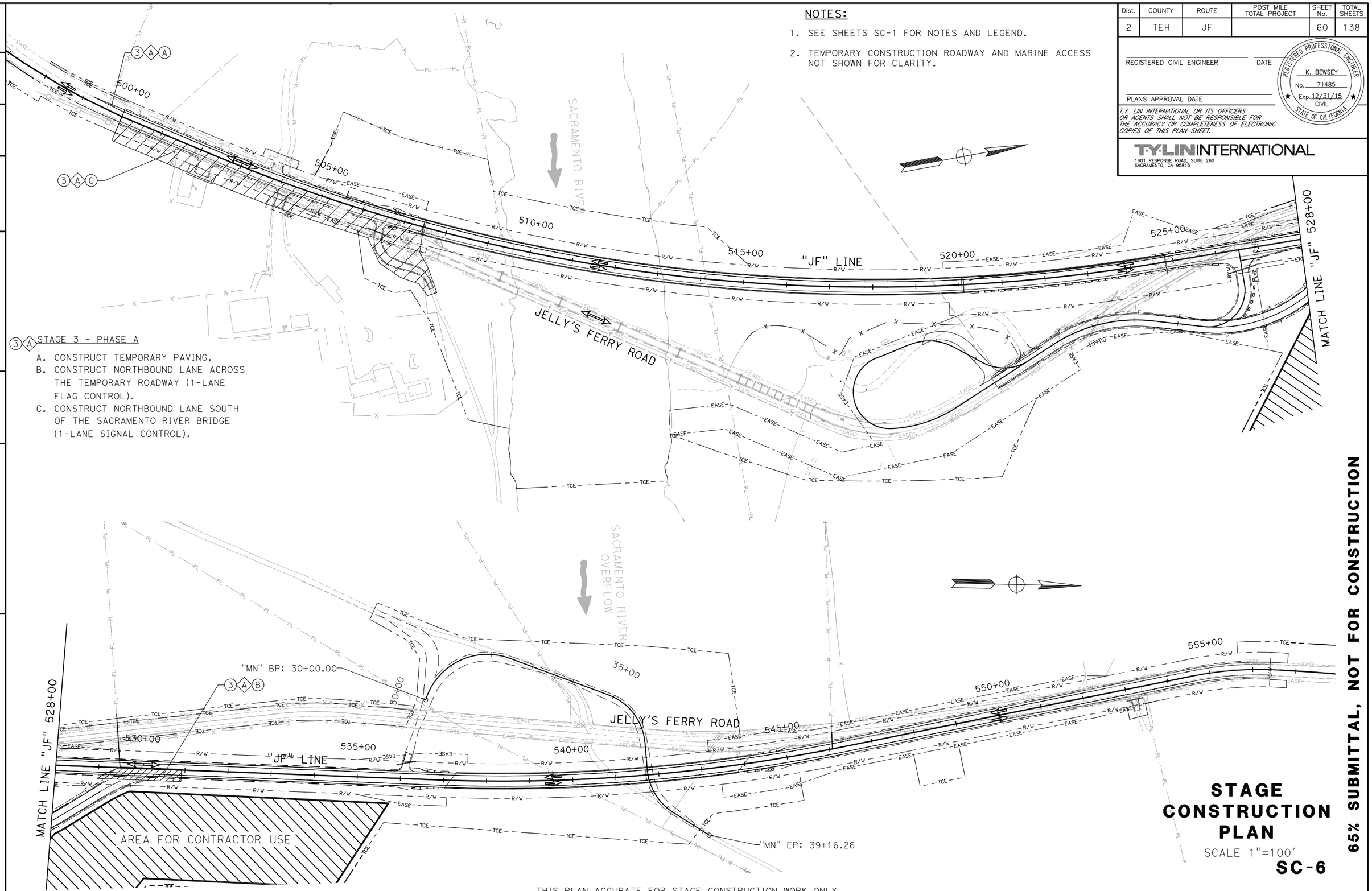

3 A STAGE 3 - PHASE A

A. CONSTRUCT TEMPORARY PAVING.
B. CONSTRUCT NORTHBOUND LANE ACROSS THE TEMPORARY ROADWAY (1-LANE FLAG CONTROL).
C. CONSTRUCT NORTHBOUND LANE SOUTH OF THE SACRAMENTO RIVER BRIDGE (1-LANE SIGNAL CONTROL).

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

STAGE CONSTRUCTION PLAN

SCALE 1"=100'

SC-6

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-CONSTRUCTION ACCESS | 054-Drainage | 054-Corridor |
Apr 20, 2015 - 12:02:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-SC.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		61	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

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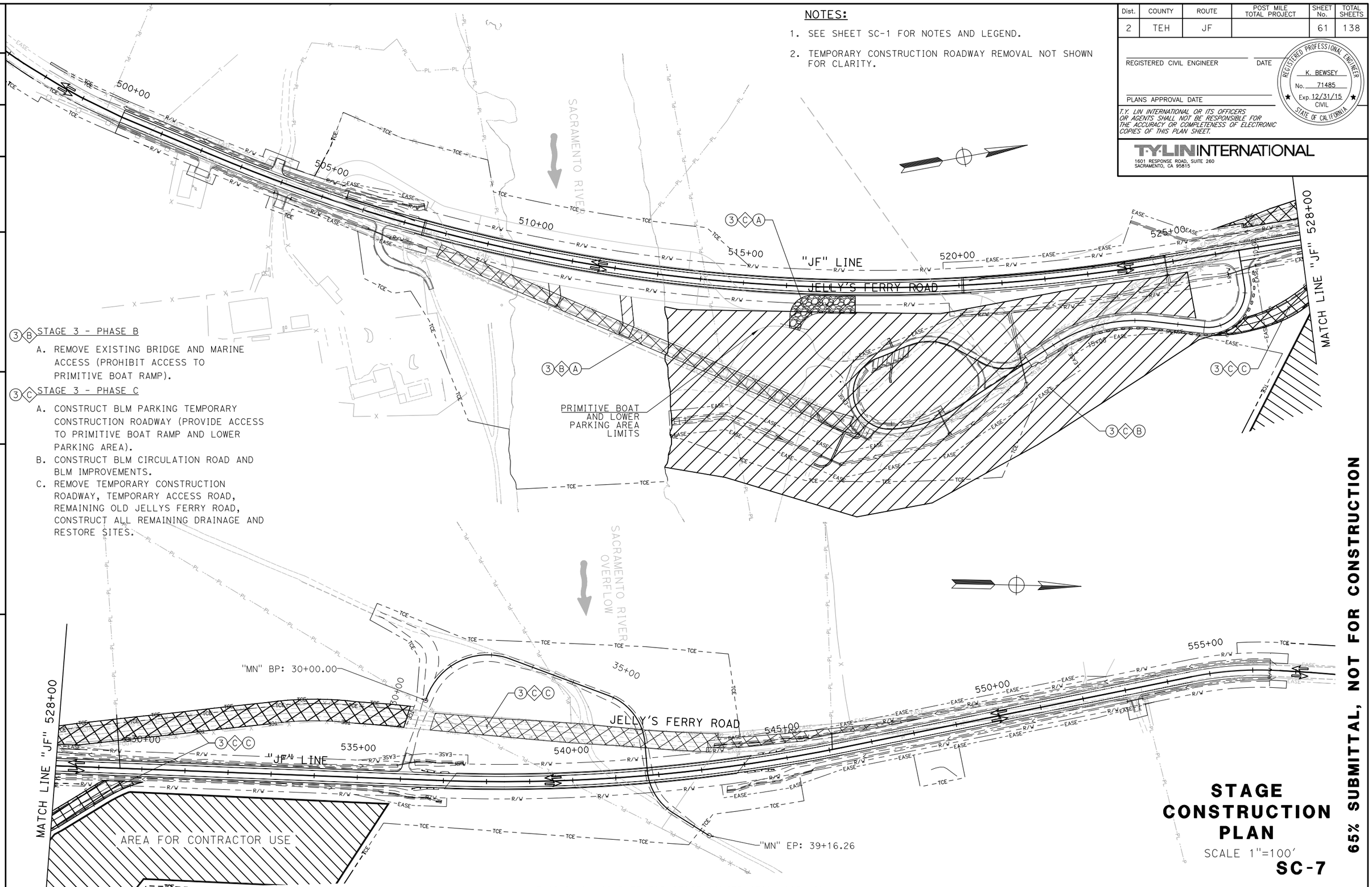

3 B STAGE 3 - PHASE B

A. REMOVE EXISTING BRIDGE AND MARINE ACCESS (PROHIBIT ACCESS TO PRIMITIVE BOAT RAMP).

3 C STAGE 3 - PHASE C

A. CONSTRUCT BLM PARKING TEMPORARY CONSTRUCTION ROADWAY (PROVIDE ACCESS TO PRIMITIVE BOAT RAMP AND LOWER PARKING AREA).
B. CONSTRUCT BLM CIRCULATION ROAD AND BLM IMPROVEMENTS.
C. REMOVE TEMPORARY CONSTRUCTION ROADWAY, TEMPORARY ACCESS ROAD, REMAINING OLD JELLYS FERRY ROAD, CONSTRUCT ALL REMAINING DRAINAGE AND RESTORE SITES.

STAGE CONSTRUCTION PLAN

SCALE 1"=100'

SC-7

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-CONSTRUCTION ACCESS | 054-Drainage | 054-Corridor |
Apr. 20, 2015 - 12:02:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-SC.dwg Updated By: DZurcher By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		62	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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SACRAMENTO, CA 95815

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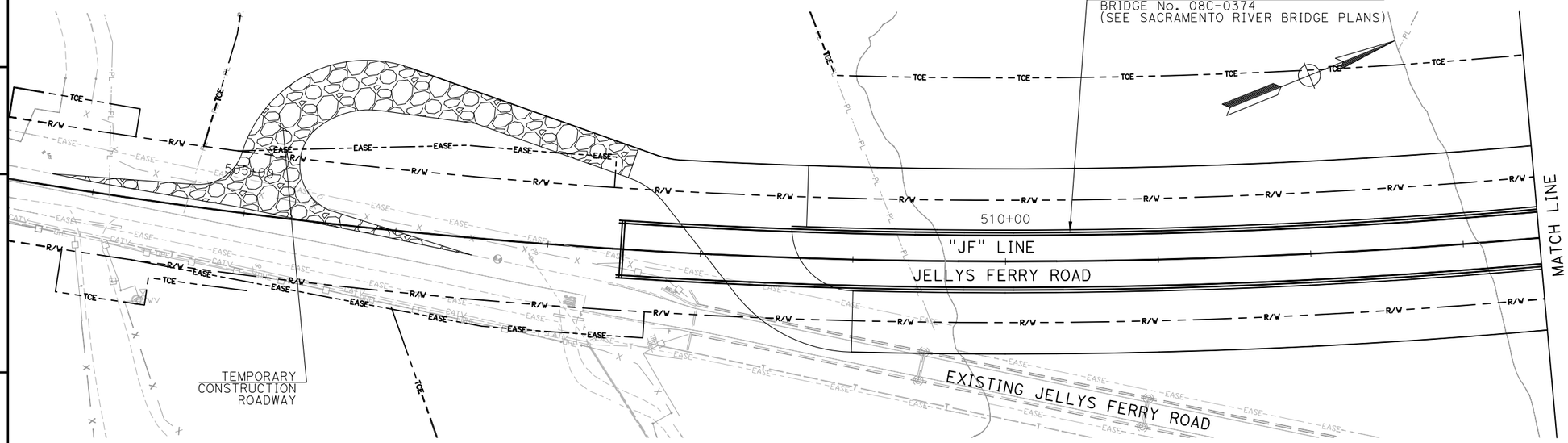

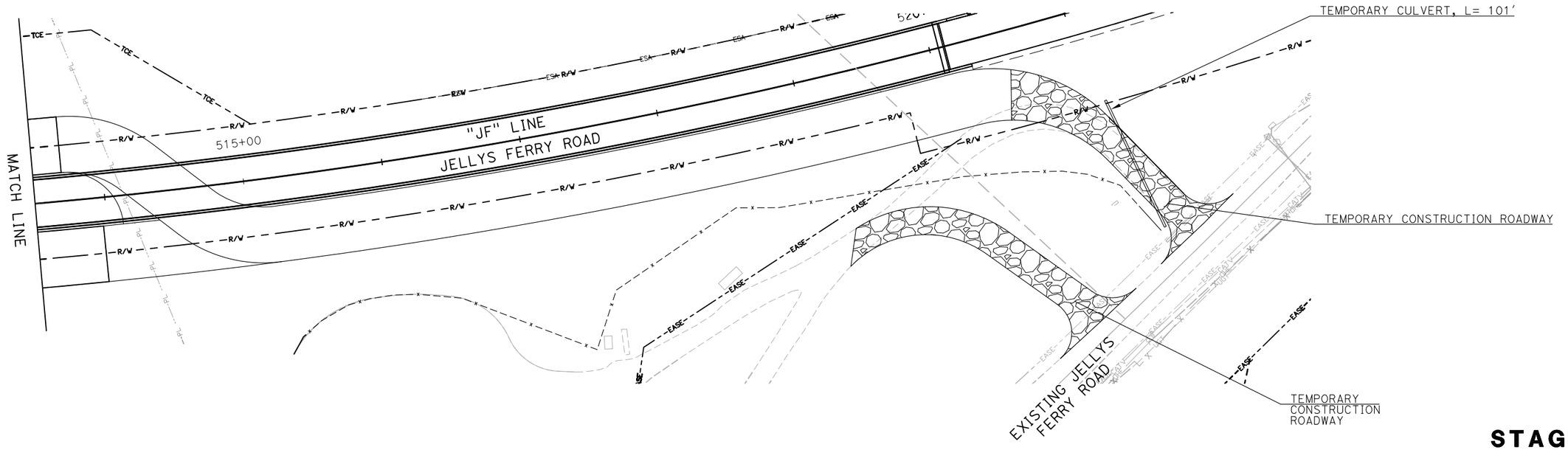

STAGE CONSTRUCTION DETAILS

SCALE: 1"=40'

SCD-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-CONSTRUCTION ACCESS |
Mar. 20, 2015 – 12:14:09 DWG Name: P:\70034 – Jellys Ferry Bridge\500_Engineering\510_Civil\51_CADD\SHEETS\054-SCD-1.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		63	138

REGISTERED CIVIL ENGINEER DATE

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NOTES:

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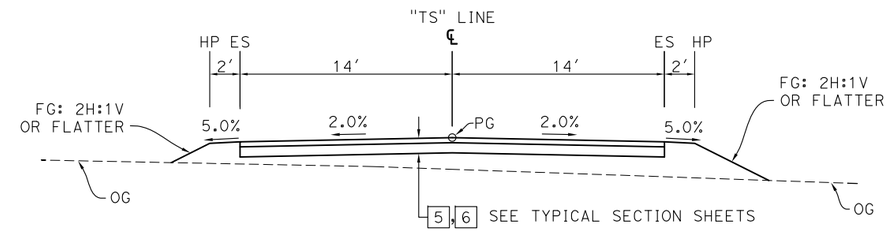
3. ALL STATIONING IS ALONG THE "TS" LINE UNLESS OTHERWISE SPECIFIED.

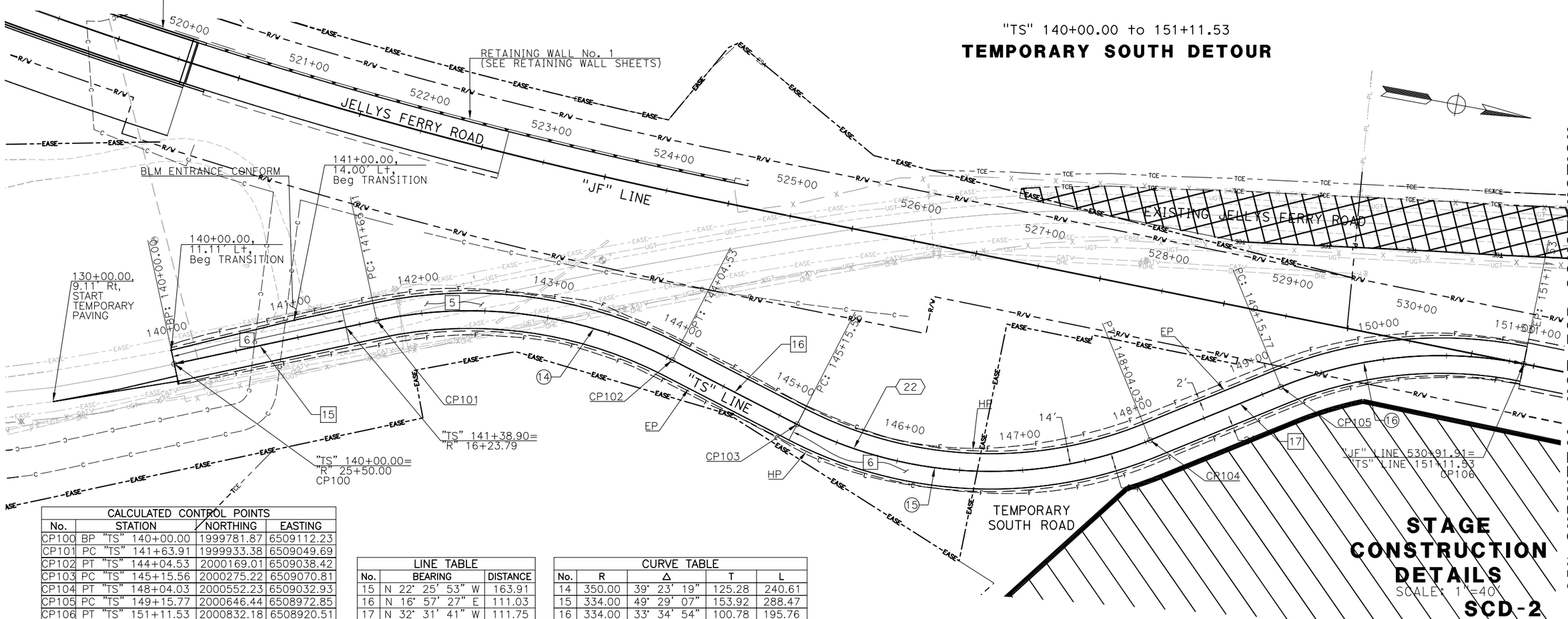
LEGEND

- DRAINAGE SYSTEM
- DRAINAGE COMPONENT
- LINE NUMBER, SEE LINE TABLE
- CURVE NUMBER, SEE CURVE TABLE
- STRUCTURAL SECTION, SEE SHEET X-1
- CALTRANS DETAIL NUMBER
- BEGIN / END DELINEATION
- SHEET / DETAIL — CONSTRUCTION DETAIL
- HINGE
- FILL
- CUT
- RIGHT OF WAY
- TEMPORARY CONSTRUCTION EASEMENT
- METAL BEAM GUARD RAIL
- (E) WIRE FENCE
- (E) WOOD FENCE
- (E) FLOWLINE
- (E) UNDERGROUND ELECTRIC
- (E) OVERHEAD ELECTRIC
- (E) UNDERGROUND TELEPHONE
- (E) OVERHEAD TELEPHONE
- (E) OVERHEAD CABLE
- (E) GUY WIRE
- (E) JOINT, POWER, OR TELEPHONE POLE



"TS" 140+00.00 to 151+11.53

TEMPORARY SOUTH DETOUR



CALCULATED CONTROL POINTS				
No.	STATION		NORTHING	EASTING
CP100	BP	"TS" 140+00.00	1999781.87	6509112.23
CP101	PC	"TS" 141+63.91	1999933.38	6509049.69
CP102	PT	"TS" 144+04.53	2000169.01	6509038.42
CP103	PC	"TS" 145+15.56	2000275.22	6509070.81
CP104	PT	"TS" 148+04.03	2000552.23	6509032.93
CP105	PC	"TS" 149+15.77	2000646.44	6508972.85
CP106	PT	"TS" 151+11.53	2000832.18	6508920.51

LINE TABLE		
No.	BEARING	DISTANCE
15	N 22° 25' 53" W	163.91
16	N 16° 57' 27" E	111.03
17	N 32° 31' 41" W	111.75

CURVE TABLE				
No.	R	Δ	T	L
14	350.00	39° 23' 19"	125.28	240.61
15	334.00	49° 29' 07"	153.92	288.47
16	334.00	33° 34' 54"	100.78	195.76

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

STAGE CONSTRUCTION DETAILS

SCALE: 1"=40'

SCD-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road |
Mar. 20, 2015 – 12:28:33 DWG Name: P:\70054 – Jellys Ferry Bridge\300_Engineering\510_Civil\11_CADD\SHEETS\054-SCD-2.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		64	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

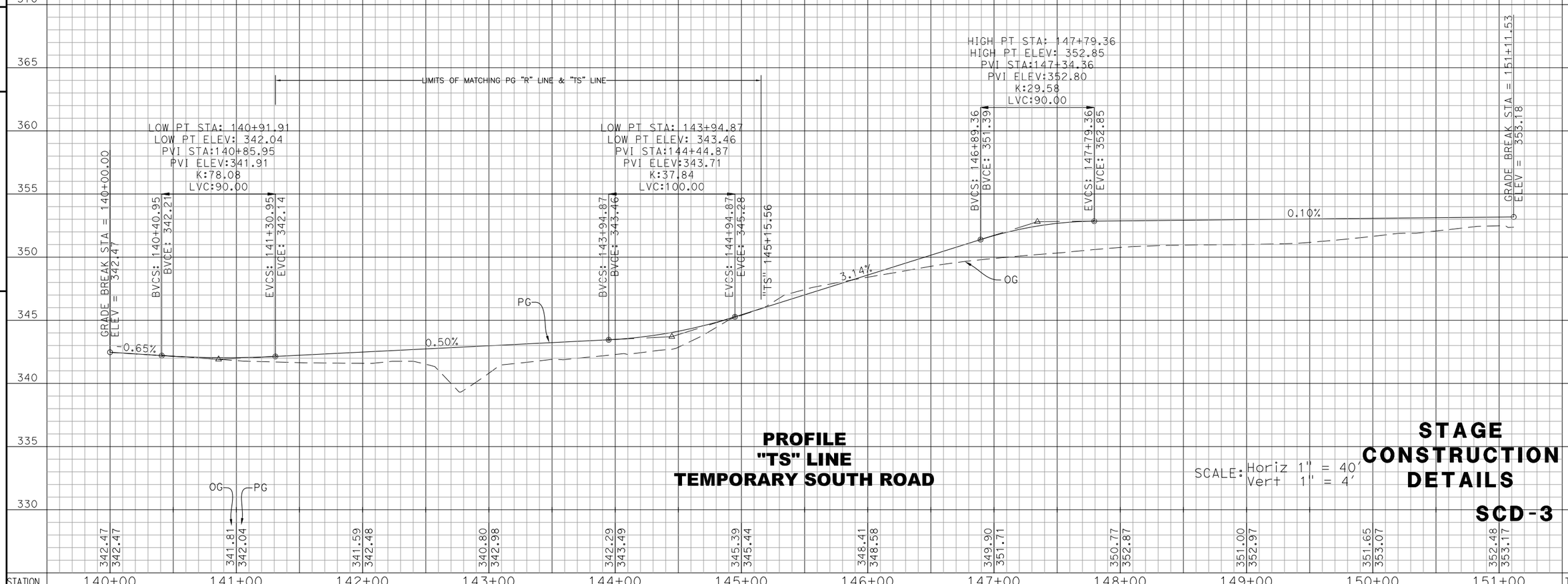
REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

T.Y. LIN INTERNATIONAL OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE TH-1 FOR NOTES AND LEGEND.



PROFILE
"TS" LINE
TEMPORARY SOUTH ROAD

SCALE: Horiz 1" = 40'
Vert 1" = 4'

STAGE CONSTRUCTION DETAILS

SCD-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES

CALCULATED-DESIGNED BY	CHECKED BY

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW |
Mar. 20, 2015 - 12:36:03 DWG Name: P:\Y10054 - Jellys Ferry Bridge\300_Engineering\310_Civil\511_CADD\SHEETS\054-SCD-3.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		65	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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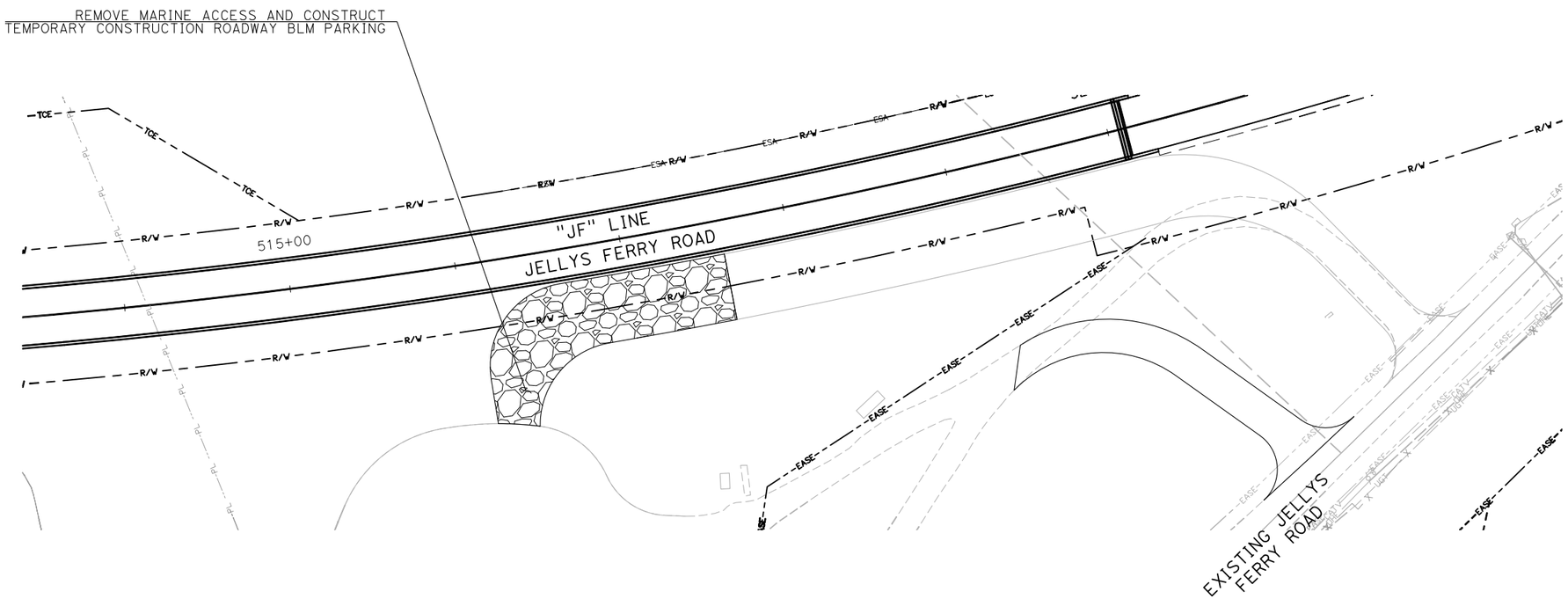
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET SC-1 FOR NOTES AND LEGEND



STAGE CONSTRUCTION DETAILS

SCALE: 1"=40'

SCD-4

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION WORK ONLY

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER
MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-UTIL | 054-X-LANDNET | 054-Proposed ROW | 054-CONSTRUCTION ACCESS |
Mar. 20, 2015 - 12:39:15 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\310_Civil\311_CADD\SHEETS\054-SCD-4.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		66	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET TH-1 FOR NOTES.

TEMPORARY MISCELLANEOUS QUANTITIES

SHEET No.	STATION	LOCATION	TEMPORARY MSE WALL	TEMPORARY CULVERT	TEMPORARY FENCE (TYPE CL-6)	TEMPORARY CONSTRUCTION ROADWAY	TEMPORARY PAVEMENT MARKING (PAINT)
			LS	LF	LF	SY	LF
SC-1	"JF" 515+14.89 TO 521+23.15	R+			700		
SC-2	"JF" 545+25.00 TO 555+50.00	C+r	X				
SC-5	"JF" 500+50.00 TO 506+50.00	C+r	X				
SCD-1	"JF" 503+72.15 TO 507+55.35	L+				1141	
	"JF" 519+10.11 TO 520+95.80	R+				508	
	"JF" 520+43.74 TO 521+77.76	R+				507	
	"JF" 521+11.11 TO 521+26.60	R+		101			
SCD-2	"TS" 140+00.00 TO 151+11.53	C+r					2222
SCD-4	"JF" 516+11.12 TO 517+60.02	R+				774	
		TOTAL	1	101	700	2930	2222

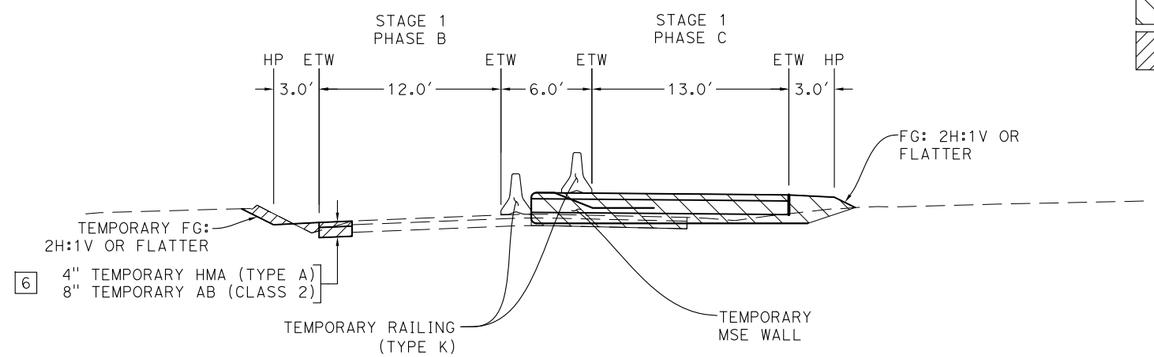
TEMPORARY ROADWAY QUANTITIES

SHEET No.	LOCATION	TEMPORARY HMA (TYPE A)	TEMPORARY AB (CLASS 2)
		TON	CY
SC-1	"JF" 545+85.26 TO 550+96.15	23.2	22.9
	"JF" 552+76.09 TO 554+35.17	2.3	2.3
	"JF" 555+81.05 TO 557+04.28	3.3	3.2
SC-2	"JF" 556+40.00 TO 557+12.61	3.9	3.9
SC-5	"JF" 498+94.85 TO 504+04.89	33.3	32.9
SC-6	"JF" 449+21.17 TO 500+00.00	5.4	5.4
SCD-2	"TS" 145+15.56 TO 151+11.53	417.2	412.0
	TOTAL	488.6	481.7

LEGEND

CONSTRUCT THIS PHASE

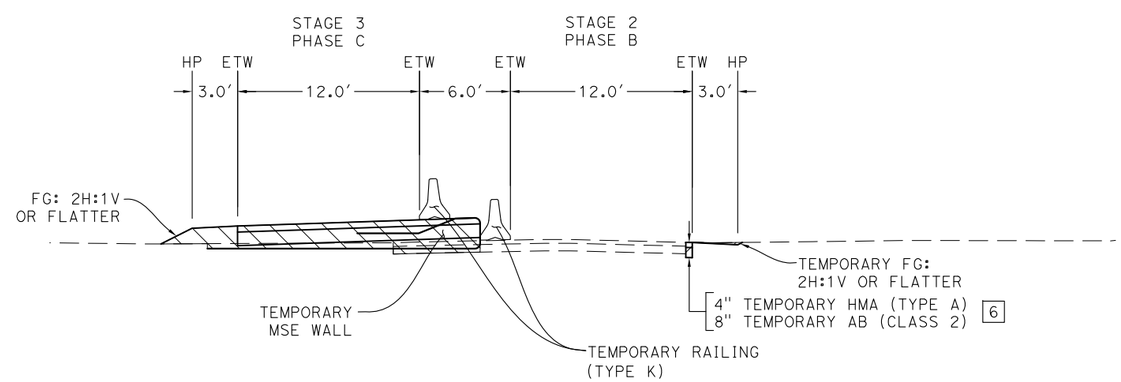
TEMPORARY CONSTRUCTION THIS PHASE



"JF" 545+50 to 556+00

JELLYS FERRY ROAD

TYPICAL CROSS SECTION - STAGE 1 - PHASE B



"JF" 501+50 to 506+00

JELLYS FERRY ROAD

TYPICAL CROSS SECTION - STAGE 2 - PHASE B

STAGE CONSTRUCTION DETAILS

NO SCALE

SCD-5

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR |
Mar. 20, 2015 - 12:43:28 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-SCD-5.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		67	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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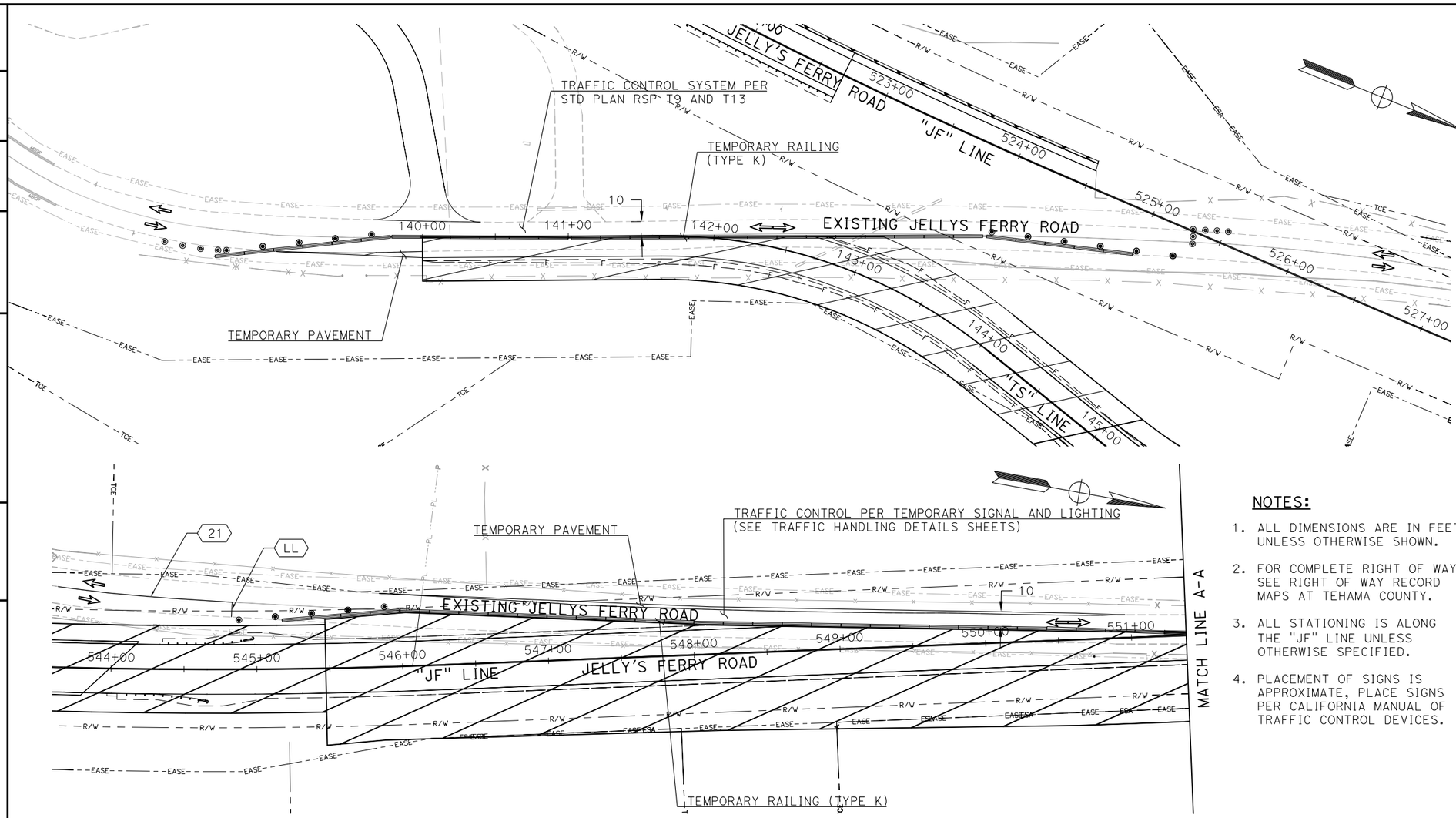
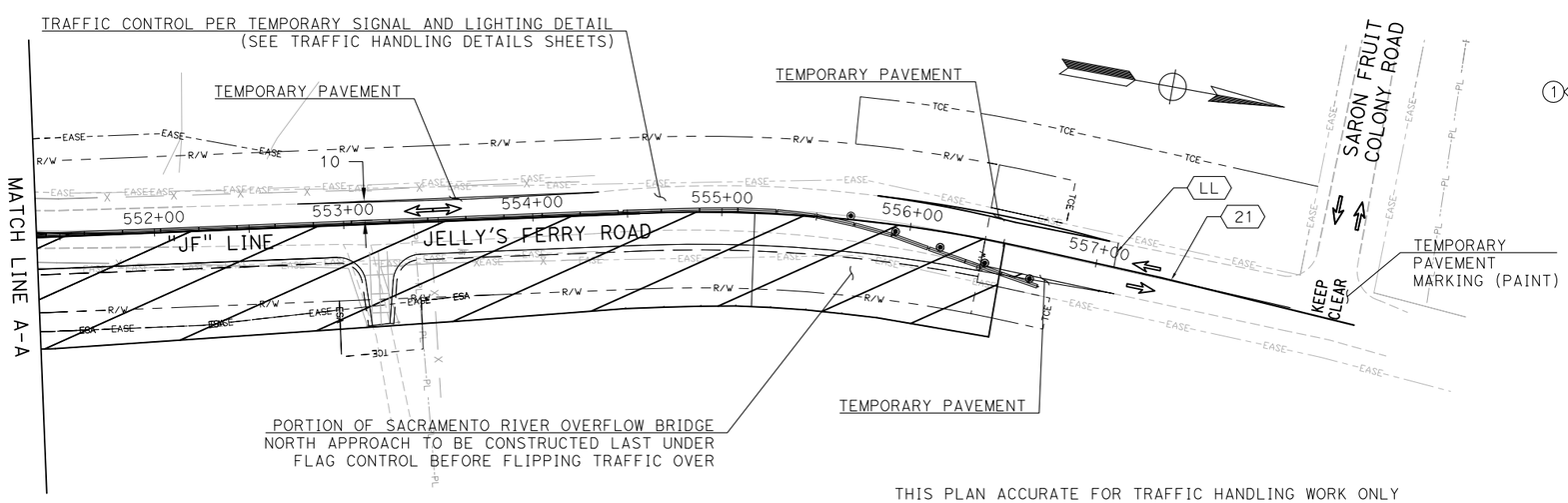
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815





THIS PLAN ACCURATE FOR TRAFFIC HANDLING WORK ONLY

LEGEND

- HINGE
- FILL
- CUT
- RIGHT OF WAY
- TEMPORARY CONSTRUCTION EASEMENT
- METAL BEAM GUARD RAIL
- (E) WIRE FENCE
- (E) WOOD FENCE
- (E) FLOWLINE
- TEMPORARY RAILING (TYPE K)
- TEMPORARY CRASH CUSHION ARRAY (TU11)
- TEMPORARY CRASH CUSHION (NARROW)
- ROADSIDE SIGN (N)
- CHANNELIZER (SURFACE MOUNTED)
- TYPE III BARRICADE
- LL — CALTRANS LIMIT LINE
- TEMPORARY PAVEMENT MARKER (PAINT)
- # — CALTRANS DETAIL NUMBER
- TEMPORARY TRAFFIC STRIPE (PAINT)
- # — STAGE OF CONSTRUCTION
- # — PHASE OF CONSTRUCTION
- ITEM OF CONSTRUCTION
- DIRECTION OF TRAFFIC FLOW
- CONSTRUCT THIS PHASE
- REMOVE THIS PHASE

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.
2. FOR COMPLETE RIGHT OF WAY, SEE RIGHT OF WAY RECORD MAPS AT TEHAMA COUNTY.
3. ALL STATIONING IS ALONG THE "JF" LINE UNLESS OTHERWISE SPECIFIED.
4. PLACEMENT OF SIGNS IS APPROXIMATE, PLACE SIGNS PER CALIFORNIA MANUAL OF TRAFFIC CONTROL DEVICES.

(1)(B) STAGE 1 - PHASE B

A. CONSTRUCT SACRAMENTO RIVER OVERFLOW BRIDGE WITH FALSEWORK OPENING FOR VEHICLE ACCESS AT MUDD NORTH ROAD.
B. CONSTRUCT SACRAMENTO RIVER OVERFLOW BRIDGE NORTH APPROACH. (1-LANE SIGNAL CONTROL).
C. CONSTRUCT SACRAMENTO RIVER OVERFLOW BRIDGE SOUTH APPROACH AND TEMPORARY ROADWAY (1-LANE FLAG CONTROL).
D. CONSTRUCT REMAINING PORTION OF MUDD DRIVEWAYS CONFORMING TO THE EXISTING JELLYS FERRY ROAD.

TRAFFIC HANDLING PLAN

SCALE 1"=40'

TH-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER
CHECKED BY: KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road |
Mar. 20, 2015 - 12:54:56 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-TH-1.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		68	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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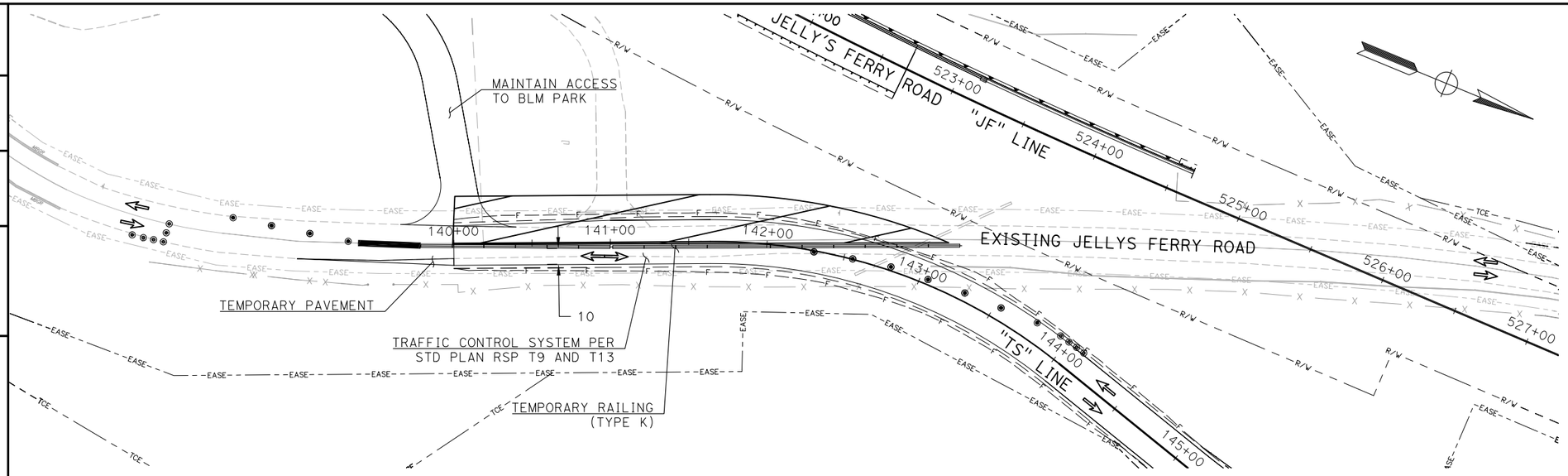
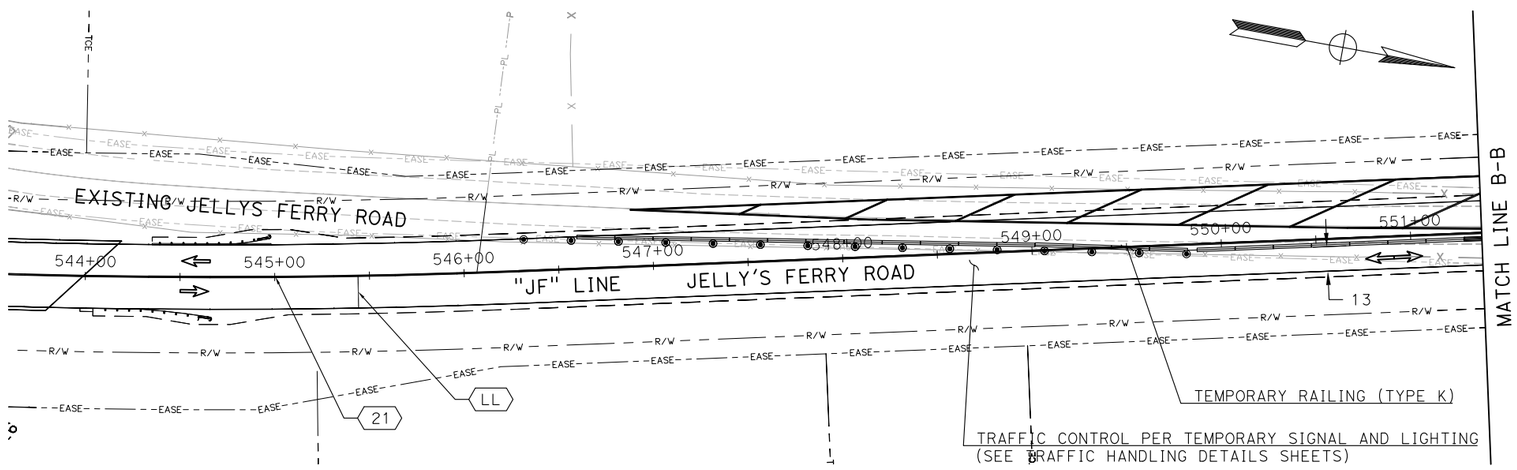
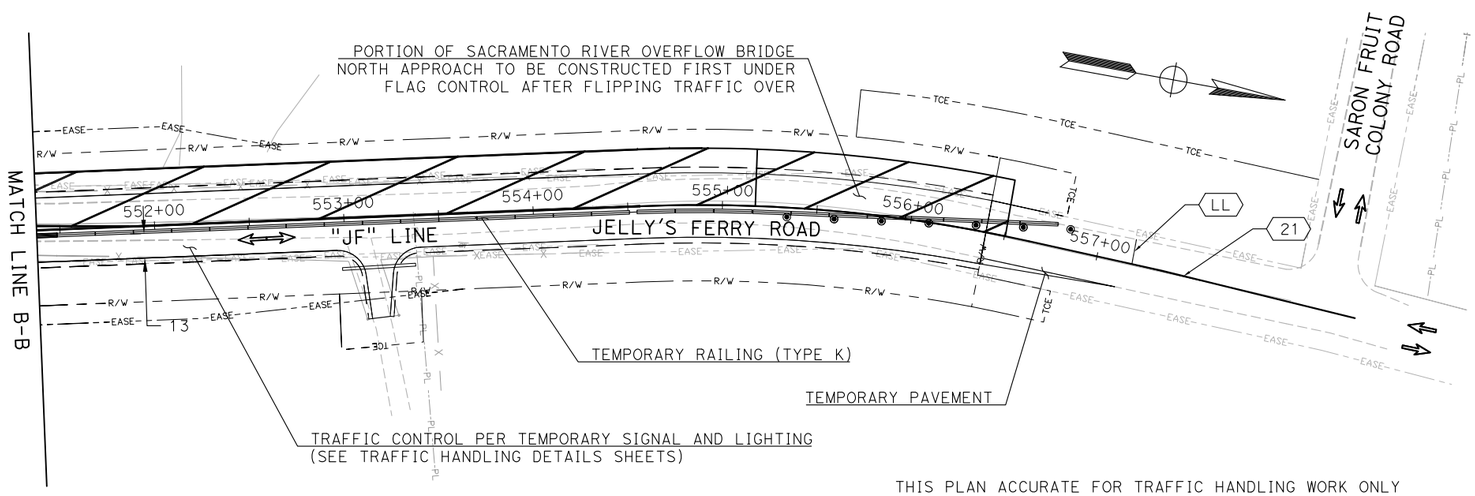
SACRAMENTO, CA 95815







NOTES:

1. SEE SHEET TH-1 FOR NOTES AND LEGEND

(1)(C) STAGE 1 - PHASE C

A. TRANSFER TRAFFIC TO THE NEW PORTIONS OF JELLYS FERRY ROAD AND THE TEMPORARY ROADWAY.
B. CONSTRUCT REMAINING PORTION OF TEMPORARY ROADWAY (1-LANE FLAG CONTROL).
C. CONSTRUCT REMAINING PORTION OF ROADWAY FROM 547+00 TO EP (1-LANE STOP CONTROL).
D. CONSTRUCT REMAINING PORTION OF MUDD DRIVEWAYS.

TRAFFIC HANDLING PLAN

SCALE 1"=40'

TH-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

THIS PLAN ACCURATE FOR TRAFFIC HANDLING WORK ONLY

REVISED BY	DATE REVISED

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER
CHECKED BY: KEITH RHODES
PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-Drainage |
Mar. 20, 2015 - 12:57:02 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-TH-2.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		69	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
K. BEWSEY
No. 71485
Exp. 12/31/15
CIVIL
STATE OF CALIFORNIA

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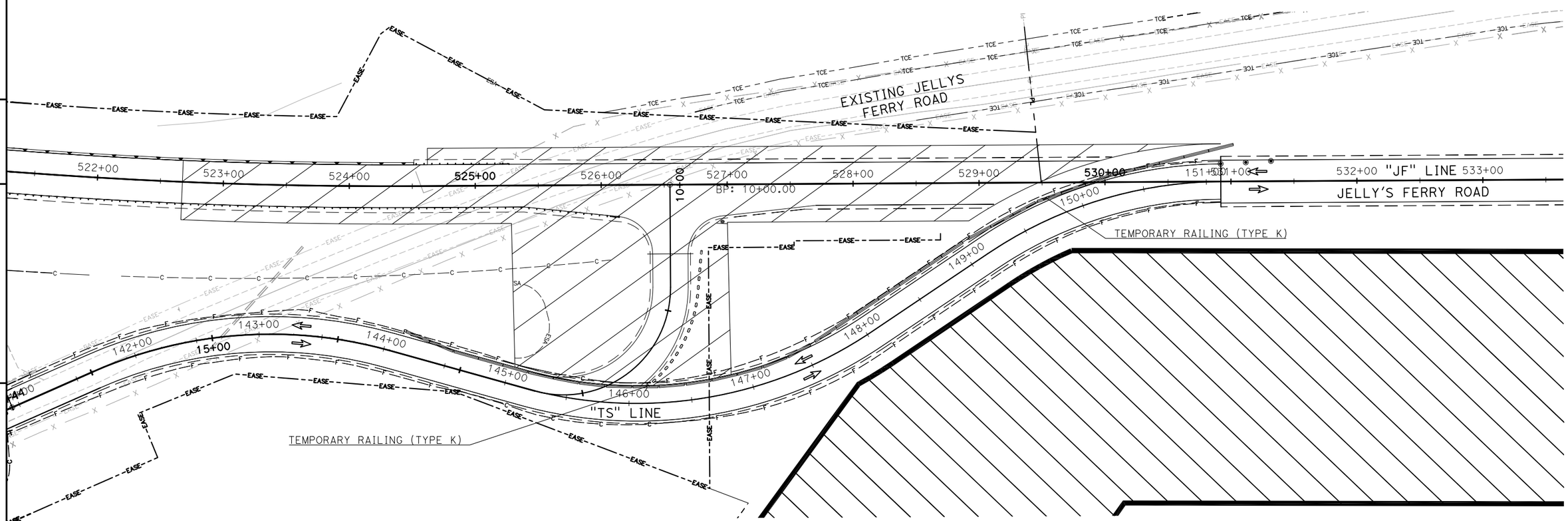
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

NOTES:

1. SEE SHEET TH-1 FOR NOTES AND LEGEND.

(2)(A) STAGE 2 - PHASE A

A. CONSTRUCT SACRAMENTO RIVER BRIDGE NORTH APPROACH AND BLM ACCESS ROAD.



TRAFFIC HANDLING PLAN

SCALE 1"=40'

TH-3

THIS PLAN ACCURATE FOR TRAFFIC HANDLING WORK ONLY

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3	
REVISED BY	K. BEWSEY/ D. ZURCHER
DATE REVISED	KEITH RHODES
CALCULATED-DESIGNED BY	MICHAEL WOLOHAN
CHECKED BY	
PROJECT ENGINEER	

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-Drainage |
Mar. 20, 2015 - 12:59:12 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-TH-3.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		70	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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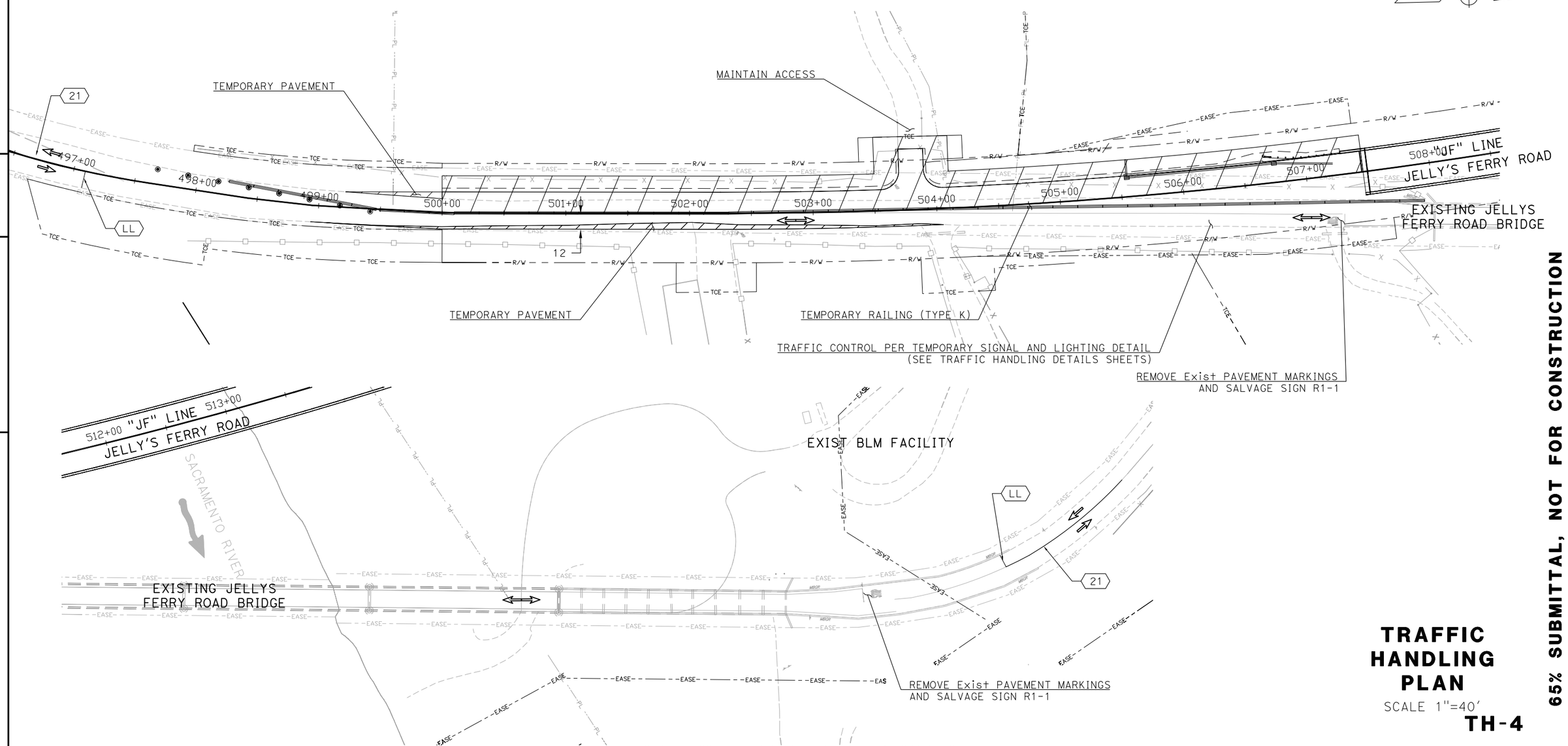
SACRAMENTO, CA 95815

(2)(B) STAGE 2 - PHASE B

A. CONSTRUCT TEMPORARY PAVEMENT SECTION.
B. CONSTRUCT SACRAMENTO RIVER BRIDGE SOUTH PORTION OF ROADWAY CONFORM (1-LANE SIGNAL CONTROL).
C. CONSTRUCT SOUTHBOUND LANE ACROSS THE TEMPORARY ROADWAY (1-LANE STOP CONTROL, SEE SHEET TH-5).

NOTES:

1. SEE SHEET TH-1 FOR NOTES AND LEGEND.



THIS PLAN ACCURATE FOR TRAFFIC HANDLING WORK ONLY

TRAFFIC HANDLING PLAN

SCALE 1"=40'

TH-4

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER
CHECKED BY: KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-Drainage |
Mar. 20, 2015 - 13:01:06 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-TH-4.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		71	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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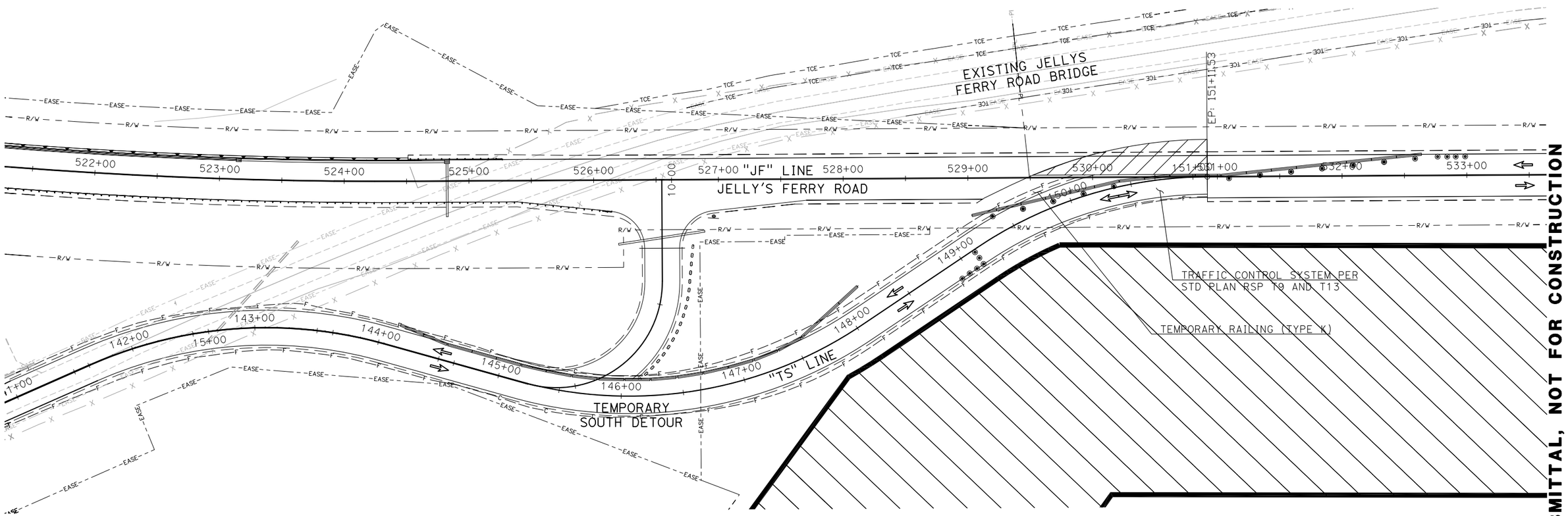
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

(2)(B) STAGE 2 - PHASE B

A. CONSTRUCT TEMPORARY PAVEMENT SECTION.
B. CONSTRUCT SACRAMENTO RIVER BRIDGE SOUTH PORTION OF ROADWAY CONFORM (1-LANE SIGNAL CONTROL, SEE SHEET TH-4).
C. CONSTRUCT SOUTHBOUND LANE ACROSS THE TEMPORARY ROADWAY (1-LANE STOP CONTROL).

NOTES:

1. SEE SHEET TH-1 FOR NOTES AND LEGEND.



TRAFFIC HANDLING PLAN

SCALE 1"=40'

TH-5

THIS PLAN ACCURATE FOR TRAFFIC HANDLING WORK ONLY

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY
PROJECT ENGINEER	MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-Drainage |
Mar. 20, 2015 - 13:03:07 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-TH-5.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		72	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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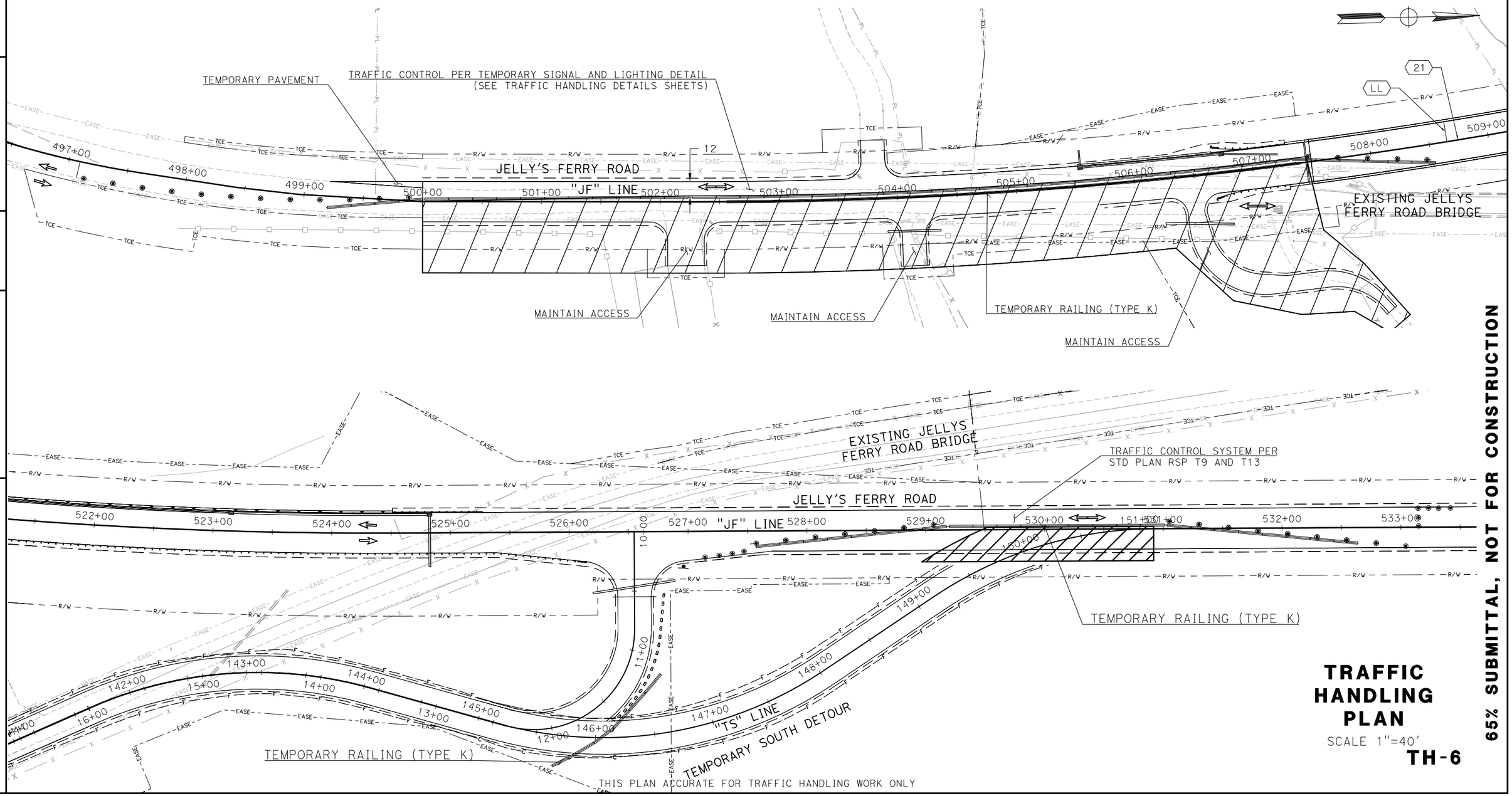
SACRAMENTO, CA 95815

(3)(A) STAGE 3 - PHASE A

A. CONSTRUCT TEMPORARY PAVING.
B. CONSTRUCT NORTHBOUND LANE ACROSS THE TEMPORARY ROADWAY (1-LANE FLAG CONTROL).
C. CONSTRUCT NORTHBOUND LANE SOUTH OF THE SACRAMENTO RIVER BRIDGE (1-LANE SIGNAL CONTROL).

NOTES:

1. SEE SHEET TH-1 FOR NOTES AND LEGEND.



TRAFFIC HANDLING PLAN

SCALE 1"=40'

TH-6

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3	
REVISED BY	DATE REVISED
CALCULATED-DESIGNED BY K. BEWSEY/ D. ZURCHER	CHECKED BY KEITH RHODES
PROJECT ENGINEER MICHAEL WOLOHAN	
TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS	
JELLYS FERRY IMPROVEMENT PROJECT	

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-Drainage |
Mar. 20, 2015 - 13:04:37 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-TH-6.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		73	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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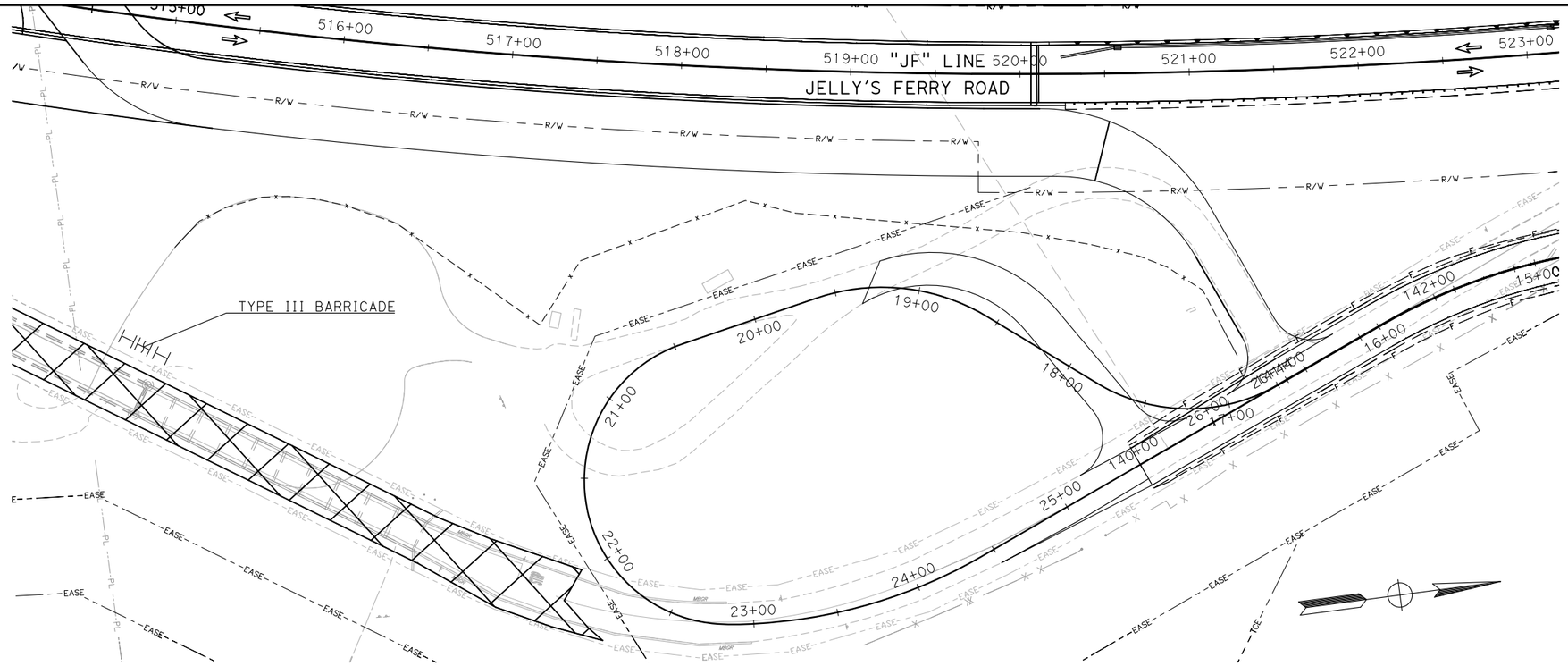
SACRAMENTO, CA 95815

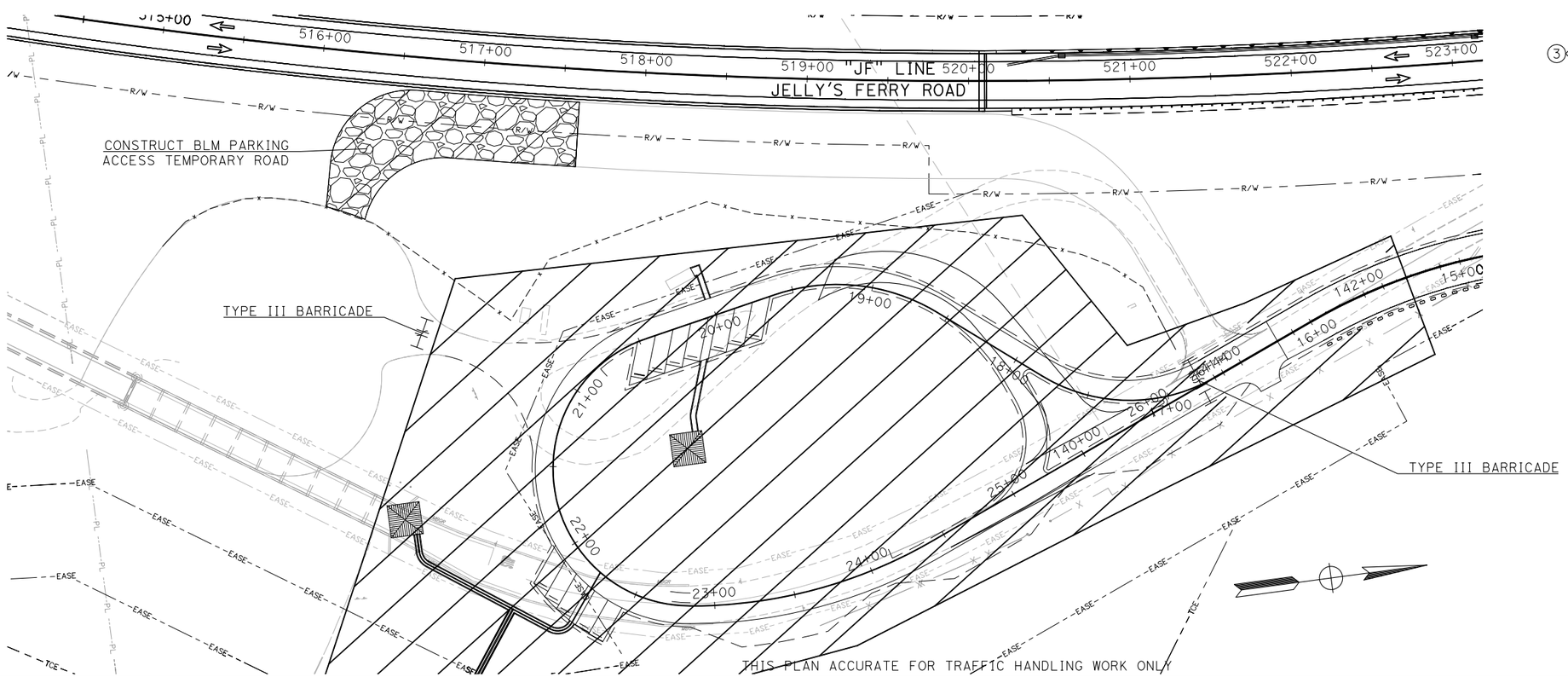


③ Ⓑ STAGE 3 - PHASE B

A. REMOVE EXISTING BRIDGE AND MARINE ACCESS (PROHIBIT ACCESS TO BOAT LAUNCH).

NOTES:

1. SEE SHEET TH-1 FOR NOTES AND LEGEND.



③ Ⓒ STAGE 3 - PHASE C

A. CONSTRUCT BLM PARKING ACCESS TEMPORARY ROAD.
B. CONSTRUCT BLM CIRCULATION ROAD AND BLM IMPROVEMENTS.
C. REMOVE TEMPORARY CONSTRUCTION ROADWAY, TEMPORARY ACCESS ROAD, REMAINING OLD JELLYS FERRY ROAD, CONSTRUCT ALL REMAINING DRAINAGE AND RESTORE SITES.

THIS PLAN ACCURATE FOR TRAFFIC HANDLING WORK ONLY

TRAFFIC HANDLING PLAN

SCALE 1"=40'

TH-7

65% SUBMITTAL, NOT FOR CONSTRUCTION

REVISED BY	K. BEWSEY/ D. ZURCHER
DATE REVISED	KEITH RHODES
CALCULATED-DESIGNED BY	MICHAEL WOLOHAN
CHECKED BY	
PROJECT ENGINEER	

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR | 054-C-RD | 054-X-TP | 054-X-LANDNET | 054-Proposed ROW | 054-TEMP Road | 054-Drainage | 054-CONSTRUCTION ACCESS |
Mar. 20, 2015 - 13:06:47 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-TH-7.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		74	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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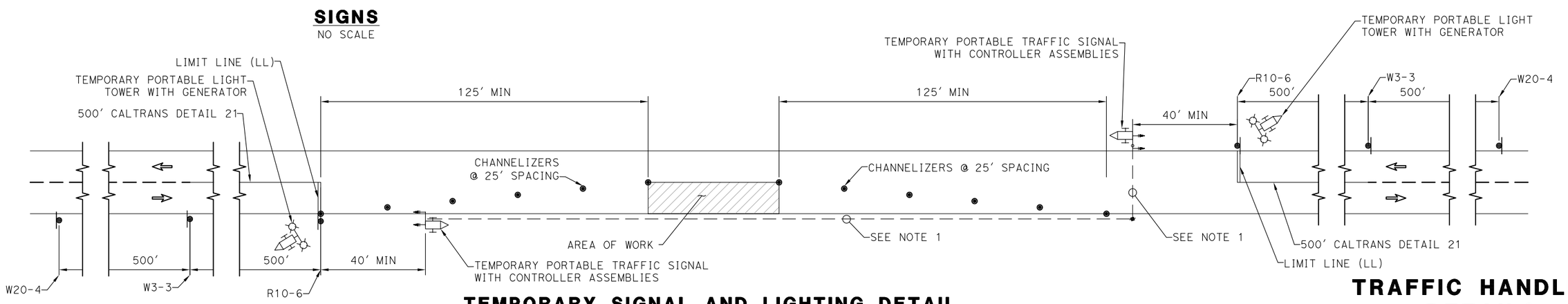
SACRAMENTO, CA 95815

TRAFFIC CONTROL QUANTITIES

SHEET	TEMPORARY RAILING (TYPE K)	CHANNELIZERS (SURFACE MOUNTED)	TEMPORARY CRASH CUSHION (ARRAY)	TEMPORARY CRASH CUSHION (NARROW)	BARRICADE (TYPE III)	TEMPORARY PAVEMENT MARKING AND TEMPORARY TRAFFIC STRIPE (PAINT) (SF)		SIGNS							
								FLAG CONTROL				STOP CONTROL			
						21	LL	W20-1	W20-4	C9a (CA)	W3-4	W20-4	W3-3	R10-6	W1-4
	LF	EA	EA	EA	EA	LF	SF	EA	EA	EA	EA	EA	EA	EA	EA
TH-1	1780	32				1000	23	2	2	2	2	2	2	2	2
TH-2	1340	43		1		500	17	2	2	2	2	2	2	2	2
TH-3	700	3													
TH-4	960	8				1000	25					2	2	2	2
TH-5	760	22						2	2	2	2				
TH-6	1560	43				500	17	2	2	2	2	2	2	2	2
TH-7					6										
TOTAL	7100	151	0	1	6	3000	82	8	8	8	8	8	8	8	8

SIGNS
NO SCALE



TEMPORARY SIGNAL AND LIGHTING DETAIL
NO SCALE

NOTES:

1. SIGNAL INTERCONNECT AS PER MANUFACTURER SPECIFICATIONS.
2. TEMPORARY SIGNS TO MOUNTED ON WOOD POLES WITH FLASHING BEACON AND PHOTOVOLTIAC PANELS.

THIS PLAN ACCURATE FOR TRAFFIC HANDLING WORK ONLY

TRAFFIC HANDLING DETAILS
NO SCALE

THD-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
K. BEWSEY/ D. ZURCHER	KEITH RHODES

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef list: | 054-BRIDR |
Mar. 20, 2015 - 13:10:56 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-THD-1.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		75	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

PLACE HMA DIKE & HMA (Misc AREAS)

SHEET No.	STATION	LOCATION	HMA DIKE TYPE C	HMA DIKE TYPE E	HMA DIKE TYPE F	HMA* (TYPE A)	HMA* OVERSIDE DRAIN (Misc AREA)
			LF	LF	LF	TON	SY
L-1/2	"JF" 505+53.03 TO "JF" 506+67.01	L+		114.0		7.6	3.4
L-2	"JF" 506+67.01 TO "JF" 507+03.94	L+	36.9			1.0	
L-2	"JF" 507+03.94 TO "JF" 507+29.17	L+			25.2	0.8	
L-3	"JF" 524+51.30 TO "JF" 525+26.32	L+			75.0	2.5	8.9
L-4	"JF" 535+50.00 TO "JF" 536+13.19	R+		63.2		4.2	7.6
L-4	"JF" 536+48.53 TO "JF" 536+88.76	L+	40.2			1.1	3.7
L-4	"JF" 536+88.76 TO "JF" 537+11.15	L+			22.4	0.7	
L-5	"JF" 544+35.15 TO "JF" 544+68.88	L+			33.7	1.1	
L-5	"JF" 544+68.88 TO "JF" 544+96.72	L+	27.8			0.8	8.6
	TOTAL		104.9	177.2	156.3	19.9	32.2

*QUANTITY INCLUDED IN PAVEMENT STRUCTURE QUANTITIES SUMMARY.

PAVEMENT STRUCTURE QUANTITIES

LOCATION	HMA (TYPE A)	AB (CLASS 2)	COLD PLANE AC
	TON	CY	SY
"JF" 500+00.00 TO 556+40.00	3,253	3,901	55
"D" 40+00.00 TO 42+41.67	61	66	
"R" 10+00.00 TO 12+38.30	143	155	
"R" 12+38.30 TO 16+68.78	296	292	
"R" 16+68.78 TO 26+43.91	54	865	
"MS" 20+00.00 TO 26+43.91	14	360	
"MN" 30+00.00 TO 38+74.73		612	
HMA DIKE	20		
HMA (Misc AREAS)	-		
RECREATIONAL PATH		85	
TOTAL	3,841	6,336	55

EARTHWORK QUANTITIES

LOCATION	ROADWAY EXCAVATION	CHANNEL EXCAVATION	DITCH EXCAVATION	EMBANKMENT (N)	IMPORT BORROW
	CY	CY	CY	CY	CY
"JF" 500+00.00 TO 507+46.00	851			2,616	-1,765
"JF" 520+10.00 TO 537+16.50	1,566			20,128	-18,562
"JF" 543+99.00 TO 556+40.00	1,456			4,637	-3,181
"R" 10+00.00 TO 26+43.91	5,346			571	4,775
"MS" 20+00.00 TO 24+55.51	387			292	95
"MN" 30+00.00 TO 30+74.73	1,025			4	1,021
INDEPENDENT VEGETATIVE SWALES			2,417	27	2,390
LOCAL BORROW BASIN		13,187		1,045	12,142
TOTAL	10,631	13,187	2,417	29,320	-3,085

(N) - NOT A SEPARATE PAY ITEM, FOR INFORMATION ONLY

RAILING QUANTITIES

SHEET No.	STATION	LOCATION	MGS	ALTERNATIVE IN-LINE TERMINAL SYSTEM	TRANSITION RAILING (TYPE WB-31)	ALTERNATIVE FLARED TERMINAL SYSTEM	WEED CONTROL MAT (FIBER)
			LF	EA	EA	EA	SF
L-2	"JF" 506+67.01 TO 507+29.17	L+ & R+			2	2	66.7
L-3	"JF" 520+26.67 TO 526+13.66	R+	515	1	1	-	99.8
L-X	"JF" 524+51.30 TO 525+26.32	L+		1	1	-	33.3
L-4	"JF" 536+28.47 TO 536+89.76	R+			1	1	33.3
L-X	"JF" 536+48.53 TO 537+11.15	L+			1	1	33.3
L-5	"JF" 544+04.30 TO 544+66.65	R+			1	1	33.3
L-X	"JF" 544+35.15 TO 544+96.72	L+			1	1	33.3
	TOTAL		515	2	8	6	495.6

PAVEMENT DELINEATION QUANTITIES

SHEET No.	STATIONING	LOCATION	DETAIL	THERMOPLASTIC TRAFFIC STRIPE 4" SOLID WHITE	THERMOPLASTIC TRAFFIC STRIPE 4" SOLID (YELLOW)	THERMOPLASTIC TRAFFIC STRIPE 4" BROKEN (12'-3')	THERMOPLASTIC PAVEMENT MARKING	PAVEMENT MARKER (TYPE D)	CULVERT MARKER	OBJECT MARKER (TYPE P)	DESCRIPTION/COMMENTS
				LF	LF	LF	SQFT	EA	EA	EA	
L-1/2/3/4/5/6	"JF" 500+00 TO 556+40	L+	27B	5,633				-		4	
L-1/2/3	"JF" 500+00 TO 526+14	Ctr	22		4,842			97			
L-1/2/3	"JF" 500+00 TO 524+14	R+	27B	2,421				-			
L-3	"JF" 524+14 TO 526+14	R+	27C			200	35	-	1	2	
L-3/4/5/6	"JF" 526+95 TO 556+40	Ctr	22		5,890			118			
L-3/4/5/6	"JF" 526+95 TO 556+40	R+	27B	2,945							
	RECREATION QUANTITIES			304				-		2	
			TOTAL	11,303	10,732	200	35	215	1	8	

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.

SUMMARY OF QUANTITIES

NO SCALE

Q-1

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: K. BEWSEY/ D. ZURCHER
CHECKED BY: KEITH RHODES
PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS
JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR |
Mar. 20, 2015 - 13:37:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-Q.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		76	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

ROADSIDE SIGN QUANTITIES

SHEET No.	SIGN CODE	PANEL SIZE (IN X IN)	ROADSIDE SIGN ONE POST	REMOVE/ SALVAGE ROADSIDE SIGN	RELOCATE ROADSIDE SIGN	REMARKS
			EA	EA	EA	
L-1	W1-2(L+)(35)	30 X 30	1			
	W1-2(R+)(35)	30 X 30	1			
	W1-2a(L+)(35)	36 X 36	1			
	W1-2a(R+)(35)	36 X 36	1			
	W13-1P	18 X 18	2			
	W1-8	18 X 24	6			
	M4-6	24 X 12	1			
	M4-14	24 X 12	1			
	D11-1	24 X 18	2			
				1		"ONE LANE BRIDGE"
L-2	D11-1	24 X 18	2			
	R1-1	30 X 30	1			
				1		"STOP"
				1		"WEIGHT LIMIT..."
				1		"BRIDGE SPEED LIMIT 15 MPH"
L-3				1		"STOP"
				1		"WEIGHT LIMIT..."
L-6	W1-2(L+)(35)	30 X 30	1	1		"BRIDGE SPEED LIMIT 15 MPH"
	W1-2(R+)(35)	30 X 30	1			
	W1-2a(L+)(35)	36 X 36	1			
	W1-2a(R+)(35)	36 X 36	1			
	W13-1P	18 X 18	2			
	W1-8	18 X 24	4			
	M4-6	24 X 12	1			
	M4-14	24 X 12	1			
	D11-1	24 X 18	2			
					1	ADVISORY SYMBOL "T-INTERSECTION"
	TOTAL	135.6 SF	33	7	1	

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.

RECREATION QUANTITIES

SHEET No.	STATION	LOCATION	4" THERMOPLASTIC TRAFFIC STRIPE (WHITE)*	PARKING STOP (N)	OUTDOOR RECREATIONAL ACCESS ROUTE (N)	MINOR CONCRETE (PARKING STOP)	STABILIZED DECOMPOSED GRANITE	AB (CLASS 2)*	MINOR CONCRETE (CURB)	SHADE STRUCTURE (20 SF)	PICNIC TABLE UNIT (ACCESSIBLE)	GRILL UNIT (ACCESSIBLE)	ROCK BARRIER	WOOD GUARD POSTS (TYPE 2)	STEEL PIPE GATE**	STEEL PIPE GATE LOCKBOX AND LOCKING PINS
			LF	EA	LF	CY	CY	CY	CY	EA	EA	EA	LF	LF	LF	LF
C-3	"JF" 515+91.69 TO "JF" 516+57.18	L+												68		
	"R" 10+54.83	L+ & R+													2	1
	"R" 10+53.66 TO "R" 16+00.00	R+											546			
	"R" 20+43.14	L+								1	1	1				
	"R" 21+66.34	R+								1	1	1				
C-5	"R" 19+64.46 TO "R" 20+71.64	L+	318	6		2.1										
	"R" 21+95.22 TO "R" 22+46.06	R+	238	5		1.8										
C-6	"P1" 50+00.00 TO "P1" 50+21.29	L+ & R+			21.3		1.2	5.9	0.7							
	"P1" 50+60.01 TO "P1" 51+05.03	L+ & R+			45.0		2.5	12.5	1.5							
	"P2" 60+35.48 TO "P2" 61+57.47	L+ & R+			122.0		6.8	33.9	4.0							
	"P3" 70+01.50 TO "P3" 71+17.58	L+ & R+			116.1		6.4	32.3	3.8							
	TOTAL		556	11	304.4	3.9	16.9	84.6	10.0	2	2	2	546	68	2	1

(N) - NOT A SEPARATE PAY ITEM, FOR INFORMATION ONLY
*QUANTITY INCLUDED IN PAVEMENT STRUCTURE QUANTITIES SUMMARY.
**QUANTITY INCLUDED IN FENCE & GATE QUANTITIES SUMMARY.

SUMMARY OF QUANTITIES

NO SCALE

Q-2

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED
K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY

PROJECT ENGINEER: MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRGR |
Mar. 20, 2015 - 13:37:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-Q.dwg Updated By: DZurcher

Dist.	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No.	TOTAL SHEETS
2	TEH	JF		77	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER K. BEWSEY No. 71485 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

FENCE & GATE QUANTITIES

SHEET No.	STATION	LOCATION	REMOVE FENCE (TYPE BW, 3-4 WIRE)	REMOVE FENCE (TYPE BW, 5-7 WIRE)	REMOVE WOOD FENCE	FENCE (TYPE BW, 3-STRAND, METAL POST)	FENCE (TYPE BW, 4-STRAND, METAL POST)	FENCE (TYPE BW, 5-STRAND, METAL POST)	FENCE (TYPE BW, 7-STRAND, METAL POST)	FENCE (TYPE BW, 5-STRAND, WOOD POST)	FENCE (TYPE WOOD, 3-RAIL, WOOD POST)	FENCE (TYPE WOOD, 4-RAIL, WOOD POST)	RESET GATE	REMOVE GATE	14' GATE	16' GATE	STEEL PIPE GATE	TEMPORARY FENCE (TYPE CL-6)
			LF	LF	LF	LF		LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	LF
L-1	"JF" 497+96.91 TO 502+14.86	L+		339					339									339
	"JF" 497+98.79 TO 501+53.95	R+			371							371						371
	"JF" 502+40.87 TO 503+96.75	R+			218							218						218
	"JF" 502+14.86 TO 503+70.77	L+			101						101							101
	"JF" 503+90.95 TO 504+25.41	L+			66						66							66
L-1/2	"JF" 504+25.06 TO 507+13.27	R+			332							332						332
	"JF" 504+25.41 TO 507+81.04	L+		358					358									358
L-2	"JF" 506+50.67 TO 507+80.24	R+												2	1	1		
	"JF" 507+32.99 TO 507+81.04	L+			65													65
	"JF" 507+75.31 TO 507+86.10	R+			32							32						32
L-3	"R" 23+60.46 TO 24+95.02	R+		141				141										141
	"R" 25+03.20 TO 16+45.46	R+												1			1	
	"R" 25+11.39 TO 15+10.09	R+		291				291										291
L-3/4	"R" 15+10.09 TO "JF" 538+73.85	R+		1624				1624										1624
L-3/4	"JF" 524+52.76 TO 539+57.85	L+		1713				1713										1713
L-4	"JF" 535+37.05	L+													1			
	"JF" 539+64.16	L+											1					
L-4/5	"JF" 538+73.85 TO 545+92.77	L+	156			156												156
	"JF" 539+68.89 TO 546+16.53	L+	725				725											725
L-5	"JF" 542+55.77 TO 543+33.87	L+ & R+	289				289											289
L-5/6	"JF" 545+92.77 TO 553+10.47	L+ & R+		742				742										742
	"JF" 546+16.53 TO 546+40.00	L+		1030						1030								1030
L-6	"JF" 553+27.00 TO 546+40.00	R+		348				348										348
	RECREATION QUANTITIES																2	
	TOTAL		1170	6586	1185	156	1014	4859	697	1030	162	953	1	3	2	1	3	8941

NOTES:

1. TEMPORARY FENCE (TYPE CL-6) TO BE PLACED IN ALL FENCE REMOVAL LOCATIONS.

SUMMARY OF QUANTITIES

NO SCALE

Q-3

65% SUBMITTAL, NOT FOR CONSTRUCTION

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

REVISED BY	DATE REVISED

K. BEWSEY/ D. ZURCHER	KEITH RHODES
CALCULATED-DESIGNED BY	CHECKED BY

PROJECT ENGINEER MICHAEL WOLOHAN

TEHAMA COUNTY DEPARTMENT OF PUBLIC WORKS

JELLYS FERRY IMPROVEMENT PROJECT

XRef List: | 054-BRDR |
Mar. 20, 2015 - 13:37:39 DWG Name: P:\710054 - Jellys Ferry Bridge\500_Engineering\510_Civil\511_CADD\SHEETS\054-Q.dwg Updated By: DZurcher

TEHAMA COUNTY

65% CONSTRUCTION COST ESTIMATE

JELLYS FERRY

LAST UPDATED: 3/20/2015

ITEM NO.	(P)(F)	ITEM CODE	ITEM DESCRIPTION	UNIT OF MEASURE	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
			ROADWAY ITEMS				
1		066105	TEMPORARY RESIDENT ENGINEERS OFFICE	LS	1	$80,000.00	$ 80,000.00
2		066999	CONSTRUCTION STAKING	LS	1	$150,000.00	$ 150,000.00
3		070030	LEAD COMPLIANCE PLAN	LS	1	$2,700.00	$ 2,700.00
4		080050	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	1	$10,000.00	$ 10,000.00
5		120090	CONSTRUCTION AREA SIGNS	LS	1	$10,000.00	$ 10,000.00
6		120100	TRAFFIC CONTROL SYSTEM	LS	1	$75,000.00	$ 75,000.00
7		120120	TYPE III BARRICADE	EA	8	$150.00	$ 1,200.00
8		120149	TEMPORARY PAVEMENT MARKING (PAINT)	SQFT	82	$7.00	$ 574.00
9		120159	TEMPORARY TRAFFIC STRIPE (PAINT)	LF	4111	$1.00	$ 4,111.00
10		120165	CHANNELIZER (SURFACE MOUNTED)	EA	147	$50.00	$ 7,350.00
11		120300A	TEMPORARY ALTERNATIVE CRASH CUSHION (NARROW)	EA	1	$3,200.00	$ 3,200.00
12		128605	TEMPORARY SIGNAL AND LIGHTING SYSTEM	LS	2	$70,000.00	$ 140,000.00
13		129000	TEMPORARY RAILING (TYPE K)	LF	6760	$18.00	$ 121,680.00
14		130100	CONSTRUCTION SITE MANAGEMENT	LS	1	$5,000.00	$ 5,000.00
15		130300	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	1	$11,900.00	$ 11,900.00
16		130310	RAIN EVENT ACTION PLAN	EA	65	$500.00	$ 32,500.00
17		130320	STORM WATER SAMPLING AND ANALYSIS DAY	EA	23	$1,100.00	$ 25,300.00
18		130330	STORM WATER ANNUAL REPORT	EA	2	$2,000.00	$ 4,000.00
19		130500	TEMPORARY EROSION CONTROL BLANKET	SQYD	4931	$3.50	$ 17,258.11
20		130520	TEMPORARY HYDRAULIC MULCH	SQYD	124982	$0.45	$ 56,241.75
21		130550	TEMPORARY HYDROSEED	SQYD	124982	$0.50	$ 62,490.83
22		130620	TEMPORARY DRAINAGE INLET PROTECTION	EA	22	$300.00	$ 6,600.00
23		130640	TEMPORARY FIBER ROLL	LF	55735	$3.50	$ 195,072.50
24		130650	TEMPORARY GRAVEL BAG BERM	LF	1195	$12.00	$ 14,340.00
25		130710	TEMPORARY CONSTRUCTION ENTRANCE	EA	3	$3,400.00	$ 10,200.00
26		130720	TEMPORARY CONSTRUCTION ROADWAY	SQYD	2930	$25.00	$ 73,250.00
27		130730	STREET SWEEPING	LS	1	$14,000.00	$ 14,000.00
28		130800	TEMPORARY ACTIVE TREATMENT SYSTEM	LS	1	$106,000.00	$ 106,000.00
29		130900	TEMPORARY CONCRETE WASHOUT	LS	1	$2,500.00	$ 2,500.00
30		141000	TEMPORARY FENCE (TYPE ESA)	LF	8033	$2.70	$ 21,689.10
31		141101	REMOVE YELLOW PAINTED TRAFFIC STRIPE (HAZARDOUS WASTE)	LF	9746	$1.80	$ 17,542.80
32		141120	TREATED WOOD WASTE	LB	24962	$0.20	$ 4,992.40
33		146000C	ANTI-SPAWNING MATS	LS	1	$71,600.00	$ 71,600.00
34		146002	CONTRACTOR-SUPPLIED BIOLOGIST (LS)	LS	1	$80,000.00	$ 80,000.00
35		146003	NATURAL RESOURCE PROTECTION PLAN	LS	1	$7,000.00	$ 7,000.00
36		146004	FISH PROTECTION	LS	1	$32,000.00	$ 32,000.00
37		146006	TEMPORARY WETLAND PROTECTION MAT (LS)	LS	1	$23,500.00	$ 23,500.00
38		150200A	REMOVE FENCE (TYPE BW, 3-4 WIRE)	LF	1170	$2.00	$ 2,340.00
39		150200B	REMOVE FENCE (TYPE BW, 5-7 WIRE)	LF	6586	$2.50	$ 16,465.00
40		150200C	REMOVE WOOD PLANTER CURB	LF	35	$3.50	$ 122.50
41		150200D	RESET ROCK ADDRESS AND MAILBOX	EA	1	$940.00	$ 940.00
42		150200E	RESET SIGN STRUCTURE (YANA TRAIL HEAD)	EA	1	$250.00	$ 250.00
43		150200F	RESET SIGN STRUCTURE (KIOSK\BULLETIN BOARD)	EA	1	$250.00	$ 250.00
44		150200G	RECONSTUCT SIGN STRUCTURE (JELLYS FERRY)	EA	1	$2,500.00	$ 2,500.00
45		150604	REMOVE WOOD FENCE	LF	1185	$5.50	$ 6,517.50
46		150620	REMOVE GATE	EA	3	$350.00	$ 1,050.00
47		150662	REMOVE METAL BEAM GUARD RAILING	LF	450	$14.00	$ 6,300.00
48		150685	REMOVE IRRIGATION FACILITY	LS	1	$2,500.00	$ 2,500.00
49		150712	REMOVE PAINTED PAVEMENT MARKING	SQFT	66	$23.00	$ 1,518.00
50		150742	REMOVE ROADSIDE SIGN	EA	7	$125.00	$ 875.00
51		150809	REMOVE CULVERT (LF)	LF	332	$34.00	$ 11,288.00
52		150857	REMOVE ASPHALT CONCRETE SURFACING	SQFT	37904	$1.50	$ 56,856.00
53		151269	SALVAGE MARKER	EA	4	$50.00	$ 200.00
54		151281	SALVAGE ROADSIDE SIGN	EA	7	$210.00	$ 1,470.00
55		151581	RECONSTRUCT SIGN STRUCTURE	EA	1	$1,500.00	$ 1,500.00
56		152291	RESET GATE	EA	1	$1,350.00	$ 1,350.00
57		152370	RESET MAILBOX	EA	3	$460.00	$ 1,380.00
58		152386	RELOCATE ROADSIDE SIGN-ONE POST	EA	1	$275.00	$ 275.00
59		153103	COLD PLANE ASPHALT CONCRETE PAVEMENT	SQYD	55	$75.00	$ 4,125.00
60		160102	CLEARING AND GRUBBING	LS	1	$110,000.00	$ 110,000.00
61		170101	DEVELOP WATER SUPPLY	LS	1	$18,000.00	$ 18,000.00
62		180106	DUST PALLIATIVE	LS	1	$11,000.00	$ 11,000.00
63		190101	ROADWAY EXCAVATION	CY	10632	$24.00	$ 255,168.00
64		194001	DITCH EXCAVATION	CY	15595	$24.00	$ 374,280.00
65		198010	IMPORTED BORROW	CY	3085	$24.00	$ 74,040.00
66		200000	WEED CONTROL MAT (FIBER)	SQYD	496	$50.00	$ 24,800.00
67		200000	STABILIZED DECOMPOSED GRANITE	CY	6	$165.00	$ 990.00
68		203031	EROSION CONTROL (HYDROSEED)	SQFT	1124835	$0.12	$ 134,980.20
69		204096	MAINTAIN EXISTING PLANTED AREAS	LS	1	$13,000.00	$ 13,000.00
70		210130	DUFF	ACRE	18.10	$7,400.00	$ 133,940.00
71		210260	ROLLED EROSION CONTROL PRODUCT (JUTE MESH)	SQFT	44378	$0.70	$ 31,064.60
72		210300	HYDROMULCH	SQYD	125188	$0.06	$ 7,511.31
73		210350	FIBER ROLLS	LF	58384	$3.25	$ 189,748.00

TEHAMA COUNTY

65% CONSTRUCTION COST ESTIMATE

JELLYS FERRY

LAST UPDATED: 3/20/2015

ITEM NO.	(P)(F)	ITEM CODE	ITEM DESCRIPTION	UNIT OF MEASURE	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
74		210600	COMPOST	SQFT	4760	$0.45	$ 2,142.00
75		210630	INCORPORATE MATERIALS	SQFT	4760	$0.45	$ 2,142.00
76		260000	TEMPORARY AGGREGATE BASE (CLASS 2)	CY	482	$84.00	$ 40,488.00
77		260203	CLASS 2 AGGREGATE BASE	CY	6336	$60.00	$ 380,160.00
78		390000	TEMPORARY HOT MIX ASPHALT (TYPE A)	TON	489	$168.00	$ 82,152.00
79		390132	HOT MIX ASPHALT (TYPE A)	TON	3841	$120.00	$ 460,920.00
80		394074	PLACE HOT MIX ASPHALT DIKE (TYPE C)	LF	105	$6.00	$ 630.00
81		394076	PLACE HOT MIX ASPHALT DIKE (TYPE E)	LF	178	$17.00	$ 3,026.00
82		394077	PLACE HOT MIX ASPHALT DIKE (TYPE F)	LF	156	$22.00	$ 3,432.00
83		394090	PLACE HOT MIX ASPHALT (MISC. AREA) OVERSIDE DRAIN	SQYD	32	$100.00	$ 3,200.00
84		480000A	TEMPORARY MSE WALL	LS	1	$63,000.00	$ 63,000.00
85	F	510000	MINOR CONCRETE (PARKING STOP, MINOR STRUCTURE)	CY	1.3	$1,600.00	$ 2,080.00
86	F	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	34.7	$1,950.00	$ 67,665.00
87	P	550000A	SHADE STUCTURE (20' SQ)	EA	2	$25,000.00	$ 50,000.00
88		566011	ROADSIDE SIGN - ONE POST	EA	33	$320.00	$ 10,560.00
89	F	570000	PICNIC TABLE UNIT (ACCESSIBLE)	EA	4	$1,000.00	$ 4,000.00
90		590000	STAINING GALVANIZED SURFACES	LS	1	$56,300.00	$ 56,300.00
91		623000	TEMPORARY CULVERT	LF	101	$70.00	$ 7,070.00
92	P	650010	12" REINFORCED CONCRETE PIPE	LF	480	$75.00	$ 36,000.00
93	P	650014	18" REINFORCED CONCRETE PIPE	LF	212	$120.00	$ 25,440.00
94	P	665016	18" CORRUGATED STEEL PIPE (.064" THICK)	LF	320	$135.00	$ 43,200.00
95	P	665022	24" CORRUGATED STEEL PIPE (.064" THICK)	LF	72	$140.00	$ 10,080.00
96	P	665030	30" CORRUGATED STEEL PIPE (.064" THICK)	LF	50	$150.00	$ 7,500.00
97		700617	DRAINAGE INLET MARKER	EA	22	$90.00	$ 1,980.00
98		705204	18" CONCRETE FLARED END SECTION	EA	1	$1,050.00	$ 1,050.00
99	F	720110	SMALL-ROCK SLOPE PROTECTION	CY	23	$160.00	$ 3,680.00
100	F	721013	ROCK SLOPE PROTECTION (1/4 T, METHOD B) (CY)	CY	83	$150.00	$ 12,450.00
101	F	721015	ROCK SLOPE PROTECTION (LIGHT, METHOD B) (CY)	CY	15	$310.00	$ 4,650.00
102	F	721017	ROCK SLOPE PROTECTION (FACING, METHOD B) (CY)	CY	1788	$90.00	$ 160,920.00
103	F	721028	ROCK SLOPE PROTECTION (NO. 2, METHOD B) (CY)	CY	164	$160.00	$ 26,181.28
104	F	721030	ROCK SLOPE PROTECTION (1/2 T, METHOD B) (CY)	CY	1051	$75.00	$ 78,825.00
105	F	721602	CONCRETED-ROCK SLOPE PROTECTION (LIGHT, METHOD B) (CY)	CY	11	$200.00	$ 2,200.00
106	P	729011	ROCK SLOPE PROTECTION FABRIC (CLASS 8)	SQYD	3024	$3.90	$ 11,793.60
107	P	750000A	GRILL UNIT (ACCESSIBLE)	EA	2	$200.00	$ 400.00
108	P	750030	INLET FRAME AND GRATE	EA	5	$700.00	$ 3,500.00
109	P	750011	MANHOLE FRAME AND GRATE	EA	2	$1,000.00	$ 2,000.00
110	P	800000A	FENCE (TYPE BW, 3-STRAND, METAL POST)	LF	156	$5.00	$ 780.00
111	P	800000B	FENCE (TYPE BW, 7-STRAND, METAL POST)	LF	697	$7.00	$ 4,879.00
112	P	800000C	FENCE (TYPE WOOD, 3-RAIL, WOOD POST)	LF	162	$5.50	$ 891.00
113	P	800000D	FENCE (TYPE WOOD, 4-RAIL, WOOD POST)	LF	953	$6.00	$ 5,718.00
114	P	800004	FENCE (TYPE BW, 5-STRAND, WOOD POST)	LF	1030	$6.50	$ 6,695.00
115	P	800007	FENCE (TYPE BW, 5-STRAND, METAL POST)	LF	4859	$6.00	$ 29,154.00
116	P	800008	FENCE (TYPE BW, 4-STRAND, METAL POST)	LF	1014	$5.50	$ 5,577.00
117	P	800103	TEMPORARY FENCE (TYPLE CL-6)	LF	9641	$10.50	$ 101,230.50
118	P	801362	14' METAL GATE	EA	2	$1,500.00	$ 3,000.00
119	P	801364	16' METAL GATE	EA	1	$1,500.00	$ 1,500.00
120	P	801000A	STEEL PIPE GATE	EA	3	$2,000.00	$ 6,000.00
121		820112	MARKER (CULVERT)	EA	1	$85.00	$ 85.00
122		820134	OBJECT MARKER (TYPE P)	EA	8	$95.00	$ 760.00
123	P	830000A	ROCK BARRIER	LF	546	$13.00	$ 7,098.00
124	P	830000B	WOOD GUARD POSTS (TYPE 2)	LF	68	$5.00	$ 340.00
125	P	832005	MIDWEST GUARDRAIL SYSTEM	LF	515	$25.00	$ 12,875.00

TEHAMA COUNTY

65% CONSTRUCTION COST ESTIMATE

JELLYS FERRY

LAST UPDATED: 3/20/2015

ITEM NO.	(P)(F)	ITEM CODE	ITEM DESCRIPTION	UNIT OF MEASURE	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
126		839584	ALTERNATIVE IN-LINE TERMINAL SYSTEM	EA	2	$3,700.00	$ 7,400.00
127	P	839543	TRANSITION RAILING (TYPE WB-31)	EA	8	$3,600.00	$ 28,800.00
128		839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	6	$2,900.00	$ 17,400.00
129		840504	4" THERMOPLASTIC TRAFFIC STRIPE (WHITE)	LF	11303	$1.00	$ 11,303.00
130		840504	4" THERMOPLASTIC TRAFFIC STRIPE (YELLOW)	LF	11110	$1.10	$ 12,221.00
131		840515	THERMOPLASTIC PAVEMENT MARKING	SQFT	35	$24.00	$ 840.00
132		840523	4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 12-3)	LF	200	$0.90	$ 180.00
133	P	850111	TYPE D TWO-WAY PAVEMENT MARKER (RETROREFLECTIVE)	EA	468	$10.00	$ 4,680.00
						SUBTOTAL ROADWAY CONTRACT ITEMS	**$ 4,939,610**
			RETAINING WALL ITEMS				
	F	192037	STRUCTURE EXCAVATION (RETAINING WALL)	CY	798	$90.00	$ 71,820.00
	F	193013	STRUCTURE BACKFILL (RETAINING WALL)	CY	1277	$85.00	$ 108,545.00
	F	193031	PERVIOUS BACKFILL MATERIAL (RETAINING WALL)	CY	197	$115.00	$ 22,655.00
		490605	36" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	3743	$375.00	$ 1,403,625.00
	F	510060	STRUCTURAL CONCRETE, RETAINING WALL	CY	1222	$700.00	$ 855,400.00
	P-F	520103	BAR REINFORCING STEEL (RETAINING WALL)	LB	724080	$1.25	$ 905,100.00
		044XXX	TUBULAR BICYCLE RAILING	LF	432	$120.00	$ 51,840.00
		8397XX	CONCRETE BARRIER TYPE 80 (MODIFIED)	LF	432	$220.00	$ 95,040.00
						SUBTOTAL RETAINING WALL CONTRACT ITEMS	**$ 3,514,025**
			SACRAMENTO RIVER BRIDGE ITEMS				
		10XXXX	TEMPORARY CONSTRUCTION TRESTLE	LS	1	$2,043,000.00	$ 2,043,000.00
		14XXXX	HYDROACOUSTIC MONITORING	LS	1	$15,000.00	$ 15,000.00
		157550	BRIDGE REMOVAL	LS	1	$953,387.20	$ 953,387.20
	F	192003	STRUCTURE EXCAVATION (BRIDGE)	CY	568	$175.00	$ 99,400.00
	F	193003	STRUCTURE BACKFILL (BRIDGE)	CY	729	$105.00	$ 76,545.00
		490607	48” CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	538	$805.00	$ 433,090.00
		490620	108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	314	$2,300.00	$ 722,200.00
		4906XX	144” CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	189	$2,800.00	$ 529,200.00
		500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	1	$615,175.49	$ 615,175.49
	F	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	175	$650.00	$ 113,750.00
	F	510053	STRUCTURAL CONCRETE, BRIDGE	CY	4799	$1,000.00	$ 4,799,000.00
	F	510088	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N MODIFIED)	CY	45	$825.00	$ 37,125.00
		518051	PTFE SPHERICAL BEARING	EA	12	$10,850.00	$ 130,200.00
	P	519094	JOINT SEAL ASSEMBLY (MR 3 1/2")	LF	38	$355.00	$ 13,490.00
	P	519099	JOINT SEAL ASSEMBLY (MR 6")	LF	38	$850.00	$ 32,300.00
	P	519118	JOINT SEAL ASSEMBLY (MR 9")	LF	38	$1,375.00	$ 52,250.00
	P-F	520102	BAR REINFORCING STEEL (BRIDGE)	LB	1909964	$1.15	$ 2,196,458.60
		7034XX	10” WELDED STEEL PIPE CASING (BRIDGE)	LF	25	$140.00	$ 3,500.00
		7034XX	16” WELDED STEEL PIPE CASING (BRIDGE)	LF	25	$155.00	$ 3,875.00
		7034XX	20” WELDED STEEL PIPE CASING (BRIDGE)	LF	50	$170.00	$ 8,500.00
	P-F	750505	BRIDGE DECK DRAINAGE SYSTEM	LB	35252	$6.25	$ 220,325.00
	F	8397XX	CONCRETE BARRIER TYPE 80 (MODIFIED)	LF	2586	$220.00	$ 568,920.00
		044XXX	TUBULAR BICYCLE RAILING	LF	2586	$120.00	$ 310,320.00
		XXXXXX	AESTHETIC ALLOWANCE	LS	1	$698,850.56	$ 698,850.56
						SUBTOTAL SACRAMENTO RIVER BRIDGE CONTRACT ITEMS	**$ 14,675,862**
			SACRAMENTO OVERFLOW BRIDGE ITEMS				
	F	192003	STRUCTURE EXCAVATION (BRIDGE)	CY	265	$175.00	$ 46,375.00
	F	193003	STRUCTURE BACKFILL (BRIDGE)	CY	180	$105.00	$ 18,900.00
		490604	30" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	3486	$330.00	$ 1,150,380.00
		500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	1	$220,901.84	$ 220,901.84
	F	510053	STRUCTURAL CONCRETE, BRIDGE	CY	2500	$800.00	$ 2,000,000.00
	F	510088	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N MODIFIED)	CY	60	$825.00	$ 49,500.00
	F	510501	MINOR CONCRETE	CY	4	$1,700.00	$ 6,800.00
		519095	JOINT SEAL ASSEMBLY (MR 4")	LF	146	$345.00	$ 50,370.00
	F	520102	BAR REINFORCING STEEL (BRIDGE)	LB	667849	$1.15	$ 768,026.35
	F	520120	HEADED BAR REINFORCEMENT	EA	400	$26.00	$ 10,400.00
		750505	BRIDGE DECK DRAINAGE SYSTEM	LB	270	$6.25	$ 1,687.50
		8397XX	CONCRETE BARRIER (TYPE 80 MODIFIED)	LF	1438	$220.00	$ 316,360.00
	F	044XXX	TUBULAR BICYCLE RAILING	LF	1438	$120.00	$ 172,560.00
						SUBTOTAL OVERFLOW BRIDGE CONTRACT ITEMS	**$ 4,812,261**
#REF!		999990	MOBILIZATION (10%)	LS	1	$2,794,176	$ 2,794,176

TOTAL CONTRACT ITEMS	**$ 30,735,934**
CONTINGENCIES (10%)	**$ 3,073,594**
PROJECT TOTAL	**$ 33,809,528**
FOR BUDGET PURPOSES USE	**$ 33,810,000**

FOUNDATION REPORT

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD
BRIDGE REPLACEMENT
(BRIDGE NO. 08C-0374)
TEHAMA COUNTY, CALIFORNIA

(DRAFT)

Prepared For:

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(408) 452-9000

March 23, 2015 PARIKH Project No. 2000-119-BRG

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FOUNDATION REPORT (DRAFT)
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD
BRIDGE REPLACEMENT (BRIDGE NO. 08C-0374)
TEHAMA COUNTY, CALIFORNIA

1.0 INTRODUCTION

This "Foundation Report" presents the results of our geotechnical engineering investigation for the proposed "Sacramento River Bridge at Jellys Ferry Road – Bridge Replacement Project (Bridge No. 08C-0374)" in Tehama County, California, hereinafter referred to as "PROJECT". The bridge project is funded by the federal Surface Transportation program (formerly the Highway Bridge Program - HBP), the Local Seismic Safety Retrofit Program, and the State Transportation Improvement Program (STIP). The work was performed in general accordance with the scope of work outlined in our proposal to T.Y.LIN International (Designer).

The geotechnical recommendations presented in this report are intended for design input and are not intended to be used as specifications. In addition, the data provided in this report including these geotechnical recommendations should not be used for bidding purposes or for construction cost estimates. If the report is provided as a reference document, any interpretation of the data and recommendations should be the sole responsibility of the user and PARIKH Consultants, Inc. (PARIKH) shall not be liable for any consequences.

2.0 SCOPE OF WORK

The purpose of this report is to evaluate the general subsurface soil conditions at the project site, to evaluate their engineering properties, and to provide foundation design recommendations for the proposed project. The approximate location of the project site is shown on the Project Location Map (Plate 1). This report supersedes the Geotechnical Engineering Report (Draft) Jellys Ferry Bridge Replacement dated February 12, 2010.

The scope of work performed for this investigation included a review of the readily available soils and geologic literature pertaining to the project site; site reconnaissance; obtaining representative soil samples and logging soil materials encountered in the exploratory soil borings; laboratory testing of the representative soil samples, performing engineering analyses based on the field and laboratory data, and preparation of this geotechnical investigation report.

3.0 PROJECT DESCRIPTION

The project is located at the crossing of Jellys Ferry Road over the Sacramento River, approximately 9 miles north of Red Bluff and 7.5 miles east of Interstate 5, in northern Tehama County. California (Plate 1). The proposed bridge replacement project requires the realignment and raising of a portion of Jelly's Ferry Road, and temporary and permanent modification of a portion of adjacent BLM recreational facilities in order to construct the new bridge over the main Sacramento River channel. The project also includes the construction of a retaining wall along the west side of the north approach roadway to minimize the environmental impact of the north approach roadway fill for the proposed river bridge on the adjacent wetlands and jurisdictional waters of the U.S. A second bridge (Sacramento Overflow Bridge) will also be constructed north of the existing bridge to eliminate frequent overtopping of Jellys Ferry Road by overflow from the Sacramento River.

The proposed new Sacramento River Bridge, Sacramento Overflow Bridge and roadway alignment would begin approximately 4.3 miles north of the intersection with Bend Ferry Road and would end just south of the intersection with Saron Fruit Colony Road. A site map of the approximate project location is shown in Appendix I.

3.1 Existing Bridge Structure

The existing bridge is a 21 foot wide, 940 foot long, curved chord, steel thru Pratt truss bridge built in 1949 with a 30 foot long south approach and 350 foot long north approach. The bridge consists of five main truss spans of 150 feet in length and ten timber approach spans of 18 to 19 feet in length at the north end. As-Built plans for this bridge are not available.

3.2 Proposed Bridge Structures

3.2.1 Sacramento River Bridge at Jellys Ferry Road

The proposed new bridge over the main river channel would be constructed on a new alignment approximately 45 feet west (upstream) of the existing

bridge, measured at the south bank of the Sacramento River and approximately 190 feet west (upstream) of the existing bridge measured at the north bank of the Sacramento River. The south approach roadway to the new Sacramento River Bridge would be approximately 750 feet in length with a maximum embankment fill height of approximately 6 to 10 feet. The north approach roadway to the Sacramento River Bridge would be approximately 1,310 feet in length with a maximum embankment fill height of approximately 20 feet. The north approach roadway profile for the Sacramento River Bridge would be raised to prevent overtopping north of the existing abutment

The new bridge would be approximately 1,264 feet in length and would be comprised of a six-span cast-in-place post-tensioned box girder superstructure with varying depth supported on single column piers founded on cast-in-drilled-hole (CIDH) concrete piles. The end spans would be supported on seat-type abutments with approximately 12 foot x 40 foot spread footings with rock slope protection. The bridge would be wide enough to accommodate two 12 foot wide undivided lanes, two 6 foot wide shoulders (5 foot minimum shoulder width, 6 foot preferred) classified as Class II bicycle lanes, and two approximately 2 foot wide solid or "see-through" concrete barriers.

3.2.2 Sacramento Overflow Bridge at Jellys Ferry Road

The proposed Sacramento Overflow Bridge would prevent frequent overtopping in the low lying area of Jellys Ferry Road north of the Sacramento River Bridge approach by passing flow from the adjacent Sacramento River overflow channel under this second bridge structure. At this location the maximum embankment fill height would be approximately 11 feet corresponding to the 100-year flood level of hydraulic service to prevent overtopping of the roadway. The approach roadway length leading up to the Sacramento Overflow Bridge from the south would be approximately 400 feet in length. The approach roadway length from the

overflow bridge to the end of project would be approximately 1,240 feet in length.

The Sacramento Overflow Bridge would be constructed on a new alignment an average of approximately 90 feet east of the existing road. The overall length of the bridge as shown is 682.5 feet with a width of 37.5 feet to accommodate the two traffic lanes, shoulders and barrier railings. The structure type as shown is cast-in-place, pre-stressed concrete slab bridge supported on pile extensions piers and seat-type abutments.

4.0 EXCEPTIONS TO POLICY

Normal procedures were assumed for construction of the bridge structure throughout our analysis and represent one of the bases of recommendations presented herein. The investigation for the proposed foundations has followed Caltrans policy. Exception to policy is not needed.

5.0 FIELD INVESTIGATION AND TESTING PROGRAM

5.1 Field Exploration Performed

In September of 2009, seven exploratory borings were drilled to maximum depth of 110 feet below the existing ground surface. Three of these borings were intended for the roadway and four were drilled for the bridge structure. In March and April of 2014, seven exploratory borings for the Sacramento Overflow Bridge were drilled. Four of these borings were drilled up to 100 feet for the bridge foundations and three of them intended for the roadway. Finally in November of 2014, an additional deep exploratory boring was drilled through the existing bridge deck down to 164 feet below the bridge deck (about 110.5 feet below the mud line). The approximate boring locations are shown on the Site Plan (Plate 2). The location, approximate ground elevation and depth of the soil borings are summarized in the table below.

TABLE 1: SUMMARY OF FIELD EXPLORATION

Boring No.	Station	Approx. Ground Elev.(1) (feet)	Approx. Depth (feet)	Bottom Elev.(1) (feet)	Measured Groundwater Depth (ft)	Measured Groundwater Elev.(1) (ft)	Relevance of the Boring
B-001	502+40	366.0	4.0	362.0	-	-	Roadway
B-002	507+10	364.0	83.0	281.0	-	-	Sacramento River Bridge
B-003	509+40	328.0	99.0	229.0	-	-	Sacramento River Bridge
R-14-SRB-001	511+05	306.5 (at Mudline)	110.5	196.0	-	319.5	Sacramento River Bridge
B-004	514+40	327.0	111.5	215.5	8.0	319.0	Sacramento River Bridge
B-005	518+10	340.0	56.5	283.5	6.0	334.0	Sacramento River Bridge
B-006	520+85	343.0	41.5	301.5	-	-	Roadway
B-007	524+20	343.0	11.5	331.5	-	-	Roadway
R-14-OFS-001	537+00	348.0	80.2	267.8	19.0	329.0	Sacramento Overflow Bridge
R-14-OFS-002	539+00	339.0	100.2	238.8	13.0	326.0	Sacramento Overflow Bridge
R-14-OFS-003	541+13	342.0	100.7	241.3	28.0	314.0	Sacramento Overflow Bridge
R-14-OFS-004	544+11	345.0	80.7	264.3	15.0	330.0	Sacramento Overflow Bridge
A-14-OFB-005	530+25	349.0	5.0	344.0	-	-	Roadway
A-14-OFB-006	533+00	352.0	5.0	347.0	-	-	Roadway
A-14-OFB-007	547+00	355.0	5.0	350.0	-	-	Roadway

(1) Elevations are based on NAVD88 Datum.

The approximate locations of the soil borings are shown on the "Site Plan", Plate No. 2. The descriptions of the soil materials encountered in the field exploration and relevant boring information are presented on the Log of Test Borings (LOTB) included in Appendix II.

5.2 Field Testing

a) The soil samples were obtained from the borings during drilling at various depths by driving a 2.5 inches Inside Diameter (I. D.) Modified California Sampler or a 1.375 inches I.D. Standard Penetration Sampler (ASTM Test Method No. 1586). The sampler was driven into the subsurface soils under the impact of a 140 pounds hammer having a free fall of 30 inches. The blow counts required to drive the sampler for the last 12 inches are presented on

the Logs of Test Borings, Appendix II. (When correlating standard penetration data in similar soils, the blow counts for the Modified California sampler can be converted to equivalent Standard Penetration Test sampler by multiplying a factor of 0.65).

b) Pocket penetration tests were also performed on clay samples to evaluate their consistency.

5.3 Details of Field Exploration

All the test borings were drilled with a truck-mounted drill rig first using 8-inch diameter hollow-stem auger and then switched to rotary-wash drilling method with 4-inch diameter drilling bit once the water was encountered. Both soil samples and rock cores were collected at Boring R-14-SRB-001. The borings were drilled under the technical supervision of our engineers, who classified and continuously logged the soils encountered during drilling and supervised the collection of soil samples at various depths for visual examination and laboratory testing. The soil samples were visually classified in the field according to the Caltrans "Soil and Rock Logging, Classification and Presentation Manual" (2010 Edition) and then transported to our laboratory for further evaluation and testing. Upon completion of drilling, the boreholes were backfilled with cement grout.

The logs presented in Appendix II were prepared from the field logs which were edited after visual re-examination of the soil samples/rock cores in the laboratory and results of classification tests on selected soil samples as indicated on the logs.

6.0 LABORATORY TESTING PROGRAM

The following laboratory tests were performed on selected soil samples collected during field exploration to evaluate the physical and engineering properties of the subsurface soils at the project site to support the foundation recommendations:

a) Laboratory determination of Moisture-Density (California Test Method T-226).
b) Atterberg Limits (California Test Method T-204).

c) Grain Size Distribution (American Standard Test Method D-422).
d) Unconfined Compression Test (California Test Method T-221).
e) Corrosion Test (California Test Method T-643).
f) Compressive Strength Test For Rock Core Samples (ASTM C42)
g) R-Value (California Test Method 301)

The laboratory test methods and test results are presented on plates included in Appendix IV. Laboratory test results for moisture content, unit weight, unconfined compression, plasticity Index and grain size classification of the soil samples are summarized in the table in Appendix IV.

It should be noted that the descriptions of the soils encountered and relevant boring information presented on the LOTB depict subsurface conditions only at the locations indicated on the plan and on the particular date noted on the LOTB. Because of the variability from place to place within soil/rock in general, subsurface conditions at other locations may differ from conditions occurring at the boring locations explored. The abrupt stratum changes shown on the logs may be gradational and relatively minor changes in soil types within a stratum may not be noted on the logs due to field limitations. Also, the passage of time may result in a change in the soil conditions at these locations due to environmental changes.

7.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

7.1 Site Geology

General geologic features pertaining to the site were evaluated by reference to the Geologic map of the Red Bluff 30’x60’ Quadrangle, California by Blake, M.C., et al. (2000). The portion of the published geologic map that includes the general project area is shown in Plates 3A and 3B. Based on this map, the project site subsoil mainly consists of Alluvial and Overbank Deposits (“Qao”), Upper and Lower Members of Riverbank Formation (“Qmu” and “Qml”). In addition to those, Sacramento River Bridge is mapped on Stream Channel Deposits (“Qsc”) and Red Bluff formation (“Qrb”).

7.2 Subsurface Conditions

The borings for both bridges encountered alluvial soils overlying pyroclastic volcanic deposits. The upper alluvial soils appear to be up to approx. 30 ft in thickness and generally consist of medium dense to dense granular material ranging from silty sand/silty gravel to poorly and well-graded gravel mixed with cobbles. Within the river flood plain area, cobbles up to 6 inches in size were observed. However, these could be limited due to equipment size limitations. Larger size cobbles and boulder should be expected due to the Sacramento River. Boring R-14-OFS-001 encountered a layer of loose clayey sand with gravel between elevations of 340 and 344 feet.

Below the alluvial soils, the borings encountered pyroclastic volcanic rock deposits. From a "soil" standpoint, the material appears to be gray, very dense silty to poorly graded fine sand with cementation. The SPT blow counts are typically refusal. Rock core pictures for these rock materials are shown in Plates 6A through 6E.

Based on the geotechnical borings, groundwater varies between Elev. 319 and 334 feet at the site. Boring R-14-SRB-001 was drilled through the existing bridge deck above the Sacramento River and surface water elevation was about 319.5 feet at the time of the drilling.

The groundwater level is anticipated to vary with the passage of time due to seasonal groundwater fluctuations, variations in yearly rainfall, water elevations in the Sacramento River, surface and subsurface flows, ground surface run-off, and other environmental factors that may not be present at the time of the investigation.

Due to limitations inherent in geotechnical investigations, it is neither uncommon to encounter unforeseen variations in the subsurface soil conditions during construction nor is it practical to determine all such variations during an acceptable program of drilling and sampling for a project of this scope. Such variations, when encountered, generally require additional engineering services to attain properly constructed project. We, therefore, recommend that a contingency fund be provided to

accommodate any additional charges resulting from technical services that may be required during construction.

8.0 SCOUR EVALUATION

Per "Final Draft – Design Hydraulic Study Jellys Ferry Road over Sacramento River, Bridge 8C-0043, and over Sacramento River Overflow (North Overflow /Overflow No. 2) Tehama County" by Pacific Hydrologic Incorporated dated March 21, 2014; the estimated scour elevations are summarized in the table below:

TABLE 3A: SUMMARY OF SCOUR ELEV. AT SACRAMENTO RIVER BRIDGE

Bridge Component	Scour Elevation (ft)
Abutment 1	Out of 100-year floodplain
Bent 2	285.1
Bent 3	285.1
Bent 4	313.8
Bent 5	313.8
Bent 6	313.8
Abutment 7	325.0

TABLE 3B: SUMMARY OF SCOUR ELEV. AT SACRAMENTO OVERFLOW BRIDGE

Bridge Component	Scour Elevation (ft)
Abutment 1	339.0
Bents 2 through 11	331.3
Abutment 12	339.0

It is also stated in the hydraulics report that Abutment Protection is recommended "to minimize risk of long term potential for damage to abutments from bank erosion and bank migration".

9.0 CORROSION EVALUATION

Chemical tests were performed on soil samples for soil samples to evaluate the corrosion potential of the subsoil. The test results are as follows:

TABLE 4: SUMMARY OF CORROSION TEST RESULT

Boring/Location	Sample Depth (feet)	Minimum Resistivity (ohms-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
B-3	5	1450	6.47	47.3	77.6
R-14-SRB-001	12.5	830	8.17	54.2	46.8
R-14-OFS-001	21	6160	6.16	6	4.4
R-14-OFS-002	6	8580	7.15	3.9	5.8
R-14-OFS-003	21	3480	7.67	7.1	6.9
R-14-OFS-004	11	2040	6.95	10.1	3.1

According to Caltrans Corrosion Guidelines, November 2012 (Version 2.0), Caltrans considers a site to be corrosive to foundation element if one of the following conditions exists for the representative soil samples taken at the site:

- Chloride concentration is greater than or equal to 500 ppm,
- Sulfate concentration is greater than or equal to 2000 ppm,
- pH is 5.5 or less.

Based on the corrosion test results, the native subsurface soils in the borings as shown in Table 4 are considered non-corrosive per Caltrans corrosion design guidelines. Standard Type II modified or Type I-P (MS) modified cement may be used for the concrete substructure.

10.0 SEISMIC RECOMMENDATIONS

10.1 Seismic Sources

The project is located in a seismically moderately active part of northern California. Many faults exist in the regional areas which are capable of producing earthquakes and causing strong ground shaking at the project site.

Maximum moment magnitudes (M_{max}) of some of the closest faults in the area are based on the 2012 ARS Online Report. These maximum moment magnitudes represent the largest earthquake a fault is capable of generating and is related to the seismic moment. The ARS data of the major active faults in the project vicinity are

summarized in the table below. The fault distances were measured from the proposed Sacramento River Bridge using Caltrans ARS Online Website. The Caltrans ARS Online Map is shown in Plate 4.

TABLE 5: ARS DATA

Fault (Fault ID)	Maximum Moment Magnitude of Fault, M_{Max}	Fault Type	Site-to-Fault Distance, Rrup* (km)
Battle Creek 2011 CFM	6.6	Normal	10.6
Hat Creek Fault Zone	7.2	Normal	72.2
San Andreas (Offshore)	8.0	Strike Slip	163.5

*Closest distance to the fault rupture plane calculated by Caltrans ARS Online.

10.2 Seismic Design Criteria

The design spectrum was developed in accordance with the 2012 Caltrans Fault Database (Version 2b) and the Acceleration Response Spectrum (ARS) Online web tool (Version 2.3.06). The development of the design ARS curve is based on several input parameters, including site location (longitude/latitude), average shear wave velocity for the top 30m/100 feet (Vs_{30m}), and other site parameters, such as fault characteristics, site-to-fault distances.

The current design methods incorporate both "Deterministic and Probabilistic Seismic Hazards" to produce the "Design Response Spectrum". According to the recent Caltrans methodology, the Caltrans probabilistic response spectrum to be used for design of bridge structures is verified with the spectrum from "2008 USGS National Seismic Hazard Map" for the 5% in 50 years probability of exceedance (or 975 year return period) at periods of 0, 0.3, 1 and 3 seconds.

Average shear wave velocities (V_s) for the top 30 meters (100 feet) at the various locations along the alignment were estimated by using established correlations and the procedure provided in the "Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations (November 2012)". The average shear wave velocity is estimated to be 500 and 450 m/s for Sacramento River Bridge and Sacramento Overflow Bridge, respectively.

The site locations and the relevant parameters are summarized as follows, and the ARS curves are presented on Plates 5A through 5D.

TABLE 6: GROUND MOTION ANALYSIS

Parameters	Sacramento River Bridge	Sacramento Overflow Bridge
Site Location	40.3172ºN/122.19ºW	40.325ºN/122.19ºW
Estimated V_{S30m}	500 m/s	450 m/s
Anticipated Peak Ground Acceleration (PGA)	0.256 g	0.276 g
Maximum Moment Magnitude:	6.6 (Battle Creek)	6.6 (Battle Creek)
The recommended ARS curve	Envelope of Caltrans Online Probabilistic and Deterministic ARS.	Envelope of Caltrans Online Probabilistic and Deterministic ARS.
Near fault adjustment	N/A	N/A
Basin effect	N/A	N/A

10.3 Seismic Hazards/Liquefaction Potential

10.3.1 Seismic Hazards

Potential seismic hazards may arise from three sources: surface fault rupture, ground shaking and liquefaction, seismically-induced settlement.

10.3.2 Seismic Ground Shaking

Based on available geological and seismic data, the possibility of the project site to experience strong ground shaking may be considered moderate. Peak ground accelerations of 0.256g and 0276g were calculated for Sacramento River Bridge and Sacramento Overflow Bridge, respectively.

10.3.3 Surface Fault Rupture

The site is not within the “Alquist-Priolo Earthquake Fault Zone” and no known/mapped faults pass through the site. The fault rupture potential at the site is considered as low.

10.3.4 Liquefaction Potential

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are the type of soils, which usually are susceptible to liquefaction. Clays are generally not susceptible to liquefaction.

Based on the boring logs, the subsurface soil generally consists of mainly medium dense to dense granular materials below water level and the peak ground acceleration is relatively low. Based on our evaluation of the logs, liquefaction is not anticipated at this site. Liquefaction analyses for critical borings are shown in Appendix V of the report.

10.3.5 Seismically-Induced Dry Sand Settlement

Loose sandy deposits that are above water table tend to densify when subjected to seismic shaking. Our borings did not encounter any loose granular soils above water table. Based on this, seismically-induced dry sand settlement at the site was estimated to be insignificant.

11.0 AS-BUILT FOUNDATION DATA

No As-Built data is available for the existing nearby Sacramento River Bridge. Based on field observation, the existing foundations appear to consist of large diameter shafts.

12.0 FOUNDATION RECOMMENDATIONS

12.1 General

This report was prepared specifically for the proposed project according to the plans provided to us. Normal construction procedures were assumed throughout our analysis and represent one of the bases of recommendations presented herein. Our

design criteria have been based upon the materials and subsurface soil conditions encountered in the soil borings at the project site. Therefore, we should be notified in the event that these conditions are changed, so as to modify or amend our recommendations.

12.2 Foundations

12.2.1 Vertical Pile Design

Per project plans dated February 18, 2015 and February 20, 2015; CIDH Piles will be used for all bridge and retaining wall supports except Abutment 1 of Sacramento River Bridge. The option of supporting proposed Retaining Wall 1 and Abutment 7 of Sacramento River Bridge on spread footing was initially considered but this option was not found feasible due the bottom of the scour elevation being about 6 feet below the proposed footing bottom elevation and the presence of groundwater.

The information provided by the designer, the pile types and calculated pile lengths are included in the tables below.

TABLE 7A: FOUNDATION DESIGN DATA – SACRAMENTO RIVER BRIDGE

Support No	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size(ft)		Permissible Settlement under Service Load (in)	No. of Piles Per Support
				B	L		
Bent 2	144” CIDH	315.00	313.00	N/A	N/A	1	1
Bent 3	144” CIDH	316.68	314.68	N/A	N/A	1	1
Bent 4	108” CIDH	333.89	331.89	N/A	N/A	1	1
Bent 5	108” CIDH	330.70	328.70	N/A	N/A	1	1
Bent 6	108” CIDH	330.70	328.70	N/A	N/A	1	1
Abutment 7	48” CIDH	349.50	331.25	20.00	44.00	1	8

TABLE 7B: FOUNDATION DESIGN DATA – SACRAMENTO OVERFLOW BRIDGE

Support No	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size(ft)		Permissible Settlement under Service Load (in)	No. of Piles Per Support
				B	L		
Abutment 1	30” CIDH	-	342.75	4.50	46.73	1	6
Bent 2	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 3	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 4	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 5	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 6	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 7	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 8	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 9	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 10	30” CIDH	340.00	340.00	N/A	N/A	1	5
Bent 11	30” CIDH	340.00	340.00	N/A	N/A	1	5
Abutment 12	30” CIDH	-	343.75	4.50	54.46	1	6

TABLE 7C: FOUNDATION DESIGN DATA – RETAINING WALL 1

Support No	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size(ft)		Permissible Settlement under Service Load (in)	No. of Piles Per Support
				B	L		
RW1 Type 1 Pt 1	36” CIDH	342.4	331.25	15.75	56.00	1	12
RW1 Type 1 Pt 2	36” CIDH	342.0	331.25	14.25	88.00	1	18
RW1 Type 1 Pt 3	36” CIDH	342.0	331.25	14.00	48.00	1	8
RW1 Type 1 Pt 4	36” CIDH	341.8	331.25	14.00	56.00	1	10
RW1 Type 1 Pt 5	36” CIDH	342.0	331.25	14.00	96.00	1	14
RW1 Type 1 Pt 6	36” CIDH	343.0	331.25	14.00	88.00	1	12

TABLE 8A: FOUNDATION DESIGN LOADS – SACRAMENTO RIVER BRIDGE

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group) (kips)				Extreme Event Limit State (Controlling Group) (kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Footing	Max Per Pile	Per Footing	Per Footing	Max Per Pile	Per Footing	Max Per Pile	Per Footing	Max Per Pile	Per Footing	Max Per Pile
Bent 2	6286	6286	5612	8743	8743	N/A	N/A	5650	5650	N/A	N/A
Bent 3	6023	6023	5266	8293	8293	N/A	N/A	5500	5500	N/A	N/A
Bent 4	3833	3833	3319	5486	5486	N/A	N/A	3850	3850	N/A	N/A
Bent 5	3100	3100	2507	4461	4461	N/A	N/A	2500	2500	N/A	N/A
Bent 6	3090	3090	2542	4476	4476	N/A	N/A	2700	2700	N/A	N/A
Abutment 7	3295	572	3295	4801	782	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 8B: FOUNDATION DESIGN LOADS – SACRAMENTO OVERFLOW BRIDGE

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group) (kips)				Extreme Event Limit State (Controlling Group) (kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Footing	Max Per Pile	Per Footing	Per Footing	Max Per Pile	Per Footing	Max Per Pile	Per Footing	Max Per Pile	Per Footing	Max Per Pile
Abutment 1	982	164	781	1335	222	N/A	N/A	N/A	N/A	N/A	N/A
Bent 2	1580	343	982	2450	501	N/A	N/A	983	309	N/A	N/A
Bent 3	1646	366	1009	2553	534	N/A	N/A	1017	318	N/A	N/A
Bent 4	1647	359	1004	2550	521	N/A	N/A	1015	312	N/A	N/A
Bent 5	1665	372	1025	2581	541	N/A	N/A	1032	320	N/A	N/A
Bent 6	1589	350	961	2406	498	N/A	N/A	974	302	N/A	N/A
Bent 7	1203	288	746	1852	426	N/A	N/A	747	256	N/A	N/A
Bent 8	1606	356	946	2386	500	N/A	N/A	960	295	N/A	N/A
Bent 9	1666	378	1019	2573	549	N/A	N/A	1033	317	N/A	N/A
Bent 10	1658	369	1016	2569	537	N/A	N/A	1023	310	N/A	N/A
Bent 11	1603	349	983	2465	506	N/A	N/A	989	298	N/A	N/A
Abutment 12	1032	172	827	1399	233	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 8C: FOUNDATION DESIGN LOADS – RETAINING WALL 1

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group) (kips)				Extreme Event Limit State (Controlling Group) (kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Footing	Max Per Pile	Per Footing	Per Footing	Max Per Pile	Per Footing	Max Per Pile	Per Footing	Max Per Pile	Per Footing	Max Per Pile
RW1 Type 1 Pt 1	2726	295	2615	3646	439	N/A	N/A	2615	436	N/A	N/A
RW1 Type 1 Pt 2	3687	338	3526	4932	420	N/A	N/A	3526	421	N/A	29
RW1 Type 1 Pt 3	1927	293	1833	2584	480	N/A	N/A	1833	467	N/A	9
RW1 Type 1 Pt 4	2161	342	2051	2900	414	N/A	N/A	2051	397	N/A	N/A
RW1 Type 1 Pt 5	3627	352	3430	4872	481	N/A	N/A	3430	451	N/A	N/A
RW1 Type 1 Pt 6	3263	310	3082	4385	494	N/A	N/A	3082	455	N/A	N/A

Consistent with Caltrans requirements, Load and Resistance Factor Design (LRFD) is used for the both bent abutment foundations, per AASHTO LRFD Bridge Design Specifications–6th Edition and its current Caltrans Amendments.

The load demands on the piles, provided by the designer, are presented in Tables 8A and 8B above. The estimated specified tip elevations for the anticipated design loading of the piles are shown in Tables 9A and 9B. The pile cut-off elevations, provided by the designer, are shown in Tables 7A and 7B. Vertical pile capacity calculations are shown in Appendix V. The specified tip elevations are based on axial loads only and LPILE analyses will be performed by the designer for the final design.

TABLE 9A: FOUNDATION DESIGN RECOMMENDATIONS – SACRAMENTO RIVER BRIDGE

Support Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Footing		Total Permissible Footing Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elev.[i] (ft)	Specified Tip Elev. (ft)[ii]
						Strength Limit		Extreme Event			
			Total	Permanent		Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
Bent 2	144" CIDH	313.00	6286	5612	1	8743	N/A	5650	N/A	(a) 219 (c) 230	219
Bent 3	144" CIDH	314.68	6023	5266	1	8293	N/A	5500	N/A	(a) 220 (c) 231	220
Bent 4	108" CIDH	331.89	3833	3319	1	5486	N/A	3850	N/A	(a) 227 (c) 245	227
Bent 5	108" CIDH	328.70	3100	2507	1	4461	N/A	2500	N/A	(a) 230 (c) 264	230
Bent 6	108" CIDH	328.70	3090	2542	1	4476	N/A	2700	N/A	(a) 229 (c) 232	229
Abut. 7	48" CIDH	331.25	3295	3295	1	782	N/A	N/A	N/A	(a) 264	264

Notes

(i) Design tip elevations are controlled by (a) Compression (Strength Limit), (b) Tension (Strength Limit), (c) Compression (Extreme Event), (d) Tension (Extreme Event), (e) Lateral Load (not included in this table) respectively.

(ii) The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.

TABLE 9B: FOUNDATION DESIGN RECOMMENDATIONS – SACRAMENTO OVERFLOW BRIDGE

Support Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Footing		Total Permissible Footing Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elev.[(i)] (ft)	Specified Tip Elev. (ft)[(ii)]
						Strength Limit		Extreme Event			
			Total	Permanent		Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
Abut 1	30" CIDH	342.75	982	781	1	222	N/A	N/A	N/A	(a) 312	312
Bent 2	30" CIDH	340.00	1580	982	1	501	N/A	309	N/A	(a) 277 (c) 299	277
Bent 3	30" CIDH	340.00	1646	1009	1	534	N/A	318	N/A	(a) 274 (c) 299	274
Bent 4	30" CIDH	340.00	1647	1004	1	521	N/A	312	N/A	(a) 274 (c) 299	274
Bent 5	30" CIDH	340.00	1665	1025	1	541	N/A	320	N/A	(a) 274 (c) 299	274
Bent 6	30" CIDH	340.00	1589	961	1	498	N/A	302	N/A	(a) 277 (c) 300	277
Bent 7	30" CIDH	340.00	1203	746	1	426	N/A	256	N/A	(a) 283 (c) 303	283
Bent 8	30" CIDH	340.00	1606	946	1	500	N/A	295	N/A	(a) 277 (c) 299	277
Bent 9	30" CIDH	340.00	1666	1019	1	549	N/A	317	N/A	(a) 273 (c) 299	273
Bent 10	30" CIDH	340.00	1658	1016	1	537	N/A	310	N/A	(a) 274 (c) 299	274
Bent 11	30" CIDH	340.00	1606	983	1	506	N/A	298	N/A	(a) 276 (c) 299	276
Abut 12	30" CIDH	243.75	1032	827	1	233	N/A	N/A	N/A	(a) 311	311

Notes

(i) Design tip elevations are controlled by (a) Compression (Strength Limit), (b) Tension (Strength Limit), (c) Compression (Extreme Event), (d) Tension (Extreme Event), (e) Lateral Load (not included in this table) respectively.

(ii) The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.

TABLE 9C: FOUNDATION DESIGN RECOMMENDATIONS – RETAINING WALL 1

Support Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Footing		Total Permissible Footing Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elev.[(i)] (ft)	Specified Tip Elev. (ft)[(ii)]
						Strength Limit		Extreme Event			
			Total	Permanent		Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
Pt 1	36" CIDH	331.25	2726	2615	1	439	N/A	436	N/A	(a) 281 (c) 290	281
Pt 2	36" CIDH	331.25	3687	3526	1	420	N/A	421	29	(a) 283 (c) 291 (d) 313	283
Pt 3	36" CIDH	331.25	1927	1833	1	480	N/A	467	9	(a) 279 (c) 289 (d) 318	279
Pt 4	36" CIDH	331.25	2161	2051	1	414	N/A	397	N/A	(a) 283 (c) 292	283
Pt 5	36" CIDH	331.25	3627	3430	1	481	N/A	451	N/A	(a) 279 (c) 289	279
Pt 6	36" CIDH	331.25	3263	3082	1	494	N/A	455	N/A	(a) 278 (c) 289	278

Notes

(i) Design tip elevations are controlled by (a) Compression (Strength Limit), (b) Tension (Strength Limit), (c) Compression (Extreme Event), (d) Tension (Extreme Event), (e) Lateral Load (not included in this table) respectively.

(ii) The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.

TABLE 10A: PILE DATA TABLE – SACRAMENTO RIVER BRIDGE

Location	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft)	Specified Tip Elev. (ft)
		Compression	Tension		
Bent 2	144” CIDH	12490	N/A	(a) 219	219
Bent 3	144” CIDH	11850	N/A	(a) 220	220
Bent 4	108” CIDH	7840	N/A	(a) 227	227
Bent 5	108” CIDH	6375	N/A	(a) 230	230
Bent 6	108” CIDH	6395	N/A	(a) 229	229
Abut. 7	48” CIDH	1120	800	(a) 264 (b) 302	264

(1) Design tip elevations for Abutments are controlled by: (a) Compression and (b) Lateral Load
(2) Design tip elevations for Bents are controlled by: (a) Compression, (b) Tension, (c) Lateral Load.
(3) The design tip elevation due to the lateral load are estimated by the designer and not included in the pile data tables above

TABLE 10B: PILE DATA TABLE – SACRAMENTO OVERFLOW BRIDGE

Location	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft)	Specified Tip Elev. (ft)
		Compression	Tension		
Abut 1	30” CIDH	360	N/A	(a) 312	312
Bent 2	30” CIDH	813	N/A	(a) 277	277
Bent 3	30” CIDH	867	N/A	(a) 274	274
Bent 4	30” CIDH	846	N/A	(a) 274	274
Bent 5	30” CIDH	878	N/A	(a) 274	274
Bent 6	30” CIDH	808	N/A	(a) 277	277
Bent 7	30” CIDH	692	N/A	(a) 283	283
Bent 8	30” CIDH	812	N/A	(a) 277	277
Bent 9	30” CIDH	891	N/A	(a) 273	273
Bent 10	30” CIDH	872	N/A	(a) 274	274
Bent 11	30” CIDH	821	N/A	(a) 276	276
Abut 12	30” CIDH	378	N/A	(a) 311	311

(1) Design tip elevations for Abutments are controlled by: (a) Compression and (b) Lateral Load
(2) Design tip elevations for Bents are controlled by: (a) Compression, (b) Tension, (c) Lateral Load.
(3) The design tip elevation due to the lateral load are estimated by the designer and not included in the pile data tables above

TABLE 10C: PILE DATA TABLE – RETAINING WALL 1

Location	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft)	Specified Tip Elev. (ft)
		Compression	Tension		
Pt 1	36" CIDH	674	N/A	(a) 281	281
Pt 2	36" CIDH	645	29	(a) 283 (c) 313	283
Pt 3	36" CIDH	737	9	(a) 279 (c) 318	279
Pt 4	36" CIDH	636	N/A	(a) 283	283
Pt 5	36" CIDH	739	N/A	(a) 279	279
Pt 6	36" CIDH	759	N/A	(a) 278	278

(1) Design tip elevations for the retaining walls are controlled by: (a) Compression (b) Lateral Load and (c) Tension

(2) The design tip elevation due to the lateral load are estimated by the designer and not included in the pile data tables above

Shaft software was used for the pile axial capacity analyses. The capacity estimation is based on procedures proposed by Reese and O'Neil (1999), which utilize α factor (α=0.55) for "Clay" and β factor for "Sand" where β is a function of depths below ground surface and independent of soil friction angle.

When the subsoils are competent (SPT-N > 50), the U.S. Department of Transportation Federal Highway Administration Publication (FHWA) manual (1999; FHWA-IF-99-025) classifies the material as either cohesive or cohesionless Intermediate Geomaterial (IGM). A cohesionless IGM is a sand-like or gravel-like material that exhibits SPT-N > 50 blows/per foot. A procedure was proposed for shaft capacity evaluation using OCR and K_0 (empirical estimated from SPT-N values). Per the boring data, the materials encountered are dense sand and gravel with cobbles and volcanic deposits that meet the criteria for "Cohesionless IGM" per O'Neill and Reese (1999; FHWA-IF-99-025).

The side friction capacities of the piles socketed in rock were calculated per FHWA Manual "FHWA-NHI-10-016" using a regression coefficient "C" of 1.0 as recommended in this publication. The design is based on side friction only.

Group resistance reduction coefficients of 0.75 and 0.88 were applied to our analyses for pile groups with center-to-center pile spacings of 3.0 and 3.5, respectively.

12.2.2 Lateral Pile Design

Under seismic loading conditions, lateral pile capacity analyses should be performed for the foundation piles at the abutments and bents using the LPILE program. "P-y Curve Modification Factors" shown in the table below should be used for the lateral capacity analysis of the piles.

TABLE 11: P-MULTIPLIERS

Pile Location	Approximate Center-to-Center Pile Spacing	P-Multiplier Longitudinal to the Bridge	P-Multiplier Transverse to the Bridge
Sacramento River Bridge –All Bents	Single Piles	1.00	1.00
Sacramento River Bridge – Abutment 7	3 times the pile diameter	0.65	0.53
Sacramento Overflow Bridge - All Abutments & Bents	3.25 times the pile diameter	0.93	0.54
Retaining Wall 1	3.25 times the pile diameter	0.49	0.68

The recommended geotechnical parameters for L-PILE analyses are include in the tables below

TABLE 12A: L-PILE PARAMETERS FOR BENTS 2, 3 (SRB)
(GRADE AT ELEV. VARIES, DESIGN GW AT ELEV. +330')

Approx. Elev.* (ft)	Generalized Soil Profile	LPILE Soil Type	Probable Soil Strength	Effective Unit Wt. (pcf)	ε_{50}	k (pcf)
Existing Grade to 300	GM	Sand (Reese)	ϕ = 34°	65	-	Default
300 to 295	GP	Sand (Reese)	ϕ = 37°	65	-	Default
295 to 280	GM,SM	Sand (Reese)	ϕ = 40°	65	-	Default
Below 280	GM, SM (cemented)	Silt	c=2000psf ϕ = 40°	65	Default	Default

*The table is based on in-situ ground elevations. Scour should be considered during analysis per Section 3.4.1 of California Amendments to AASTHO LRFD Specifications

TABLE 12B: L-PILE PARAMETERS FOR BENTS 4, 5,6 (SRB)
(GRADE AT ELEV. VARIES, DESIGN GW AT ELEV. +330')

Approx. Elev.* (ft)	Generalized Soil Profile	LPILE Soil Type	Probable Soil Strength	Effective Unit Wt. (pcf)	ε_{50}	k (pcf)
Existing Grade to 330	GM, SM	Sand (Reese)	ϕ = 40°	125	-	Default
330 to 310	GM, SM	Sand (Reese)	ϕ = 40°	65	-	Default
Below 310	GM,SM (cemented)	Silt	c=2000psf ϕ = 40°	65	Default	Default

*The table is based on in-situ ground elevations. Scour should be considered during analysis per Section 3.4.1 of California Amendments to AASTHO LRFD Specifications

Table 12C: L-PILE PARAMETERS FOR ABUTMENT 7 (SRB) & RW1
(GRADE AT ELEV. VARIES, DESIGN GW AT ELEV. +330')

Approx. Elev.* (ft)	Generalized Soil Profile	LPILE Soil Type	Probable Soil Strength	Effective Unit Wt. (pcf)	ε_{50}	k (pcf)
Existing Grade to 330	SM	Sand (Reese)	ϕ = 31°	125	-	Default
330 to 320	SM	Sand (Reese)	ϕ = 34°	65	-	Default
Below 320	GM,SM (cemented)	Silt	c=2000psf ϕ = 40°	65	Default	Default

*The table is based on in-situ ground elevations. Scour should be considered during analysis per Section 3.4.1 of California Amendments to AASTHO LRFD Specifications

Table 12D: L-PILE PARAMETERS FOR SACRAMENTO OVERFLOW BRIDGE (GRADE AT ELEV. VARIES, DESIGN GW AT ELEV. +330')

Approx. Elev.* (ft)	Generalized Soil Profile	LPILE Soil Type	Probable Soil Strength	Effective Unit Wt. (pcf)	ε_{50}	k (pcf)
Existing Grade to 340	SC	Sand (Reese)	ϕ = 30°	125	-	Default
340 to 330	GM, SM	Sand (Reese)	ϕ = 34°	125	-	Default
330 to 326	GM, SM	Sand (Reese)	ϕ = 34°	65	-	Default
326 to 240	GM,SM,ML, SP-SM	Sand (Reese)	ϕ = 38°	65	-	Default

*The table is based on in-situ ground elevations. Scour should be considered during analysis per Section 3.4.1 of California Amendments to AASTHO LRFD Specifications

Embankment materials above the existing grade can be modelled as "Stiff Clay without Free Water" with cohesion of 1200 psf and total unit weight of 125 pcf.

12.2.3 Lateral Earth Pressures

Abutments, wing walls and retaining walls should be designed to resist the following Applied Lateral Earth Pressures (Equivalent Fluid Pressures-EFP) and live load. These values assume no hydrostatic pore pressure buildup behind the wall and are based on well-drained backfill behind the walls supported in native soil. If hydrostatic pressures are allowed to build up behind the walls, additional lateral loads should be considered in the design.

<u>Applied Lateral Earth Pressure</u>

a) Active Condition: Recommended active pressure is 36 pcf EFP for the engineered backfill.

b) At-Rest Condition: Recommended at-rest pressure is 55 pcf EFP for the engineered backfill.

c) Passive Resistance: 5.0 ksf (ultimate) for seismic design of the abutment backwall (5.5 feet or greater); for activated height less than 5.5 feet, modify proportionally i.e. 5.0x (H/5.5) ksf per. A minimum lateral wall

movement of 2% of wall height to mobilize the full ultimate passive resistance is required.

d) Seismic Resistance: Seismic design of the wall for seismic soil loads is not considered mandatory for wall located at sites where the site-adjusted PGA is less than or equal to 0.4g per AASHTO LRFD BDS 6th Edition. Therefore, no additional seismic lateral soil loads will be provided for the wall design.

Cantilever walls, which are free to rotate by at least 0.004 radian, may be assumed flexible and designed for the active condition. Walls that are not capable of this movement should be assumed rigid and designed for the at-rest condition. The effect of any surcharge (dead, live, or traffic load) should be added to the preceding lateral earth pressures. A coefficient of 0.28 and 0.44 may be used to determine the additional lateral earth pressures resulting from the surcharge for flexible walls and rigid walls, respectively. An equivalent soil height of 2 feet (250 psf) can be used for the live load surcharge. This resulted in the additional lateral earth pressures of 70 psf for the flexible walls and 110 psf for the rigid walls from the live load surcharge.

12.2.4 Spread footing at Abutment 1 of Sacramento River Bridge

The Abutment 1 of the Sacramento River Bridge is planned to be supported on spread footing. The foundation design data for this footing is shown in the table below.

TABLE 13: FOUNDATION DESIGN DATA – SACRAMENTO RIVER BRIDGE - ABUTMENT 1

Support No	Finish Grade Elevation (ft)	Bottom of Footing Elevation (ft)	Estimated Footing Dimensions (ft)		Permissible Settlement under Service Load (in)
			B	L	
Abutment 1	357	349	14	39.5	1

The factored bearing capacities of 7 ksf, 11.5 ksf and 21 ksf can be used for service limit state, strength limit state and extreme event limit state,

respectively. A factored sliding friction resistance coefficient of 0.5 (ϕ=1.0) can be used for the abutment on dense native sand/gravel or compacted Class 2 AB. The resistance factors are based on Table 11.5.7-1 of California Amendments to AASHTO LRFD BDS.

12.3 Approach Fill Earthwork

All grading operations should be performed in accordance with the project specifications and Caltrans Standard Specifications for Earthwork (Section 19). A representative from PARIKH or regulating agency should observe all excavated areas during grading and perform moisture and density tests on prepared subgrade and compacted fill materials.

12.3.1 Approach Fills

Approach fills of up to 10 and 20 feet is anticipated at the abutments of the Sacramento River Bridge and Sacramento Overflow Bridge, respectively. The subsurface soils generally consist of dense to very dense granular (gravels, sands, silty sands with some cobble pockets) and relatively permeable soils. The subsurface soil is considered suitable for the approach fill. Parts of the approach embankments will be within the 100-year flood level and redirect flow. For these embankments, permeable material as specified in 2010 Caltrans Standard Specifications Section 68-2.02F can be used near the slope face below the flood level with geotextile wrapping of these materials (at 2’ vertical lifts) as an erosion control measure.

12.3.2 Settlement & Waiting Period

The settlement under the planned fill is estimated to be insignificant (less than 1 inch) and the soils encountered are predominantly granular. A standard waiting period of 30 days is recommended.

13.0 GRADING

All grading operations should be performed in accordance with the project specifications and 2010 Caltrans Standard Specifications for Earthwork (Section 19). A representative from this office or regulating agency should observe all excavated areas during grading and perform moisture and density tests on prepared subgrade and compacted fill material.

Areas to receive embankment fill should be clean of vegetation, shrubs, trees, and their roots greater than 1 inch in diameter. If any soft or saturated soils are encountered during site grading, deeper excavation may be required to expose firm soils.

Engineered Fill

Any fill material imported to the site should be non-expansive, relatively granular material having a Plasticity Index (PI) of less than 15 and a minimum Sand Equivalent (SE) of 10. The maximum particle size of fill material should not be greater than 4 inches in largest dimension. It should also be non-corrosive, free of deleterious material and should be reviewed by the Geotechnical Engineer. The on-site soils may be used as engineered fill if they meet the above criteria.

Should there be any alterations of the proposed construction that will affect the stated bases of our recommendations, we should be informed so that we can review such changes and amend or submit additional recommendations.

Compaction of Fill and Subgrade

The recommendations for compaction as per Caltrans standards are as follows:

- 90% for general fill and backfilling after removing buried utilities and depressions caused due to construction activities, etc.
- 95% for all engineered fill for structural backfill of bridge abutments, footing subgrade, and for upper 6 inches of pavement subgrade and aggregate base of pavement sections.

Slope Ratio

For permanent fill slope, a maximum slope gradient of 2H:1V is recommended. The end slopes at the abutments should not be steeper than 1.5H:1V.

Soil slopes for excavation to construct Rock Slope Protection (RSP) may use a maximum temporary 1H:1V slope gradient. For other temporary excavations for construction and access, a cut/compacted fill slope of 1.5H:1V should be used. It should be noted that local irregularities such as loose layers and pockets and seepage might require flatter slopes.

We understand that during the approach embankment construction, it may be necessary to maintain the ongoing traffic on Jellys Ferry Road. Temporary retaining walls such as temporary MSE walls may be used in this situation. The design of these walls is the responsibility of the specialty contractor.

This office should review the final grading plans prior to grading to see that the intent of our recommendations is included in the plans.

14.0 PAVEMENT SECTIONS

Pavement design for flexible hot mix asphalt (HMA) was based on the current Caltrans Highway Design Manual. The pavement design is governed by the planned embankment material. Traffic Indexes (TI) of 7 and 5 was provided by the Designer for Jellys Ferry Road and Minor Roads, respectively. We performed R-value tests on three samples in our lab and R-values were estimated as 31, 70, 67, 28 and 34 for Borings B-1, B-7, A-14-OFS-005, A-14-OFS-006 and A-14-OFS-007, respectively. We used an R-value of 25 for design for the on-site soils. Parts of the pavement will be on fill. It is recommended that the imported material within 4ft of the pavement has minimum R-value of 25. The pavement section calculations are shown in Appendix V of this report. Following is our recommendations for design of structural pavement sections.

TABLE 14: RECOMMENDED (MINIMUM) STRUCTURAL PAVEMENT SECTIONS

TI	R-value	Structural Pavement Section (ft)		
		Option 1		Option 2*
		HMA	AB	AB
7 (Jellys Ferry Road)	25	0.35	0.85	-
5 (Minor Road)		0.25	0.55	1.20

*AB only pavement is a non-standard pavement type and maintenance of it may be costly due to the lack of an HMA surface wearing course.
HMA: Hot Mix Asphalt (Type A);
AB: Aggregate Base (Class 2) with R-value equal to 78;

Borings A-14-OFS-005, A-14-OFS-007 and R-14-OFS-004 were drilled through existing asphalt pavement with the pavement thicknesses of 1.5" AC over 1" AB, 2" AC and 2" AC for R-14-OFS-004, A-14-OFS-005 and A-14-OFS-007, respectively.

Aggregate Base: Class 2 aggregate base shall conform to the provisions in Section 26-1.02B of the 2010 Caltrans Standard Specifications. It shall also be clean and free from organic matter and other deleterious substances.

15.0 BUREAU OF LAND MANAGEMENT SITE

The proposed bridge replacement project requires temporary and permanent modification of a portion of adjacent Bureau of Land Management (BLM) recreational facilities in order to construct the new bridge over the main Sacramento River channel. Below are the recommended pavement sections for this site.

TABLE 15: GEOTECHNICAL RECOMMENDATIONS FOR BLM SITE FEATURES

Item	Feature	Recommendation
A	Outdoor Recreational Access Route	2" DG / 10"AB Class 2 shown on the plans can be used for the access route.
B	Concrete Path	6" PCC / 4" AB Class 2 can be used for the concrete path.
C	Accessible Picnic Unit (20'x20')	Allowable Bearing Capacity=2.5ksf Lateral Active Soil Pressure=36 EFP Lateral At-Rest Soil Pressure=55pcf EFP Lateral Passive Soil Pressure=350 pcf EFP
D	Jelly's Ferry Entrance Sign Foundation	BLM standard plan can be used.
E	Equestrian (Truck and Trailer) Parking	Section 14 "Minor Road" pavement recommendations apply
F	Standard Parking	Section 14 "Minor Road" pavement recommendations apply
G	ADA Parking	Section 14 "Minor Road" pavement recommendations apply

16.0 NOTES TO DESIGNER

It is our understanding that the lateral pile analysis will be conducted by the structural engineer. It is recommended that the structure engineer verify the pile tip elevations when finalizing the pile data table. Should the specified pile tip elevation required to meet lateral load demands exceed the specified pile tip elevation given within this report, the Geotechnical Engineer must be contacted for further recommendations.

17.0 CONSTRUCTION CONSIDERATIONS

17.1 General Consideration

A safe working distance from underground and overhead utilities should be provided during construction work. If this is not possible, the utility lines may need to be cleared from the site before the start of construction work.

17.2 CIDH Concrete Piles

Due to the dense gravel and large size cobbles and boulders, drilling for the investigation was very strenuous. Large size gravels and cobbles caved in from time to time since the boreholes could not be stabilized by drilling mud. The driller had to frequently clean the hole and adjust the consistency of drilling mud. Based on the

drilling condition and rig response, it is our opinion that particles/cobbles of greater sizes are present and could not be brought up in the circulation.

2010 Caltrans standard specifications for "Cast-in-Place Concrete Piling" should be used for the construction of CIDH piles. It is expected that groundwater will be encountered during construction and "dry" condition as per the standard specifications Section 49-4 could not be maintained.

Vertical inspection pipes for acceptance testing should be provided in all CIDH piles that are 24 inches in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control groundwater. The acceptance test should include Gamma- Gamma Logging and may also include cross-hole sonic logging. Gamma-Gamma Logging should be performed in accordance with California Test 233 Standard (CT233) to check the homogeneity of CIDH piles. CT233 defines pile rejection criteria based on the statistical principles of mean and three standard deviations to analyze the homogeneity of a pile. Anomalies detected should be evaluated by the designer for their significance and potential impact on design and to see if mitigation plans are required. Details of the acceptance testing and Gamma-Gamma Logging are contained in Caltrans CT233.

Due to the presence of granular material and groundwater, raveling or caving is expected which may require additional drilling and cleaning effort and may increase the concrete volume for the piles. It is prudent to make the contractor aware of these conditions so that he takes appropriate steps to comply with the standards and maintain the integrity of the CIDH piles. The use of temporary steel casing should be anticipated at all times to maintain the integrity of the piles. It is also recommended that the specifications set certain criteria for qualifications and previous work experience requirements to pre-qualify the potential contractors. The intent is to help select qualified contractors to reduce construction issues.

All piles excavations should be observed by the geotechnical engineer or regulatory agency prior to the placement of reinforcement and concrete so that if conditions differ from those anticipated, appropriate recommendations can be made.

18.0 PLAN REVIEW

This report is prepared for the proposed "Sacramento River Bridge at Jellys Ferry Road Replacement Project". We recommend that final foundation plans for the proposed project to be reviewed by PARIKH prior to construction so that the intent of our recommendations is included in the project plans and specifications and to further see that no misunderstandings or misinterpretations have occurred. However, design-build elements should be reviewed only from overall compliance standpoint.

19.0 CONSTRUCTION OBSERVATION

To a degree, the performance of any structure is dependent upon construction procedures and quality control measures. Hence, geotechnical observation and testing of grading operations, foundation excavations, and observation of pile installations should be carried out by the Geotechnical Engineer. If the subsurface conditions different from those forming the basis of our recommendations are encountered, this office should be informed in order to assess the need for design changes. Therefore, the recommendations presented in this report are contingent upon good quality control and these geotechnical observations during construction.

20.0 INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices and are based on our site reconnaissance and the assumption that the subsurface conditions do not deviate from observed conditions. All work done is in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site. Unanticipated soil conditions are commonly

encountered and cannot be fully determined by taking soil samples and excavating test borings; different soil conditions may require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

This report has been prepared for the proposed project as described earlier, to assist the engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our conclusions and recommendations shall not be considered valid unless the changes or variations are reviewed and our recommendations modified or approved by us in writing.

This report is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the project and that necessary steps are also taken to see that the recommendations are carried out in the field.

The findings in this report are valid as of the present date. However, changes in the subsurface conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

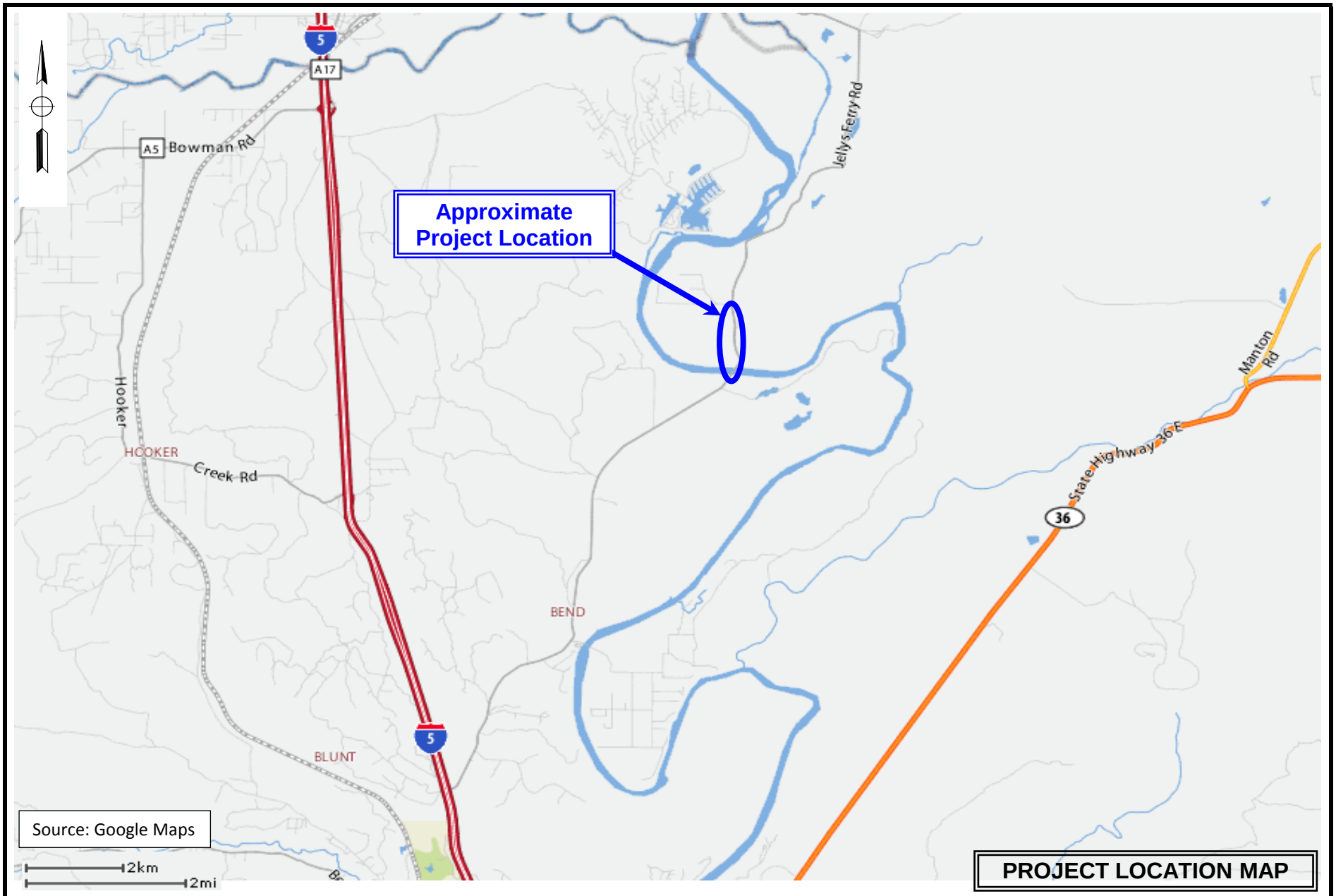
Respectfully submitted,
PARIKH CONSULTANTS, INC.

A. Emre Ortakci, P.E., 76040
Project Engineer

Y. David Wang, Ph.D., P.E. 52911
Senior Project Engineer

Gary Parikh, P.E., G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12/31/2015
GEOTECHNICAL
STATE OF CALIFORNIA

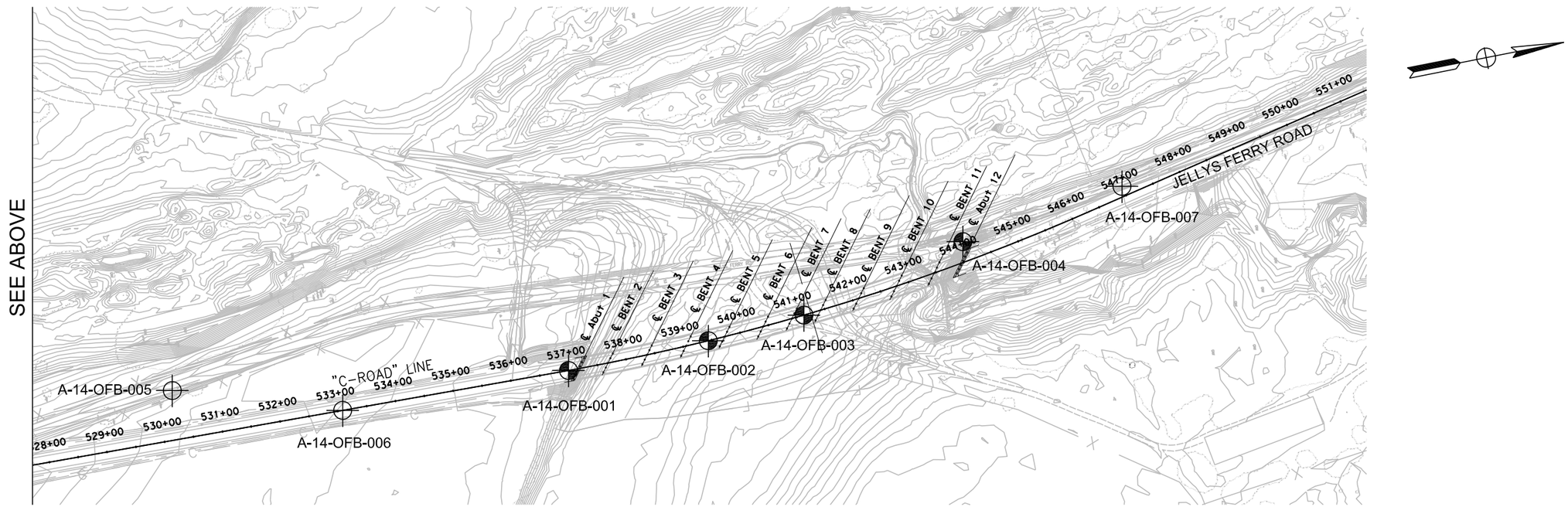


PROJECT LOCATION MAP

PARIKH
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	PLATE NO.: 1



SITE PLAN

LEGEND

B-1
Approx. Boring Location

A-14-OFB-005
Approx. R-Value Boring Location

SCALE 1 inch = 200 feet

Note: All units are in feet unless otherwise specified
Reference Map was provided by T.Y. Lin International

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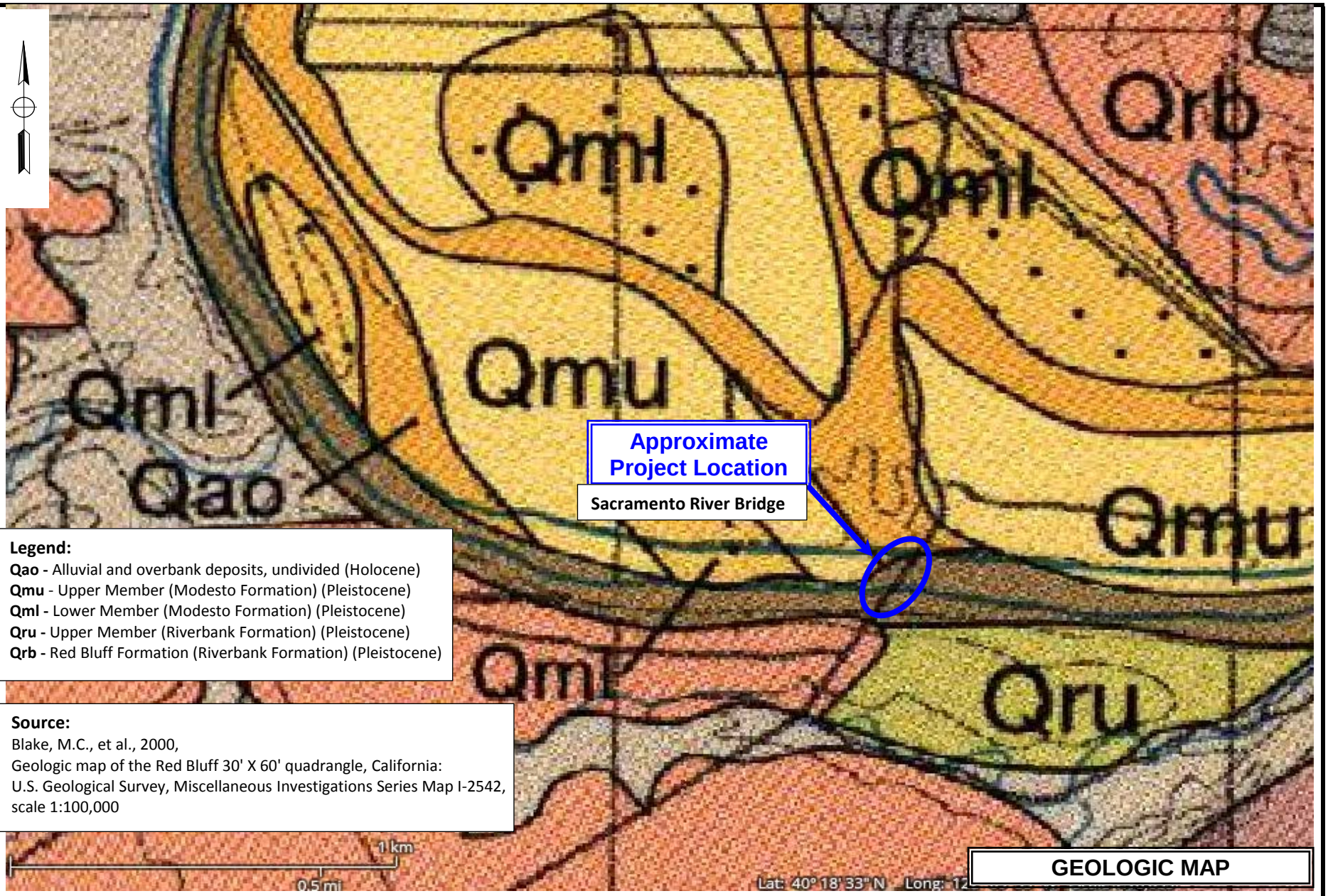
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG

PLATE NO: 2



Legend:
Qao - Alluvial and overbank deposits, undivided (Holocene)
Qmu - Upper Member (Modesto Formation) (Pleistocene)
Qml - Lower Member (Modesto Formation) (Pleistocene)
Qru - Upper Member (Riverbank Formation) (Pleistocene)
Qrb - Red Bluff Formation (Riverbank Formation) (Pleistocene)

Source:
Blake, M.C., et al., 2000,
Geologic map of the Red Bluff 30' X 60' quadrangle, California:
U.S. Geological Survey, Miscellaneous Investigations Series Map I-2542,
scale 1:100,000

GEOLOGIC MAP

PARIKH
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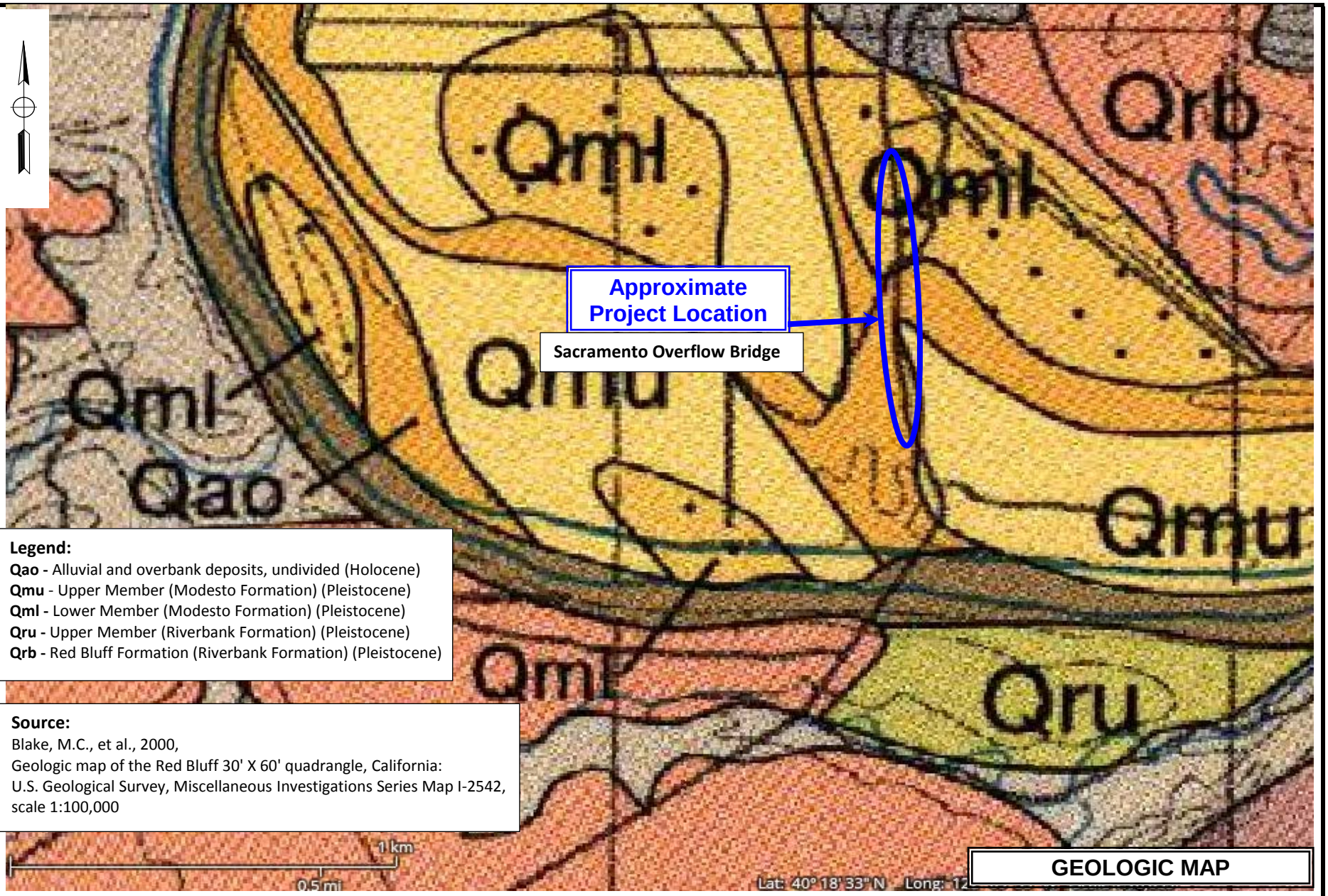
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	**PLATE NO.: 3A**



Legend:
Qao - Alluvial and overbank deposits, undivided (Holocene)
Qmu - Upper Member (Modesto Formation) (Pleistocene)
Qml - Lower Member (Modesto Formation) (Pleistocene)
Qru - Upper Member (Riverbank Formation) (Pleistocene)
Qrb - Red Bluff Formation (Riverbank Formation) (Pleistocene)

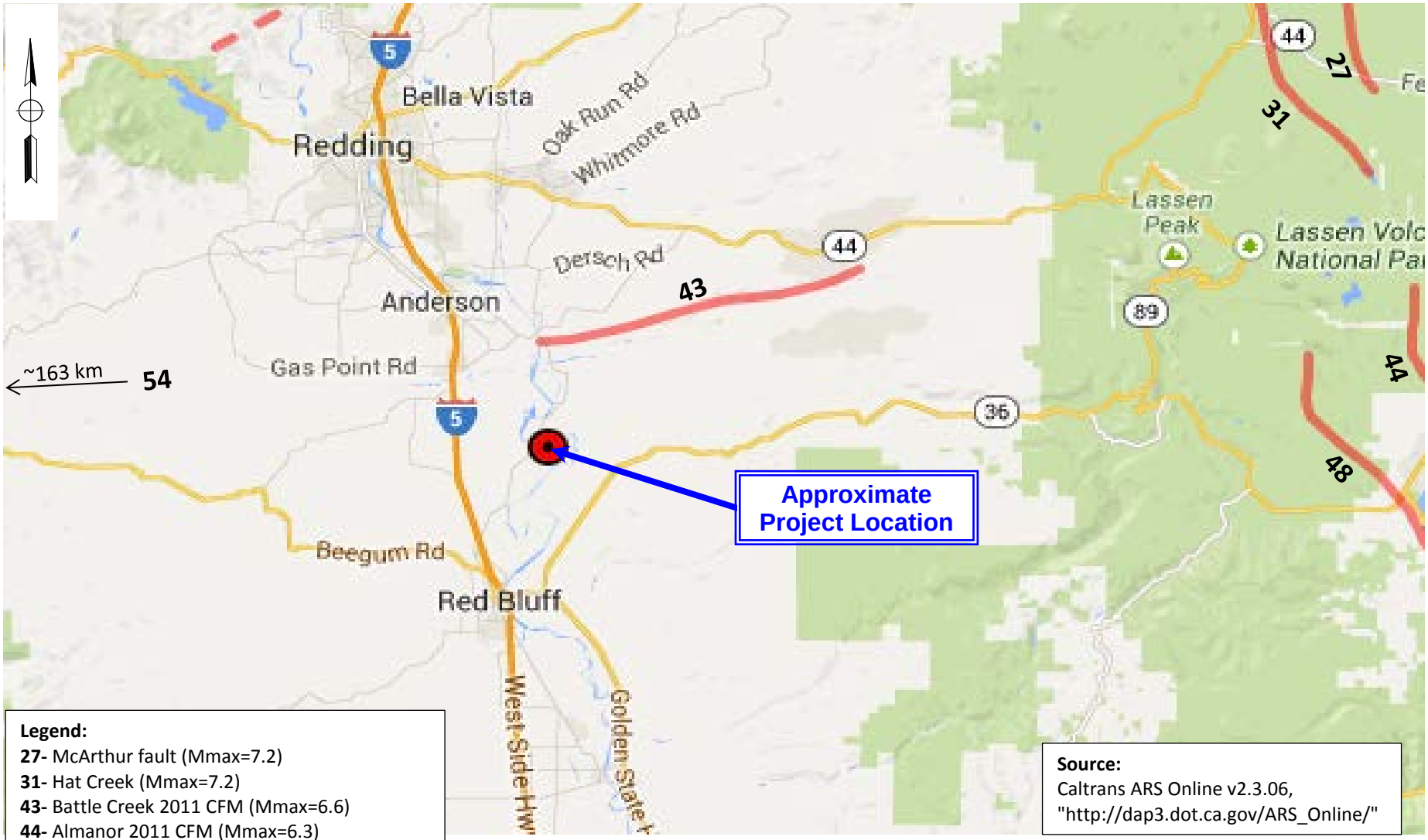
Source:
Blake, M.C., et al., 2000,
Geologic map of the Red Bluff 30' X 60' quadrangle, California:
U.S. Geological Survey, Miscellaneous Investigations Series Map I-2542,
scale 1:100,000

GEOLOGIC MAP

PARIKH
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	**PLATE NO.: 3B**



Legend:
27- McArthur fault (Mmax=7.2)
31- Hat Creek (Mmax=7.2)
43- Battle Creek 2011 CFM (Mmax=6.6)
44- Almanor 2011 CFM (Mmax=6.3)
48- Butt Creek fault zone (Mmax =7.0)
54- San Andreas (Offshore) 2011 CFM (MMax=8)

Source:
Caltrans ARS Online v2.3.06,
"http://dap3.dot.ca.gov/ARS_Online/"

CALTRANS ARS ONLINE MAP

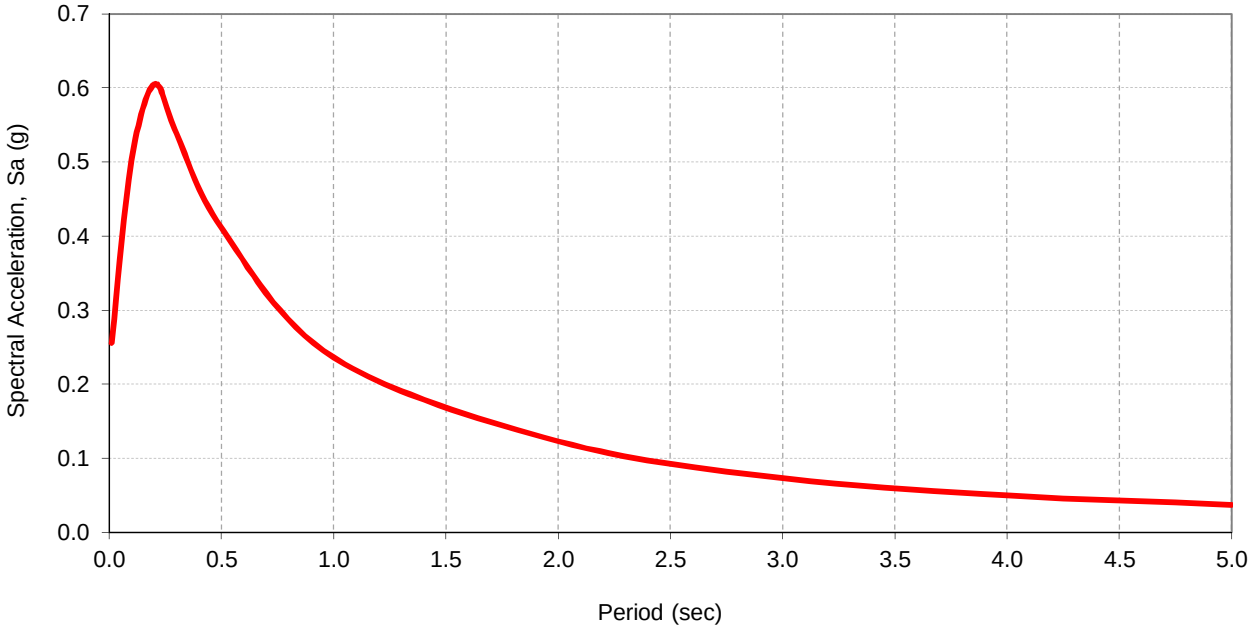
PARIKH
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	PLATE NO.: 4

RECOMMENDED ACCELERATION RESPONSE SPECTRUM

(5% Damping)



Site Information

Latitude:	40.3172
Longitude	-122.1900
V_{S30} (m/s) =	500
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	104.7

Recommended Response Spectrum

Period (sec)	Envelope Spectral Acceleration(g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.256	1	1	0.256
0.1	0.503	1	1	0.503
0.2	0.605	1	1	0.605
0.3	0.538	1	1	0.538
0.5	0.411	1	1	0.411
1.0	0.236	1	1	0.236
2.0	0.123	1	1	0.123
3.0	0.073	1	1	0.073
4.0	0.05	1	1	0.050
5.0	0.037	1	1	0.037

Governing Curve:

Envelope of Caltrans Online Probabilistic & Deterministic ARS

Fault/s Governing Deterministic ARS

Battle Creek 2011 CFM (Fault ID: 43, Fault Type: Rev, Mmax: 6.6)

Source:

SACRAMENTO RIVER BRIDGE

1. Caltrans ARS Online tool (V.2, http://dap3.dot.ca.gov/ARS_Online/)
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)
3. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

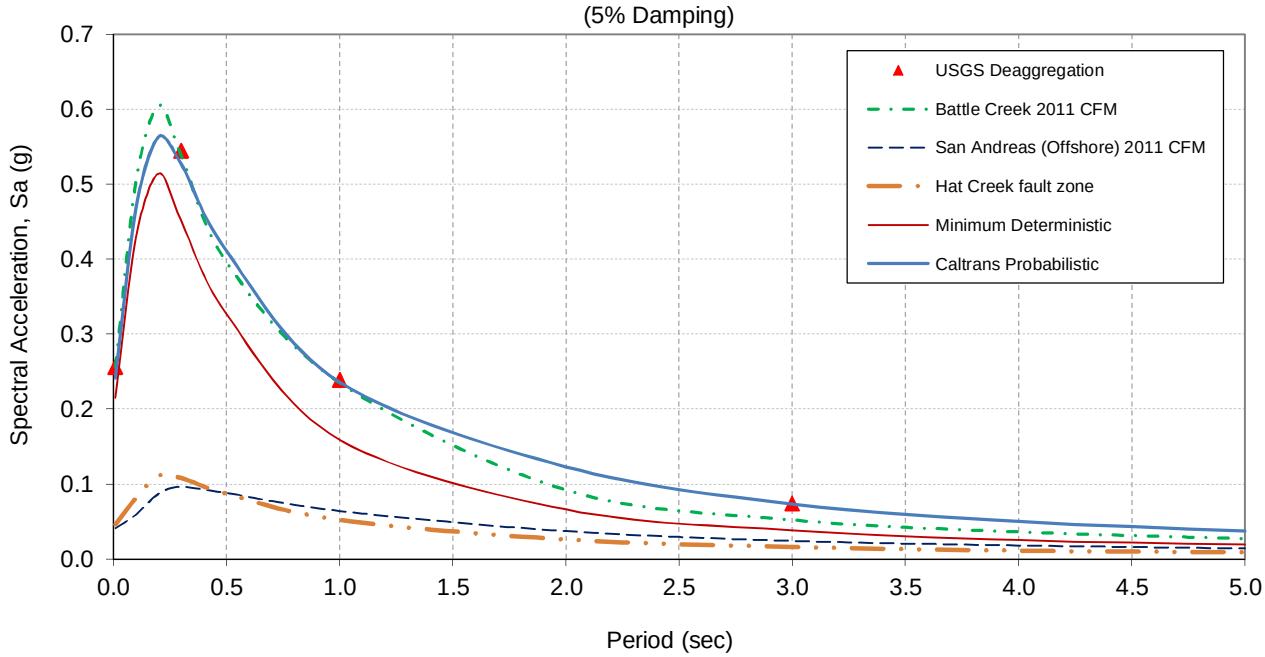
PARIKH Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CA

Project No.: 2000-119-OFS | **Plate No.: 5A**

ACCELERATION RESPONSE SPECTRUM COMPARISON

(Deterministic & Probablistic Curves)
(5% Damping)



Site Information

Latitude:	40.3172
Longitude	-122.1900
V_{S30} (m/s) =	500
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	104.7

	Final Adjusted Spectral Accelerations (g)					
Period (sec)	Battle Creek 2011 CFM	San Andreas (Offshore) 2011 CFM	Hat Creek fault zone	Minimum Deterministic	Caltrans Probabilistic	USGS Deaggregation
0.0	0.256	0.041	0.046	0.215	0.241	0.256
0.1	0.503	0.059	0.081	0.428	0.467	
0.2	0.605	0.087	0.111	0.514	0.563	
0.3	0.538	0.096	0.108	0.451	0.527	0.544
0.5	0.396	0.088	0.087	0.327	0.411	
1.0	0.235	0.064	0.052	0.159	0.236	0.239
2.0	0.092	0.037	0.026	0.066	0.123	
3.0	0.052	0.024	0.016	0.038	0.073	0.074
4.0	0.036	0.018	0.011	0.025	0.050	
5.0	0.027	0.014	0.009	0.019	0.037	

SACRAMENTO RIVER BRIDGE

Source:

1. Caltrans ARS Online tool (V.2, http://dap3.dot.ca.gov/ARS_Online/)
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)
3. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

PARIKH
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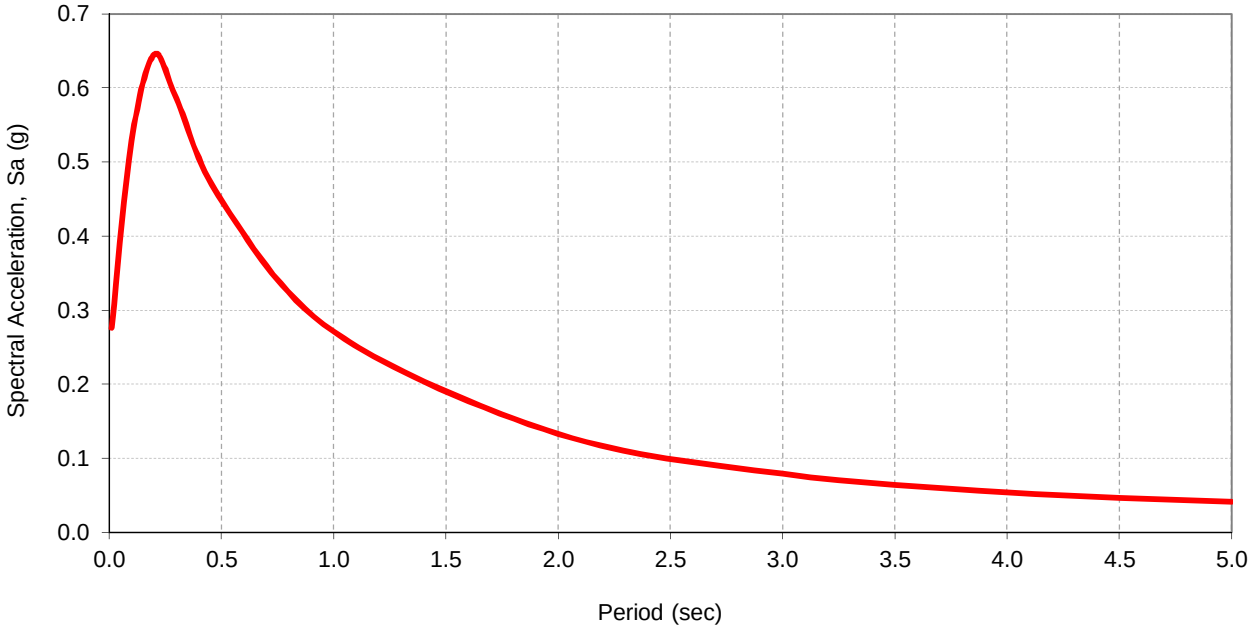
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CA

Project No.: 2000-119-OFS | **Plate No.: 5B**

RECOMMENDED ACCELERATION RESPONSE SPECTRUM

(5% Damping)



Site Information

Latitude:	40.3250
Longitude	-122.1892
V_{S30} (m/s) =	450
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	102.6

Recommended Response Spectrum

Period (sec)	Envelope Spectral Acceleration(g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.276	1	1	0.276
0.1	0.529	1	1	0.529
0.2	0.645	1	1	0.645
0.3	0.585	1	1	0.585
0.5	0.448	1	1	0.448
1.0	0.226	1.2	1	0.271
2.0	0.133	1	1	0.133
3.0	0.079	1	1	0.079
4.0	0.054	1	1	0.054
5.0	0.041	1	1	0.041

Governing Curve:

Envelope of Caltrans Online Probabilistic & Deterministic ARS

Fault/s Governing Deterministic ARS

Battle Creek 2011 CFM (Fault ID: 43, Fault Type: Rev, Mmax: 6.6)

Source:

SACRAMENTO OVERFLOW BRIDGE

1. Caltrans ARS Online tool (V.2, http://dap3.dot.ca.gov/ARS_Online/)
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)
3. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

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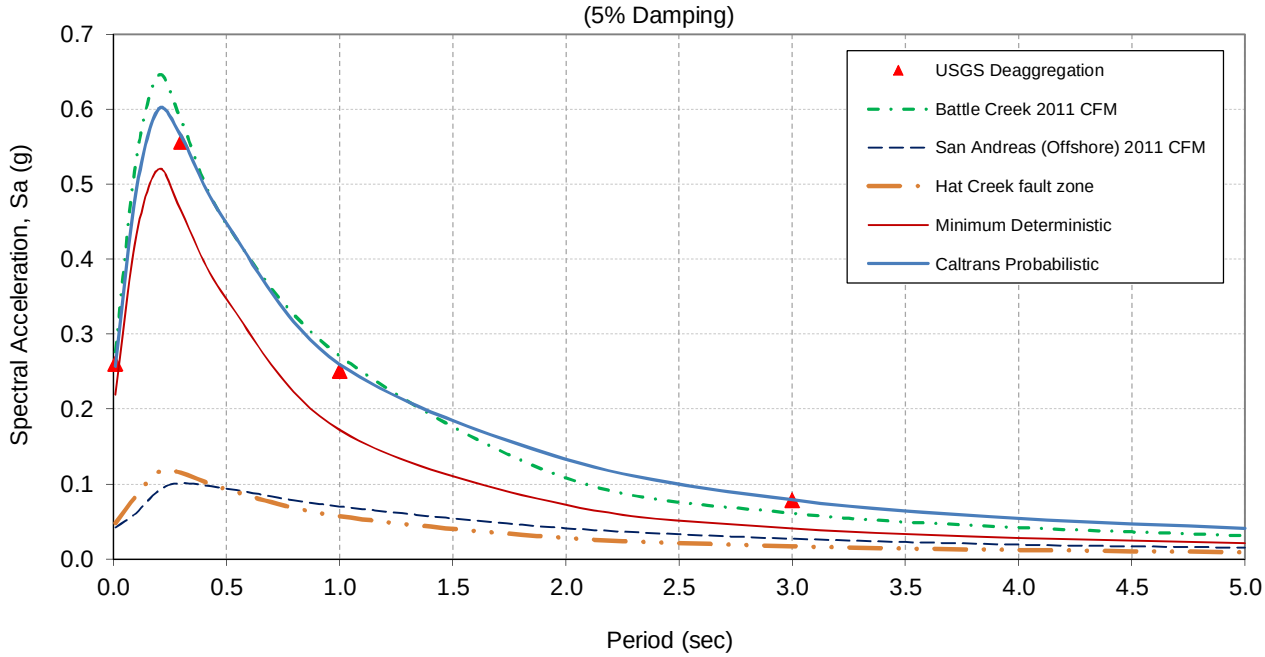
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CA

Project No.: 2000-119-OFS | **Plate No.: 5C**

ACCELERATION RESPONSE SPECTRUM COMPARISON

(Deterministic & Probablistic Curves)
(5% Damping)



Site Information

Latitude:	40.3250
Longitude	-122.1892
V_{S30} (m/s) =	450
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	102.6

	Final Adjusted Spectral Accelerations (g)					
Period (sec)	Battle Creek 2011 CFM	San Andreas (Offshore) 2011 CFM	Hat Creek fault zone	Minimum Deterministic	Caltrans Probabilistic	USGS Deaggregation
0.0	0.276	0.042	0.048	0.219	0.257	0.260
0.1	0.529	0.061	0.084	0.428	0.488	
0.2	0.645	0.091	0.116	0.520	0.600	
0.3	0.585	0.101	0.115	0.464	0.564	0.556
0.5	0.447	0.094	0.093	0.347	0.448	
1.0	0.271	0.070	0.057	0.172	0.260	0.251
2.0	0.108	0.041	0.028	0.072	0.133	
3.0	0.061	0.027	0.017	0.041	0.079	0.078
4.0	0.042	0.019	0.012	0.028	0.054	
5.0	0.031	0.015	0.009	0.021	0.041	

SACRAMENTO OVERFLOW BRIDGE

Source:

1. Caltrans ARS Online tool (V.2, http://dap3.dot.ca.gov/ARS_Online/)
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)
3. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

PARIKH
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SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CA

Project No.: 2000-119-OFS | **Plate No.: 5D**

CORE 1 & 2

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SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	**PLATE NO.: 6A**

CORE 3, 4 & 5

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SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	**PLATE NO.: 6B**

CORE 6 & 7

PARIKH
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	**PLATE NO.: 6C**

CORE 8 & 9 (PARTIAL)

PARIKH
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	**PLATE NO.: 6D**

CORE 9 (PARTIAL)

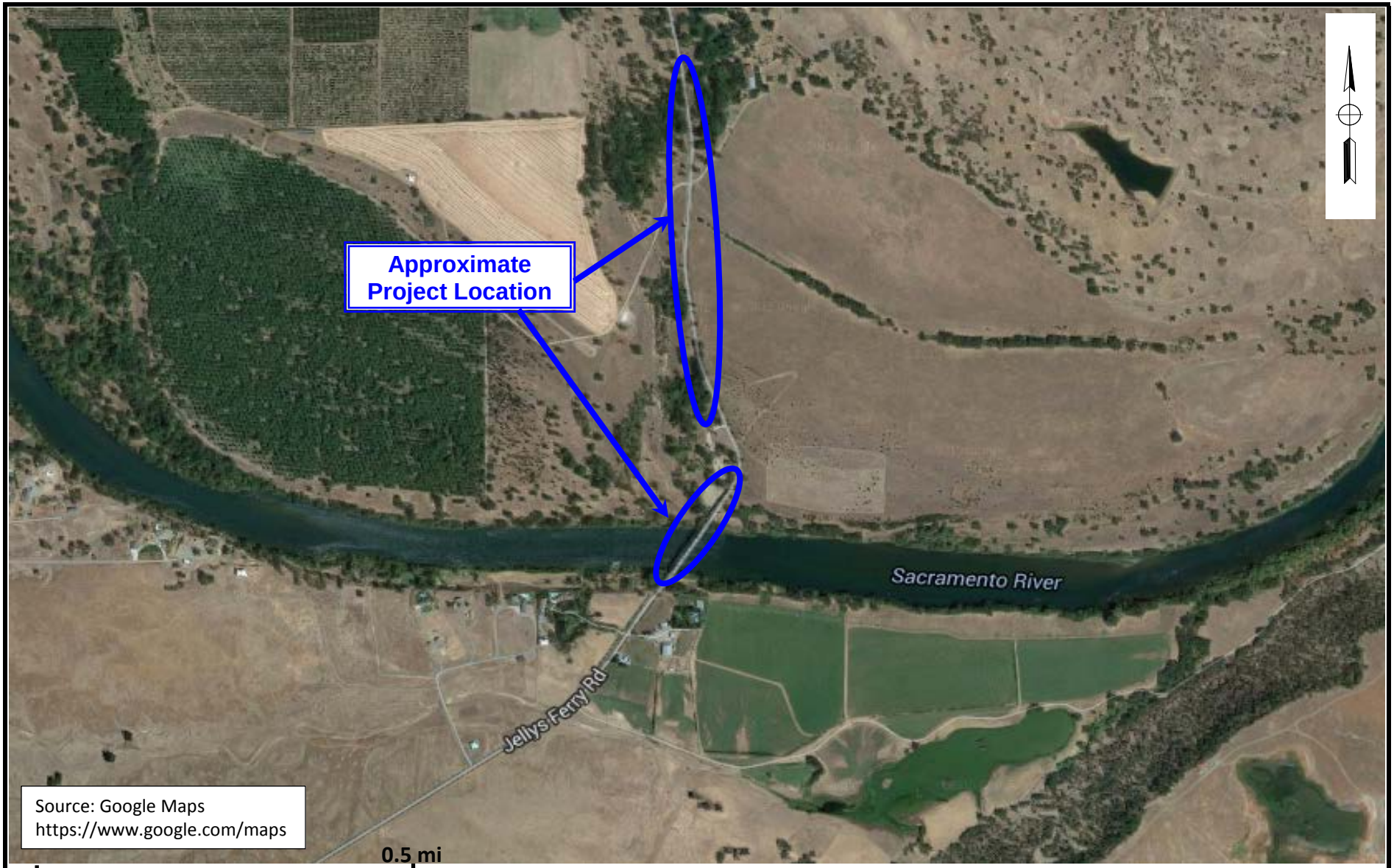
PARIKH
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	**PLATE NO.: 6E**

APPENDICES

APPENDIX I
Site Map



0.5 mi

2000 ft

SITE MAP

PARIKH
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG	PLATE NO.: I

APPENDIX II
Log of Test Borings

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
02	TEH	CO RD		113	138

REGISTERED CIVIL ENGINEER DATE

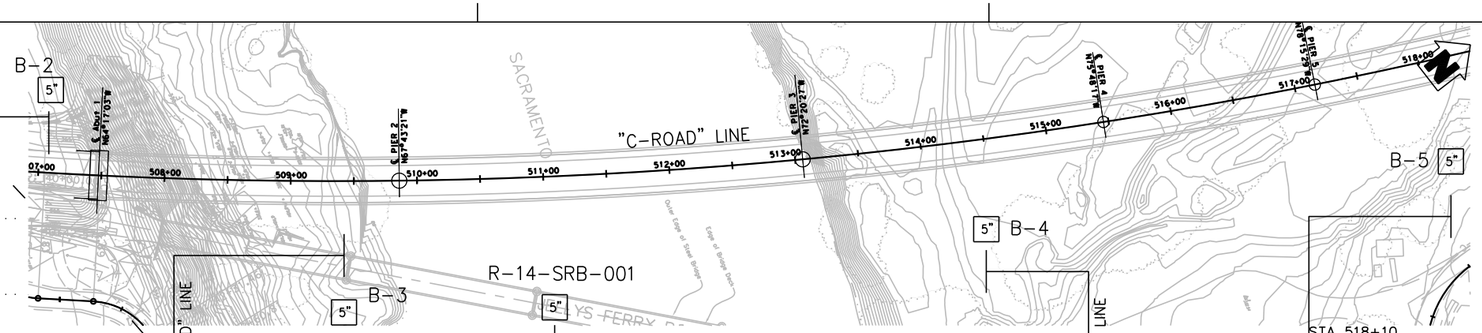
PLANS APPROVAL DATE

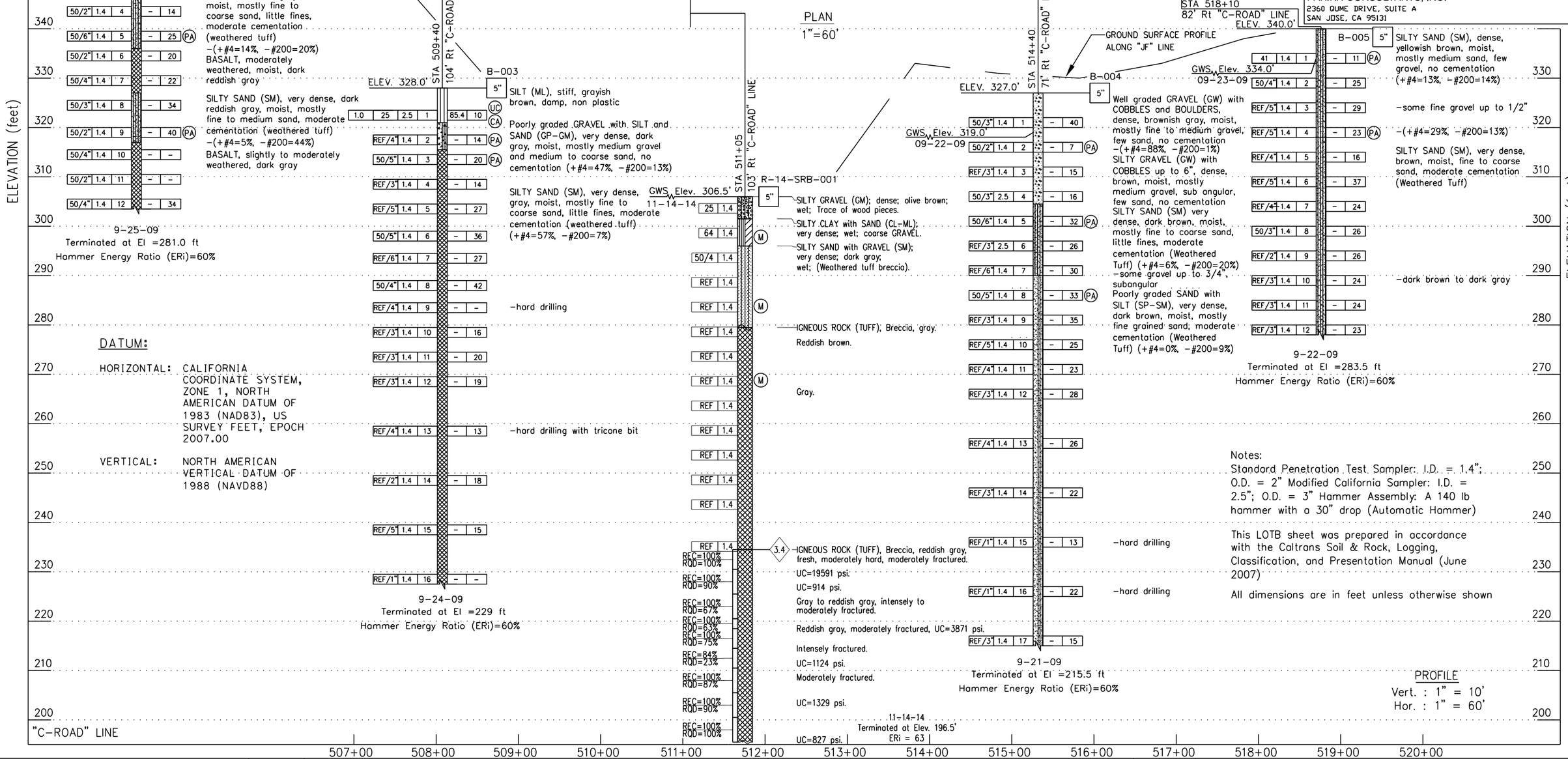
REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/15 — GEOTECHNICAL — STATE OF CALIFORNIA

T. Y. Lin International or its officers or agents shall not be responsible for the accuracy or completeness of scanned copies of this plan sheet.

T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131





DATUM:

HORIZONTAL: CALIFORNIA COORDINATE SYSTEM, ZONE 1, NORTH AMERICAN DATUM OF 1983 (NAD83), US SURVEY FEET, EPOCH 2007.00

VERTICAL: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

Notes:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2" Modified California Sampler: I.D. = 2.5"; O.D. = 3" Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock, Logging, Classification, and Presentation Manual (June 2007)

All dimensions are in feet unless otherwise shown

PROFILE
Vert. : 1" = 10'
Hor. : 1" = 60'

65% SUBMITTAL, NOT FOR CONSTRUCTION

TIME PLOTTED => $TIME
DATE PLOTTED => $DATE
USERNAME => $USER

DESIGN OVERSIGHT	DRAWN BY K. OUYANG	L. BHANGOO/V. SANTOS FIELD INVESTIGATION BY:	PREPARED FOR THE TEHAMA COUNTY PUBLIC WORKS DEPARTMENT
SIGN OFF DATE	CHECKED BY EMRE ORTAKCI	DATE: SEPTEMBER 2009/NOVEMBER 2014	D. WANG PROJECT ENGINEER

BRIDGE NO. 08C-0374 — POST MILES -

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD

LOG OF TEST BORINGS 1 OF 2

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU - EA -

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: ? 2/9/10

SHEET 32 OF 33

FILE => $REQUEST

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
02	TEH	CO RD		114	138

REGISTERED CIVIL ENGINEER DATE

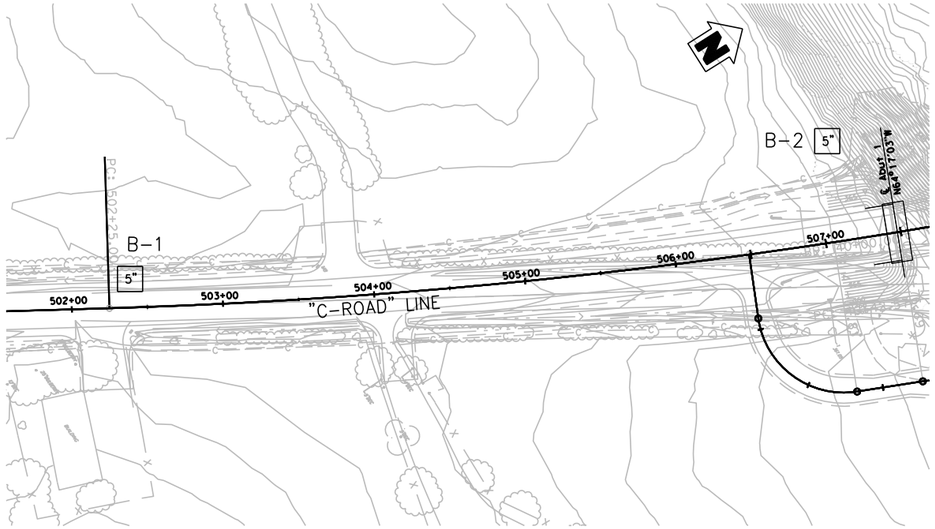
PLANS APPROVAL DATE

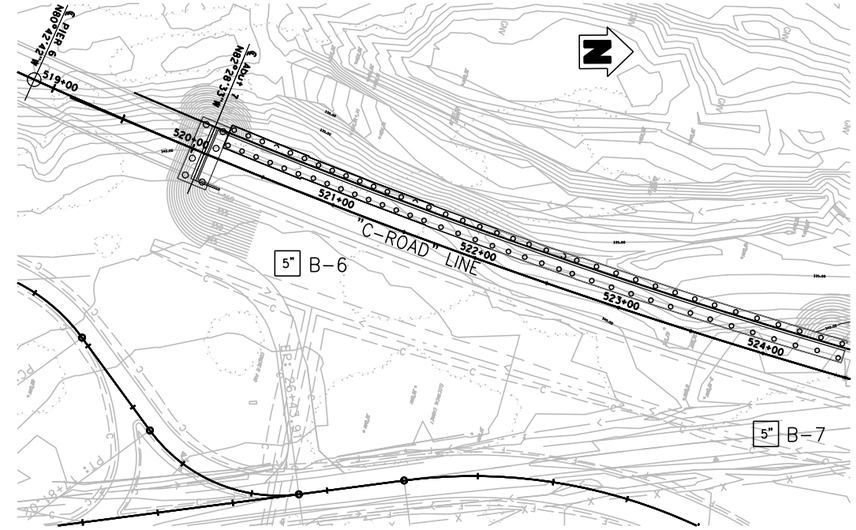
REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/15 — GEOTECHNICAL — STATE OF CALIFORNIA

T. Y. Lin International or its officers or agents shall not be responsible for the accuracy or completeness of scanned copies of this plan sheet.

T·Y·LIN INTERNATIONAL
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131



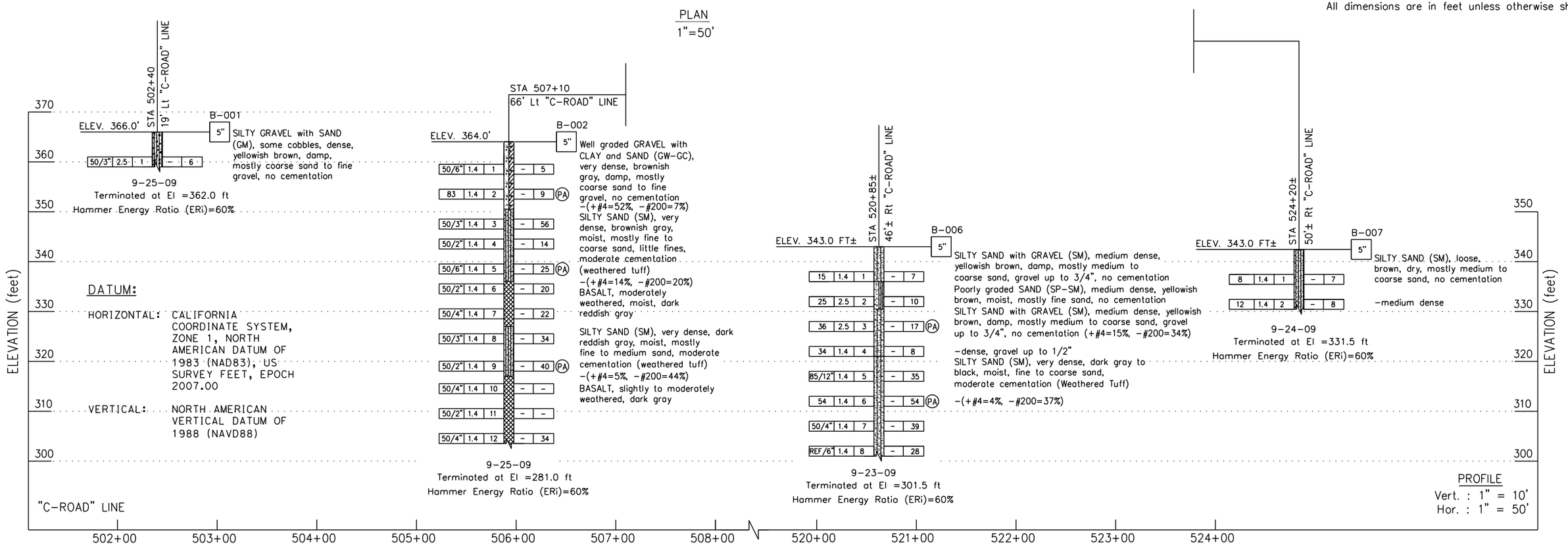


PLAN
1"=50'

Notes:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2" Modified California Sampler: I.D. = 2.5"; O.D. = 3" Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock, Logging, Classification, and Presentation Manual (June 2007)

All dimensions are in feet unless otherwise shown



65% SUBMITTAL, NOT FOR CONSTRUCTION

DESIGN OVERSIGHT	DRAWN BY	K. OUYANG	L. BHANGOO/V. SANTOS FIELD INVESTIGATION BY:	**PREPARED FOR THE TEHAMA COUNTY PUBLIC WORKS DEPARTMENT**	D. WANG PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	EMRE ORTAKCI	DATE: SEPTEMBER 2009		

BRIDGE NO. 08C-0374 — POST MILES –

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD

LOG OF TEST BORINGS 2 OF 2

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU – EA –

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: ? 2/9/10

SHEET 33 OF 33

FILE => $REQUEST

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USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED =>

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
02	TEH	JF		137	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/15 — GEOTECHNICAL — STATE OF CALIFORNIA

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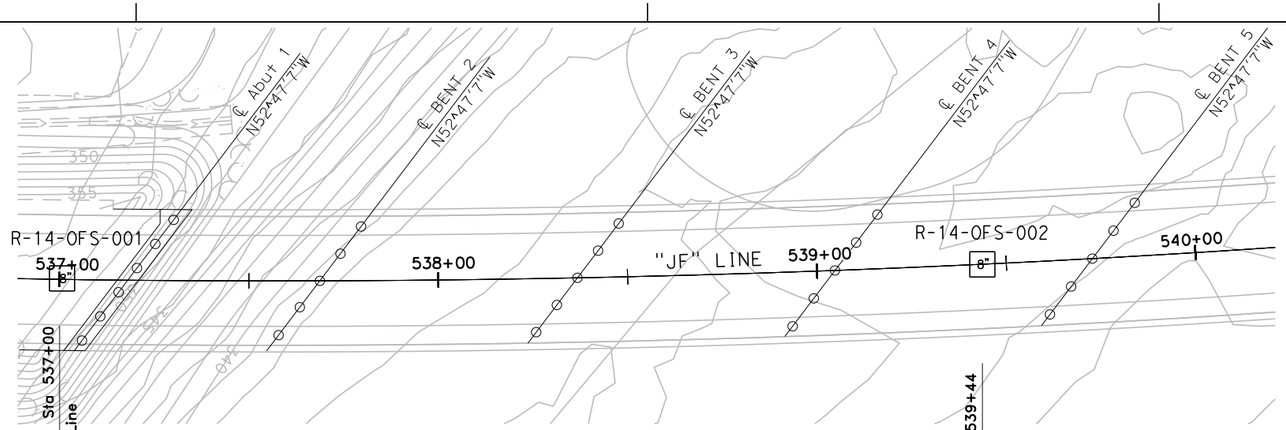
1601 RESPONSE ROAD, SUITE 260
SACRAMENTO, CA 95815

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

DATUM:

HORIZONTAL: CALIFORNIA COORDINATE SYSTEM, ZONE 1, NORTH AMERICAN DATUM OF 1983 (NAD83), US SURVEY FEET, EPOCH 2007.00

VERTICAL: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)



PLAN
1"=20'

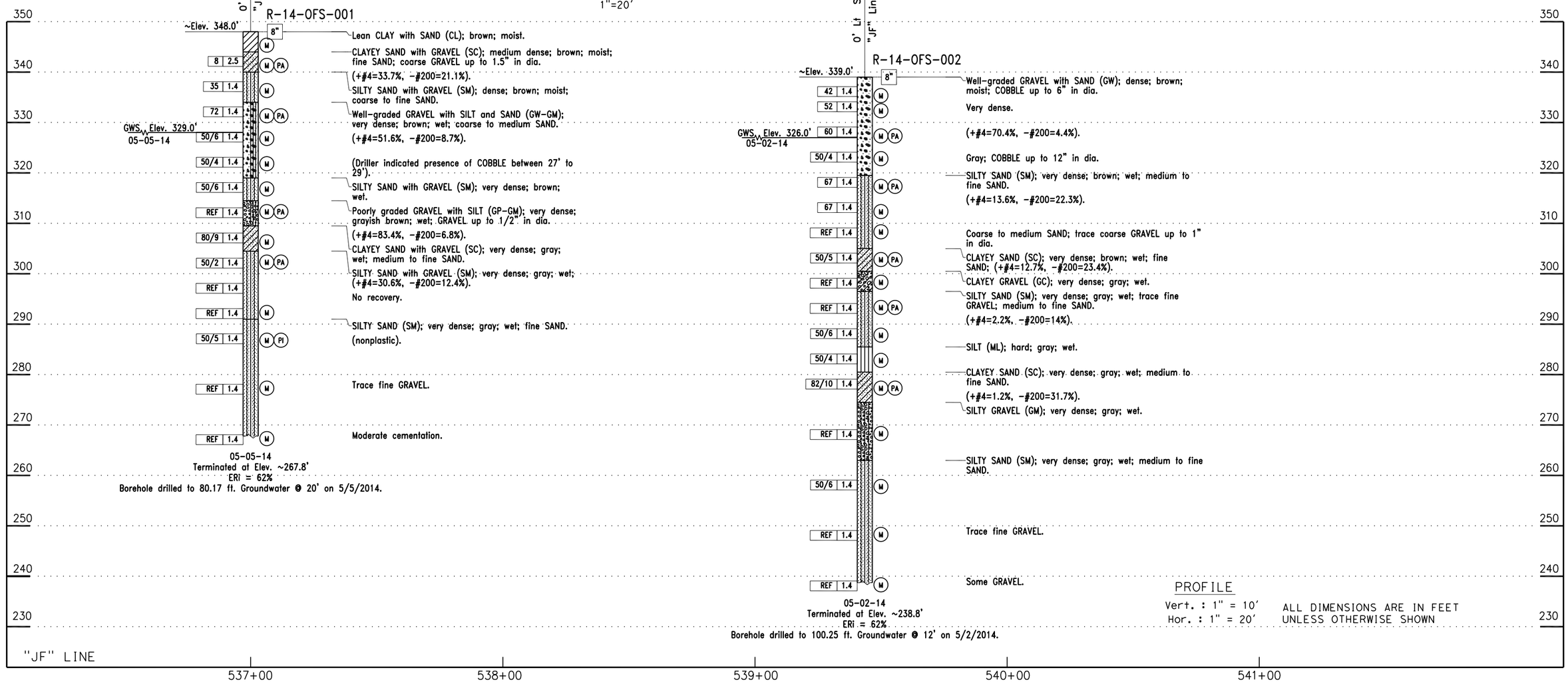
NOTES:

Standard Penetration Test Sampler: I.D.=1.4"; O.D.=2" Modified California Sampler: I.D.=2.5"; O.D.=3" Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock, Logging, Classification, and Presentation Manual (2010)

See Caltrans 2010 Standard Plans A10F, A10G and A10H for Soil and Rock Legends.

All dimensions are in feet unless otherwise shown



PROFILE
Vert. : 1" = 10'
Hor. : 1" = 20'

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

65% SUBMITTAL, NOT FOR CONSTRUCTION

DESIGN OVERSIGHT	DRAWN BY	K. OUYANG	L. BHANGOO FIELD INVESTIGATION BY:	PREPARED FOR THE TEHAMA COUNTY PUBLIC WORKS DEPARTMENT	D. WANG PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	EMRE ORTAKCI	DATE: APRIL/MAY 2014		

BRIDGE NO. 08C-0### POST MILES -

SACRAMENTO OVERFLOW BRIDGE AT JELLYS FERRY ROAD

LOG OF TEST BORINGS 1 OF 2

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU -
EA -

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET 23 | OF 24

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USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED =>

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
02	TEH	JF		138	138

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/15 — GEOTECHNICAL — STATE OF CALIFORNIA

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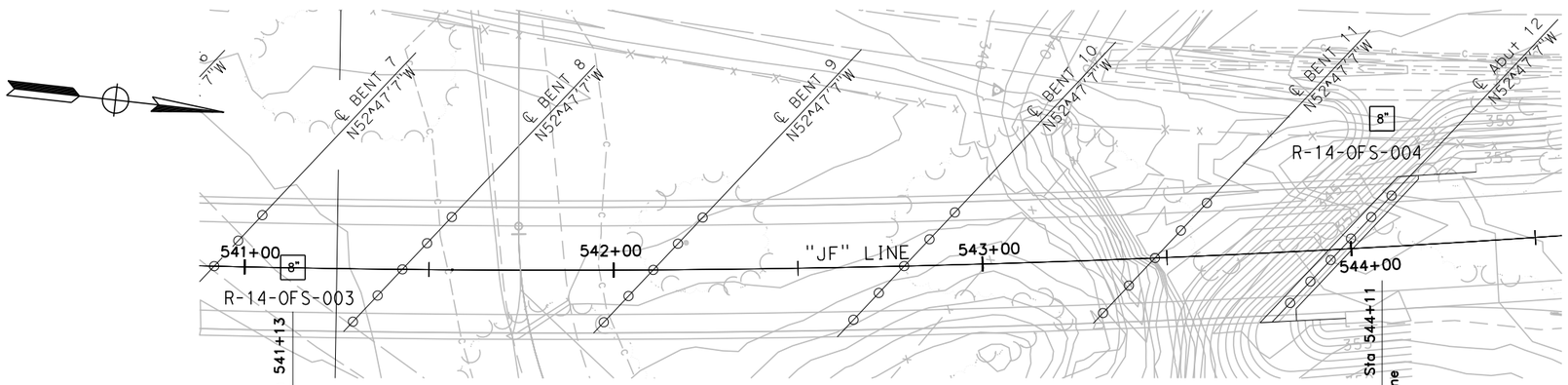

PLAN
1"=20'

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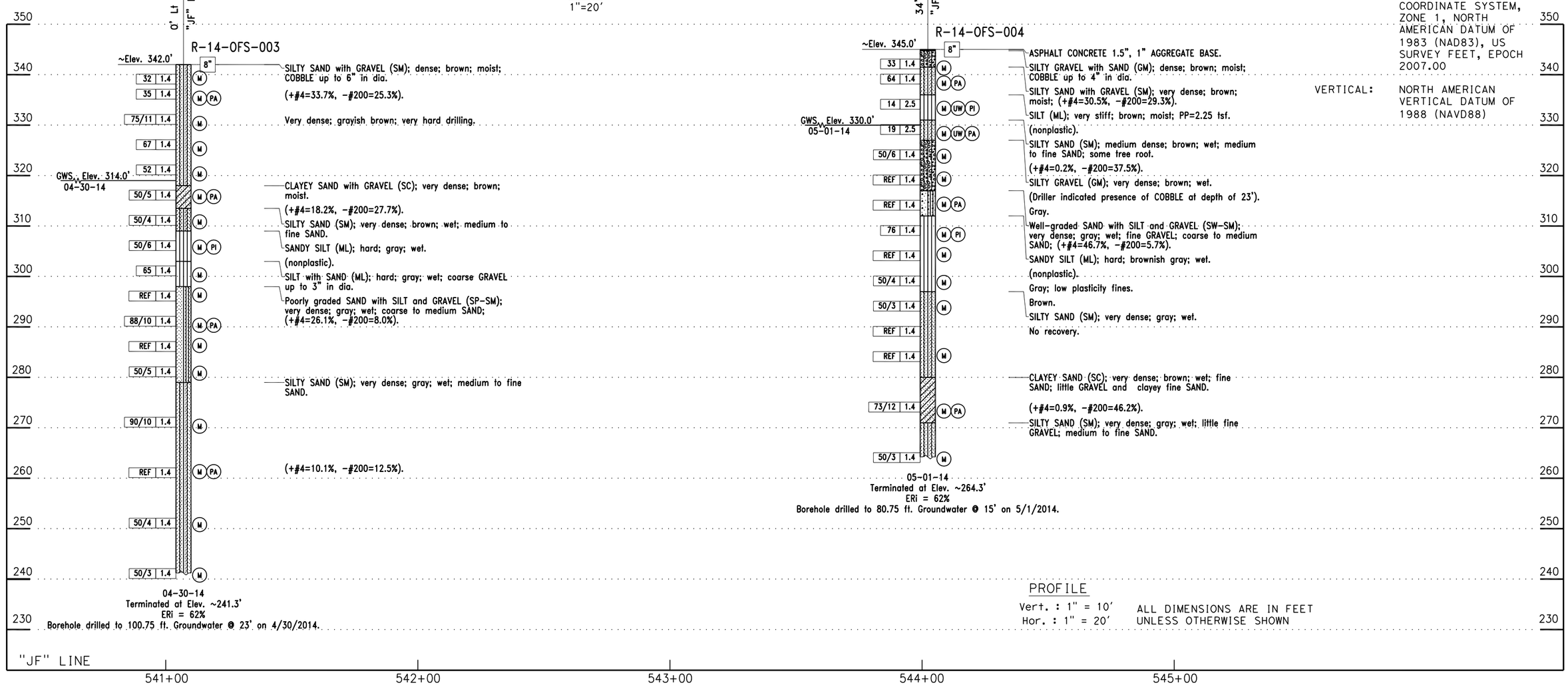

PROFILE
Vert. : 1" = 10'
Hor. : 1" = 20'

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

65% SUBMITTAL, NOT FOR CONSTRUCTION

DESIGN OVERSIGHT	DRAWN BY	K. OUYANG	L. BHANGOO FIELD INVESTIGATION BY:	PREPARED FOR THE TEHAMA COUNTY PUBLIC WORKS DEPARTMENT	D. WANG PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	EMRE ORTAKCI	DATE: APRIL/MAY 2014		

BRIDGE NO. 08C-0### POST MILES -

SACRAMENTO OVERFLOW BRIDGE AT JELLYS FERRY ROAD
LOG OF TEST BORINGS 2 OF 2

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU -
EA -

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET 24 OF 24

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APPENDIX III
Field Exploration and Testing

This appendix is not relevant to the report.

APPENDIX IV
Laboratory Test Results

APPENDIX IV

LABORATORY TESTS

Classification Tests
The field classification of the samples was visually verified in the laboratory according to the Unified Soil Classification System. The results are presented in “Log of Test Borings”, Appendix II.

Moisture-Density
The natural moisture contents and dry unit weights were determined for selected undisturbed samples of the soils in general accordance with ASTM Test Method D2216-92. This information was used to classify and correlate the soils. The results are presented at appropriate depths in "Log of Test Borings", Appendix II.

Atterberg Limits
The Atterberg Limits were determined for selected samples of the fine-grained materials. These results were used to classify the soils, as well as to obtain an indication of the effective strength characteristics and expansion potential with variations in moisture content. The Atterberg Limits were determined in general accordance with ASTM Test Method D4318-93. The results of these tests are presented on” Plasticity Chart”, Plates No. IV-2A and IV-2B, Appendix IV.

Grain Size Classification
Grain size classification tests (ASTM Test Method D422-63 and D6913) were performed on selected samples of granular soil to aid in the classification. The results are presented on “Grain Size Distribution Curves”, Plates No. IV-3A thru IV-3G, Appendix IV.

Rock Core Compressive Strength Test
A strength test was performed using an unconfined compression machine. Unconfined compression tests were performed in general accordance with ASTM Test Method C42. The results are presented on Plates No. IV-4A thru IV-4F, Appendix IV.

Corrosion Tests
Corrosion tests were performed on selected samples to determine the corrosion potential of the soils. The pH and minimum resistively tests were performed according to California Test Method 643. The sulfate content was determined in accordance with California Test Method 417. The chloride content was determined in accordance with California Test Method 422. The tests were performed by AP Engineering & Testing, Inc. The test results are presented on Plates No. IV-5A thru IV-5F, Appendix IV.

R-value Tests
R-value tests (ASTM Test Method D2844) were performed on representative bulk samples for pavement design. The test results are presented on Plates No. IV-6A thru IV-6E, Appendix IV.

Borehole	Sample Number	Depth	Classi-fication	Water Content	Dry Density	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Unconfined Shear Strength (tsf)
R-14-OFS-001	1	2.0	CL	8.8	-						
R-14-OFS-001	2	6.0	SC	7.8	-				33.7	21.1	
R-14-OFS-001	3	11.0	SM	8.2	-						
R-14-OFS-001	4	16.0	GW-GM	7.4	-				51.6	8.7	
R-14-OFS-001	5	20.5	GW-GM	9.1	-						
R-14-OFS-001	6	25.5	GW-GM	8.2	-						
R-14-OFS-001	7	30.5	SM	45.0	-						
R-14-OFS-001	8	35.0	GP-GM	18.6	-				83.4	6.8	
R-14-OFS-001	9	41.0	SC	40.8	-						
R-14-OFS-001	10	45.0	SM	42.4	-				30.6	12.4	
R-14-OFS-001	11	50.0	SM	-	-						
R-14-OFS-001	12	55.0	SM	68.5	-						
R-14-OFS-001	13	60.5	SM	36.6	-	NP	NP	NP			
R-14-OFS-001	14	70.0	SM	40.7	-						
R-14-OFS-001	15	80.0	SM	27.1	-						
R-14-OFS-002	1	3.0	GW	1.6	-						
R-14-OFS-002	2	6.0	GW	2.3	-						
R-14-OFS-002	3	11.0	GW	4.5	-				70.4	4.4	
R-14-OFS-002	4	15.5	GW	4.9	-						
R-14-OFS-002	5	21.0	SM	33.5	-				13.6	22.3	
R-14-OFS-002	6	26.0	SM	34.1	-						
R-14-OFS-002	7	30.0	SM	21.3	-						
R-14-OFS-002	8	35.5	SC	45.6	-				12.7	23.4	
R-14-OFS-002	9	40.0	GC	30.9	-						
R-14-OFS-002	10	45.0	SM	29.0	-				2.2	14.0	
R-14-OFS-002	11	50.5	SM	33.5	-						
R-14-OFS-002	12	55.5	ML	30.5	-						
R-14-OFS-002	13	61.0	SC	40.5	-				1.2	31.7	
R-14-OFS-002	14	70.0	GM	36.8	-						
R-14-OFS-002	15	80.5	SM	35.6	-						
R-14-OFS-002	16	90.0	SM	13.7	-						
R-14-OFS-002	17	100.0	SM	18.5	-						
R-14-OFS-003	1	2.0	SM	2.1	-						
R-14-OFS-003	2	6.0	SM	11.2	-				33.7	25.3	
R-14-OFS-003	3	11.0	SM	3.7	-						
R-14-OFS-003	4	16.0	SM	6.7	-						
R-14-OFS-003	5	21.0	SM	2.8	-						
R-14-OFS-003	6	25.5	SC	32.0	-				18.2	27.7	
R-14-OFS-003	7	30.5	SM	40.1	-						
R-14-OFS-003	8	35.5	ML	32.0	-	NP	NP	NP			
R-14-OFS-003	9	41.0	ML	29.8	-						
R-14-OFS-003	10	45.0	SP-SM	15.5	-						
R-14-OFS-003	11	51.0	SP-SM	20.1	-				26.1	8.0	

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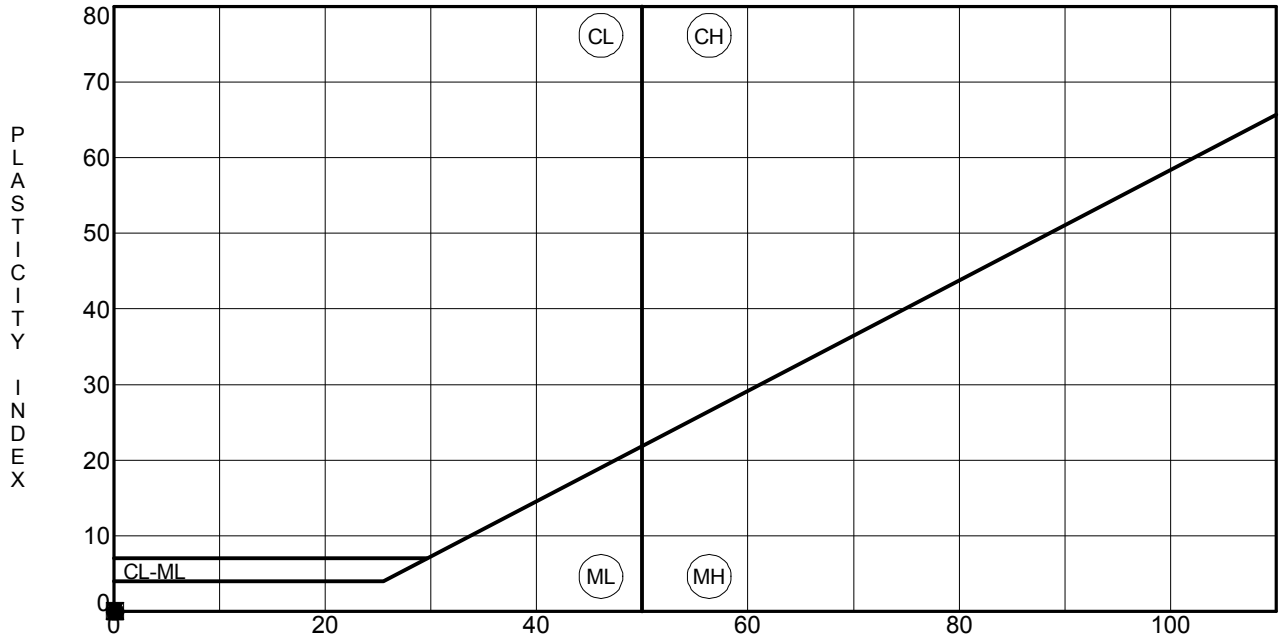
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO: 2000-119-BRG | **PLATE NO: IV-1A**

Borehole	Sample Number	Depth	Classi-fication	Water Content	Dry Density	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Unconfined Shear Strength (tsf)
R-14-OFS-003	12	55.0	SP-SM	22.5	-						
R-14-OFS-003	13	60.5	SP-SM	25.8	-						
R-14-OFS-003	14	71.0	SM	28.6	-						
R-14-OFS-003	15	80.0	SM	35.6	-				10.1	12.5	
R-14-OFS-003	16	90.5	SM	31.1	-						
R-14-OFS-003	17	100.5	SM	29.9	-						
R-14-OFS-004	1	3.0	GM	4.4	-						
R-14-OFS-004	2	6.0	SM	6.9	-				30.5	29.3	
R-14-OFS-004	3	11.0	ML	27.1	96.8	NP	NP	NP			
R-14-OFS-004	4	16.0	SM	29.9	92.8				0.2	37.5	
R-14-OFS-004	5	20.5	GM	7.6	-						
R-14-OFS-004	6	25.0	GM	6.1	-						
R-14-OFS-004	7	30.0	SW-SM	13.3	-				46.7	5.7	
R-14-OFS-004	8	36.0	ML	29.7	-	NP	NP	NP			
R-14-OFS-004	9	40.0	ML	25.1	-						
R-14-OFS-004	10	45.5	ML	39.0	-						
R-14-OFS-004	11	50.5	SM	33.7	-						
R-14-OFS-004	12	55.0	SM	-	-						
R-14-OFS-004	13	60.0	SM	23.9	-						
R-14-OFS-004	14	71.0	SC	58.0	-				0.9	46.2	
R-14-OFS-004	15	80.5	SM	24.0	-						
R-14-SRB-001	1	2.5	GM	-	-						
R-14-SRB-001	2	7.5	GM	5.5	-						
R-14-SRB-001	3	12.5	SM	-	-						
R-14-SRB-001	4	17.5	SM	-	-						
R-14-SRB-001	5	21.5	SM	22.5	-						
R-14-SRB-001	6	27.5	-	-	-						
R-14-SRB-001	7	32.5	-	-	-						
R-14-SRB-001	8	36.5	-	36.2	-						
R-14-SRB-001	9	42.5	-	-	-						
R-14-SRB-001	10	47.5	-	-	-						
R-14-SRB-001	11	52.5	-	-	-						
R-14-SRB-001	12	57.5	-	-	-						
R-14-SRB-001	13	62.5	-	-	-						
R-14-SRB-001	14	71.5	-	-	-						



PLASTICITY

	BOREHOLE	SAMPLE #	DEPTH	LL	PL	PI	Fines	Classification
●	**R-14-OFS-001**	**13**	**60.5**	**NP**	**NP**	**NP**		**SILTY SAND**
⧗	**R-14-OFS-003**	**8**	**35.5**	**NP**	**NP**	**NP**		**SANDY SILT**
▲	**R-14-OFS-004**	**3**	**11.0**	**NP**	**NP**	**NP**		**SILT**
★	**R-14-OFS-004**	**8**	**36.0**	**NP**	**NP**	**NP**		**SANDY SILT**

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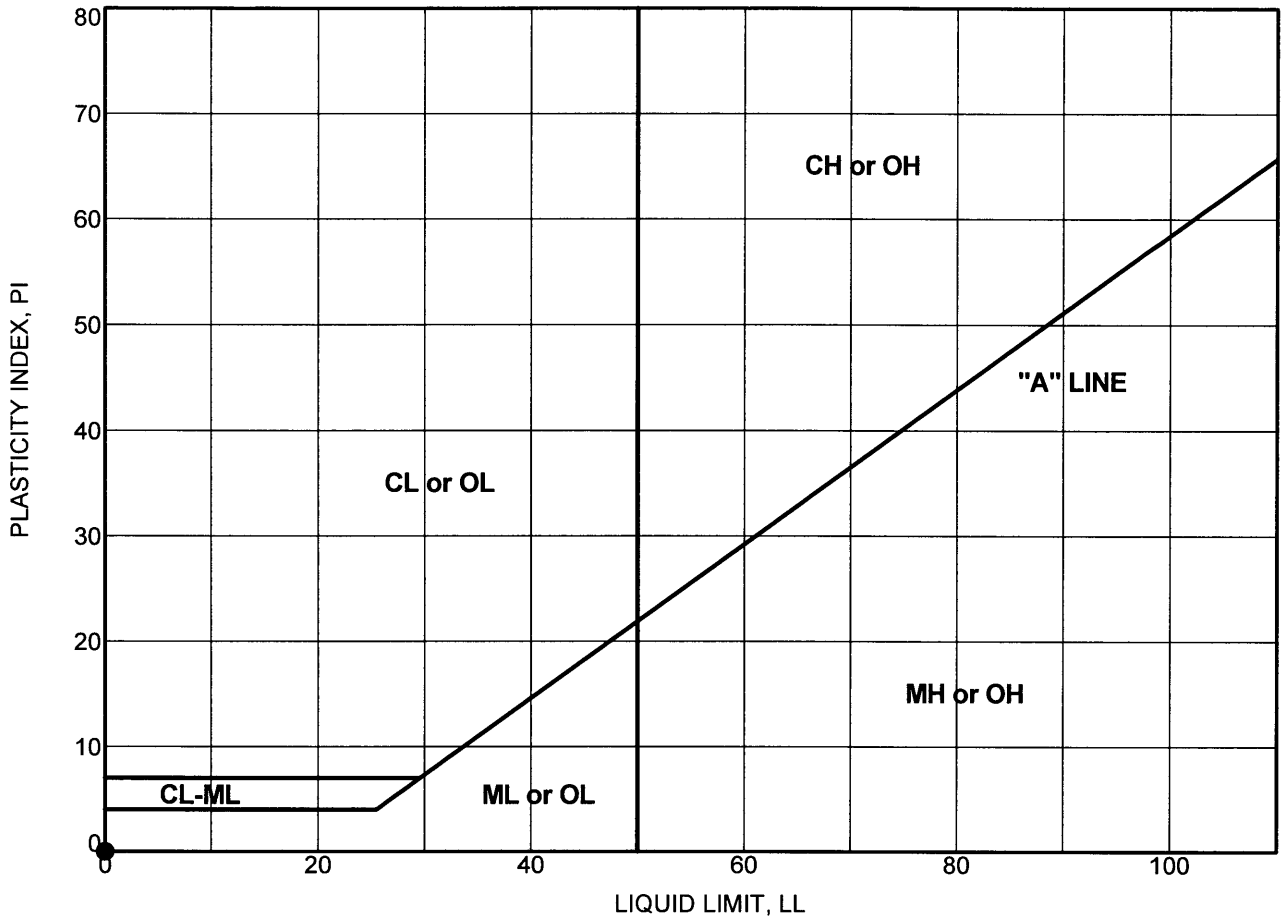
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO: 2000-119-BRG | **PLATE NO.: IV-2A**



PLASTICITY CHART

Boring Number	Sample Number	Depth (feet)	Test Symbol	Moisture Content (%)	LL	PL	PI	Description
B-3	SPT-5	5.0	●	27	NP	NP	NP	SILTY SAND (SM)

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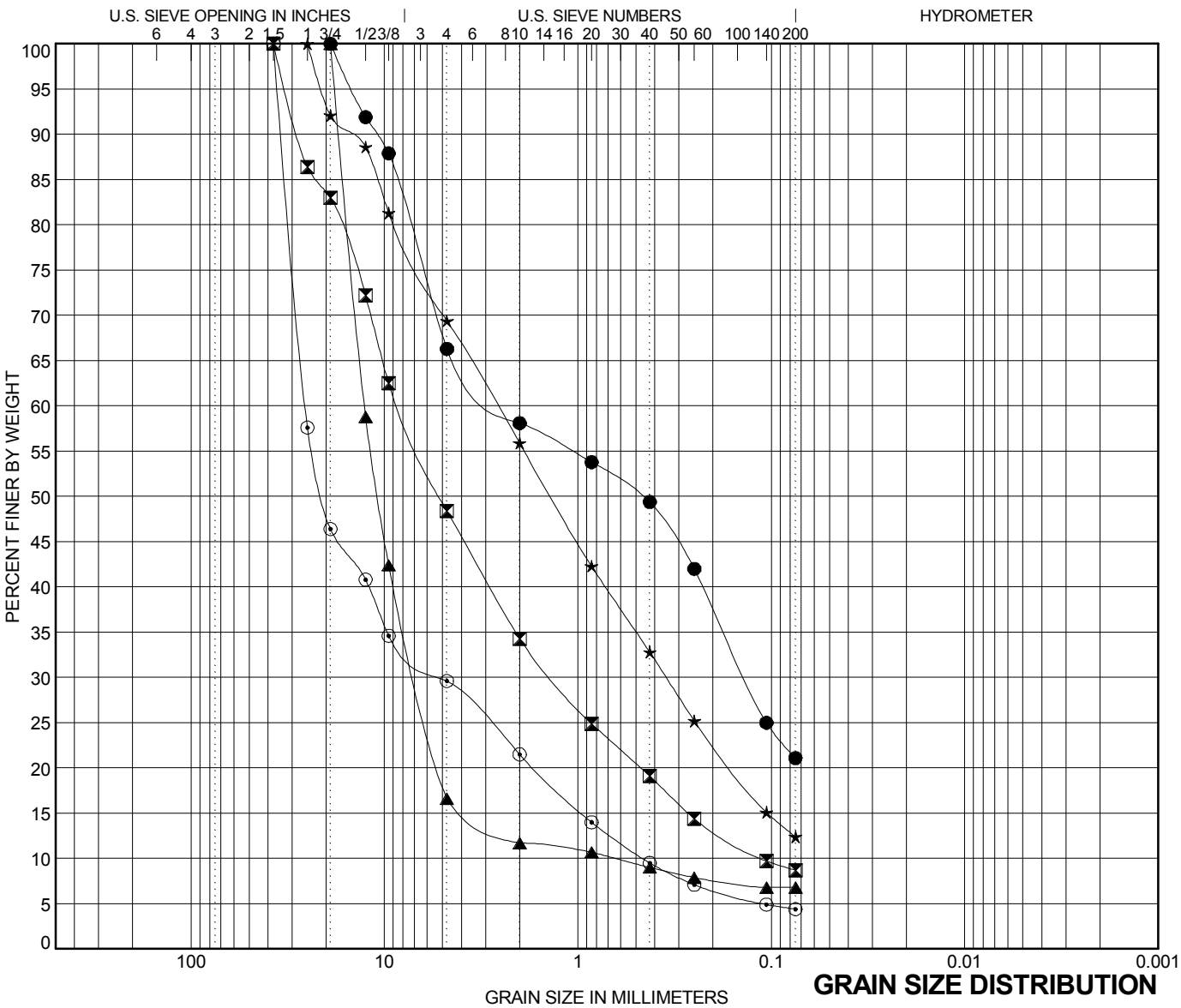
MATERIALS ENGINEERING

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG

PLATE NO.: IV-2B



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	R-14-OFS-0012		6.0	CLAYEY SAND with GRAVEL					
⧗	R-14-OFS-0014		16.0	Well-graded GRAVEL with SILT and SAND				1.94	75.03
▲	R-14-OFS-0018		35.0	Poorly graded GRAVEL with SILT				5.73	19.80
★	R-14-OFS-00110		45.0	SILTY SAND with GRAVEL				0.85	47.16
⊙	R-14-OFS-0023		11.0	Well-graded GRAVEL with SAND				2.15	55.73

	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	R-14-OFS-0012		6.0	19	2.444	0.136		33.7	45.2	21.1	
⧗	R-14-OFS-0014		16.0	37.5	8.401	1.352	0.112	51.6	39.7	8.7	
▲	R-14-OFS-0018		35.0	19	12.653	6.808	0.639	83.4	9.8	6.8	
★	R-14-OFS-00110		45.0	25	2.601	0.35		30.6	57.0	12.4	
⊙	R-14-OFS-0023		11.0	37.5	25.58	5.021	0.459	70.4	25.2	4.4	

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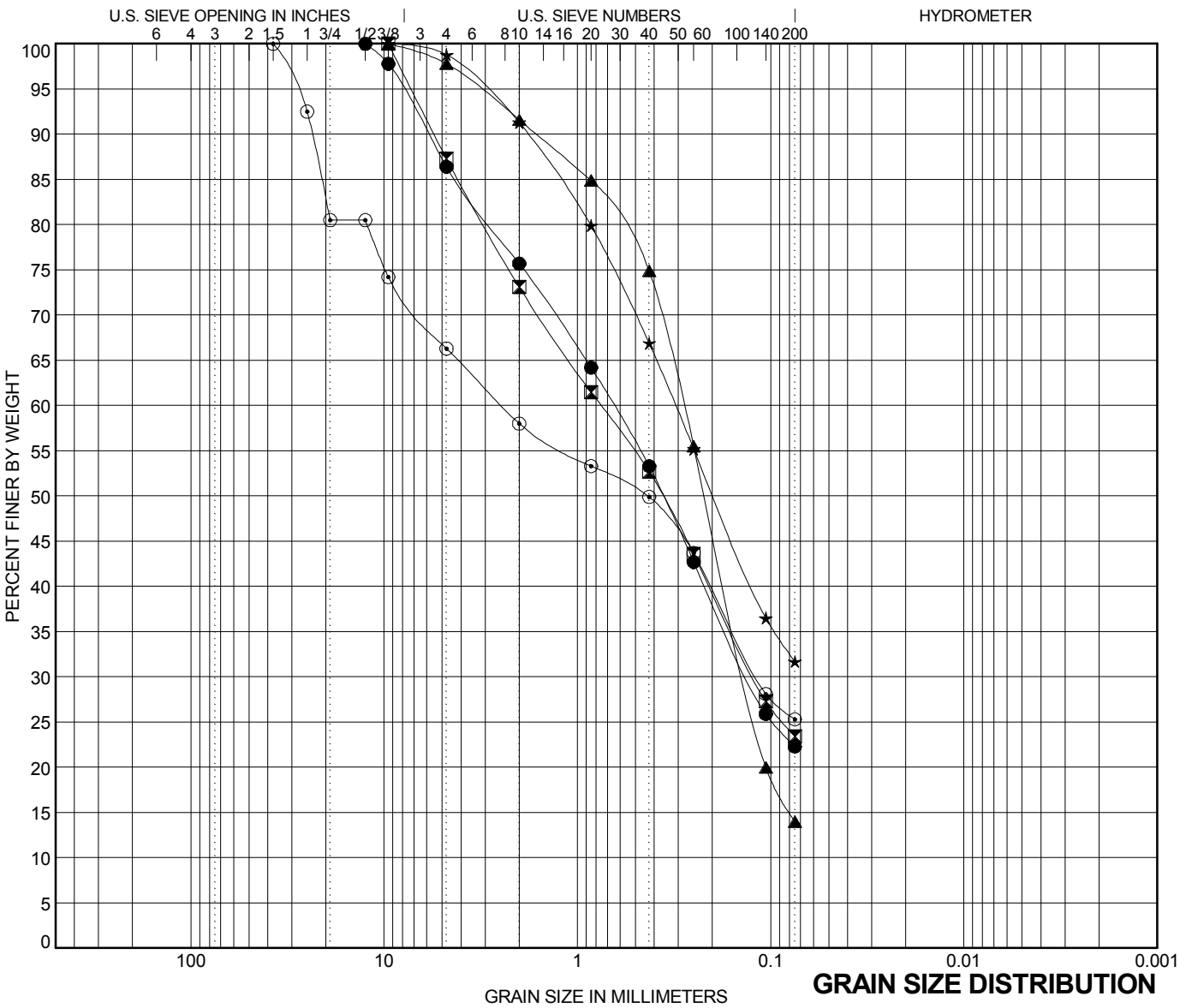
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO: 2000-119-BRG

PLATE NO: IV-3A



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	R-14-OFS-	0025	21.0	**SILTY SAND**					
⧗	R-14-OFS-	0028	35.5	**CLAYEY SAND**					
▲	R-14-OFS-	0020	45.0	**SILTY SAND**					
★	R-14-OFS-	0023	61.0	**CLAYEY SAND**					
⊙	R-14-OFS-	0032	6.0	**SILTY SAND with GRAVEL**					

	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	R-14-OFS-	0025	21.0	**12.5**	**0.651**	**0.131**		**13.6**	**64.1**	**22.3**	
⧗	R-14-OFS-	0028	35.5	**9.5**	**0.755**	**0.122**		**12.7**	**63.9**	**23.4**	
▲	R-14-OFS-	0020	45.0	**9.5**	**0.283**	**0.135**		**2.2**	**83.8**	**14.0**	
★	R-14-OFS-	0023	61.0	**9.5**	**0.311**			**1.2**	**67.1**	**31.7**	
⊙	R-14-OFS-	0032	6.0	**37.5**	**2.463**	**0.118**		**33.7**	**41.0**	**25.3**	

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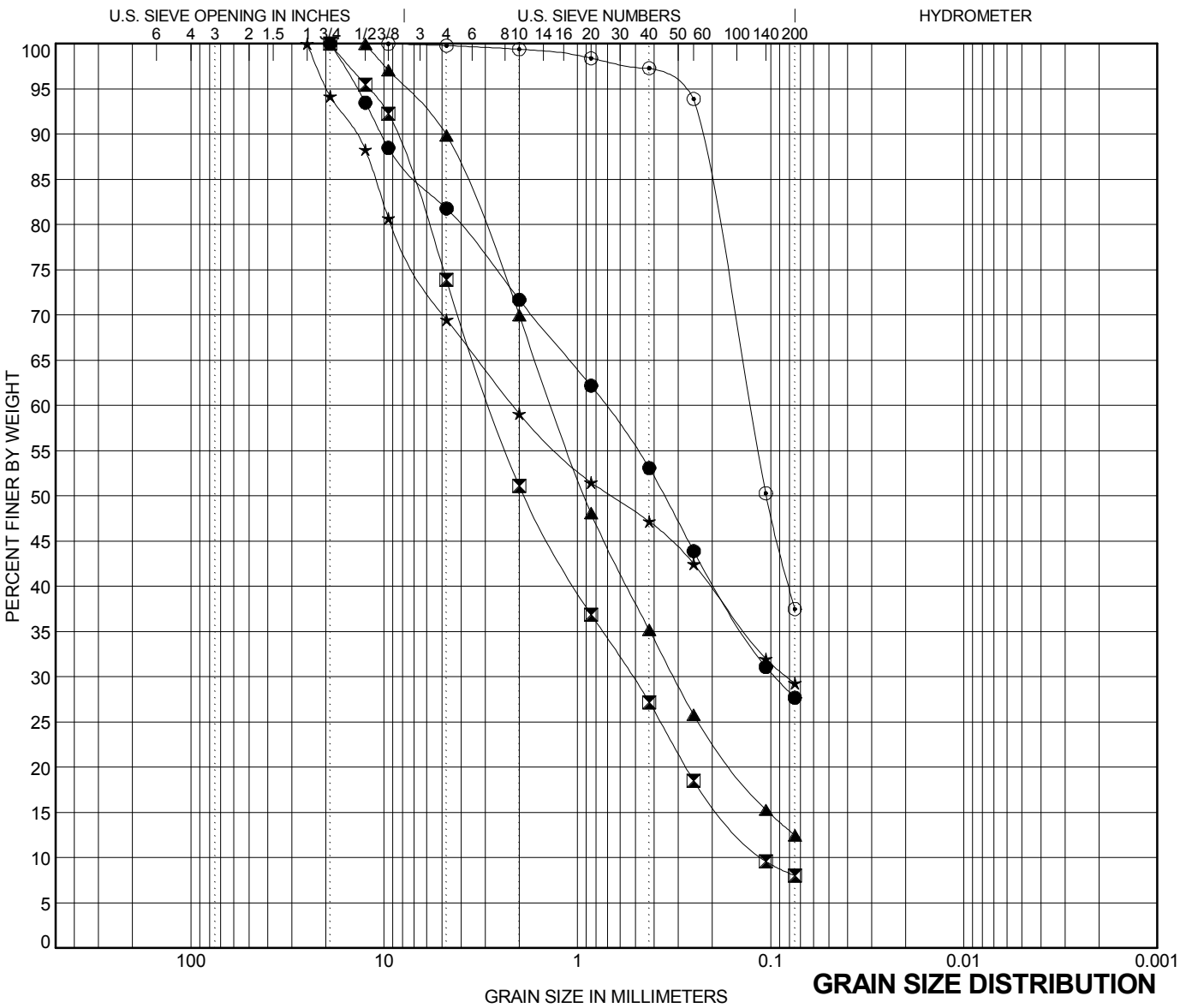
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO: 2000-119-BRG | **PLATE NO: IV-3B**



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	R-14-OFS-	0036	25.5	**CLAYEY SAND with GRAVEL**					
⊠	R-14-OFS-	0031	51.0	**Poorly graded SAND with SILT and GRAVEL**				0.87	25.45
▲	R-14-OFS-	0031	80.0	**SILTY SAND**					
★	R-14-OFS-	0042	6.0	**SILTY SAND with GRAVEL**					
⊙	R-14-OFS-	0044	16.0	**SILTY SAND**					

	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	R-14-OFS-	0036	25.5	19	0.719	0.095		18.2	54.1	27.7	
⊠	R-14-OFS-	0031	51.0	19	2.803	0.519	0.11	26.1	65.9	8.0	
▲	R-14-OFS-	0031	80.0	12.5	1.353	0.317		10.1	77.4	12.5	
★	R-14-OFS-	0042	6.0	25	2.155	0.082		30.5	40.2	29.3	
⊙	R-14-OFS-	0044	16.0	9.5	0.128			0.2	62.3	37.5	

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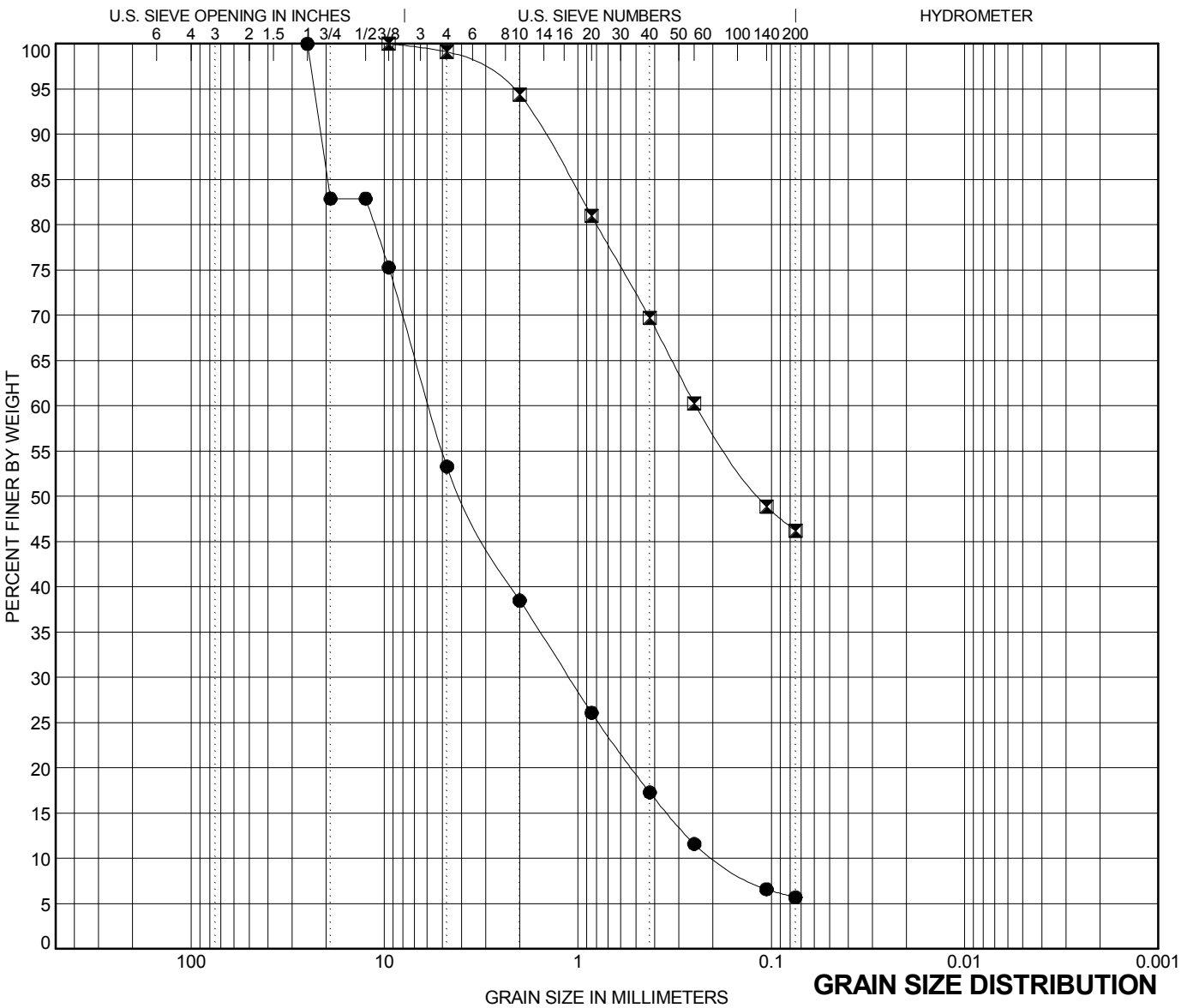
SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO: 2000-119-BRG | **PLATE NO: IV-3C**



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	R-14-OFS-	0047	30.0	**Well-graded SAND with SILT and GRAVEL**				1.11	30.88
⧗	R-14-OFS-	0041 4	71.0	**CLAYEY SAND**					

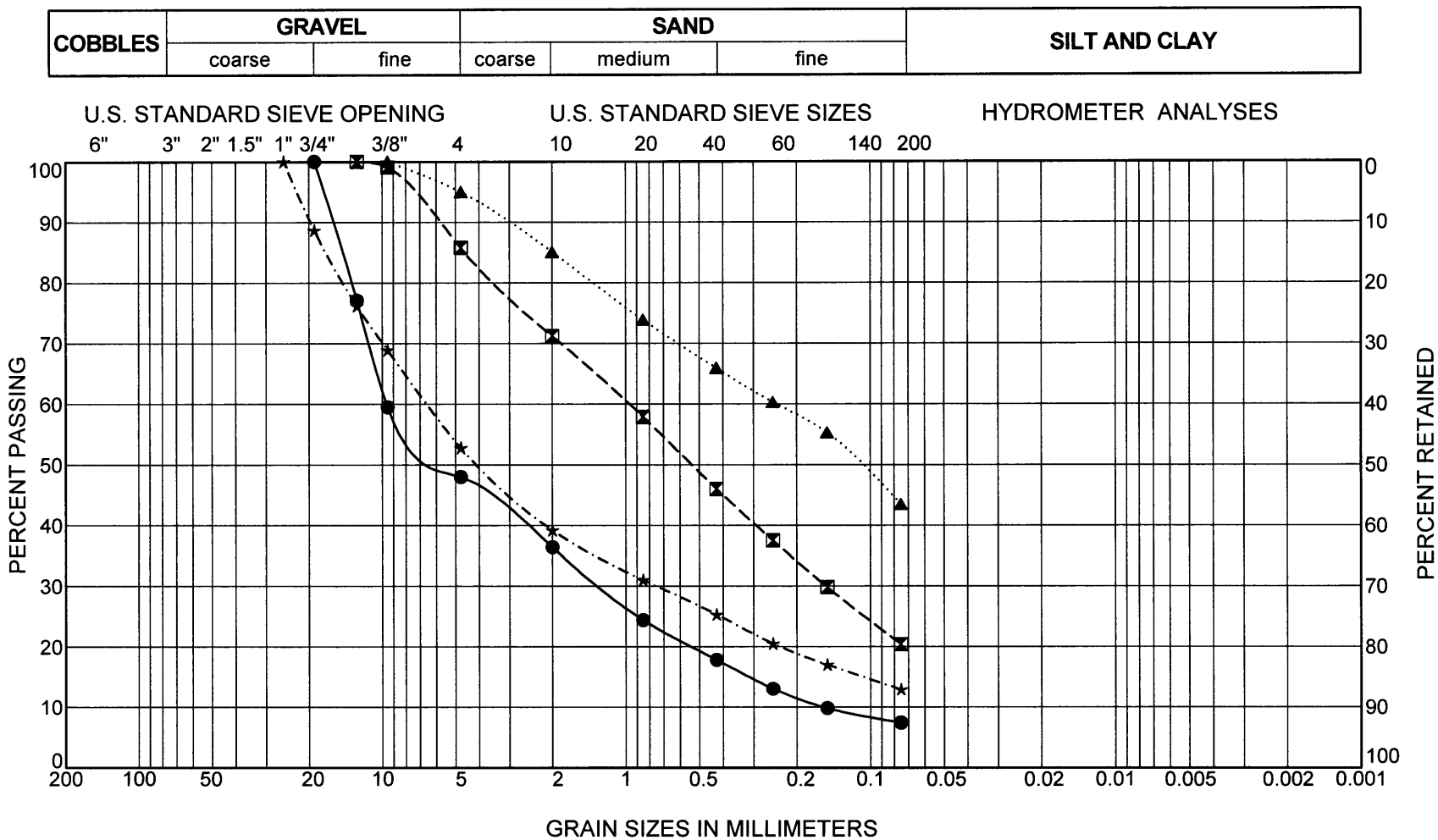
	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	R-14-OFS-	0047	30.0	25	5.866	1.112	0.19	46.7	47.6	5.7	
⧗	R-14-OFS-	0041 4	71.0	9.5	0.244			0.9	52.9	46.2	

PARIKH
Practicing in the Geosciences

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD - BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO: 2000-119-BRG | **PLATE NO: IV-3D**

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
B-2	SPT-2	10.0	●			WELL-GRADED GRAVEL WITH CLAY AND SAND (GW-GC)
B-2	SPT-5	23.5	⊠			SILTY SAND (SM)
B-2	SPT-9	44.0	▲			SILTY SAND (SM)
B-3	SPT-2	8.5	★			SILTY GRAVEL WITH SAND (GM)

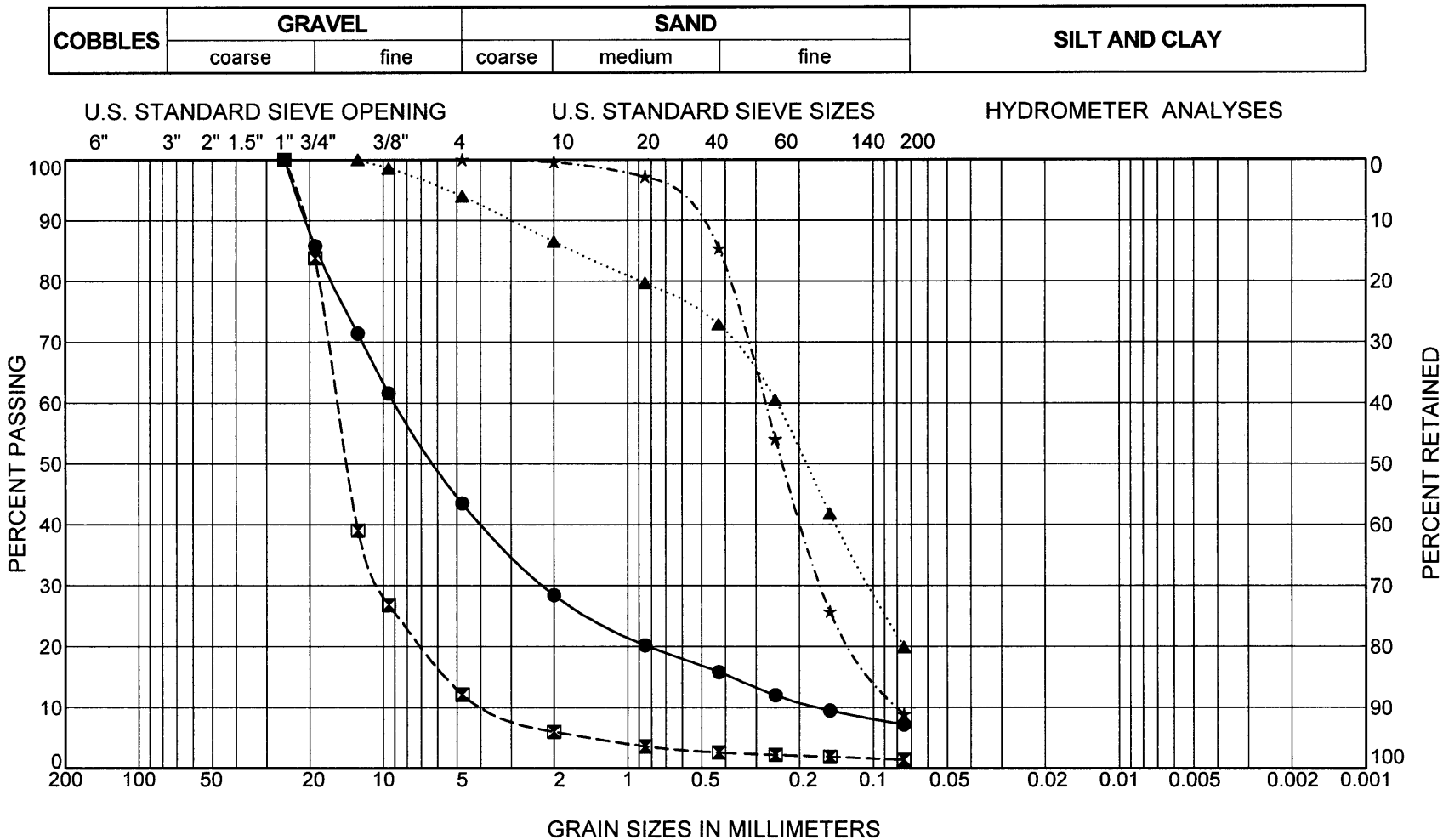
PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD-
BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG

PLATE NO.: IV-3E

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
B-3	SPT-3	13.5	●			POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM)
B-4	SPT-2	10.0	⊠			WELL-GRADED GRAVEL (GW)
B-4	SPT-5	25.0	▲			SILTY SAND (SM)
B-4	SPT-8	40.0	★			POORLY-GRADED SAND WITH SILT (SP-SM)

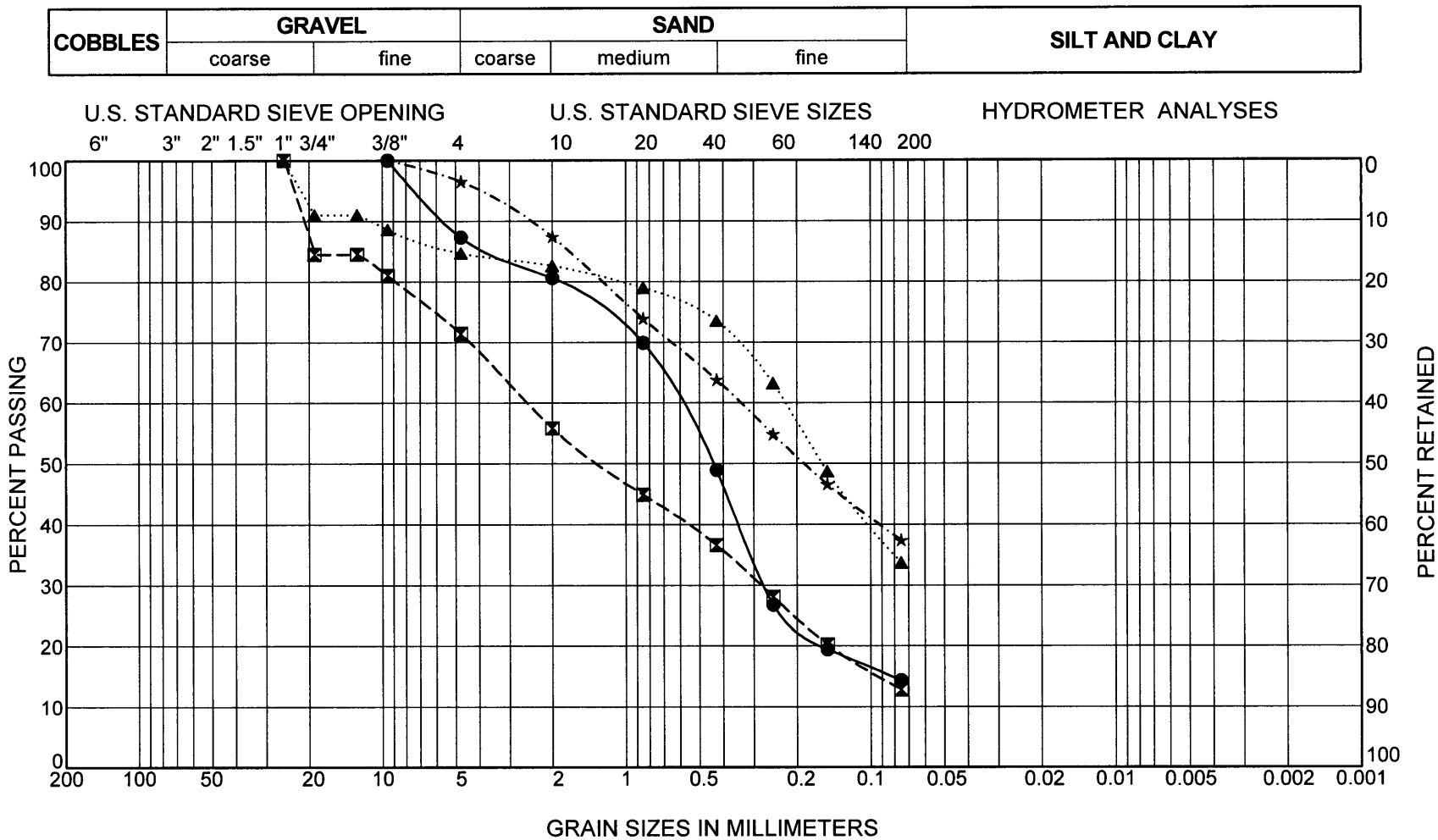
PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD-
BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG

PLATE NO.: IV-3F

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
B-5	SPT-1	5.0	●			SILTY SAND (SM)
B-5	SPT-4	20.0	⊠			SILTY SAND WITH GRAVEL (SM)
B-6	MC-3	15.0	▲			SILTY SAND WITH GRAVEL (SM)
B-6	SPT-6	30.0	★			SILTY SAND (SM)

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

SACRAMENTO RIVER BRIDGE AT JELLYS FERRY ROAD-
BRIDGE REPLACEMENT
TEHAMA COUNTY, CALIFORNIA

JOB NO.: 2000-119-BRG

PLATE NO.: IV-3G

COMPRESSIVE STRENGTH TEST FOR ROCK CORE SAMPLES (ASTM C 42)

Project Name: Sacramento River Bridge at Jelly's Ferry Road
Project Number: 2000-119-BRG
Boring Number: R-14-SRB-001
Core Run Number: 1
Approx. Depth of Core Sample (ft): 125.5 (72' below mud line)
Rock Type: Volcanic Tuff Breccia
Test Date: 12/5/14

Average Length (in)	Average Diameter (in)	Core Weight (gms)	Calculated Density (pcf)	Correction Factor	Max. Load (lbs)	Compressive Strength (psi)	Corrected Strength (psi)
5.0	2.4	976.1	164.3	1	87890	19591	

COMPRESSIVE STRENGTH TEST FOR ROCK CORE SAMPLES (ASTM C 42)

Project Name: Sacramento River Bridge at Jelly's Ferry Road
Project Number: 2000-119-BRG
Boring Number: R-14-SRB-001
Core Run Number: 2
Approx. Depth of Core Sample (ft): 132 (78.5' below mud line)
Rock Type: Volcanic Tuff Breccia
Test Date: 12/5/14

Average Length (in)	Average Diameter (in)	Core Weight (gms)	Calculated Density (pcf)	Correction Factor	Max. Load (lbs)	Compressive Strength (psi)	Corrected Strength (psi)
5.08	2.38	810.9	136.6	1	4100	914	

COMPRESSIVE STRENGTH TEST FOR ROCK CORE SAMPLES (ASTM C 42)

Project Name: Sacramento River Bridge at Jelly's Ferry Road
Project Number: 2000-119-BRG
Boring Number: R-14-SRB-001
Core Run Number: 5
Approx. Depth of Core Sample (ft): 141 (87.5' below mud line)
Rock Type: Volcanic Tuff Breccia
Test Date: 12/5/14

Average Length (in)	Average Diameter (in)	Core Weight (gms)	Calculated Density (pcf)	Correction Factor	Max. Load (lbs)	Compressive Strength (psi)	Corrected Strength (psi)
5.08	2.39	877.4	148.09	1	17370	3871	

COMPRESSIVE STRENGTH TEST FOR ROCK CORE SAMPLES (ASTM C 42)

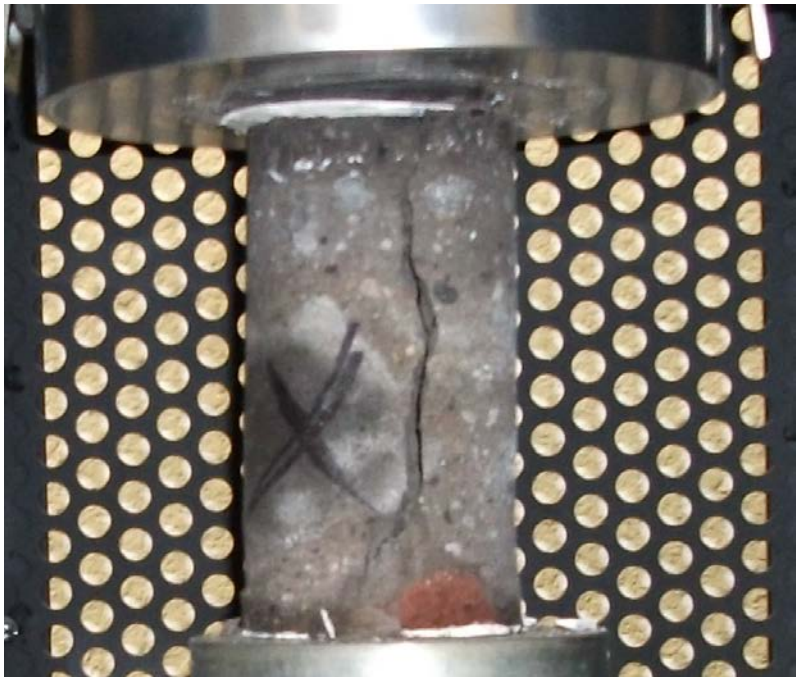
Project Name: Sacramento River Bridge at Jelly's Ferry Road
Project Number: 2000-119-BRG
Boring Number: R-14-SRB-001
Core Run Number: 6
Approx. Depth of Core Sample (ft): 148 (94.5' below mud line)
Rock Type: Volcanic Tuff Breccia
Test Date: 12/5/14

Average Length (in)	Average Diameter (in)	Core Weight (gms)	Calculated Density (pcf)	Correction Factor	Max. Load (lbs)	Compressive Strength (psi)	Corrected Strength (psi)
5.0	2.38	811.1	138.9	1	5000	1124	

COMPRESSIVE STRENGTH TEST FOR ROCK CORE SAMPLES (ASTM C 42)

Project Name: Sacramento River Bridge at Jelly's Ferry Road
Project Number: 2000-119-BRG
Boring Number: R-14-SRB-001
Core Run Number: 8
Approx. Depth of Core Sample (ft): 156 (102.5' below mud line)
Rock Type: Volcanic Tuff Breccia
Test Date: 12/5/14

Average Length (in)	Average Diameter (in)	Core Weight (gms)	Calculated Density (pcf)	Correction Factor	Max. Load (lbs)	Compressive Strength (psi)	Corrected Strength (psi)
4.875	2.36	770.4	138	1	5810	1329	



COMPRESSIVE STRENGTH TEST FOR ROCK CORE SAMPLES (ASTM C 42)

Project Name: Sacramento River Bridge at Jelly's Ferry Road
Project Number: 2000-119-BRG
Boring Number: R-14-SRB-001
Core Run Number: 9
Approx. Depth of Core Sample (ft): 164 (110.5' below mud line)
Rock Type: Volcanic Tuff Breccia
Test Date: 12/5/14

Average Length (in)	Average Diameter (in)	Core Weight (gms)	Calculated Density (pcf)	Correction Factor	Max. Load (lbs)	Compressive Strength (psi)	Corrected Strength (psi)
4.74	2.375	850.7	154.2	1	3660	827	

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/21/2014
Date Submitted 05/15/2014

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite 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 : 2000-119-OFS R-14OFS Site ID : 001 #5 @ 21FEET.
Thank you for your business.

* For future reference to this analysis please use SUN # 66972-138759.

EVALUATION FOR SOIL CORROSION

Soil pH	7.34		
Minimum Resistivity	6.16 ohm-cm (x1000)		
Chloride	6.0 ppm	00.00060	%
Sulfate	4.4 ppm	00.00044	%

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

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/21/2014
Date Submitted 05/15/2014

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite 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 : 2000-119-OFS R-140FS Site ID : 002 #2 @ 6 FEET.
Thank you for your business.

* For future reference to this analysis please use SUN # 66972-138760.

EVALUATION FOR SOIL CORROSION

Soil pH	7.15	
Minimum Resistivity	8.58 ohm-cm (x1000)	
Chloride	3.9 ppm	00.00039 %
Sulfate	5.8 ppm	00.00058 %

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

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/21/2014
Date Submitted 05/15/2014

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite 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 : 2000-119-OFS R-14OFS Site ID : 003#5@ 21 FEET.
Thank you for your business.

* For future reference to this analysis please use SUN # 66972-138761.

EVALUATION FOR SOIL CORROSION

Soil pH	7.67	
Minimum Resistivity	3.48 ohm-cm (x1000)	
Chloride	7.1 ppm	00.00071 %
Sulfate	6.9 ppm	00.00069 %

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

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/21/2014
Date Submitted 05/15/2014

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite 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 : 2000-119-OFS R-14OFS Site ID : 004#3@11 FEET.
Thank you for your business.

* For future reference to this analysis please use SUN # 66972-138762.

EVALUATION FOR SOIL CORROSION

Soil pH	6.95	
Minimum Resistivity	2.04 ohm-cm (x1000)	
Chloride	10.1 ppm	00.00101 %
Sulfate	3.1 ppm	00.00031 %

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

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 11/25/2014
Date Submitted 11/20/2014

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite 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 : R-14-SRB-001 Site ID : SAMPLE 3 @ 66FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 68377-142049.

EVALUATION FOR SOIL CORROSION

Soil pH	8.17		
Minimum Resistivity	0.83 ohm-cm (x1000)		
Chloride	54.2 ppm	0.00542	%
Sulfate	46.8ppm	0.00468	%

METHODS
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

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

Date Reported 10/09/2009
Date Submitted 10/05/2009

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 : 200119.10/JELLY'S Site ID : B3#1 @ 5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 56841-114956.

EVALUATION FOR SOIL CORROSION

Soil pH	6.47	
Minimum Resistivity	1.45 ohm-cm (x1000)	
Chloride	47.3 ppm	00.00473 %
Sulfate	77.6 ppm	00.00776 %

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

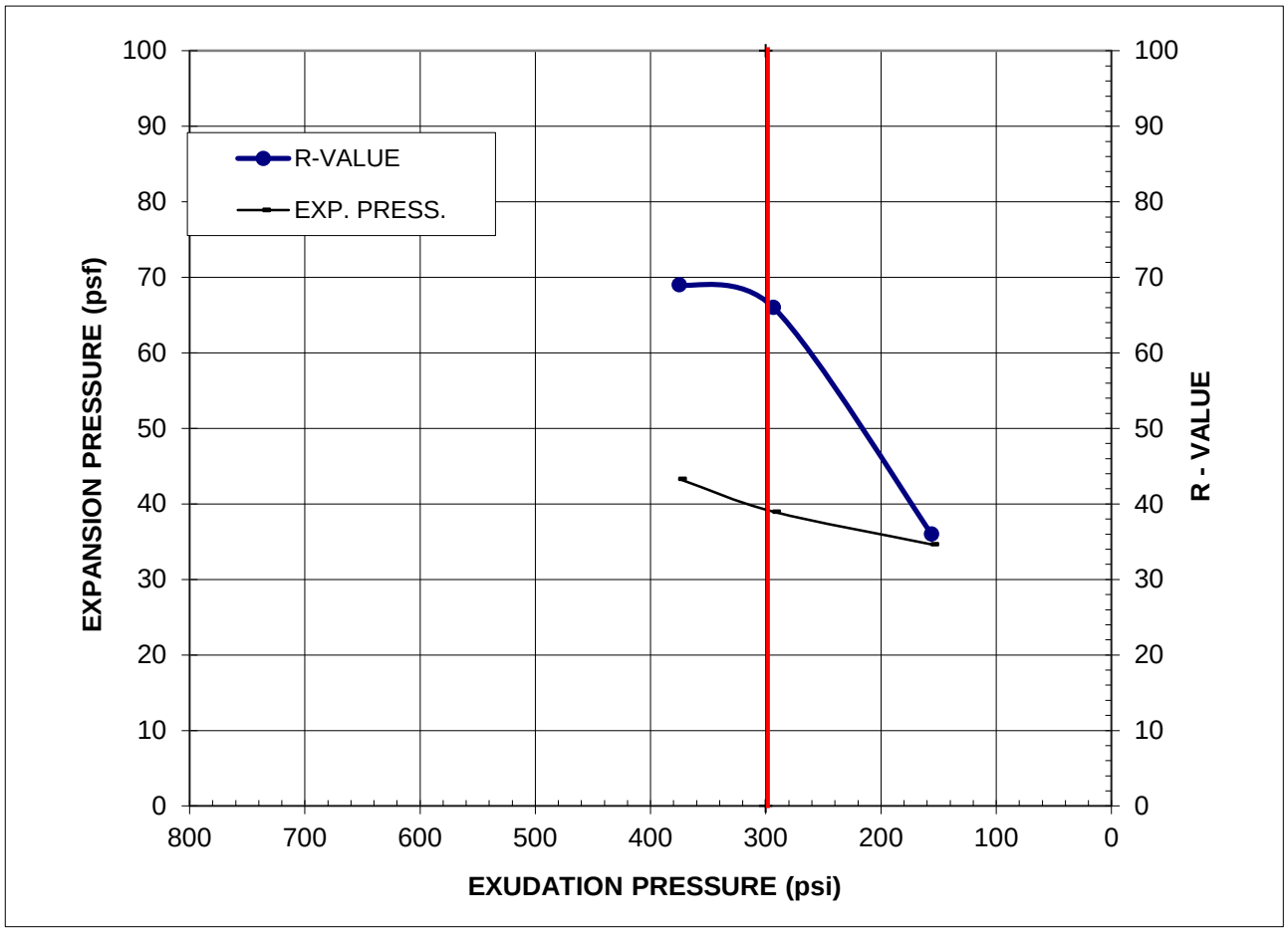
RECEIVED
OCT 13 2009

PLATE NO.: IV-5F

R-VALUE REPORT

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

Project Name:	Sacramento River Bridge at Jellys Ferry Road - Bridge Repl.	Date:	5-13-14
Client:	Tylin	Project #:	2000-119-BRG
Sample #:	A-14-OFS-005 Depth: 0'-5'	Lab #:	M 934
Location / Sou	Tehama County Onsite / Native	Sample Date:	
Material :	Sandy Silt	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	156.15	293.24	375.1
Expansion Pressure, psf	34.64	38.97	43.3
R-Value	36	66	69
Moisture Content at Test, %	16.6	14.2	13.7
Dry Density at Test, pcf	110.9	115.6	117.0

R-Value @ 300 psi Exudation Pressure = 67

Expansion Pressure @300 psi Exudation, psf = **38**

Minimum R-Value Requirement:

Comments:

Report By: Nasir Ahm,ad

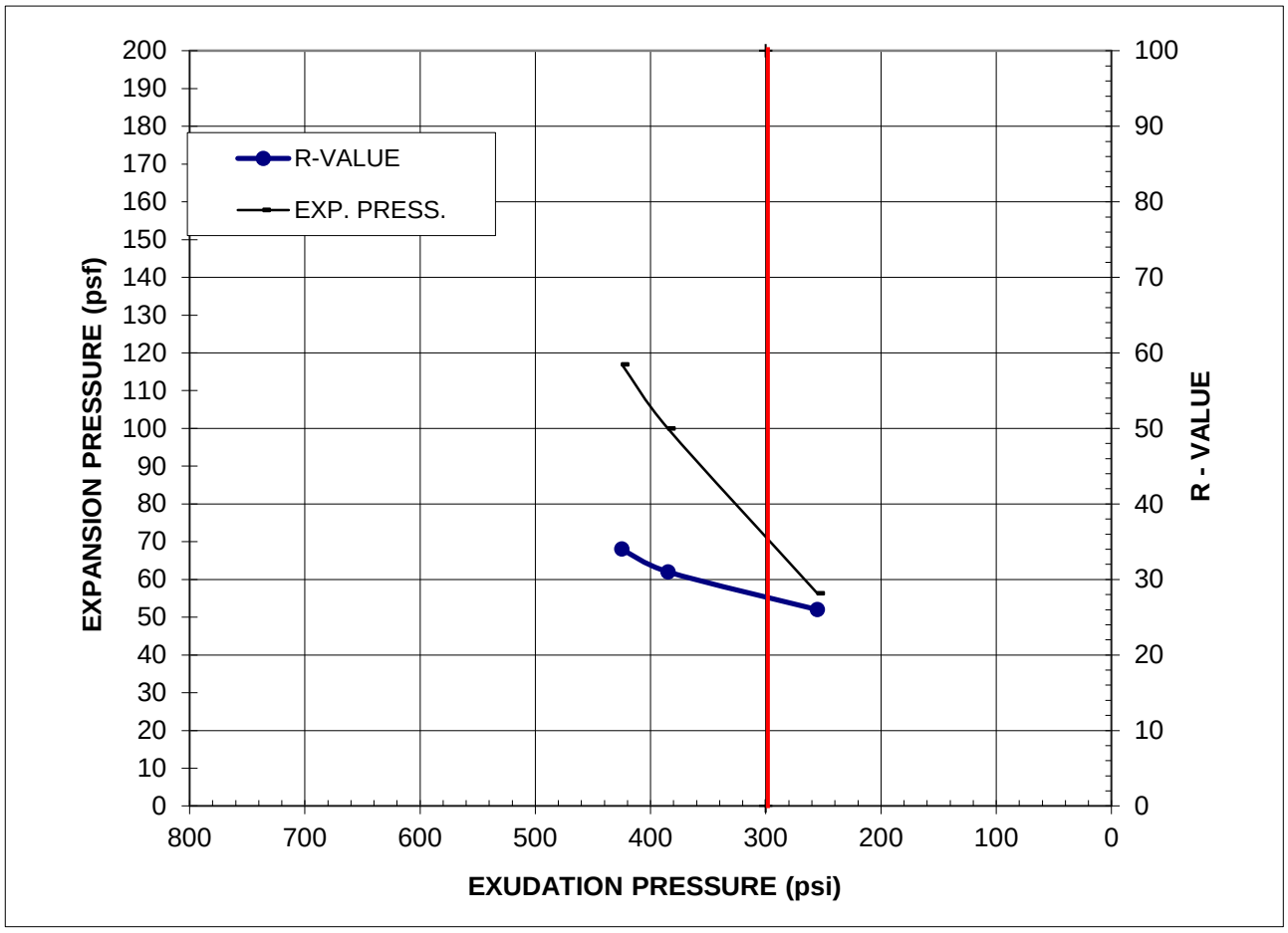
Plate No.: IV-6A

RVALUE with calcs pdp

R-VALUE REPORT

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

Project Name:	Sacramento River Bridge at Jellys Ferry Road - Bridge Repl.	Date:	5-13-14
Client:	Tylin	Project #:	2000-119-BRG
Sample #:	A-14-OFS-006 Depth: 0'-5'	Lab #:	M 934
Location / Sou	Tehama County Onsite / Native	Sample Date:	
Material :	Sandy Silt	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	255.19	384.82	424.8
Expansion Pressure, psf	56.29	99.93	116.91
R-Value	26	31	34
Moisture Content at Test, %	13.2	12.4	11.9
Dry Density at Test, pcf	114.1	116.4	117.3

R-Value @ 300 psi Exudation Pressure = 28

Expansion Pressure @300 psi Exudation, psf = **70**

Minimum R-Value Requirement:

Comments:

Report By: Nasir Ahm,ad

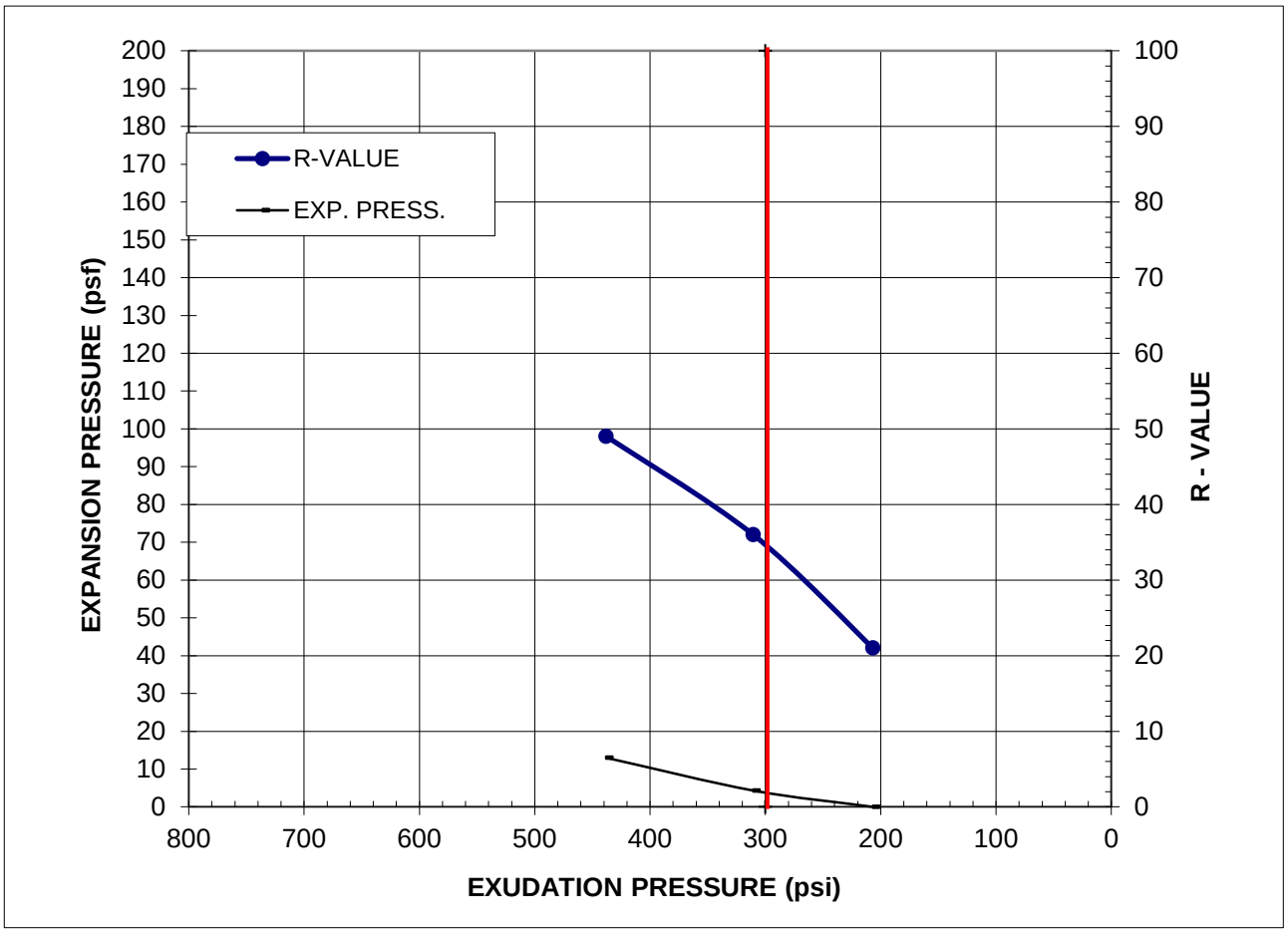
Plate No.: IV-6B

RVALUE with calcs pdp

R-VALUE REPORT

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

Project Name:	Sacramento River Bridge at Jellys Ferry Road - Bridge Repl.	Date:	5-13-14
Client:	Tylin	Project #:	2000-119-BRG
Sample #:	A-14-OFS-007 Depth: 0'-5'	Lab #:	M 934
Location / Sou	Tehama County Onsite / Native	Sample Date:	
Material :	Sandy Silt	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	206.75	310.58	438.02
Expansion Pressure, psf	0	4.33	12.99
R-Value	21	36	49
Moisture Content at Test, %	14.3	13.4	12.5
Dry Density at Test, pcf	116.5	119.3	122.1

R-Value @ 300 psi Exudation Pressure = 34

Expansion Pressure @300 psi Exudation, psf = **2**

Minimum R-Value Requirement:

Comments:

Report By: Nasir Ahm,ad

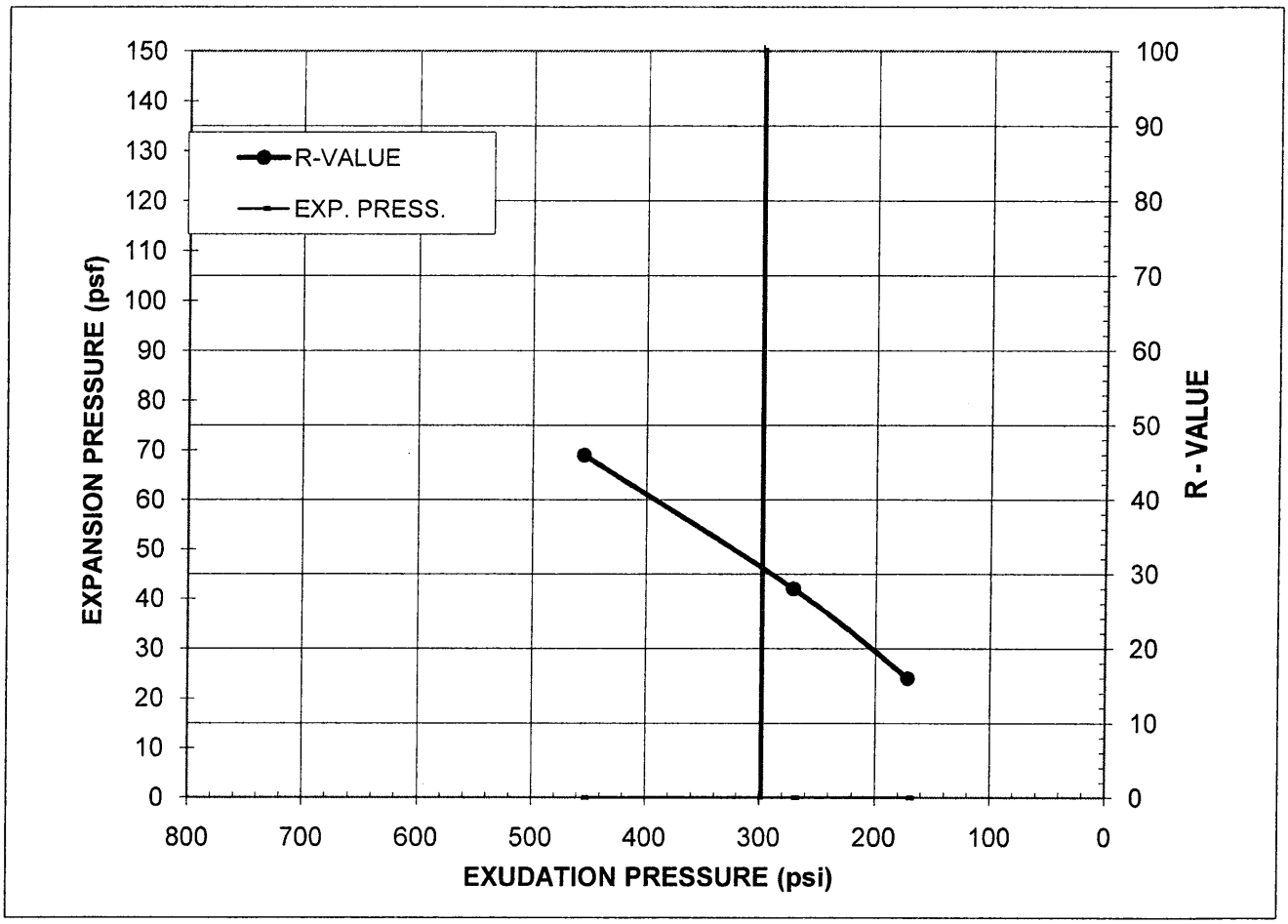
Plate No.: IV-6C

RVALUE with calcs pdp

R-VALUE REPORT

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

Project Name:	Jelly's Ferry Improvement Project	Date:	10/02/09
Client:	Tehama County	Project #:	201186.10
Sample #: B1	Depth: 1' - 5'	Lab #:	M764
Location / Source:	Onsite / Native	Sample Date:	
Material :	Clayey Sand with some Gravel, yellowish brown	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	172	271	455
Expansion Pressure, psf	0	0	0
R-Value	16	28	46
Moisture Content at Test, %	18.4	17.4	16.4
Dry Density at Test, pcf	109.2	111.4	112.5

R-Value @ 300 psi Exudation Pressure = 31

Expansion Pressure @300 psi Exudation, psf = **0**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

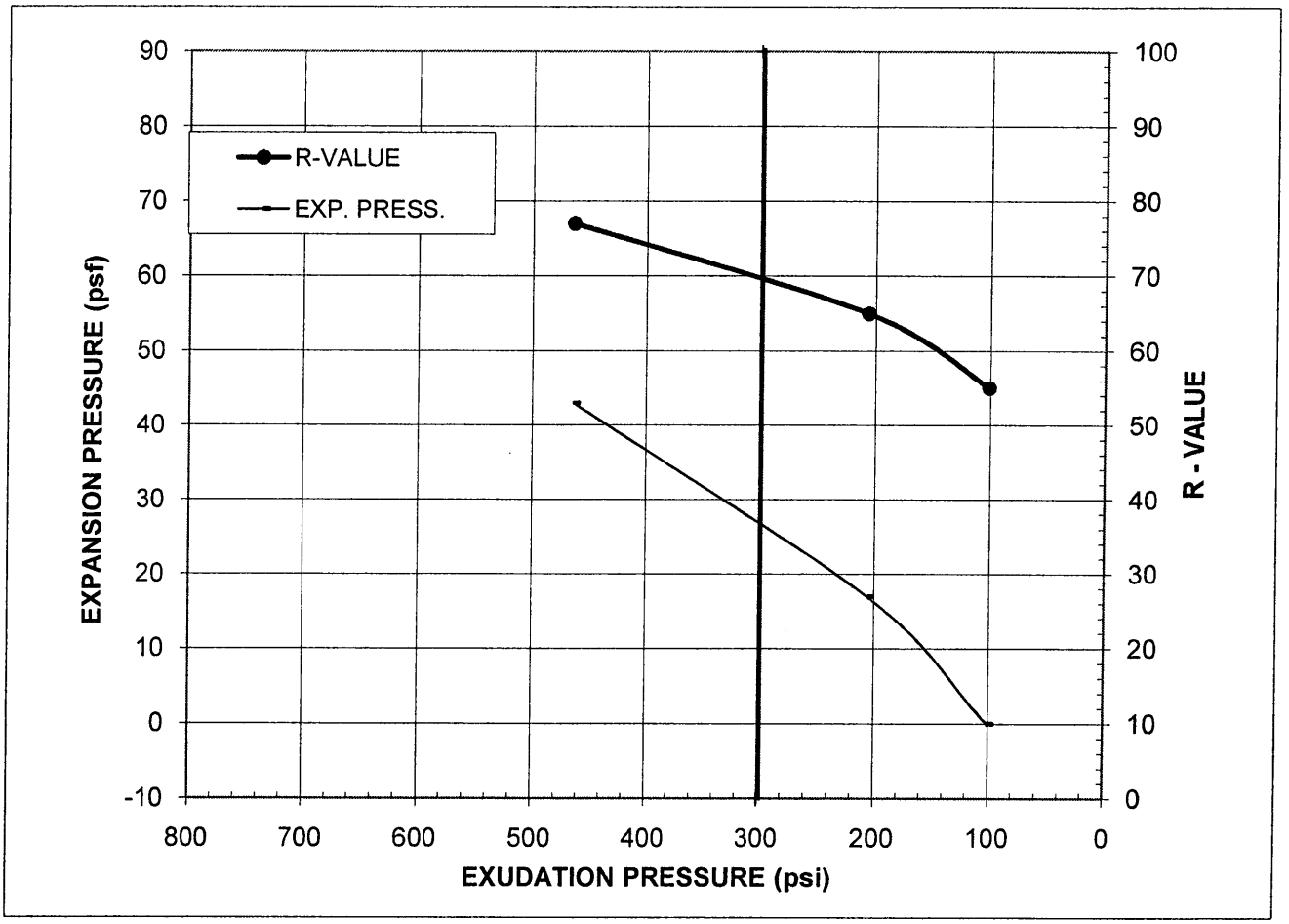
Plate No.: IV-6D

RVALUE with calcs pdp

R-VALUE REPORT

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

Project Name:	Jelly's Ferry Improvement Project	Date:	10/02/09
Client:	Tehama County	Project #:	201186.10
Sample #: B7	Depth: 1' - 5'	Lab #:	M764
Location / Source:	Onsite / Native	Sample Date:	
Material :	Silty Sand, brown	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	101	206	464
Expansion Pressure, psf	0	17	43
R-Value	55	65	77
Moisture Content at Test, %	16.2	15.3	14.4
Dry Density at Test, pcf	108.0	110.8	112.4

R-Value @ 300 psi Exudation Pressure = 70

Expansion Pressure @300 psi Exudation, psf = **27**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

Plate No.: IV-6E

RVALUE with calcs pdp

APPENDIX V
Analyses and Calculations

Evaluation of Liquefaction Potential

LIQUEFACTION POTENTIAL ANALYSIS (SPT procedures per Youd et al, 2001)

PROJECT NAME ***Jellys Ferry Overflow No. 2 Bridge***
PROJECT NO. ***2000-119***
BORING NO. ***R-14-OFS-001***

SOIL GROUPS
1. GRAVELS, SANDS AND NONPLASTIC SILTS
2. CLAYS AND PLASTIC SILTS

FAULT INFO
HAYWARD FAULT
a_{max} (g)= 0.276
FAULT M_w = 6.6

GW DEPTH (ft)= 19 *(during drilling)*

BOREHOLE DIA (in)= 8
HAMMER ENERGY = 62%

MAJOR CUT(-)/FILL(+) (ft) 6
DESIGN GW DEPTH (ft)= 0

MSF = 1.39

					LIQUEFACTION RESISTANCE ($CRR_{7.5}$)												*CYCLIC STRESS RATIO (CSR)*				*F.S.=($CRR_{7.5}$/CSR)*MSF*K σ*K α*		
Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	C_E	C_R	C_S	C_B	N_{60}	σ_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60, CS}$	$CRR_{7.5}$	σ_v (psf)	σ_v' (psf)	r_d	CSR	Kσ	Kα	F.S.
1	6	1	8	SPT	8	1.03	0.80	1.2	1.15	9.1	750	1.63	14.9	21%	20.0	0.22	1500	1125	0.99	0.24	1.00	1	(1.26)
2	11	1	35	SPT	35	1.03	0.85	1.2	1.15	42.4	1375	1.21	51.2		51.2		2125	1438	0.98	0.26	1.00	1	NON-LIQ.
3	16	1	72	MC	47	1.03	0.95	1.0	1.15	52.8	2000	1.00	52.8	9%	54.1		2750	1750	0.97	0.27	1.00	1	NON-LIQ.

Notes:
1. The correction factors C_E (Energy Ratio), C_B (Borehole Diameter), C_R (Rod Length) and C_S (Sampling Method-liner) are per Youd et al. (2001).
2. For correction of overburden, $C_N = (1/\sigma_v')^{0.5}$ with a maximum value of 1.7.
3. The influence of Fines Contents are expressed by the following correction: $(N_1)_{60cs} = \alpha + \beta\ (N_1)_{60}$
   where α and β = coefficients determined from the following relationships
   for FC $\leq$ 5% $\alpha = 0$, $\beta = 1.0$
   for 5% < FC < 35% $\alpha = \exp(1.76-(190/FC^2))$, $\beta = (0.99+(FC^{1.5}/1000))$
   for FC $\geq$ 35% $\alpha = 5.0$, $\beta = 1.2$
4. For $(N_1)_{60,cs}$ greater than 30, clean granular soils are too dense to liquefy and are classed as non-liquefiable.

Reference:
Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER Workshops on Evaluation of Liquefaction Resistance of Soils, Youd, et al., ASCE Journal of Geotechnical and Geoenvironmental Engineering, October 2001, Vol. 127 No. 10

LIQUEFACTION POTENTIAL ANALYSIS (SPT procedures per Youd et al, 2001)

PROJECT NAME ***Jellys Ferry Overflow No. 2 Bridge***
PROJECT NO. ***2000-119***
BORING NO. ***R-14-OFS-004***

SOIL GROUPS
1. GRAVELS, SANDS AND NONPLASTIC SILTS
2. CLAYS AND PLASTIC SILTS

FAULT INFO
HAYWARD FAULT
a_{max} (g)= 0.276
FAULT M_w = 6.6

GW DEPTH (ft)= 15 *(during drilling)*

BOREHOLE DIA (in)= 8
HAMMER ENERGY = 62%

MAJOR CUT(-)/FILL(+) (ft) 6
DESIGN GW DEPTH (ft)= 0

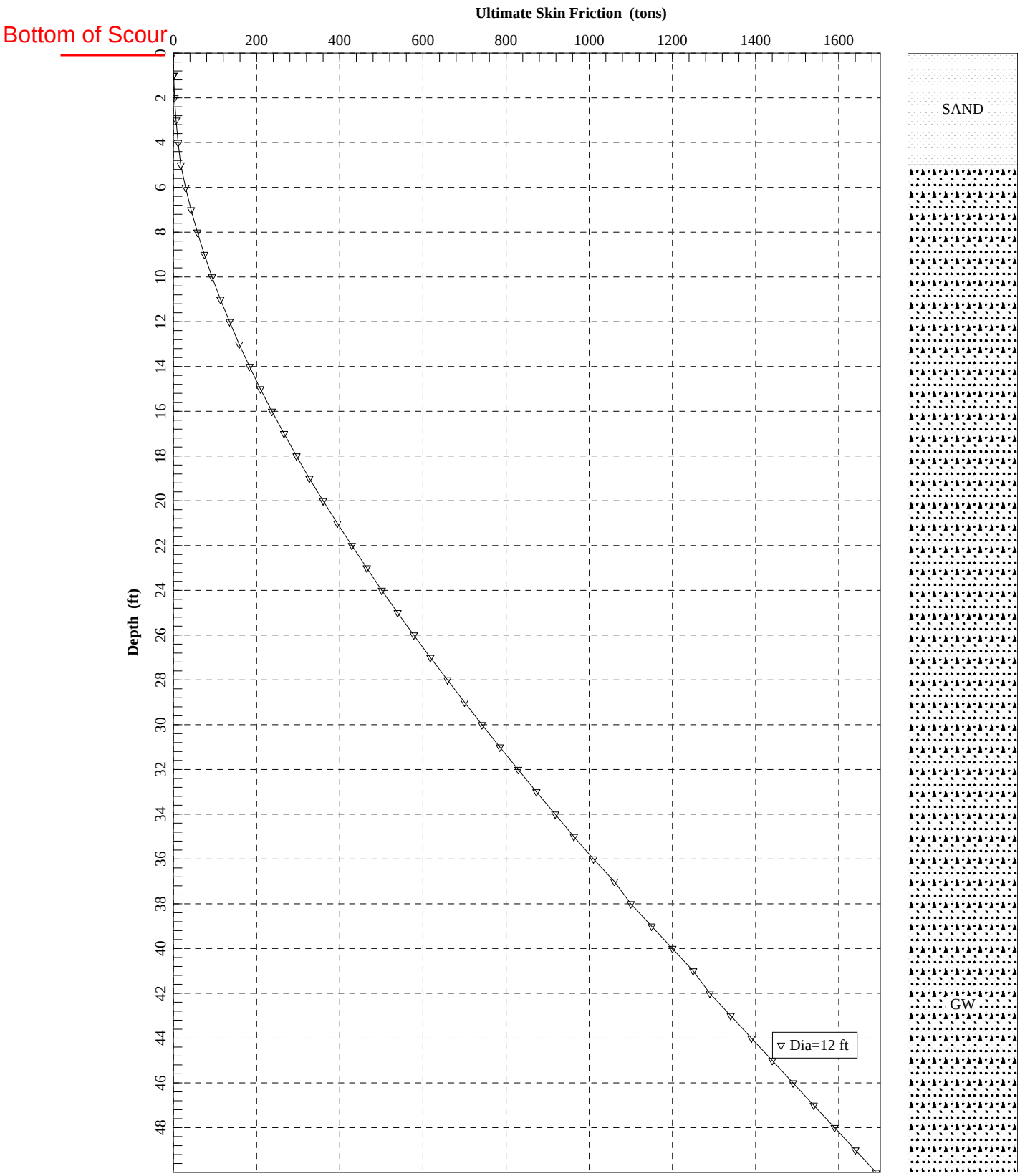
MSF = 1.39

					LIQUEFACTION RESISTANCE ($CRR_{7.5}$)												*CYCLIC STRESS RATIO (CSR)*				*F.S.=($CRR_{7.5}$/CSR)*MSF*K σ*K α*		
Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	C_E	C_R	C_S	C_B	N_{60}	σ_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60, CS}$	$CRR_{7.5}$	σ_v (psf)	σ_v' (psf)	r_d	CSR	Kσ	Kα	F.S.
1	3	1	33	SPT	33	1.03	0.75	1.2	1.15	35.3	375	1.70	60.0		60.0		1125	938	0.99	0.21	1.00	1	NON-LIQ.
2	6	1	64	SPT	64	1.03	0.80	1.2	1.15	73.0	750	1.63	119.2		119.2		1500	1125	0.99	0.24	1.00	1	NON-LIQ.
3	11	1	14	MC	9	1.03	0.85	1.0	1.15	9.2	1375	1.21	11.1	50%	18.3	0.20	2125	1438	0.98	0.26	1.00	1	(1.04)
4	15	1	19	MC	12	1.03	0.95	1.0	1.15	13.9	1875	1.03	14.4	38%	22.3	0.25	2625	1688	0.97	0.27	1.00	1	(1.26)
5	21	1	100	SPT	100	1.03	0.95	1.2	1.15	135.5	2250	0.94	127.7		127.7		3375	2063	0.95	0.28	0.95	1	NON-LIQ.

Notes:
1. The correction factors C_E (Energy Ratio), C_B (Borehole Diameter), C_R (Rod Length) and C_S (Sampling Method-liner) are per Youd et al. (2001).
2. For correction of overburden, $C_N = (1/\sigma_v')^{0.5}$ with a maximum value of 1.7.
3. The influence of Fines Contents are expressed by the following correction: $(N_1)_{60cs} = \alpha + \beta\ (N_1)_{60}$
   where α and β = coefficients determined from the following relationships
   for FC ≤ 5% $\alpha = 0$, $\beta = 1.0$
   for 5% < FC < 35% $\alpha = \exp(1.76-(190/FC^2))$, $\beta = (0.99+(FC^{1.5}/1000))$
   for FC ≥ 35% $\alpha = 5.0$, $\beta = 1.2$
4. For $(N_1)_{60,cs}$ greater than 30, clean granular soils are too dense to liquefy and are classed as non-liquefiable.

Reference:
Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER Workshops on Evaluation of Liquefaction Resistance of Soils, Youd, et al., ASCE Journal of Geotechnical and Geoenvironmental Engineering, October 2001, Vol. 127 No. 10

Vertical Pile Analysis



Sacramento River Bridge at Jellys Ferry Road - Bents 2&3

```
==========================================================================

                 SHAFT for Windows, Version 2012.7.11

                  Serial Number :  291911540

               VERTICALLY LOADED DRILLED SHAFT ANALYSIS
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==========================================================================


     Path to file locations      : S:\Ongoing\Emre Ortakci\2000-119-10 Jellys Ferry
Road Bridge\Calcs\SRB\
     Name of input data file     : SRB-Bent2.sfd
     Name of output file         : SRB-Bent2.sfo
     Name of plot output file    : SRB-Bent2.sfp
     Name of runtime file        : SRB-Bent2.sfr


     --------------------------------------------------------------------------
                         Time and Date of Analysis
     --------------------------------------------------------------------------

               Date:  March 20, 2015     Time:  14:49:40

     Sacramento Rive Bridge at Jellys Ferry - Bent 2 and 3


     PROPOSED DEPTH =      50.0 FT
     ----------------


     NUMBER OF LAYERS =    2
     ------------------


     WATER TABLE DEPTH =       0.0 FT.
     --------------------


     FACTOR OF SAFETY APPLIED TO THE ULTIMATE SIDE FRICTION CAPACITY = 3.00
     -----------------------------------------------------------
     FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00
     -----------------------------------------------------------


     SOIL INFORMATION
     ----------------

     LAYER NO 1----SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.400E+02
```



```
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.000E+00


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.400E+02
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.500E+01


     LAYER NO  2----GRAVELLEY SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.179E+01
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.800E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.500E+01


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.354E+00
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.800E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.800E+02



      DRILLED SHAFT INFORMATION
      -------------------------

       DIAMETER OF STEM          =   12.000  FT.
       DIAMETER OF BASE          =   12.000  FT.
       END OF STEM TO BASE       =    0.000  FT.
       ANGLE OF BELL             =    0.000  DEG.
       IGNORED TOP PORTION       =    0.000  FT.
       IGNORED BOTTOM PORTION    =    0.000  FT.
       AREA OF ONE PERCENT STEEL =  162.881  SQ.IN.
       ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
       VOLUME OF UNDERREAM       =    0.000  CU.YDS.



      PREDICTED RESULTS
      -----------------

      QS     = ULTIMATE SIDE RESISTANCE;
```

QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
1.0	4.19	0.71	232.18	232.89	232.89	232.41	55.59
2.0	8.38	2.83	247.11	249.94	249.94	248.05	29.83
3.0	12.57	6.37	261.99	268.36	268.36	264.12	21.35
4.0	16.76	11.33	276.81	288.13	288.13	280.58	17.19
5.0	20.95	17.69	291.53	309.23	309.23	297.43	14.76
6.0	25.14	29.14	306.26	335.40	335.40	315.98	13.34
7.0	29.33	42.45	320.99	363.44	363.44	335.14	12.39
8.0	33.51	57.56	335.72	393.28	393.28	354.91	11.73
9.0	37.70	74.42	350.45	424.87	424.87	375.25	11.27
10.0	41.89	92.96	365.17	458.14	458.14	396.16	10.94
11.0	46.08	113.14	379.90	493.04	493.04	417.62	10.70
12.0	50.27	134.90	394.63	529.53	529.53	439.60	10.53
13.0	54.46	158.19	409.36	567.55	567.55	462.09	10.42
14.0	58.65	182.96	424.09	607.04	607.04	485.07	10.35
15.0	62.84	209.15	438.81	647.97	647.97	508.53	10.31
16.0	67.03	236.73	453.54	690.28	690.28	532.45	10.30
17.0	71.22	265.65	468.27	733.92	733.92	556.82	10.31
18.0	75.41	295.85	483.00	778.85	778.85	581.61	10.33
19.0	79.60	327.29	497.73	825.01	825.01	606.82	10.36
20.0	83.79	359.92	512.46	872.38	872.38	632.43	10.41
21.0	87.98	393.70	527.18	920.89	920.89	658.42	10.47
22.0	92.17	428.59	541.91	970.50	970.50	684.77	10.53
23.0	96.35	464.53	556.64	1021.17	1021.17	711.48	10.60
24.0	100.54	501.50	571.37	1072.86	1072.86	738.53	10.67
25.0	104.73	539.43	586.10	1125.53	1125.53	765.91	10.75
26.0	108.92	578.30	600.82	1179.12	1179.12	793.59	10.83
27.0	113.11	618.05	615.55	1233.61	1233.61	821.57	10.91
28.0	117.30	658.65	630.28	1288.93	1288.93	849.83	10.99
29.0	121.49	700.06	645.01	1345.07	1345.07	878.36	11.07
30.0	125.68	742.23	659.74	1401.96	1401.96	907.15	11.16
31.0	129.87	785.12	674.46	1459.58	1459.58	936.17	11.24
32.0	134.06	828.69	689.19	1517.88	1517.88	965.42	11.32
33.0	138.25	872.90	703.92	1576.83	1576.83	994.89	11.41
34.0	142.44	917.72	718.65	1636.37	1636.37	1024.56	11.49
35.0	146.63	963.10	733.38	1696.48	1696.48	1054.41	11.57
36.0	150.82	1009.00	748.11	1757.11	1757.11	1084.44	11.65
37.0	155.01	1055.39	762.83	1818.22	1818.22	1114.63	11.73
38.0	159.19	1102.22	777.56	1879.78	1879.78	1144.97	11.81
39.0	163.38	1149.46	792.29	1941.75	1941.75	1175.44	11.88
40.0	167.57	1197.07	807.02	2004.09	2004.09	1206.04	11.96
41.0	171.76	1245.01	821.75	2066.76	2066.76	1236.75	12.03
42.0	175.95	1293.24	836.47	2129.72	2129.72	1267.55	12.10
43.0	180.14	1341.73	851.20	2192.93	2192.93	1298.45	12.17
44.0	184.33	1390.44	865.93	2256.37	2256.37	1329.41	12.24
45.0	188.52	1439.33	880.66	2319.98	2319.98	1360.43	12.31
46.0	192.71	1488.36	895.39	2383.75	2383.75	1391.51	12.37
47.0	196.90	1537.50	910.11	2447.61	2447.61	1422.61	12.43
48.0	201.09	1586.71	924.84	2511.55	2511.55	1453.75	12.49

49.0	205.28	1635.96	939.57	2575.53	2575.53	1484.89	12.55
50.0	209.47	1685.20	954.30	2639.50	2639.50	1516.03	12.60

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.6041E-01	0.1098E-04	0.2319E-02	0.1000E-04
0.3021E+00	0.5492E-04	0.1160E-01	0.5000E-04
0.6041E+00	0.1098E-03	0.2319E-01	0.1000E-03
0.3021E+02	0.5492E-02	0.1160E+01	0.5000E-02
0.4531E+02	0.8238E-02	0.1740E+01	0.7500E-02
0.6041E+02	0.1098E-01	0.2319E+01	0.1000E-01
0.1510E+03	0.2746E-01	0.5799E+01	0.2500E-01
0.3021E+03	0.5492E-01	0.1160E+02	0.5000E-01
0.4532E+03	0.8238E-01	0.1740E+02	0.7500E-01
0.6044E+03	0.1098E+00	0.2319E+02	0.1000E+00
0.1137E+04	0.2687E+00	0.5799E+02	0.2500E+00
0.1575E+04	0.5263E+00	0.1160E+03	0.5000E+00
0.1844E+04	0.1473E+01	0.3292E+03	0.1440E+01
0.1959E+04	0.3637E+01	0.6108E+03	0.3600E+01
0.2317E+04	0.7246E+01	0.9686E+03	0.7200E+01

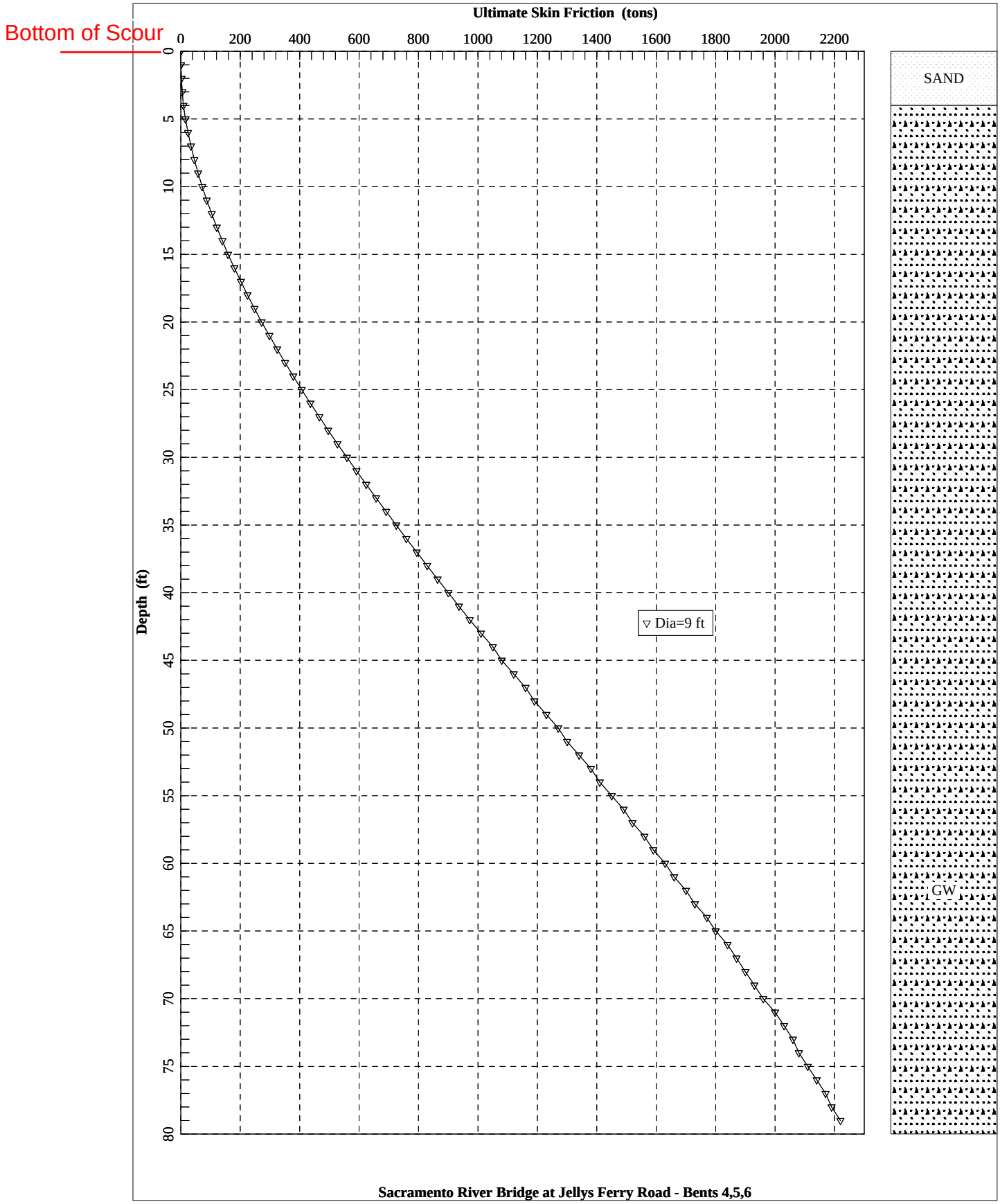
RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.8835E-01	0.1143E-04	0.3314E-02	0.1000E-04
0.4417E+00	0.5717E-04	0.1657E-01	0.5000E-04
0.8835E+00	0.1143E-03	0.3314E-01	0.1000E-03
0.4417E+02	0.5717E-02	0.1657E+01	0.5000E-02
0.6626E+02	0.8575E-02	0.2485E+01	0.7500E-02
0.8835E+02	0.1143E-01	0.3314E+01	0.1000E-01
0.2209E+03	0.2858E-01	0.8284E+01	0.2500E-01
0.4418E+03	0.5717E-01	0.1657E+02	0.5000E-01
0.6631E+03	0.8576E-01	0.2485E+02	0.7500E-01
0.8842E+03	0.1143E+00	0.3314E+02	0.1000E+00
0.1498E+04	0.2747E+00	0.8284E+02	0.2500E+00
0.1745E+04	0.5295E+00	0.1657E+03	0.5000E+00
0.2086E+04	0.1478E+01	0.4581E+03	0.1440E+01
0.2210E+04	0.3642E+01	0.7253E+03	0.3600E+01
0.2515E+04	0.7250E+01	0.1031E+04	0.7200E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.3410E-01	0.1056E-04	0.1325E-02	0.1000E-04
0.1705E+00	0.5278E-04	0.6627E-02	0.5000E-04
0.3410E+00	0.1056E-03	0.1325E-01	0.1000E-03
0.1705E+02	0.5278E-02	0.6627E+00	0.5000E-02
0.2558E+02	0.7917E-02	0.9941E+00	0.7500E-02
0.3410E+02	0.1056E-01	0.1325E+01	0.1000E-01

0.8525E+02	0.2639E-01	0.3314E+01	0.2500E-01
0.1705E+03	0.5278E-01	0.6627E+01	0.5000E-01
0.2558E+03	0.7917E-01	0.9941E+01	0.7500E-01
0.3410E+03	0.1056E+00	0.1325E+02	0.1000E+00
0.7791E+03	0.2627E+00	0.3314E+02	0.2500E+00
0.1249E+04	0.5206E+00	0.6627E+02	0.5000E+00
0.1603E+04	0.1468E+01	0.2004E+03	0.1440E+01
0.1708E+04	0.3632E+01	0.4962E+03	0.3600E+01
0.2119E+04	0.7242E+01	0.9066E+03	0.7200E+01


Bottom of Scour
Ultimate Skin Friction (tons)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Dia=9 ft
SAND
GW
Sacramento River Bridge at Jellys Ferry Road - Bents 4,5,6

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==========================================================================

                 SHAFT for Windows, Version 2012.7.11

                  Serial Number :  291911540

               VERTICALLY LOADED DRILLED SHAFT ANALYSIS
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Road Bridge\Calcs\SRB\
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     Name of output file         : SRB-Bent4.sfo
     Name of plot output file    : SRB-Bent4.sfp
     Name of runtime file        : SRB-Bent4.sfr


     --------------------------------------------------------------------------
                         Time and Date of Analysis
     --------------------------------------------------------------------------

               Date:  March 20, 2015     Time:  14:51:05

     Sacramento Rive Bridge at Jellys Ferry - Bents 4,5,6


     PROPOSED DEPTH =      79.0 FT
     ----------------


     NUMBER OF LAYERS =    2
     ------------------


     WATER TABLE DEPTH =       0.0 FT.
     --------------------


     FACTOR OF SAFETY APPLIED TO THE ULTIMATE SIDE FRICTION CAPACITY = 3.00
     ----------------------------------------------------------
     FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00
     ----------------------------------------------------------


     SOIL INFORMATION
     ----------------

     LAYER NO 1----SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.400E+02
```



```
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.000E+00


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.400E+02
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.400E+01


     LAYER NO  2----GRAVELLEY SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.180E+01
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.800E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.400E+01


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.250E+00
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.800E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.120E+03



      DRILLED SHAFT INFORMATION
      -------------------------

       DIAMETER OF STEM          =    9.000  FT.
       DIAMETER OF BASE          =    9.000  FT.
       END OF STEM TO BASE       =    0.000  FT.
       ANGLE OF BELL             =    0.000  DEG.
       IGNORED TOP PORTION       =    0.000  FT.
       IGNORED BOTTOM PORTION    =    0.000  FT.
       AREA OF ONE PERCENT STEEL =   91.621  SQ.IN.
       ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
       VOLUME OF UNDERREAM       =    0.000  CU.YDS.



      PREDICTED RESULTS
      -----------------

      QS     = ULTIMATE SIDE RESISTANCE;
```

QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
1.0	2.36	0.53	180.75	181.28	181.28	180.93	76.93
2.0	4.71	2.12	195.69	197.82	197.82	196.40	41.97
3.0	7.07	4.78	210.54	215.32	215.32	212.14	30.46
4.0	9.43	8.50	225.27	233.77	233.77	228.10	24.80
5.0	11.78	15.64	240.00	255.64	255.64	245.21	21.70
6.0	14.14	24.23	254.73	278.96	278.96	262.80	19.73
7.0	16.50	34.21	269.45	303.67	303.67	280.86	18.41
8.0	18.85	45.55	284.18	329.73	329.73	299.37	17.49
9.0	21.21	58.19	298.91	357.10	357.10	318.31	16.84
10.0	23.57	72.10	313.64	385.74	385.74	337.67	16.37
11.0	25.92	87.23	328.37	415.60	415.60	357.44	16.03
12.0	28.28	103.55	343.10	446.64	446.64	377.61	15.79
13.0	30.63	121.02	357.82	478.84	478.84	398.16	15.63
14.0	32.99	139.59	372.55	512.14	512.14	419.08	15.52
15.0	35.35	159.24	387.28	546.52	546.52	440.36	15.46
16.0	37.70	179.93	402.01	581.93	581.93	461.98	15.43
17.0	40.06	201.61	416.74	618.35	618.35	483.94	15.44
18.0	42.42	224.26	431.46	655.72	655.72	506.22	15.46
19.0	44.77	247.84	446.19	694.03	694.03	528.81	15.50
20.0	47.13	272.31	460.92	733.23	733.23	551.69	15.56
21.0	49.49	297.65	475.65	773.30	773.30	574.87	15.63
22.0	51.84	323.82	490.38	814.19	814.19	598.32	15.70
23.0	54.20	350.78	505.10	855.88	855.88	622.03	15.79
24.0	56.56	378.50	519.83	898.33	898.33	646.00	15.88
25.0	58.91	406.95	534.56	941.51	941.51	670.21	15.98
26.0	61.27	436.10	549.29	985.39	985.39	694.66	16.08
27.0	63.63	465.91	564.02	1029.93	1029.93	719.32	16.19
28.0	65.98	496.36	578.75	1075.11	1075.11	744.20	16.29
29.0	68.34	527.42	593.47	1120.89	1120.89	769.28	16.40
30.0	70.69	559.04	608.20	1167.25	1167.25	794.55	16.51
31.0	73.05	591.21	622.93	1214.14	1214.14	820.00	16.62
32.0	75.41	623.89	637.66	1261.55	1261.55	845.62	16.73
33.0	77.76	657.05	652.39	1309.44	1309.44	871.40	16.84
34.0	80.12	690.67	667.11	1357.78	1357.78	897.34	16.95
35.0	82.48	724.70	681.84	1406.54	1406.54	923.41	17.05
36.0	84.83	759.13	696.57	1455.70	1455.70	949.61	17.16
37.0	87.19	793.92	711.30	1505.22	1505.22	975.94	17.26
38.0	89.55	829.04	726.03	1555.07	1555.07	1002.37	17.37
39.0	91.90	864.47	740.75	1605.23	1605.23	1028.91	17.47
40.0	94.26	900.18	755.48	1655.66	1655.66	1055.54	17.56
41.0	96.62	936.13	770.21	1706.34	1706.34	1082.25	17.66
42.0	98.97	972.31	784.94	1757.25	1757.25	1109.04	17.75
43.0	101.33	1008.67	799.67	1808.34	1808.34	1135.89	17.85
44.0	103.69	1045.20	814.40	1859.60	1859.60	1162.80	17.93
45.0	106.04	1081.87	829.12	1910.99	1910.99	1189.75	18.02
46.0	108.40	1118.64	843.85	1962.49	1962.49	1216.73	18.10
47.0	110.76	1155.50	858.58	2014.08	2014.08	1243.75	18.18
48.0	113.11	1192.41	873.31	2065.72	2065.72	1270.78	18.26

49.0	115.47	1229.34	888.04	2117.38	2117.38	1297.82	18.34
50.0	117.82	1266.28	902.76	2169.04	2169.04	1324.86	18.41
51.0	120.18	1303.18	917.49	2220.68	2220.68	1351.89	18.48
52.0	122.54	1340.04	932.22	2272.26	2272.26	1378.90	18.54
53.0	124.89	1376.81	946.95	2323.76	2323.76	1405.88	18.61
54.0	127.25	1413.47	961.68	2375.15	2375.15	1432.83	18.67
55.0	129.61	1450.00	976.40	2426.40	2426.40	1459.74	18.72
56.0	131.96	1486.37	991.13	2477.50	2477.50	1486.59	18.77
57.0	134.32	1522.55	1005.86	2528.41	2528.41	1513.38	18.82
58.0	136.68	1558.52	1020.59	2579.11	2579.11	1540.10	18.87
59.0	139.03	1594.25	1035.32	2629.57	2629.57	1566.74	18.91
60.0	141.39	1629.72	1050.05	2679.77	2679.77	1593.29	18.95
61.0	143.75	1664.90	1064.77	2729.67	2729.67	1619.74	18.99
62.0	146.10	1699.76	1079.50	2779.26	2779.26	1646.09	19.02
63.0	148.46	1734.28	1094.23	2828.51	2828.51	1672.32	19.05
64.0	150.82	1768.44	1108.96	2877.39	2877.39	1698.44	19.08
65.0	153.17	1802.20	1123.69	2925.88	2925.88	1724.42	19.10
66.0	155.53	1835.54	1138.41	2973.96	2973.96	1750.26	19.12
67.0	157.89	1868.45	1153.14	3021.59	3021.59	1775.96	19.14
68.0	160.24	1900.88	1167.87	3068.75	3068.75	1801.50	19.15
69.0	162.60	1932.83	1182.60	3115.43	3115.43	1826.87	19.16
70.0	164.96	1964.26	1197.33	3161.58	3161.58	1852.08	19.17
71.0	167.31	1995.14	1212.05	3207.20	3207.20	1877.10	19.17
72.0	169.67	2025.46	1226.78	3252.24	3252.24	1901.94	19.17
73.0	172.02	2055.19	1240.62	3295.81	3295.81	1925.69	19.16
74.0	174.38	2084.30	1253.53	3337.83	3337.83	1948.29	19.14
75.0	176.74	2112.78	1265.45	3378.23	3378.23	1969.71	19.11
76.0	179.09	2140.59	1276.34	3416.93	3416.93	1989.87	19.08
77.0	181.45	2167.71	1286.16	3453.87	3453.87	2008.73	19.03
78.0	183.81	2194.12	1294.86	3488.98	3488.98	2026.23	18.98
79.0	186.16	2219.79	1302.39	3522.18	3522.18	2042.32	18.92

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1149E+00	0.1477E-04	0.4221E-02	0.1000E-04
0.5746E+00	0.7384E-04	0.2110E-01	0.5000E-04
0.1149E+01	0.1477E-03	0.4221E-01	0.1000E-03
0.5746E+02	0.7384E-02	0.2110E+01	0.5000E-02
0.8619E+02	0.1108E-01	0.3166E+01	0.7500E-02
0.1149E+03	0.1477E-01	0.4221E+01	0.1000E-01
0.2875E+03	0.3693E-01	0.1055E+02	0.2500E-01
0.5757E+03	0.7387E-01	0.2110E+02	0.5000E-01
0.8637E+03	0.1108E+00	0.3166E+02	0.7500E-01
0.1116E+04	0.1471E+00	0.4221E+02	0.1000E+00
0.1812E+04	0.3280E+00	0.1055E+03	0.2500E+00
0.2159E+04	0.5966E+00	0.2110E+03	0.5000E+00
0.2427E+04	0.1195E+01	0.4493E+03	0.1080E+01
0.2596E+04	0.2833E+01	0.8335E+03	0.2700E+01
0.3084E+04	0.5568E+01	0.1322E+04	0.5400E+01

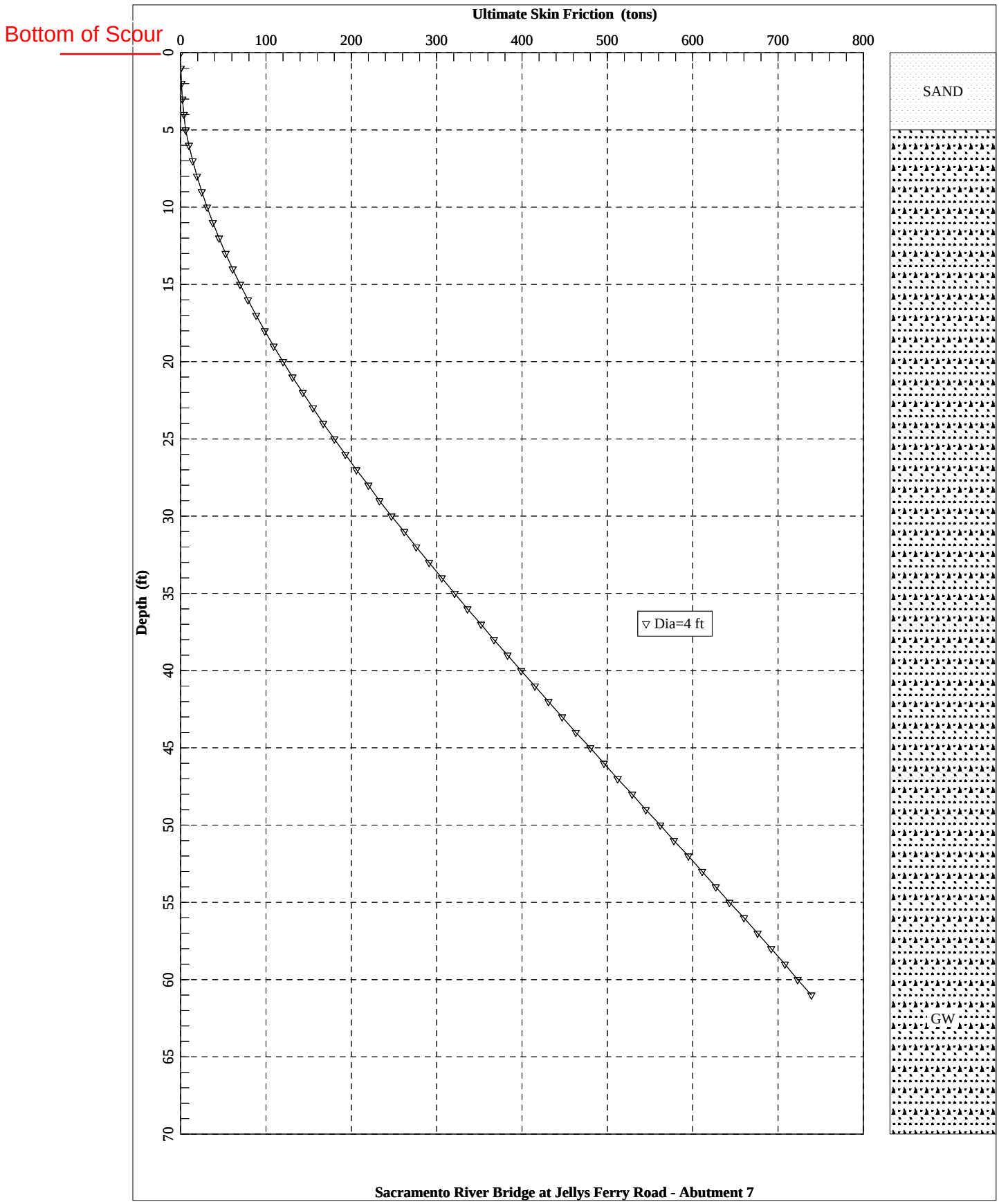
RESULT FROM UPPER-BOUND LINE

TOP LOAD	TOP MOVEMENT	TIP LOAD	TIP MOVEMENT

ton	IN.	ton	IN.
0.1743E+00	0.1711E-04	0.6030E-02	0.1000E-04
0.8713E+00	0.8555E-04	0.3015E-01	0.5000E-04
0.1743E+01	0.1711E-03	0.6030E-01	0.1000E-03
0.8713E+02	0.8555E-02	0.3015E+01	0.5000E-02
0.1307E+03	0.1283E-01	0.4522E+01	0.7500E-02
0.1743E+03	0.1711E-01	0.6030E+01	0.1000E-01
0.4366E+03	0.4280E-01	0.1507E+02	0.2500E-01
0.8740E+03	0.8563E-01	0.3015E+02	0.5000E-01
0.1305E+04	0.1284E+00	0.4522E+02	0.7500E-01
0.1628E+04	0.1687E+00	0.6030E+02	0.1000E+00
0.2148E+04	0.3441E+00	0.1507E+03	0.2500E+00
0.2426E+04	0.6104E+00	0.3015E+03	0.5000E+00
0.2752E+04	0.1214E+01	0.6251E+03	0.1080E+01
0.2931E+04	0.2852E+01	0.9898E+03	0.2700E+01
0.3348E+04	0.5582E+01	0.1407E+04	0.5400E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.6259E-01	0.1264E-04	0.2412E-02	0.1000E-04
0.3129E+00	0.6320E-04	0.1206E-01	0.5000E-04
0.6259E+00	0.1264E-03	0.2412E-01	0.1000E-03
0.3129E+02	0.6320E-02	0.1206E+01	0.5000E-02
0.4694E+02	0.9480E-02	0.1809E+01	0.7500E-02
0.6259E+02	0.1264E-01	0.2412E+01	0.1000E-01
0.1565E+03	0.3160E-01	0.6030E+01	0.2500E-01
0.3131E+03	0.6320E-01	0.1206E+02	0.5000E-01
0.4699E+03	0.9481E-01	0.1809E+02	0.7500E-01
0.6243E+03	0.1264E+00	0.2412E+02	0.1000E+00
0.1325E+04	0.3066E+00	0.6030E+02	0.2500E+00
0.1864E+04	0.5813E+00	0.1206E+03	0.5000E+00
0.2104E+04	0.1176E+01	0.2735E+03	0.1080E+01
0.2261E+04	0.2815E+01	0.6772E+03	0.2700E+01
0.2821E+04	0.5555E+01	0.1237E+04	0.5400E+01


Bottom of Scour
Ultimate Skin Friction (tons)
0
100
200
300
400
500
600
700
800
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Dia=4 ft
SAND
GW
Sacramento River Bridge at Jellys Ferry Road - Abutment 7

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==========================================================================

                 SHAFT for Windows, Version 2012.7.11

                  Serial Number :  291911540

               VERTICALLY LOADED DRILLED SHAFT ANALYSIS
                (c) Copyright ENSOFT, Inc., 1987-2012
                      All Rights Reserved

==========================================================================


     Path to file locations      : S:\Ongoing\Emre Ortakci\2000-119-10 Jellys Ferry
 Road Bridge\Calcs\SRB\
     Name of input data file     : SRB-Abutment 7.sfd
     Name of output file         : SRB-Abutment 7.sfo
     Name of plot output file    : SRB-Abutment 7.sfp
     Name of runtime file        : SRB-Abutment 7.sfr


     --------------------------------------------------------------------------
                         Time and Date of Analysis
     --------------------------------------------------------------------------

               Date:  March 20, 2015     Time:  14:51:47

     Sacramento Rive Bridge at Jellys Ferry - Abutment 7


     PROPOSED DEPTH =      61.0 FT
     ----------------


     NUMBER OF LAYERS =    2
     ------------------


     WATER TABLE DEPTH =       0.0 FT.
     --------------------


     FACTOR OF SAFETY APPLIED TO THE ULTIMATE SIDE FRICTION CAPACITY = 3.00
     ----------------------------------------------------------
     FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00
     ----------------------------------------------------------


     SOIL INFORMATION
     ----------------

     LAYER NO 1----SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.340E+02
```



```
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.000E+00


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.340E+02
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.500E+01


     LAYER NO  2----GRAVELLEY SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.179E+01
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.800E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.500E+01


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.250E+00
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.800E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.120E+03



      DRILLED SHAFT INFORMATION
      -------------------------

       DIAMETER OF STEM          =    4.000  FT.
       DIAMETER OF BASE          =    4.000  FT.
       END OF STEM TO BASE       =    0.000  FT.
       ANGLE OF BELL             =    0.000  DEG.
       IGNORED TOP PORTION       =    0.000  FT.
       IGNORED BOTTOM PORTION    =    0.000  FT.
       AREA OF ONE PERCENT STEEL =   18.098  SQ.IN.
       ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
       VOLUME OF UNDERREAM       =    0.000  CU.YDS.



      PREDICTED RESULTS
      -----------------

      QS     = ULTIMATE SIDE RESISTANCE;
```

QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
1.0	0.47	0.24	77.41	77.64	77.64	77.49	166.81
2.0	0.93	0.94	98.02	98.96	98.96	98.33	106.30
3.0	1.40	2.12	117.01	119.14	119.14	117.72	85.32
4.0	1.86	3.78	133.85	137.63	137.63	135.11	73.92
5.0	2.33	5.90	147.99	153.89	153.89	149.95	66.12
6.0	2.79	9.71	162.13	171.84	171.84	165.37	61.53
7.0	3.26	14.15	176.27	190.42	190.42	180.98	58.44
8.0	3.72	19.19	190.41	209.59	209.59	196.80	56.28
9.0	4.19	24.81	204.54	229.35	229.35	212.81	54.75
10.0	4.65	30.99	218.68	249.67	249.67	229.01	53.64
11.0	5.12	37.71	232.82	270.54	270.54	245.39	52.84
12.0	5.59	44.97	246.96	291.93	291.93	261.95	52.26
13.0	6.05	52.73	261.10	313.83	313.83	278.68	51.86
14.0	6.52	60.99	275.24	336.22	336.22	295.57	51.59
15.0	6.98	69.72	289.38	359.10	359.10	312.62	51.43
16.0	7.45	78.91	303.52	382.43	382.43	329.82	51.35
17.0	7.91	88.55	317.66	406.21	406.21	347.17	51.33
18.0	8.38	98.62	331.80	430.41	430.41	364.67	51.37
19.0	8.84	109.10	345.93	455.03	455.03	382.30	51.45
20.0	9.31	119.97	360.07	480.05	480.05	400.06	51.56
21.0	9.78	131.23	374.21	505.45	505.45	417.96	51.71
22.0	10.24	142.86	388.35	531.21	531.21	435.97	51.87
23.0	10.71	154.84	402.49	557.34	557.34	454.11	52.06
24.0	11.17	167.17	416.63	583.79	583.79	472.35	52.26
25.0	11.64	179.81	430.77	610.58	610.58	490.71	52.47
26.0	12.10	192.77	444.91	637.67	637.67	509.16	52.69
27.0	12.57	206.02	459.05	665.06	665.06	527.72	52.92
28.0	13.03	219.55	473.19	692.74	692.74	546.37	53.15
29.0	13.50	233.35	487.32	720.68	720.68	565.11	53.39
30.0	13.96	247.41	501.46	748.87	748.87	583.93	53.63
31.0	14.43	261.71	515.60	777.31	777.31	602.84	53.87
32.0	14.90	276.23	529.74	805.97	805.97	621.82	54.11
33.0	15.36	290.97	541.76	832.73	832.73	638.75	54.21
34.0	15.83	305.91	551.42	857.33	857.33	653.39	54.17
35.0	16.29	321.03	558.49	879.52	879.52	665.50	53.99
36.0	16.76	336.33	562.73	899.07	899.07	674.84	53.65
37.0	17.22	351.80	564.85	916.65	916.65	682.12	53.22
38.0	17.69	367.41	565.56	932.97	932.97	688.03	52.74
39.0	18.15	383.15	565.56	948.71	948.71	693.28	52.26
40.0	18.62	399.02	565.56	964.58	964.58	698.57	51.81
41.0	19.08	415.00	565.56	980.56	980.56	703.89	51.38
42.0	19.55	431.08	565.56	996.64	996.64	709.25	50.98
43.0	20.02	447.24	565.56	1012.80	1012.80	714.64	50.60
44.0	20.48	463.48	565.56	1029.04	1029.04	720.05	50.24
45.0	20.95	479.78	565.56	1045.34	1045.34	725.49	49.90
46.0	21.41	496.12	565.56	1061.68	1061.68	730.93	49.58
47.0	21.88	512.50	565.56	1078.06	1078.06	736.39	49.28
48.0	22.34	528.90	565.56	1094.46	1094.46	741.86	48.98

49.0	22.81	545.32	565.56	1110.88	1110.88	747.33	48.70
50.0	23.27	561.73	565.56	1127.29	1127.29	752.80	48.44
51.0	23.74	578.14	565.56	1143.70	1143.70	758.27	48.18
52.0	24.21	594.52	565.56	1160.08	1160.08	763.73	47.93
53.0	24.67	610.86	565.56	1176.42	1176.42	769.18	47.69
54.0	25.14	627.15	565.56	1192.71	1192.71	774.61	47.45
55.0	25.60	643.39	565.56	1208.95	1208.95	780.02	47.22
56.0	26.07	659.55	565.56	1225.11	1225.11	785.41	47.00
57.0	26.53	675.63	565.56	1241.19	1241.19	790.77	46.78
58.0	27.00	691.62	565.56	1257.18	1257.18	796.10	46.57
59.0	27.46	707.50	565.56	1273.06	1273.06	801.39	46.35
60.0	27.93	723.27	565.56	1288.83	1288.83	806.65	46.15
61.0	28.39	738.90	565.56	1304.46	1304.46	811.86	45.94

RESULT FROM TREND (AVERAGED) LINE

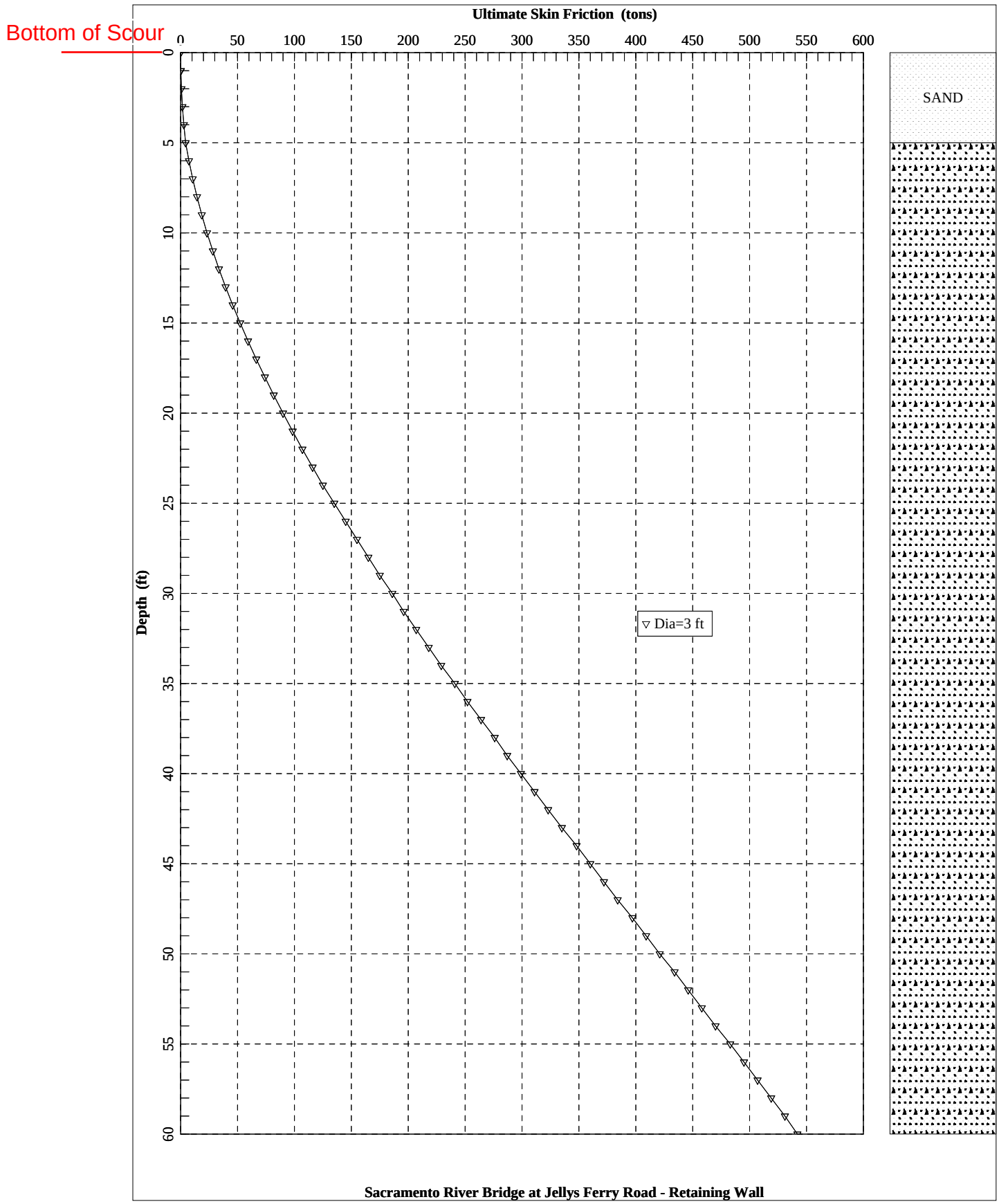
TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1011E+00	0.2625E-04	0.4124E-02	0.1000E-04
0.5055E+00	0.1312E-03	0.2062E-01	0.5000E-04
0.1011E+01	0.2625E-03	0.4124E-01	0.1000E-03
0.5062E+02	0.1313E-01	0.2062E+01	0.5000E-02
0.7616E+02	0.1971E-01	0.3093E+01	0.7500E-02
0.1017E+03	0.2631E-01	0.4124E+01	0.1000E-01
0.2528E+03	0.6578E-01	0.1031E+02	0.2500E-01
0.4229E+03	0.1219E+00	0.2062E+02	0.5000E-01
0.5167E+03	0.1637E+00	0.3093E+02	0.7500E-01
0.5960E+03	0.2040E+00	0.4124E+02	0.1000E+00
0.7448E+03	0.3886E+00	0.1030E+03	0.2500E+00
0.8367E+03	0.6655E+00	0.2017E+03	0.5000E+00
0.8659E+03	0.7999E+00	0.2430E+03	0.6250E+00
0.9327E+03	0.1399E+01	0.3620E+03	0.1200E+01
0.1145E+04	0.2658E+01	0.5740E+03	0.2400E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1646E+00	0.3544E-04	0.5891E-02	0.1000E-04
0.8229E+00	0.1772E-03	0.2946E-01	0.5000E-04
0.1646E+01	0.3544E-03	0.5891E-01	0.1000E-03
0.8283E+02	0.1777E-01	0.2946E+01	0.5000E-02
0.1246E+03	0.2670E-01	0.4418E+01	0.7500E-02
0.1663E+03	0.3563E-01	0.5891E+01	0.1000E-01
0.3963E+03	0.8804E-01	0.1473E+02	0.2500E-01
0.5938E+03	0.1521E+00	0.2946E+02	0.5000E-01
0.6632E+03	0.1916E+00	0.4418E+02	0.7500E-01
0.7084E+03	0.2270E+00	0.5891E+02	0.1000E+00
0.8412E+03	0.4100E+00	0.1468E+03	0.2500E+00
0.9637E+03	0.6958E+00	0.2804E+03	0.5000E+00
0.1004E+04	0.8338E+00	0.3364E+03	0.6250E+00
0.1058E+04	0.1428E+01	0.4298E+03	0.1200E+01
0.1239E+04	0.2678E+01	0.6108E+03	0.2400E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5122E-01	0.1857E-04	0.2356E-02	0.1000E-04
0.2561E+00	0.9284E-04	0.1178E-01	0.5000E-04
0.5122E+00	0.1857E-03	0.2356E-01	0.1000E-03
0.2561E+02	0.9284E-02	0.1178E+01	0.5000E-02
0.3842E+02	0.1393E-01	0.1767E+01	0.7500E-02
0.5127E+02	0.1857E-01	0.2356E+01	0.1000E-01
0.1286E+03	0.4648E-01	0.5891E+01	0.2500E-01
0.2468E+03	0.9176E-01	0.1178E+02	0.5000E-01
0.3451E+03	0.1337E+00	0.1767E+02	0.7500E-01
0.4305E+03	0.1740E+00	0.2357E+02	0.1000E+00
0.6469E+03	0.3669E+00	0.5915E+02	0.2500E+00
0.7094E+03	0.6352E+00	0.1230E+03	0.5000E+00
0.7150E+03	0.7640E+00	0.1495E+03	0.6250E+00
0.8070E+03	0.1370E+01	0.2941E+03	0.1200E+01
0.1050E+04	0.2638E+01	0.5373E+03	0.2400E+01


Bottom of Scour
Ultimate Skin Friction (tons)
0
50
100
150
200
250
300
350
400
450
500
550
600
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
Dia=3 ft
SAND
Sacramento River Bridge at Jellys Ferry Road - Retaining Wall

```
==========================================================================

                 SHAFT for Windows, Version 2012.7.11

                  Serial Number :  291911540

               VERTICALLY LOADED DRILLED SHAFT ANALYSIS
                (c) Copyright ENSOFT, Inc., 1987-2012
                      All Rights Reserved

==========================================================================


Path to file locations      : S:\Ongoing\Emre Ortakci\2000-119-10 Jellys Ferry
Road Bridge\Calcs\SRB\
Name of input data file     : Retaining Wall.sfd
Name of output file         : Retaining Wall.sfo
Name of plot output file    : Retaining Wall.sfp
Name of runtime file        : Retaining Wall.sfr


--------------------------------------------------------------------------
                     Time and Date of Analysis
--------------------------------------------------------------------------

          Date:  March 20, 2015     Time:  14:54:43

Sacramento River Bridge at Jellys Ferry Road - Retaining Wall


PROPOSED DEPTH =      60.0 FT
----------------


NUMBER OF LAYERS =    2
------------------


WATER TABLE DEPTH =       0.0 FT.
--------------------


FACTOR OF SAFETY APPLIED TO THE ULTIMATE SIDE FRICTION CAPACITY = 2.50
-------------------------------------------------------
FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 3.00
-------------------------------------------------------


SOIL INFORMATION
----------------

LAYER NO 1----SAND

  AT THE TOP

  SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
  UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
  INTERNAL FRICTION ANGLE, DEG.                      = 0.340E+02
```



```
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
  SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
  DEPTH, FT                                          = 0.000E+00


  AT THE BOTTOM

  SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
  UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
  INTERNAL FRICTION ANGLE, DEG.                      = 0.340E+02
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
  SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
  DEPTH, FT                                          = 0.500E+01


LAYER NO  2----GRAVELLEY SAND

  AT THE TOP

  SKIN FRICTION COEFFICIENT- BETA                    = 0.179E+01
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.800E+02
  SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
  DEPTH, FT                                          = 0.500E+01


  AT THE BOTTOM

  SKIN FRICTION COEFFICIENT- BETA                    = 0.250E+00
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.800E+02
  SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
  DEPTH, FT                                          = 0.120E+03



DRILLED SHAFT INFORMATION
-------------------------

 DIAMETER OF STEM          =    3.000  FT.
 DIAMETER OF BASE          =    3.000  FT.
 END OF STEM TO BASE       =    0.000  FT.
 ANGLE OF BELL             =    0.000  DEG.
 IGNORED TOP PORTION       =    0.000  FT.
 IGNORED BOTTOM PORTION    =    0.000  FT.
 AREA OF ONE PERCENT STEEL =   10.180  SQ.IN.
 ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
 VOLUME OF UNDERREAM       =    0.000  CU.YDS.



PREDICTED RESULTS
-----------------

QS     = ULTIMATE SIDE RESISTANCE;
```

QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
1.0	0.26	0.18	37.11	37.29	12.55	12.44	142.42
2.0	0.52	0.71	56.54	57.25	19.56	19.13	109.33
3.0	0.79	1.59	73.77	75.36	26.18	25.23	95.94
4.0	1.05	2.83	88.05	90.88	32.18	30.48	86.77
5.0	1.31	4.42	98.65	103.07	37.31	34.65	78.73
6.0	1.57	7.29	109.26	116.54	43.70	39.33	74.18
7.0	1.83	10.61	119.86	130.47	50.57	44.20	71.19
8.0	2.09	14.39	130.46	144.86	57.88	49.24	69.15
9.0	2.36	18.60	141.07	159.67	65.63	54.46	67.76
10.0	2.62	23.24	151.67	174.91	73.80	59.85	66.80
11.0	2.88	28.28	162.28	190.56	82.38	65.41	66.16
12.0	3.14	33.72	172.88	206.61	91.35	71.12	65.76
13.0	3.40	39.55	183.49	223.03	100.71	76.98	65.52
14.0	3.67	45.74	194.09	239.83	110.44	82.99	65.43
15.0	3.93	52.29	204.69	256.98	120.52	89.15	65.43
16.0	4.19	59.18	215.30	274.48	130.95	95.44	65.52
17.0	4.45	66.41	225.90	292.31	141.71	101.87	65.67
18.0	4.71	73.96	236.51	310.47	152.80	108.42	65.87
19.0	4.97	81.82	247.11	328.93	164.19	115.10	66.12
20.0	5.24	89.98	257.72	347.70	175.89	121.90	66.40
21.0	5.50	98.43	268.32	366.75	187.87	128.81	66.70
22.0	5.76	107.15	278.92	386.07	200.12	135.83	67.02
23.0	6.02	116.13	289.53	405.66	212.64	142.96	67.36
24.0	6.28	125.37	300.13	425.51	225.42	150.19	67.71
25.0	6.55	134.86	308.49	443.35	237.69	156.77	67.73
26.0	6.81	144.57	314.27	458.85	249.33	162.59	67.40
27.0	7.07	154.51	317.16	471.68	260.23	167.53	66.72
28.0	7.33	164.66	318.13	482.79	270.71	171.91	65.85
29.0	7.59	175.01	318.13	493.14	281.06	176.05	64.95
30.0	7.86	185.56	318.13	503.68	291.60	180.27	64.12
31.0	8.12	196.28	318.13	514.41	302.32	184.55	63.38
32.0	8.38	207.17	318.13	525.30	313.21	188.91	62.69
33.0	8.64	218.23	318.13	536.35	324.27	193.33	62.07
34.0	8.90	229.43	318.13	547.56	335.47	197.81	61.51
35.0	9.16	240.78	318.13	558.90	346.82	202.35	60.99
36.0	9.43	252.25	318.13	570.38	358.29	206.94	60.51
37.0	9.69	263.85	318.13	581.98	369.89	211.58	60.07
38.0	9.95	275.56	318.13	593.68	381.60	216.26	59.67
39.0	10.21	287.37	318.13	605.49	393.41	220.99	59.30
40.0	10.47	299.27	318.13	617.40	405.31	225.75	58.95
41.0	10.74	311.25	318.13	629.38	417.30	230.54	58.63
42.0	11.00	323.31	318.13	641.44	429.35	235.37	58.33
43.0	11.26	335.43	318.13	653.56	441.48	240.22	58.05
44.0	11.52	347.61	318.13	665.74	453.65	245.09	57.79
45.0	11.78	359.83	318.13	677.96	465.87	249.98	57.54
46.0	12.04	372.09	318.13	690.22	478.13	254.88	57.31
47.0	12.31	384.37	318.13	702.50	490.42	259.79	57.09
48.0	12.57	396.68	318.13	714.81	502.72	264.71	56.88

49.0	12.83	408.99	318.13	727.12	515.03	269.64	56.67
50.0	13.09	421.30	318.13	739.43	527.34	274.56	56.48
51.0	13.35	433.60	318.13	751.73	539.65	279.48	56.29
52.0	13.62	445.89	318.13	764.01	551.93	284.40	56.11
53.0	13.88	458.14	318.13	776.27	564.19	289.30	55.94
54.0	14.14	470.37	318.13	788.49	576.41	294.19	55.77
55.0	14.40	482.54	318.13	800.67	588.58	299.06	55.60
56.0	14.66	494.66	318.13	812.79	600.71	303.91	55.43
57.0	14.92	506.73	318.13	824.85	612.77	308.73	55.27
58.0	15.19	518.72	318.13	836.84	624.76	313.53	55.11
59.0	15.45	530.63	318.13	848.75	636.67	318.29	54.94
60.0	15.71	542.45	318.13	860.58	648.49	323.02	54.78

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1163E+00	0.4072E-04	0.3093E-02	0.1000E-04
0.5815E+00	0.2036E-03	0.1546E-01	0.5000E-04
0.1163E+01	0.4072E-03	0.3093E-01	0.1000E-03
0.5868E+02	0.2045E-01	0.1546E+01	0.5000E-02
0.8825E+02	0.3074E-01	0.2320E+01	0.7500E-02
0.1178E+03	0.4102E-01	0.3093E+01	0.1000E-01
0.2595E+03	0.9773E-01	0.7732E+01	0.2500E-01
0.3739E+03	0.1594E+00	0.1546E+02	0.5000E-01
0.4423E+03	0.2087E+00	0.2320E+02	0.7500E-01
0.4842E+03	0.2504E+00	0.3093E+02	0.1000E+00
0.5527E+03	0.4309E+00	0.7670E+02	0.2500E+00
0.5960E+03	0.7071E+00	0.1444E+03	0.5000E+00
0.5951E+03	0.8359E+00	0.1659E+03	0.6250E+00
0.6228E+03	0.1125E+01	0.2036E+03	0.9000E+00
0.7421E+03	0.2084E+01	0.3229E+03	0.1800E+01

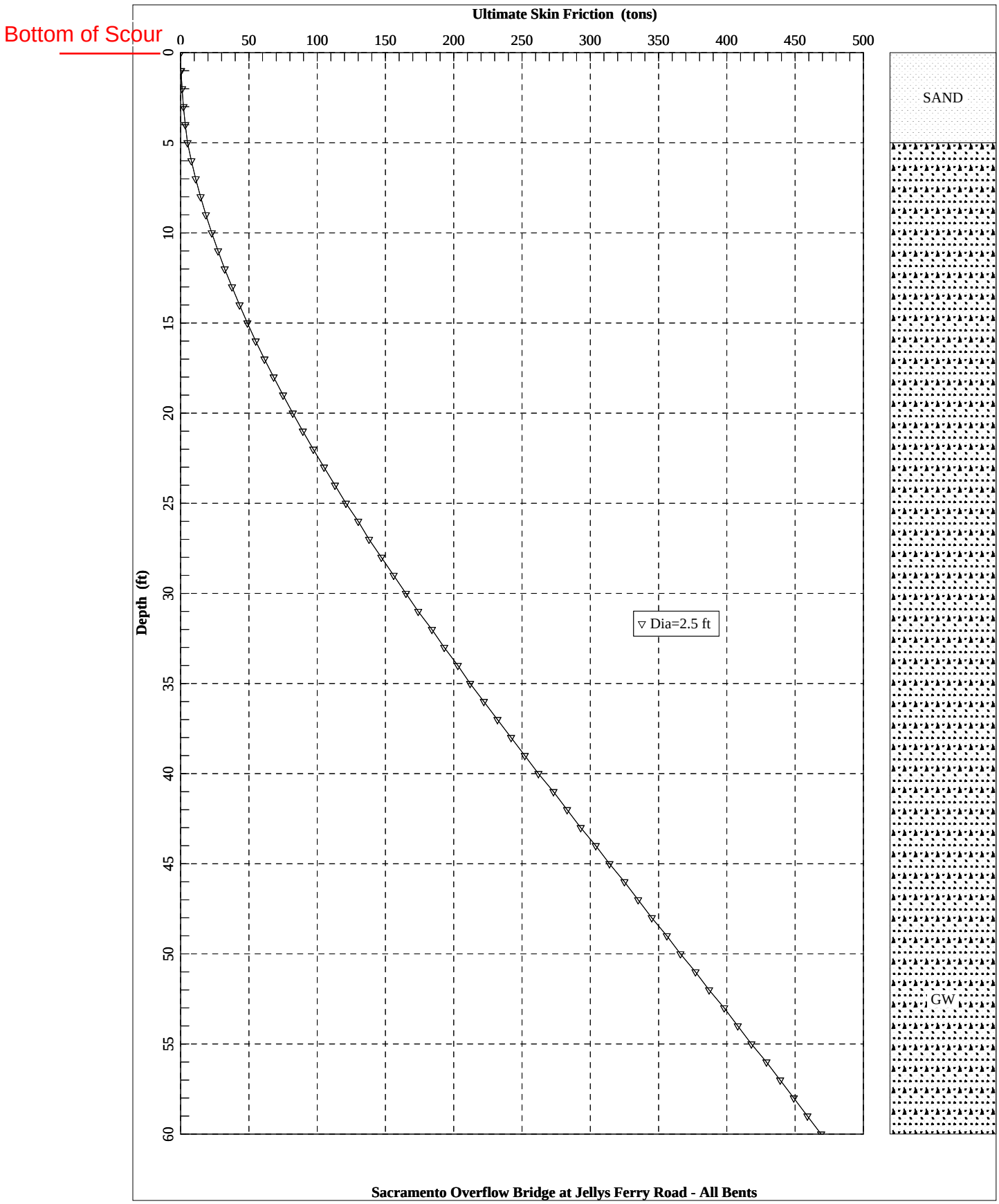
RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2021E+00	0.6049E-04	0.4418E-02	0.1000E-04
0.1011E+01	0.3025E-03	0.2209E-01	0.5000E-04
0.2021E+01	0.6049E-03	0.4418E-01	0.1000E-03
0.1027E+03	0.3055E-01	0.2209E+01	0.5000E-02
0.1542E+03	0.4591E-01	0.3314E+01	0.7500E-02
0.2009E+03	0.6090E-01	0.4418E+01	0.1000E-01
0.3818E+03	0.1335E+00	0.1105E+02	0.2500E-01
0.4759E+03	0.1938E+00	0.2209E+02	0.5000E-01
0.5157E+03	0.2348E+00	0.3314E+02	0.7500E-01
0.5384E+03	0.2693E+00	0.4418E+02	0.1000E+00
0.6176E+03	0.4564E+00	0.1080E+03	0.2500E+00
0.6823E+03	0.7435E+00	0.1997E+03	0.5000E+00
0.6868E+03	0.8733E+00	0.2199E+03	0.6250E+00
0.7035E+03	0.1157E+01	0.2418E+03	0.9000E+00
0.8053E+03	0.2106E+01	0.3436E+03	0.1800E+01

Retaining Wall.sfo

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.5499E-01	0.2544E-04	0.1767E-02	0.1000E-04
0.2750E+00	0.1272E-03	0.8837E-02	0.5000E-04
0.5499E+00	0.2544E-03	0.1767E-01	0.1000E-03
0.2752E+02	0.1272E-01	0.8837E+00	0.5000E-02
0.4142E+02	0.1910E-01	0.1326E+01	0.7500E-02
0.5531E+02	0.2549E-01	0.1767E+01	0.1000E-01
0.1365E+03	0.6359E-01	0.4418E+01	0.2500E-01
0.2452E+03	0.1206E+00	0.8837E+01	0.5000E-01
0.3276E+03	0.1717E+00	0.1326E+02	0.7500E-01
0.3838E+03	0.2158E+00	0.1767E+02	0.1000E+00
0.4880E+03	0.4054E+00	0.4542E+02	0.2500E+00
0.4964E+03	0.6667E+00	0.8908E+02	0.5000E+00
0.4977E+03	0.7962E+00	0.1120E+03	0.6250E+00
0.5422E+03	0.1094E+01	0.1654E+03	0.9000E+00
0.6790E+03	0.2061E+01	0.3022E+03	0.1800E+01


Bottom of Scour
Ultimate Skin Friction (tons)
0
50
100
150
200
250
300
350
400
450
500
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
▽ Dia=2.5 ft
SAND
GW
Sacramento Overflow Bridge at Jellys Ferry Road - All Bents

```
==========================================================================

                 SHAFT for Windows, Version 2012.7.11

                  Serial Number :  291911540

               VERTICALLY LOADED DRILLED SHAFT ANALYSIS
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                      All Rights Reserved

==========================================================================


     Path to file locations      : S:\Ongoing\Emre Ortakci\2000-119-10 Jellys Ferry
Road Bridge\Calcs\SRB\
     Name of input data file     : OFS-Bents.sfd
     Name of output file         : OFS-Bents.sfo
     Name of plot output file    : OFS-Bents.sfp
     Name of runtime file        : OFS-Bents.sfr


     --------------------------------------------------------------------------
                         Time and Date of Analysis
     --------------------------------------------------------------------------

               Date:  March 20, 2015     Time:  14:53:41

     Sacramento Overflow Bridge at Jellys Ferry Road - All Bents


     PROPOSED DEPTH =      60.0 FT
     ----------------


     NUMBER OF LAYERS =    2
     ------------------


     WATER TABLE DEPTH =       1.0 FT.
     --------------------


     FACTOR OF SAFETY APPLIED TO THE ULTIMATE SIDE FRICTION CAPACITY = 3.00
     ----------------------------------------------------------
     FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00
     ----------------------------------------------------------


     SOIL INFORMATION
     ----------------

     LAYER NO 1----SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.340E+02
```



```
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.000E+00


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.340E+02
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.500E+01


     LAYER NO  2----GRAVELLEY SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.179E+01
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.900E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.500E+01


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.250E+00
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.900E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.100E+03



     DRILLED SHAFT INFORMATION
     -------------------------

      DIAMETER OF STEM          =    2.500  FT.
      DIAMETER OF BASE          =    2.500  FT.
      END OF STEM TO BASE       =    0.000  FT.
      ANGLE OF BELL             =    0.000  DEG.
      IGNORED TOP PORTION       =    0.000  FT.
      IGNORED BOTTOM PORTION    =    0.000  FT.
      AREA OF ONE PERCENT STEEL =    7.069  SQ.IN.
      ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
      VOLUME OF UNDERREAM       =    0.000  CU.YDS.



     PREDICTED RESULTS
     -----------------

     QS     = ULTIMATE SIDE RESISTANCE;
```

QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
1.0	0.18	0.29	20.94	21.23	21.23	21.03	116.76
2.0	0.36	1.03	37.74	38.77	38.77	38.08	106.62
3.0	0.55	2.06	54.85	56.91	56.91	55.54	104.34
4.0	0.73	3.39	68.28	71.67	71.67	69.41	98.55
5.0	0.91	5.01	77.12	82.13	82.13	78.79	90.34
6.0	1.09	7.83	85.96	93.79	93.79	88.57	85.96
7.0	1.27	11.02	94.80	105.82	105.82	98.47	83.14
8.0	1.45	14.59	103.63	118.22	118.22	108.50	81.27
9.0	1.64	18.51	112.47	130.98	130.98	118.64	80.04
10.0	1.82	22.78	121.31	144.09	144.09	128.90	79.24
11.0	2.00	27.39	130.14	157.53	157.53	139.27	78.76
12.0	2.18	32.31	138.98	171.29	171.29	149.75	78.50
13.0	2.36	37.55	147.82	185.37	185.37	160.33	78.42
14.0	2.55	43.09	156.65	199.75	199.75	171.02	78.47
15.0	2.73	48.93	165.49	214.42	214.42	181.80	78.61
16.0	2.91	55.04	174.33	229.37	229.37	192.67	78.84
17.0	3.09	61.43	183.16	244.59	244.59	203.64	79.13
18.0	3.27	68.08	192.00	260.08	260.08	214.69	79.46
19.0	3.45	74.98	200.84	275.82	275.82	225.83	79.84
20.0	3.64	82.13	209.67	291.80	291.80	237.05	80.24
21.0	3.82	89.51	216.10	305.61	305.61	245.94	80.04
22.0	4.00	97.11	219.72	316.83	316.83	252.09	79.20
23.0	4.18	104.93	220.92	325.85	325.85	255.90	77.92
24.0	4.36	112.96	220.92	333.88	333.88	258.58	76.51
25.0	4.55	121.18	220.92	342.11	342.11	261.32	75.26
26.0	4.73	129.60	220.92	350.52	350.52	264.12	74.14
27.0	4.91	138.19	220.92	359.11	359.11	266.99	73.15
28.0	5.09	146.96	220.92	367.88	367.88	269.91	72.26
29.0	5.27	155.88	220.92	376.81	376.81	272.88	71.46
30.0	5.45	164.97	220.92	385.89	385.89	275.91	70.74
31.0	5.64	174.19	220.92	395.12	395.12	278.99	70.10
32.0	5.82	183.56	220.92	404.48	404.48	282.11	69.52
33.0	6.00	193.05	220.92	413.97	413.97	285.27	68.99
34.0	6.18	202.67	220.92	423.59	423.59	288.48	68.52
35.0	6.36	212.39	220.92	433.32	433.32	291.72	68.09
36.0	6.55	222.23	220.92	443.15	443.15	295.00	67.70
37.0	6.73	232.15	220.92	453.08	453.08	298.31	67.35
38.0	6.91	242.17	220.92	463.09	463.09	301.65	67.02
39.0	7.09	252.27	220.92	473.19	473.19	305.01	66.73
40.0	7.27	262.44	220.92	483.36	483.36	308.40	66.46
41.0	7.45	272.67	220.92	493.59	493.59	311.81	66.21
42.0	7.64	282.96	220.92	503.88	503.88	315.24	65.98
43.0	7.82	293.30	220.92	514.22	514.22	318.69	65.77
44.0	8.00	303.68	220.92	524.60	524.60	322.15	65.57
45.0	8.18	314.09	220.92	535.01	535.01	325.62	65.39
46.0	8.36	324.53	220.92	545.45	545.45	329.10	65.21
47.0	8.55	334.99	220.92	555.91	555.91	332.58	65.05
48.0	8.73	345.45	220.92	566.38	566.38	336.07	64.89

49.0	8.91	355.92	220.92	576.85	576.85	339.56	64.74
50.0	9.09	366.39	220.92	587.31	587.31	343.05	64.60
51.0	9.27	376.84	220.92	597.77	597.77	346.54	64.46
52.0	9.46	387.28	220.92	608.20	608.20	350.01	64.33
53.0	9.64	397.69	220.92	618.61	618.61	353.48	64.19
54.0	9.82	408.06	220.92	628.98	628.98	356.94	64.06
55.0	10.00	418.39	220.92	639.32	639.32	360.39	63.93
56.0	10.18	428.68	220.92	649.60	649.60	363.81	63.80
57.0	10.36	438.91	220.92	659.83	659.83	367.22	63.66
58.0	10.55	449.07	220.92	669.99	669.99	370.61	63.53
59.0	10.73	459.17	220.92	680.09	680.09	373.98	63.39
60.0	10.91	469.18	220.92	690.10	690.10	377.32	63.26

RESULT FROM TREND (AVERAGED) LINE

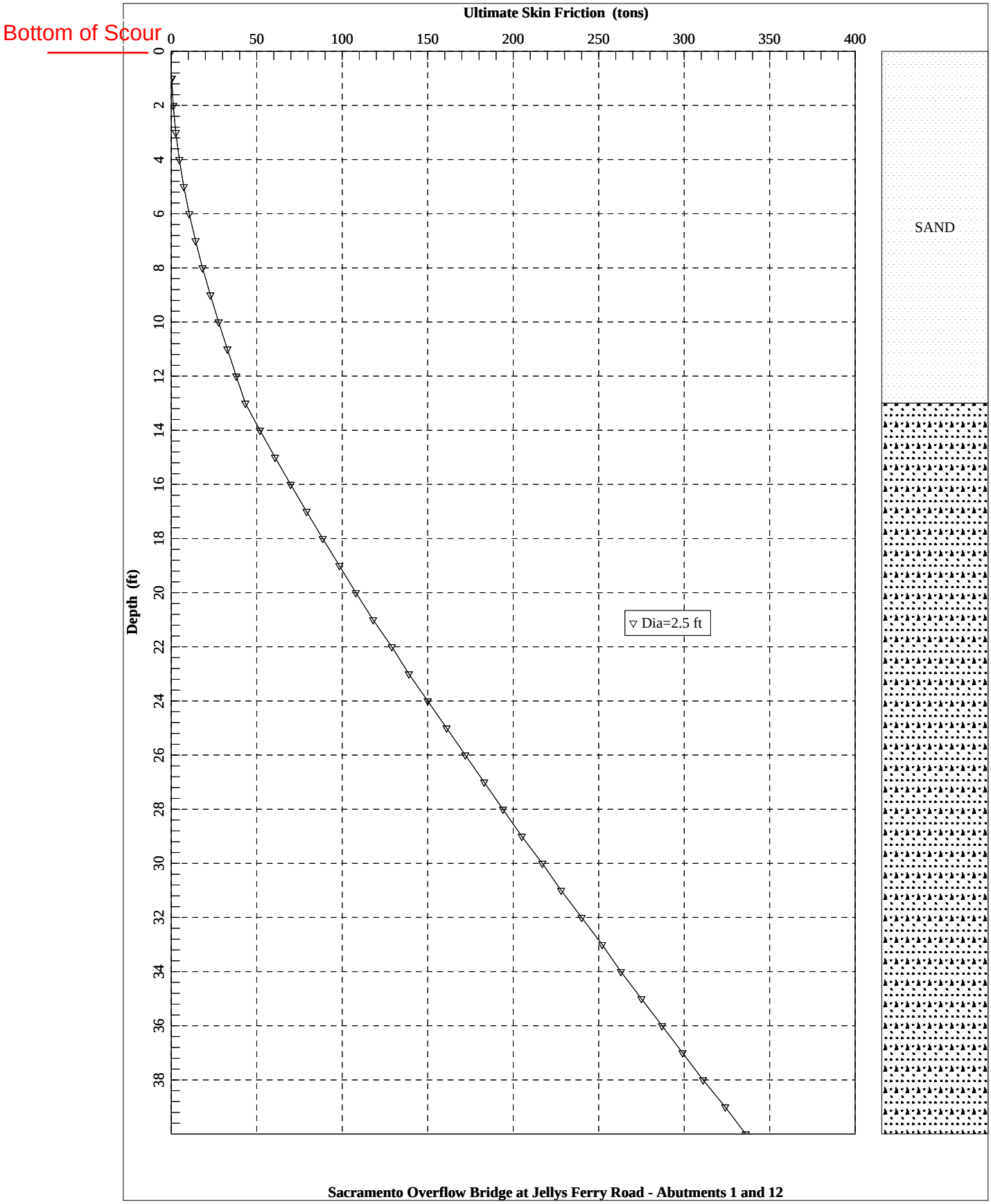
TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1531E+00	0.6339E-04	0.2577E-02	0.1000E-04
0.7654E+00	0.3169E-03	0.1289E-01	0.5000E-04
0.1531E+01	0.6339E-03	0.2577E-01	0.1000E-03
0.7789E+02	0.3204E-01	0.1289E+01	0.5000E-02
0.1154E+03	0.4800E-01	0.1933E+01	0.7500E-02
0.1484E+03	0.6324E-01	0.2577E+01	0.1000E-01
0.2828E+03	0.1366E+00	0.6444E+01	0.2500E-01
0.3698E+03	0.2045E+00	0.1289E+02	0.5000E-01
0.4183E+03	0.2566E+00	0.1933E+02	0.7500E-01
0.4382E+03	0.2937E+00	0.2577E+02	0.1000E+00
0.4828E+03	0.4753E+00	0.6370E+02	0.2500E+00
0.4969E+03	0.7452E+00	0.1129E+03	0.5000E+00
0.5006E+03	0.8742E+00	0.1271E+03	0.6250E+00
0.5148E+03	0.1009E+01	0.1414E+03	0.7500E+00
0.5977E+03	0.1817E+01	0.2242E+03	0.1500E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.2870E+00	0.1030E-03	0.3682E-02	0.1000E-04
0.1435E+01	0.5151E-03	0.1841E-01	0.5000E-04
0.2870E+01	0.1030E-02	0.3682E-01	0.1000E-03
0.1437E+03	0.5220E-01	0.1841E+01	0.5000E-02
0.1992E+03	0.7596E-01	0.2762E+01	0.7500E-02
0.2429E+03	0.9701E-01	0.3682E+01	0.1000E-01
0.3831E+03	0.1825E+00	0.9205E+01	0.2500E-01
0.4422E+03	0.2409E+00	0.1841E+02	0.5000E-01
0.4673E+03	0.2811E+00	0.2762E+02	0.7500E-01
0.4836E+03	0.3164E+00	0.3682E+02	0.1000E+00
0.5380E+03	0.5060E+00	0.8911E+02	0.2500E+00
0.5682E+03	0.7858E+00	0.1513E+03	0.5000E+00
0.5708E+03	0.9133E+00	0.1596E+03	0.6250E+00
0.5791E+03	0.1044E+01	0.1679E+03	0.7500E+00
0.6498E+03	0.1844E+01	0.2386E+03	0.1500E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.6661E-01	0.3526E-04	0.1473E-02	0.1000E-04
0.3330E+00	0.1763E-03	0.7364E-02	0.5000E-04
0.6661E+00	0.3526E-03	0.1473E-01	0.1000E-03
0.3353E+02	0.1768E-01	0.7364E+00	0.5000E-02
0.5043E+02	0.2657E-01	0.1105E+01	0.7500E-02
0.6730E+02	0.3546E-01	0.1473E+01	0.1000E-01
0.1590E+03	0.8674E-01	0.3682E+01	0.2500E-01
0.2662E+03	0.1577E+00	0.7364E+01	0.5000E-01
0.3329E+03	0.2146E+00	0.1105E+02	0.7500E-01
0.3692E+03	0.2581E+00	0.1473E+02	0.1000E+00
0.4272E+03	0.4447E+00	0.3829E+02	0.2500E+00
0.4197E+03	0.7011E+00	0.7438E+02	0.5000E+00
0.4303E+03	0.8351E+00	0.9463E+02	0.6250E+00
0.4506E+03	0.9743E+00	0.1149E+03	0.7500E+00
0.5455E+03	0.1791E+01	0.2099E+03	0.1500E+01


Bottom of Scour
Ultimate Skin Friction (tons)
0
50
100
150
200
250
300
350
400
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Dia=2.5 ft
SAND
Sacramento Overflow Bridge at Jellys Ferry Road - Abutments 1 and 12

```
==========================================================================

                 SHAFT for Windows, Version 2012.7.11

                  Serial Number :  291911540

               VERTICALLY LOADED DRILLED SHAFT ANALYSIS
                (c) Copyright ENSOFT, Inc., 1987-2012
                      All Rights Reserved

==========================================================================


     Path to file locations      : S:\Ongoing\Emre Ortakci\2000-119-10 Jellys Ferry
Road Bridge\Calcs\SRB\
     Name of input data file     : OFS-Abutments.sfd
     Name of output file         : OFS-Abutments.sfo
     Name of plot output file    : OFS-Abutments.sfp
     Name of runtime file        : OFS-Abutments.sfr


     --------------------------------------------------------------------------
                         Time and Date of Analysis
     --------------------------------------------------------------------------

          Date:  March 20, 2015     Time:  14:52:40

     Sacramento Overflow Bridge at Jellys Ferry - Abutment 1 and 12


     PROPOSED DEPTH =      40.0 FT
     ----------------


     NUMBER OF LAYERS =    2
     ------------------


     WATER TABLE DEPTH =       9.0 FT.
     --------------------


     FACTOR OF SAFETY APPLIED TO THE ULTIMATE SIDE FRICTION CAPACITY = 3.00
     ----------------------------------------------------------
     FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 1.00
     ----------------------------------------------------------


     SOIL INFORMATION
     ----------------

     LAYER NO 1----SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.120E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.340E+02
```



```
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.000E+00


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.101E+01
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.000E+00
       INTERNAL FRICTION ANGLE, DEG.                      = 0.340E+02
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.130E+02


     LAYER NO  2----GRAVELLEY SAND

       AT THE TOP

       SKIN FRICTION COEFFICIENT- BETA                    = 0.158E+01
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.900E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.130E+02


       AT THE BOTTOM

       SKIN FRICTION COEFFICIENT- BETA                    = 0.250E+00
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.900E+02
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.100E+03



     DRILLED SHAFT INFORMATION
     -------------------------

      DIAMETER OF STEM          =    2.500  FT.
      DIAMETER OF BASE          =    2.500  FT.
      END OF STEM TO BASE       =    0.000  FT.
      ANGLE OF BELL             =    0.000  DEG.
      IGNORED TOP PORTION       =    0.000  FT.
      IGNORED BOTTOM PORTION    =    0.000  FT.
      AREA OF ONE PERCENT STEEL =    7.069  SQ.IN.
      ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
      VOLUME OF UNDERREAM       =    0.000  CU.YDS.



     PREDICTED RESULTS
     -----------------

     QS     = ULTIMATE SIDE RESISTANCE;
```

QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
1.0	0.18	0.29	9.90	10.20	10.20	10.00	56.08
2.0	0.36	1.18	12.00	13.18	13.18	12.39	36.23
3.0	0.55	2.65	14.09	16.74	16.74	14.98	30.70
4.0	0.73	4.71	16.19	20.90	20.90	17.76	28.74
5.0	0.91	7.36	18.28	25.64	25.64	20.74	28.21
6.0	1.09	10.52	20.38	30.90	30.90	23.88	28.32
7.0	1.27	14.16	22.47	36.64	36.64	27.19	28.78
8.0	1.45	18.28	24.57	42.85	42.85	30.66	29.46
9.0	1.64	22.85	52.40	75.26	75.26	60.02	45.99
10.0	1.82	27.72	86.37	114.09	114.09	95.61	62.75
11.0	2.00	32.76	118.19	150.95	150.95	129.11	75.47
12.0	2.18	37.96	138.98	176.94	176.94	151.63	81.09
13.0	2.36	43.31	147.82	191.12	191.12	162.25	80.86
14.0	2.55	51.90	156.65	208.55	208.55	173.95	81.93
15.0	2.73	60.73	165.49	226.22	226.22	185.73	82.94
16.0	2.91	69.80	174.33	244.13	244.13	197.59	83.91
17.0	3.09	79.10	183.16	262.26	262.26	209.53	84.85
18.0	3.27	88.62	192.00	280.62	280.62	221.54	85.74
19.0	3.45	98.34	200.84	299.18	299.18	233.62	86.60
20.0	3.64	108.27	209.67	317.94	317.94	245.76	87.43
21.0	3.82	118.39	216.10	334.49	334.49	255.56	87.60
22.0	4.00	128.69	219.72	348.41	348.41	262.61	87.10
23.0	4.18	139.16	220.92	360.08	360.08	267.31	86.10
24.0	4.36	149.80	220.92	370.73	370.73	270.86	84.95
25.0	4.55	160.60	220.92	381.52	381.52	274.46	83.93
26.0	4.73	171.55	220.92	392.47	392.47	278.10	83.02
27.0	4.91	182.63	220.92	403.55	403.55	281.80	82.20
28.0	5.09	193.85	220.92	414.77	414.77	285.54	81.47
29.0	5.27	205.19	220.92	426.11	426.11	289.32	80.81
30.0	5.45	216.65	220.92	437.57	437.57	293.14	80.22
31.0	5.64	228.21	220.92	449.13	449.13	296.99	79.68
32.0	5.82	239.87	220.92	460.80	460.80	300.88	79.19
33.0	6.00	251.63	220.92	472.55	472.55	304.80	78.75
34.0	6.18	263.47	220.92	484.39	484.39	308.74	78.35
35.0	6.36	275.38	220.92	496.30	496.30	312.71	77.99
36.0	6.55	287.36	220.92	508.28	508.28	316.71	77.65
37.0	6.73	299.40	220.92	520.32	520.32	320.72	77.34
38.0	6.91	311.49	220.92	532.41	532.41	324.75	77.05
39.0	7.09	323.62	220.92	544.55	544.55	328.80	76.79
40.0	7.27	335.79	220.92	556.72	556.72	332.85	76.54

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.7465E-01	0.3089E-04	0.2577E-02	0.1000E-04

0.3733E+00	0.1544E-03	0.1289E-01	0.5000E-04
0.7465E+00	0.3089E-03	0.2577E-01	0.1000E-03
0.3770E+02	0.1551E-01	0.1289E+01	0.5000E-02
0.5670E+02	0.2331E-01	0.1933E+01	0.7500E-02
0.7570E+02	0.3112E-01	0.2577E+01	0.1000E-01
0.1733E+03	0.7496E-01	0.6444E+01	0.2500E-01
0.2474E+03	0.1231E+00	0.1289E+02	0.5000E-01
0.2974E+03	0.1650E+00	0.1933E+02	0.7500E-01
0.3184E+03	0.1979E+00	0.2577E+02	0.1000E+00
0.3696E+03	0.3695E+00	0.6370E+02	0.2500E+00
0.3982E+03	0.6361E+00	0.1129E+03	0.5000E+00
0.4017E+03	0.7640E+00	0.1271E+03	0.6250E+00
0.4159E+03	0.8957E+00	0.1414E+03	0.7500E+00
0.4986E+03	0.1685E+01	0.2242E+03	0.1500E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.1214E+00	0.4292E-04	0.3682E-02	0.1000E-04
0.6068E+00	0.2146E-03	0.1841E-01	0.5000E-04
0.1214E+01	0.4292E-03	0.3682E-01	0.1000E-03
0.6178E+02	0.2168E-01	0.1841E+01	0.5000E-02
0.9285E+02	0.3258E-01	0.2762E+01	0.7500E-02
0.1235E+03	0.4345E-01	0.3682E+01	0.1000E-01
0.2547E+03	0.9854E-01	0.9205E+01	0.2500E-01
0.3143E+03	0.1444E+00	0.1841E+02	0.5000E-01
0.3395E+03	0.1790E+00	0.2762E+02	0.7500E-01
0.3561E+03	0.2106E+00	0.3682E+02	0.1000E+00
0.4154E+03	0.3876E+00	0.8911E+02	0.2500E+00
0.4574E+03	0.6604E+00	0.1513E+03	0.5000E+00
0.4597E+03	0.7871E+00	0.1596E+03	0.6250E+00
0.4680E+03	0.9160E+00	0.1679E+03	0.7500E+00
0.5387E+03	0.1699E+01	0.2386E+03	0.1500E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.3807E-01	0.2097E-04	0.1473E-02	0.1000E-04
0.1904E+00	0.1048E-03	0.7364E-02	0.5000E-04
0.3807E+00	0.2097E-03	0.1473E-01	0.1000E-03
0.1906E+02	0.1049E-01	0.7364E+00	0.5000E-02
0.2869E+02	0.1575E-01	0.1105E+01	0.7500E-02
0.3831E+02	0.2101E-01	0.1473E+01	0.1000E-01
0.9450E+02	0.5238E-01	0.3682E+01	0.2500E-01
0.1684E+03	0.9943E-01	0.7364E+01	0.5000E-01
0.2241E+03	0.1418E+00	0.1105E+02	0.7500E-01
0.2570E+03	0.1774E+00	0.1473E+02	0.1000E+00
0.3239E+03	0.3515E+00	0.3829E+02	0.2500E+00
0.3325E+03	0.6096E+00	0.7438E+02	0.5000E+00
0.3437E+03	0.7410E+00	0.9463E+02	0.6250E+00
0.3639E+03	0.8755E+00	0.1149E+03	0.7500E+00
0.4586E+03	0.1670E+01	0.2099E+03	0.1500E+01

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

PROJECT NO. 2000-119-BRG
PROJECT NAME Sacramento River, Bridge at Jellys Ferry Road
CALCULATED BY EO DATE 3/16/15
CHECKED BY DATE
VERIFIED BY DATE
BACK CHECKED BY DATE

SUBJECT Rock socket calculation

Jellys Ferry Rock Socket Calculation - C10H

$q_u = 800$ psi below El. 235 ft

$$\frac{f_{sN}}{p_a} = c\sqrt{\frac{q_u}{p_a}} \rightarrow c = 1.0 \text{ (recommended, Kulhawy et al. (2005))}$$

$f_{sN} = 7.8$ tsf

$F_s = f_{sN} \cdot \pi \cdot D \cdot L \cong 294 \times L$ tons for 12' Diameter C10H Pile

$\cong 220 \times L$ tons for 9' Diameter C10H Pile

Pavement Section Analysis

PAVEMENT DESIGN

PER HIGHWAY DESIGN MANUAL, CHAP. 600

PROJECT NAME: *SACRAMENTO OVERFLOW BRIDGE AT JELLYS FERRY ROAD*
PROJECT NO.: *2000-119-OFS*

Design Case: AC over AB

Design TI=	***7***	input
R_{BS}=	***25***	input
R_{AB}=	78	

$GE_{AC+AB} = 0.0032*TI*(100-R_{BS}) =$ 1.68

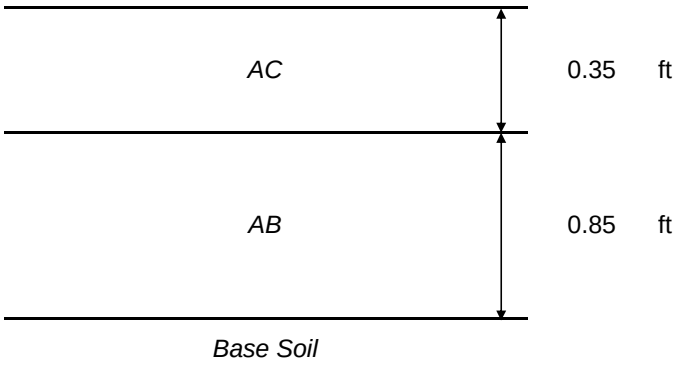
$GE_{AC} = 0.0032*TI*(100-R_{AB}) =$ 0.49

=>	GE'_{AC} =	0.69	(add 0.2 ft safety factor)
	AC Thickness =	0.32	ft
=>	AC Thickness =	**0.35**	ft (round up to the nearest 0.05 ft)
	$G_{f,\,AC}$ =	2.14	
	GE_{AC} =	0.75	

$GE_{AB} = GE_{AC+AB} - GE_{AC} =$ 0.93

	AB thickness=	0.85	ft
=>	AB Thickness=	**0.85**	ft (round up to the nearest 0.05 ft)
	GE_{AB}=	0.94	$G_{f,\,AB}$=1.1

Design Section:



PAVEMENT DESIGN

PER HIGHWAY DESIGN MANUAL, CHAP. 600

PROJECT NAME: *SACRAMENTO OVERFLOW BRIDGE AT JELLYS FERRY ROAD*
PROJECT NO.: *2000-119-OFS*

Design Case: AC over AB

Design TI=	***5***	input
R_{BS}=	***25***	input
R_{AB}=	78	

$GE_{AC+AB} = 0.0032*TI*(100-R_{BS}) =$ 1.20

$GE_{AC} = 0.0032*TI*(100-R_{AB}) =$ 0.35

=> GE'_{AC} = 0.55 (add 0.2 ft safety factor)

AC Thickness = 0.22 ft

=> AC Thickness = **0.25** ft (round up to the nearest 0.05 ft)

$G_{f,\,AC}$ = 2.54

GE_{AC} = 0.63

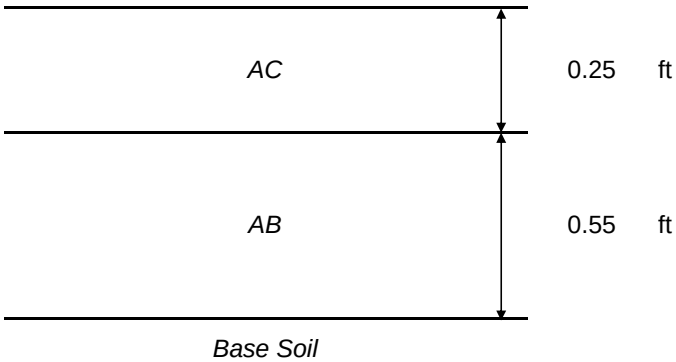
$GE_{AB} = GE_{AC+AB} - GE_{AC} =$ 0.57

AB thickness= 0.51 ft

=> AB Thickness= **0.55** ft (round up to the nearest 0.05 ft)

GE_{AB}= 0.61 $G_{f,\,AB}$=1.1

Design Section:



PAVEMENT DESIGN

*NON-STANDARD DESIGN, SOLVED AS FULL-DEPTH AC PER HIGHWAY DESIGN MANUAL, CHAP. 600

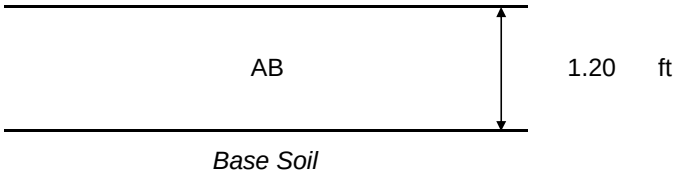
PROJECT NAME: *SACRAMENTO OVERFLOW BRIDGE AT JELLYS FERRY ROAD*
PROJECT NO.: *2000-119-OFS*

Design Case: Full depth AC

Design TI=	***5***	input
R_{BS}=	***25***	input

$GE_{AB} = 0.0032*TI*(100-R_{BS}) =$		1.20	
=>	GE'_{AB}=	1.30	(add 0.1 ft safety factor)
=>	AB Thickness=	1.18	$G_{f,\,AB}$=1.1
=>	AB Thickness=	**1.20**	ft (round up to the nearest 0.05 ft)

Design Section:



APPENDIX VI
Exceptions to Policy

This appendix is not relevant to the report.

Design Hydraulic Study

Jellys Ferry Road over Sacramento River, Bridge 8C-0043, and

over Sacramento River Overflow (North Overflow/Overflow No. 2)

Tehama County

Prepared for:

TY Lin International
3301 C Street, Building 100-M
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Prepared by:

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1062 Market Street
Redding, CA 96001

Norman S. Braithwaite, P.E.

March 21, 2014

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Executive Summary

Purpose:	Replace deficient bridge
Funding Program:	HBP
Design Flood:	Sacramento River - Standard Design Flood (Q50, 183000-cfs) North overflow channel – Standard Design Flood (Q50, 11500-cfs)
Clearance for Drift:	3.0-feet in Sacramento River channel, 2.0-feet in north overflow channel
Design Exception:	No design exception is required at either bridge for hydraulic conditions

Jellys Ferry Road over Sacramento River

Recommendations:	Min. Soffit Elevation –	352.0-feet NAVD-88 (to meet recommendations of Caltrans and FHWA)
	Pier Scour Elevation –	P2 & P3: 285.1-feet P4, P5, & P6: 313.8-feet
	Abutment Scour Elevation –	A1: Out of 100-year floodplain A7: 325.0-feet
	Abutment Protection –	Recommended to minimize risk of long term potential for damage to abutments from bank erosion and bank migration.

Preferred Bridge Characteristics:

Soffit Elevation –	352.5-feet NAVD-88 (1.8-ft above Q100, 3.5-ft above Q50)
Overtopping Flood –	207000-cfs, 200-year recurrence, overtopping at north overflow
Impact on Flood Risk –	No increased risk of damage to structures during floods up to and including the most probable 100-year flood.
Impact on Channel –	The preferred bridge is not expected to aggravate channel instability.

Jellys Ferry Road over North Overflow/Overflow No. 2 of Sacramento River

Recommendations:	Min. Soffit Elevation –	353.3-feet NAVD-88 (to meet recommendations of Caltrans and FHWA)
	Pier Scour Elevation –	All piers: 331.3-feet
	Abutment Scour Elevation –	Both abutments: 339.0-feet
	Abutment Protection –	Recommended to minimize risk of long term potential for damage to abutments from bank erosion and bank migration.

Preferred Bridge Characteristics:

Soffit Elevation –	353.4-feet NAVD-88 (0.5-ft above Q100, 2.1-ft above Q50)
Overtopping Flood –	20000-cfs, 200-year recurrence (227,000-cfs in Sacramento River)
Impact on Flood Risk –	No increased risk of damage to structures during floods up to and including the most probable 100-year flood.
Impact on Channel –	The preferred bridge is not expected to aggravate channel instability.

Note regarding estimates of potential scour: Potential scour has been estimated using empirical equations presented in FHWA HEC-18. These equations do not consider geotechnical conditions and therefore assume all substrate is erodible. The potential scour estimates identified in this report may be inappropriate if a geotechnical investigation identifies material resistant to erosion at higher elevations.

Draft Design Hydraulic Study
Jellys Ferry Road over Sacramento River and over Sacramento River Overflow

INTRODUCTION

Background: This bridge hydraulic analysis has been prepared for the sole purpose of meeting the requirements of 23 CFR §650.115 and §650.117 dealing with bridges, structures, and hydraulics. Although potentially useful for other purposes, this analysis has not been prepared for any other purpose. Reuse of information contained in this report for purposes other than those for which this analysis and report are intended is not endorsed or encouraged by the author and is at the sole risk of the entity reusing information herein contained.

Analyses to meet the requirements of FEMA, the State of California Reclamation Board, low flow environmental or construction concerns and for other purposes may be provided as additional services.

Initial studies for replacement of the existing Jellys Ferry Road bridge over the Sacramento River were limited to replacement of the existing bridge in kind. The existing bridge spans the low flow channel of the Sacramento River with overflow channels crossing Jellys Ferry Road immediately north of the existing bridge (South Overflow Channel/Overflow No. 1) and approximately ½-mile north of the existing bridge (North Overflow Channel/Overflow No. 2). It was recognized, however, that replacement of the confined, narrow existing bridge having an elevated north abutment which quickly drops into the south overflow area with a new open, wide concrete bridge having a matching wide north approach dropping into the floodplain would present a substantial safety concern for the public, especially if travelling at night during stormy weather. The initial replacement concept was modified to consider a replacement bridge that spanned the Sacramento River channel and had an elevated north approach roadway to span across the south overflow area. Subsequent to this decision a value engineering effort conducted by Caltrans, Tehama County, and the consultant team concluded that it was prudent and cost effective to include a new bridge to span over the North Overflow Channel/Overflow No. 2 rather than leaving correction of the north overflow section of Jellys Ferry Road for a separate project. This DHS report documents the flood hydraulic analysis for evaluation and design of the bridge over the Sacramento River plus south overflow channel and the bridge over the north overflow channel. The locations of the preferred bridges with respect to the Sacramento River and overflow channels are shown in Figure 1 (page 20).

Design Standards: Hydraulic design of the preferred bridge is based on standards recommended by Caltrans (Local Programs Manual - reference 1). Exceptions to these design standards are considered only if meeting the standard is found to be impractical or unreasonably costly for the proposed project and the exception does not result in an increased risk of damage during floods. Local design standards that have been provided in writing prior to the preparation of the hydraulic analysis have also been considered.

Funding:	HBP
Existing Bridge:	Year Constructed – 1949 Length – 941-feet nominal, 850-ft effective hydraulic Skew – 28-degrees from perpendicular to flood flow Clear Width – 17.7-ft Total Width – 21.5-ft Lanes – Currently striped as one lane Speed Limit – 15-mph on bridge Load Limit – 17 tons per vehicle, 27 tons per semi-trailer, 32 tons per truck and full trailer Structure – 5-span Pratt Truss + 10-span RC flat slab approach Deficiency – Bridge, Alignment Sketch – Figure 2, page 21 Photos 1-4, pages 15, 16
Significance:	Vital Route – Yes Bus Route – No Road Classification – Rural Major Collector Present ADT – 350 (year 2005) Estimated future ADT – 1205 (year 2035) Trucks or Commercial Vehicles – 7% Description of Service – Local farms and ranches Length of Detour – 30-miles ± Description of Road – Straight, rolling
Sacramento River Preferred Bridge:	Length – 1264.0-ft nominal, 1215-ft effective hydraulic Skew – 15-degrees from perpendicular to flood flow Clear Width – 34.0-ft Total Width – 37.5-ft Lanes – 2 Speed Limit – 55-mph Load Limit – None Structure – 6-span CIP/PS concrete box on RC abutments and RC piers. Traffic During Construction – Maintained on existing bridge General Plan – Figure 3, page 22
North Overflow Preferred Bridge:	Length – 682.5-ft nominal, 510-ft effective hydraulic Skew – 40-degrees from perpendicular to flood flow Clear Width – 34.0-ft Total Width – 37.5-ft Lanes – 2 Speed Limit – 55-mph Load Limit – None Structure – 11-span CIP/PS concrete slab supported on RC abutments and CIDH piles with extensions. Traffic During Construction – Accommodated with local detour General Plan – Figure 4, page 23

DESCRIPTION OF BASIN

Geographic Location:	Upstream of Jellys Ferry Road, the Sacramento River drains a large basin including the east slopes of the coastal range, high mountain desert, southwest slopes of the most southerly reaches of the Cascade Range, and the Sacramento Valley floor.
Receiving Waters:	Pacific Ocean
Characteristics:	Area of basin – 8900-sq mi excluding Goose Lake basin Shape – n/a Highest elevation – 14162-feet on Mt Shasta Lowest elevation – 340-feet near bridge Elevation index – n/a Average annual precipitation (basin wide) – n/a Aspect – South
Land use:	Forest, ranch, farm, small farm, suburban, and urban uses
Vegetation:	Valley grasses with sparse oaks at low elevations to evergreen forest and sage at high elevations.
Geologic:	Topographic features indicate low potential for significant landslides capable of causing channel instability and risk to bridge integrity.

DESCRIPTION OF STREAM AND SITE

River Channel:	In the vicinity of Jellys Ferry Road, the Sacramento River has a very well defined, mildly meandering main channel. Streambed materials visible at the margins of the channel consist of gravel and cobbles with some sand. The Sacramento River is shown in Photos 5 and 6 (page 17).
River Banks:	In the vicinity of Jellys Ferry Road the right (south) bank of the Sacramento River is high, steep, and consists of cohesive alluvium with a cover of grasses and sparse oak. The left (north) bank of the Sacramento River is low, mildly to moderately steep at the channel edges, and consists of cohesive alluvium with a cover of grasses, shrubs, cottonwood, and sparse oak. Multiple overflow channels are present on the north overbank and are active during frequent flood events.
North Overflow:	The north overflow of the Sacramento River consists of a wide, shallow grassy swale with no distinct low flow channel or banks. The north overflow is shown in Photos 7 and 8 (page 18).
Existing Bridge:	Jellys Ferry Road crosses the Sacramento River channel at a skew approximately 24-degrees from perpendicular to the direction of flood flow.
Site Topography:	Figure 5 & 6, pages 24,25

EXTERNAL FLOOD HYDROLOGIC ANALYSIS

Hydrologic Stability: Infrequent floods in the Sacramento River are greatly influenced by the operation of Shasta Dam.

Flood History: Water was observed to flow over Jellys Ferry Road to the north of the existing bridge during the flood of January 1, 1997, a flood of approximately 10-year recurrence in the Sacramento River at this location. The exact location and source of this overflow was not reported. During infrequent floods in the Sacramento River flow may cross Jellys Ferry Road at a location approximately 500-feet north of the existing bridge and at another location approximately 2500-feet north of the existing bridge. Overflow at the more distant location may be due to flow leaving the Sacramento River at a location approximately 3-miles upstream of the Jellys Ferry Road bridge. Overflow at the location nearest the bridge is due to hydraulic conditions in the Sacramento River immediately upstream of the bridge. It is unlikely that hydraulic conditions in the Sacramento River near the Jellys Ferry Road bridge has much influence on overflow at the more distant location. As such, flow over Jellys Ferry Road at the more distant location is considered substantially independent of flood hydraulic conditions in the Sacramento River at Jellys Ferry Road.

Number of Methods: Two methods were investigated for estimating potential infrequent flood peak flows in the Sacramento River. These include development of flood frequency statistics from a representative river flow record and consideration of the FEMA hydrologic analysis prepared for the Sacramento River.

Frequency Statistics: Approach – A flood frequency relationship for the USGS Streamgage 1137710, "Sacramento River near Bend Bridge", was determined by plotting annual flood peaks and computing the normal probability Log-Pearson Type III curve fit (reference 7). A plot of the original data and Log-Pearson Type III curve fit is included in Appendix A. The small difference in basin area between the USGS streamgage and the Jellys Ferry Road bridge is not sufficient to justify adjustment of the flood frequency statistics at the USGS streamgage site, especially when considering the regulating effects of Shasta Dam.

FEMA FIS: Although the Jellys Ferry Road bridge is not in a reach of the Sacramento River having flood risk mapped by FEMA using detailed study methods, FEMA has conducted a detailed study of flood risk along the Sacramento River adjacent to the Lake California development located approximately 2-miles upstream of the bridge. Flood hydrologic conditions in the Sacramento River at the Jellys Ferry Road Bridge are identical to those adjacent to the Sacramento River along the Lake California development. Therefore, the FEMA estimate of infrequent flood peak flows have been considered as potentially appropriate for design of the replacement bridge without adjustment.

Flood Peak Flows: Candidate flood frequency relationship – All candidate flood frequency curves derived from regional analysis for the proposed project site are plotted and shown in Appendix A. Estimated 50- and 100-year flood peak flows from all methods investigated are summarized in Table 1.

TABLE 1
Estimated 50- and 100-year Flood Peak Flows

Estimated from	50-Year (cfs)	100-Year (cfs)
Sacramento River near Bend Bridge	173000	191000
FEMA FIS	183000	205000

Selected flood frequency relationship – The flood frequency relationship relied upon for the FEMA FIS was selected as most appropriate for design of the replacement bridge. This estimate was selected to be consistent with the FEMA analysis. The selected flood frequency relationship is shown in Figure 7 (page 26).

Flood of Record: Since construction of Shasta Dam, the flood of record (FOR) in the Sacramento River at Jellys Ferry Road is the flood of January 24, 1970 having a peak flow estimated to be 157,000-cfs. This represents a flood of approximately 20-year recurrence.

Other Floods: The Central Valley Flood Protection Board Design Flood for this reach of the Sacramento River is a flood having a peak flow of 140,000-cfs. According to CVFPB data, this represents a flood of approximately 10-year recurrence.

INTERNAL FLOOD HYDROLOGIC ANALYSIS

Purpose: At the location of the existing and preferred bridge over the Sacramento River, the peak flows in the Sacramento River channel during floods of interest are reduced from the peak flows estimated above by multiple overflow channels. The internal hydrologic analysis consisted of a flood hydraulic analysis conducted to estimate the division of flows between the Sacramento River channel and the overflow channels as necessary to identify the flood peak flows of concern for evaluation and design of the bridges over the Sacramento River channel (plus south overflow) and the north overflow channel.

Approach: The division of flood peak flows between the Sacramento River channel and the overflow channels was first estimated using an optimized steady state multiple channel linear HEC-RAS backwater model. This model estimated flow into the overflow channels as computed weir flow exiting the Sacramento River channel but was somewhat unstable and sensitive to the geometric data entered in the model at locations of flow splits. The model was improved some by entering fixed flows for the main and west overflow channels after the flows had been computed using the prior version of the model. This model was found useful for initial evaluation of candidate bridge configurations but confidence in the ability of the model to estimate the division of flows sufficient for design of the bridges, especially the north overflow bridge, was low. Therefore a 2D flow model capable of much more confidently estimating the division of flows and some other hydraulic parameters was prepared, calibrated, and run by TY Lin International to represent existing conditions. The divisions of flow from the 2D model were then used as a basis for interpolation of the design flood flows entered into the HEC-RAS backwater model (main and west overflows) and for verification of flow splits computed by the HEC-RAS model (north and south overflows).

After flow adjustments based on 2D model results, the HEC-RAS backwater model was used for evaluation and design of the preferred bridges because the specific requirements of agencies such as FEMA and CVFPB are better accommodated using the HEC-RAS program.

Results: Flows entered and computed for the HEC-RAS model are summarized in Table 2. Existing condition flood frequency curves for the Sacramento River and selected overflows are shown on Figure 7 (page 26).

Table 2: Estimated Sacramento River and Overflow Channel Flood Flows (CFS)

	Location	100-year	50-year	1-24-1970 FOR	3-1-1983 Calibration
Existing	Sacramento River Total	205000	183000	157000	152000
	Main Overflow	47460	39490	31540	29290
	West Overflow	26380	20000	13750	12080
	North Overflow	14770	11070	7550	6860
	South Overflow	19690	13840	7340	6330
Preferred	Sacramento River Total	205000	183000	157000	152000
	Main Overflow	47000	39270	31410	29170
	West Overflow	25600	19550	13420	11810
	North Overflow	15230	11480	7860	7170
	South Overflow[1]	0	0	0	0

Notes: 1) Redirected to Sacramento River upstream of Jellys Ferry Road.

HYDRAULIC ANALYSIS

Backwater Model: Backwater program – The Corps of Engineers' HEC-RAS version 4.1.0 backwater program (reference 3) has been selected for modeling hydraulic characteristics representing existing conditions, preliminary bridge configurations and the preferred bridges. This program has been selected because of its long history of use (derived from HEC-2), wide acceptance and great flexibility for evaluating bridge configurations.

Cross-section data – Stream cross-sections and Manning's roughness coefficients upstream and downstream of the proposed project have been assumed constant for all backwater model runs. Interpolated cross-sections have been included as appropriate to improve model reliability. Cross-sections used in the backwater models were from a recent ground survey. Locations of cross-sections used in the backwater model are shown on Figure 8 (page 27). Cross-sections have been adjusted for skew as appropriate.

Elevation Datum – NAVD-88 (subtract 2.47' for elevations in NGVD-29)

Manning's Roughness Coefficients – Mannings Roughness Coefficients for the channel and banks were initially estimated by observing channel and bank conditions and comparing with similar channels identified in Roughness Coefficients of Natural Channels (reference 6). These were subsequently adjusted within reason to reproduce flood hydraulic conditions observed

during the flood of March 1, 1983 and reasonably match the FEMA Base Flood profile at Lake California. High water during the March 1, 1983 flood is shown in Photo 9 (page 19). Manning's roughness coefficients used in the models are as follows:

Sacramento River: channel 0.042 – 0.045, overbanks 0.055
Main overflow: channel 0.045 – 0.060, overbanks 0.050 – 0.060
North overflow: 0.040
West overflow: 0.050

Contraction and Expansion Coefficients – Contraction and expansion coefficients of 0.1 and 0.3 respectively were used to represent natural channels. These values were raised to 0.3 and 0.5 respectively in the vicinity of bridges.

Downstream starting water surface elevation assumption – The normal depth method in HEC-RAS was selected for estimating the downstream water surface elevation. A slope of 0.0005, estimated from the 2D flow model, was used as the starting slopes in the Sacramento River and north overflow channel. A minimum of four surveyed and/or interpolated cross-sections were used to isolate the effects of downstream starting water surface elevation assumption from water surface elevations at the existing Sacramento River bridge and the preferred north overflow bridge site.

Existing Sacramento River Bridge:

Purpose – The existing condition Sacramento River backwater model has been prepared to identify and document existing hydraulic conditions and to serve as a basis of comparison with which to evaluate preliminary and proposed bridge configurations.

Channel roughness coefficient at bridge – 0.044 DS, 0.045 US
Overbank roughness coefficient at bridge – 0.055
Contraction coefficient – 0.3 (at bridge)
Expansion coefficient – 0.5 (at bridge)
Bridge modeling method – Energy
Drift assumption – Effective pier widths assumed 6.0 to 12.0-feet
(up to 3 times actual width)
Figure 9 (page 28) shows how existing bridge is represented in model.

Model results – Existing hydraulic conditions are summarized in Table 3. Existing condition flood profiles and a stage discharge curve at cross-section 4480 are shown in Figures 11 and 12 (pages 30, 31). Summary output tables from the existing condition HEC-RAS backwater model are included in Appendix B.

TABLE 3: Existing Sacramento River Hydraulic Conditions (with drift)

Flood	Flow (cfs)	Recurrence (years)	W.S. Elevation[1] (feet)	Avg. Channel Velocity[2] (fps)
Standard Design	158100[3]	50	349.4	9.3
Base	170500[3]	100	351.1	9.4
Flood of Record	142100[3]	20	347.0	9.1
Overtopping Flood[4]	85000	<2	340.5	<9
CVFPB Design Flood	140000	10[5]	346.8[6]	9.1

Notes:
1) At cross-section 4480 located approximately 400-feet upstream of the existing bridge.
2) Highest average channel velocity in vicinity of bridge.
3) Sacramento River upstream minus north and south overflows.
4) Overtopping of Jellys Ferry Road at north overflow swale
5) CVFPB estimate
6) Estimate from existing condition stage-discharge curve

Existing North Overflow Channel: Purpose – The existing condition north overflow backwater model has been prepared to identify and document existing hydraulic conditions and to serve as a basis of comparison with which to evaluate preliminary and proposed bridge configurations.

Channel roughness coefficient at bridge site – 0.040
Overbank roughness coefficient at bridge – 0.040
Contraction coefficient – 0.1 (at bridge site)
Expansion coefficient – 0.3 (at bridge site)
Bridge modeling method – Energy
Drift assumption – None (no structure)
Figure 13 (page 32) shows how existing crossing is represented in model.

Model results – Existing hydraulic conditions are summarized in Table 4. Existing condition flood profiles and a stage discharge curve at cross-section 4.88 are shown in Figures 14 - 16 (pages 33 - 35). Summary output tables from the existing condition HEC-RAS backwater model are included in Appendix B.

TABLE 4: Existing North Overflow Hydraulic Conditions (no drift)

Flood	Flow (cfs)	Recurrence (years)	W.S. Elevation[1] (feet)	Avg. Channel Velocity[2] (fps)
Standard Design	11100	50	351.1	2.3
Base	14800	100	352.7	2.5
Flood of Record	7600	2	349.1	2.1
Overtopping Flood[3]	1	<2	341.0	<1

Notes:
1) At cross-section 4.88 located approximately 50-feet upstream of the existing road.
2) Highest average channel velocity in immediate vicinity of bridge site.
3) All flow in north overflow channel overtops Jellys Ferry Road.

Preliminary Bridges: Backwater models were prepared to represent several candidate bridge configurations. Results from these models were provided to project staff in the form of a preliminary hydraulic analysis report. Using information

provided in the preliminary hydraulic analysis report and considering additional factors not related to hydraulic conditions, a bridge configuration was selected as the preferred bridge for final design.

Preferred Sacramento River Bridge: The preferred Sacramento River bridge model has been prepared to identify hydraulic requirements and impacts of the preferred bridge.

Channel roughness coefficient at bridge – 0.045
Bank roughness coefficient at bridge – 0.055
Contraction coefficient – 0.3 (at bridge)
Expansion coefficient – 0.5 (at bridge)
Bridge modeling method – Energy
Drift assumption – Effective pier widths assumed to be 10- and 15-feet (6- and 9-feet actual)
Figure 10 (page 29) shows how preferred bridge is represented in model.

Model results – Preferred bridge hydraulic conditions are summarized in Table 5. Preferred bridge flood profiles and a stage discharge curve at cross-section 4480 are shown in Figures 11 and 12 (pages 30, 31). Summary output tables from the preferred bridge HEC-RAS backwater model are included in Appendix B.

TABLE 5: Sacramento River Preferred Bridge Hydraulic Conditions (with drift)

Flood	Flow (cfs)	Recurrence (years)	W.S. Elevation[1] (feet)	Avg. Channel Velocity[2] (fps)
Standard Design	171500[3]	50	349.0	9.3
Base	190000[3]	100	350.7	9.5
Flood of Record	149100[3]	20	346.8	9.0
Overtopping Flood[4]	207000	200	352.1	10±
CVFPB Design Flood	140000	10[5]	345.8[6]	<9

Notes: 1) At cross-section 4480 located approximately 400-feet upstream of the existing bridge.
2) Highest average channel velocity in vicinity of bridge.
3) Sacramento River upstream minus north overflow.
4) Overtopping of Jellys Ferry Road at north overflow bridge.
5) CVFPB estimate
6) Estimate from existing condition stage-discharge curve

Preferred North Overflow Bridge: The preferred bridge backwater model has been prepared to identify hydraulic requirements and impacts of the preferred bridge.

Channel roughness coefficient at bridge – 0.040
Bank roughness coefficient at bridge – 0.040
Contraction coefficient – 0.3 (at bridge)
Expansion coefficient – 0.5 (at bridge)
Bridge modeling method – Energy
Drift assumption – Effective pier width assumed 4-feet (2 x actual)
Figure 13 (page 32) shows how preferred bridge is represented in model.

Model results – Preferred bridge hydraulic conditions are summarized in Table 6. Preferred bridge flood profiles and a stage discharge curve at cross-section 4.88 are shown in Figures 14 - 16 (pages 33 - 35). A stage discharge curve at cross-section 6.0 on the main overflow channel for flood risk assessment is shown in Figure 17 (page 36). Summary output tables from the preferred bridge HEC-RAS backwater model are included in Appendix B.

TABLE 6: North Overflow Preferred Bridge Hydraulic Conditions (with drift)

Flood	Flow (cfs)	Recurrence (years)	W.S. Elevation[1] (feet)	Avg. Channel Velocity[2] (fps)
Standard Design	11500	50	351.3	2.0
Base	15200	100	352.9	2.3
Flood of Record	7900	20	349.3	1.7
Overtopping Flood	20000	200	356.0	3.0±

Notes: 1) At cross-section 4.88 located approximately 50-feet upstream of the existing road.
2) Highest average channel velocity in immediate vicinity of bridge site.

SCOUR AND EROSION

Channel Stability: Prior to construction of Shasta Dam in the early 1940s, the Sacramento River in the vicinity of Jellys Ferry Road was fully unregulated. Large floods would inundate the entire inside of the river bend north of the existing bridge. Sediment from upstream in the Sacramento River and from tributaries would replenish the river bed and bank materials. Since construction of Shasta Dam, floods up to and including the most probable 100-year flood at Jellys Ferry Road are substantially but not entirely confined to the river channel. Although sediment from upstream sources in the Sacramento River has been reduced, sediment from unregulated tributaries below Shasta Dam continues to enter the river channel. The net reduced sediment supply to the Sacramento River enters a channel with a reduced capability to transport sediment due to flood regulation. No distinct evidence of channel incision or of aggradation was observed along the Sacramento River channel in the vicinity of Jellys Ferry Road. Considering the balancing factors of reduced sediment supply with reduced transport capability and the lack of distinct evidence of channel instability, it is reasonable to believe that the channel is presently stable (maintaining a constant profile over time, not physically static).

The south approach of the Jellys Ferry Road bridge is located on a high terrace on the outside of a large bend in the Sacramento River. Regardless of the condition of stability of the Sacramento River, erosion at the outside of bends can be expected, although at rates much less than during times before regulation of floods by Shasta Dam. Additionally, as is the nature of alluvial river channels, the thalweg of the channel may migrate to any location within and adjacent to the active channel during the expected life of the bridge.

Replacement of the existing bridge with the preferred bridge is not expected to affect energy slope or sediment transport to a significant degree and therefore is not expected to aggravate channel instability.

Contraction Local: Potential contraction scour was estimated using the modified Laursen equation for live bed conditions presented in HEC-18 (reference 4).

Pier Local: Potential pier scour has been estimated using the CSU equation presented in FHWA HEC-18. It is possible for the thalweg of the Sacramento River to migrate to any location between the existing banks of the Sacramento River during the expected life of the replacement bridge. Therefore the existing thalweg elevation has been identified as the ground elevation for the purpose of estimating potential pier scour in the river channel. Similarly, the lowest ground elevation in the north overbank area has been identified as the ground elevation for the purpose of estimating potential pier scour in the overbank area.

Abutment Local: Total potential abutment scour (contraction scour included) was estimated using the NCHRP 24-20 approach identified in FHWA HEC-18.

Total Scour: Total potential scour and potential scour elevations at piers and abutments are summarized in Table 7. Scour computations and data are included in Appendix C.

TABLE 7: Total Potential Scour (feet)

Location	Ground Elev.	Degradation	Contraction Scour	Local Scour	Total Scour	Scour Elev.
Sac R piers 2 & 3	307.0	0	2.8	19.1	21.9	285.1
Sac R piers 4, 5, & 6	330.0	0	1.8	14.4	16.2	313.8
Sac R abutment 7	330.0	0	0[1]	5.0	5.0	325.0
North overflow piers	339.0	0	1.8	5.9	7.7	331.3
North overflow abuts	344.0	0	0[1]	5.0	5.0	339.0

Notes: 1) NCHRP 24-20 approach for estimating local abutment scour includes contraction scour.

OTHER CONSIDERATIONS:

Drift: There is a moderate potential for significant volumes of drift of all sizes in the Sacramento River. Drift has been considered in the design of the preferred bridge by selection of a structure with longer spans, by use of large diameter piers that are less prone to catching drift, by considering an accumulation of drift when identifying bridge hydraulic design requirements, and by providing the minimum recommended clearance for drift. When drift does accumulate at piers during flood events, the "Y" shaped geometry of the piers may cause accumulated drift at the surface to creep down the pier allowing more drift to accumulate at the water surface. Therefore it will be important to monitor drift accumulation and remove any accumulated drift prior to each flood season or when significant during a flood season.

FEMA: The preferred bridges are not within a reach of channel having flood risk mapped by FEMA using detailed study methods but project flood risk impacts have the potential to propagate upstream within an area of channel and overflow floodplain having flood risk mapped by FEMA using detailed study methods. As such, the replacement bridge project may increase Base Flood

water surface elevations as much as 1.0-foot provided that the increase in water surface elevation does not represent an increased risk of damage to properties. However, the project may not increase Base Flood water surface elevations within the reach of channel and overflow floodplain having flood risk mapped by FEMA using detailed study methods unless the increased risk of damage during the Base Flood is first mitigated and the FEMA flood study and maps are corrected. Existing condition and preferred project Base Flood water surface elevations in the Sacramento River channel at cross-section 4660 (upstream of the bridge project) and in the main overflow at cross-section 6.0 (downstream extent of FEMA FIRM in overflow floodplain) are summarized in Table 8. A copy of applicable portions of the FEMA flood insurance rate map (FIRM) is included in Appendix B.

TABLE 8: Base Flood Water Surface Elevations (feet, no drift)

Location	Existing Cond.	Preferred Bridge	Increase
Sacramento River, Cross-section 4660	351.4	351.0	-0.4
Main Overflow, Cross-section 6.0	354.4	354.4	0.0

Given the slight reduction in Base Flood water surface elevations in the Sacramento River channel and no increase in the Base Flood water surface elevation at the downstream extent of the FEMA FIRM in the main overflow channel, no FEMA applications are believed necessary for the bridge replacement project.

CVFPB: The Central Valley Flood Protection Board (CVFPB) design flood at this location is a flood having a peak flow of 140,000-cfs, a flood of approximately 10-year recurrence. Replacement of the existing bridge with the preferred bridge is expected to result in a minor reduction of the water surface elevation during the CVFPB Design Flood. No variance to the requirements of the CVFPB is believed necessary.

Conveyance Improvement: The preferred bridge project includes the excavation and grading of ground at the Jellys Ferry Road crossing of the north overflow channel depicted on the road plan sheets at the north overflow. Anticipated grading is reflected in the topography shown on Figure 18 (page 37). This excavation and grading constitutes a channel conveyance improvement necessary for the project to avoid increasing Base Flood water surface elevations at the downstream extent of the FEMA Special Flood Hazard Area (SFHA) and has been relied upon by the hydraulic analysis supporting this report.

Existing Bridge: Removal of the existing bridge and north approach has been identified as part of the bridge replacement project and has been relied upon by this analysis.

CONCLUSIONS AND RECOMMENDATIONS

Design Flood: Caltrans and FHWA recommend that new and replacement bridges be designed with a minimum soffit elevation equal to the water surface elevation of the most probable 50-year flood (Standard Design Flood) plus appropriate clearance for drift or to the water surface elevation of the most probable 100-year flood (Base Flood) with no clearance for drift, whichever is higher. The CVFPB requires that new and replacement bridges have a lowest soffit elevation 3.0-feet above the CVFPB Design Flood. Given that the CVFPB Design Flood in this reach of the Sacramento River is a 10-year flood, the Caltrans and FHWA criteria are the critical criteria governing the minimum design standards for this bridge project.

Clearance for Drift: The minimum clearance for drift recommended by Caltrans and FHWA for bridges over large streams and rivers is 3.0-feet and for small streams is 2.0-feet. A clearance for drift of 3.0-feet is appropriate for the bridge over the Sacramento River. Unlike the Sacramento River channel, the size of drift and potential for accumulation of drift at the North Overflow/Overflow No. 2 bridge is reasonably low due to the limited opportunity for drift to leave the Sacramento River channel, be conveyed down the main overflow channel, and enter the north overflow channel. Therefore a clearance for drift of 2.0-feet is appropriate for the bridge over the north overflow channel.

Design Exception: The preferred bridge structures meet the minimum recommended hydraulic design requirements of Caltrans and FHWA therefore no design exception will be required for either bridge due to hydraulic conditions.

Recommendations: Minimum Soffit Elevation – The minimum soffit elevation of a bridge over the Sacramento River meeting the recommendations of Caltrans and FHWA is 352.0-feet NAVD-88. This represents the water surface elevation of the Standard Design Flood (50-year flood with drift) plus 3.0-feet of clearance for drift. The minimum soffit elevation of a bridge over the north overflow meeting the recommendations of Caltrans and FHWA is 353.3-feet NAVD-88. This represents the water surface elevation of the Standard Design Flood (50-year flood with drift) plus 2.0-feet of clearance for drift.

Pier Scour – Piers 2 and 3 of the bridge over the Sacramento River channel should be designed considering potential scour to an elevation of 285.1-feet NAVD-88. Piers 4, 5, and 6 of the bridge over the Sacramento River channel should be designed considering potential scour to an elevation of 313.8-feet NAVD-88. All piers of the bridge over the north overflow should be designed considering potential scour to an elevation of 331.3-feet NAVD-88.

Abutment Scour – Abutment 7 of the bridge over the Sacramento River channel should be designed considering or protected against total potential scour to an elevation of 325.0-feet NAVD-88. Both abutments of the bridge over the north overflow channel should be designed considering or protected against potential scour to an elevation of 339.0-feet NAVD-88

Abutment Protection – Abutment protection is recommended to reduce the potential for damage to abutments from bank erosion and bank migration. Bank protection should be designed such that the protection does not represent a new encroachment in the floodplain.

Note regarding estimates of potential scour: Potential scour has been estimated using empirical equations presented in FHWA HEC-18. These equations do not consider geotechnical conditions and therefore assume all substrate is erodible. The potential scour estimates identified in this report may be inappropriate if a geotechnical investigation identifies material resistant to erosion at higher elevations.

Sacramento River Preferred Bridge Characteristics:

Soffit Elevation –	352.5-feet NAVD-88 (1.8-ft above Q100 with drift, 3.5-ft above Q50 with drift)
Overtopping Flood –	227000-cfs, 200-year recurrence, overtopping at north overflow
Impact on Flood Risk –	No increased risk of damage to structures during floods up to and including the most probable 100-year flood.
Impact on Channel –	The preferred bridge is not expected to aggravate channel instability.

North Overflow Preferred Bridge Characteristics:

Soffit Elevation –	353.4-feet NAVD-88 (0.5-ft above Q100 with drift, 2.1-ft above Q50 with drift)
Overtopping Flood –	20000-cfs, 200-year recurrence (227,000-cfs in Sacramento River)
Impact on Flood Risk –	No increased risk of damage to structures during floods up to and including the most probable 100-year flood.
Impact on Channel –	The preferred bridge is not expected to aggravate channel instability.

Photo 1: Looking downstream (east) at Bridge 8C-0043, Jellys Ferry Road Bridge over Sacramento River

Photo 2: Looking downstream (southeast) at Bridge 8C-0043, Jellys Ferry Road over Sacramento River

Photo 3: Looking north across Bridge 8C-0043,
Jellys Ferry Road over Sacramento River.

Photo 4: Looking south across Bridge 8C-0043,
Jellys Ferry Road over Sacramento River.

Photo 5: Looking downstream (east) at Sacramento River from Bridge 8C-0043, Jellys Ferry Road.

Photo 6: Looking upstream (west) at Sacramento River from Bridge 8C-0043, Jellys Ferry Road.

Photo 7: Looking north at North Overflow over Jellys Ferry Road

Photo 8: Looking east (downstream) at North Overflow from Jellys Ferry Road

Photo 9: Aerial during March 1983 Flood

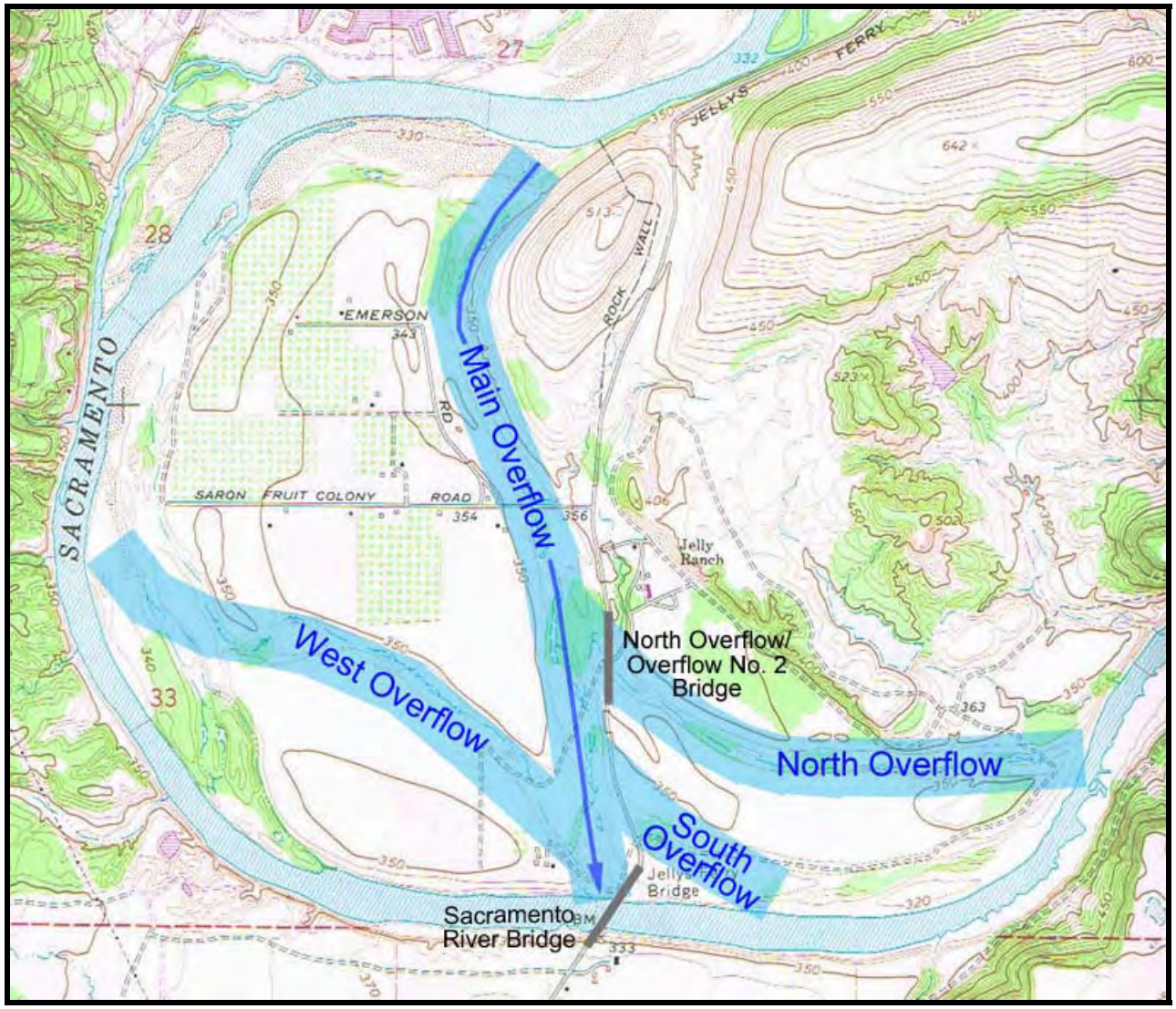


Figure 1: Sacramento River and Overflow Channels

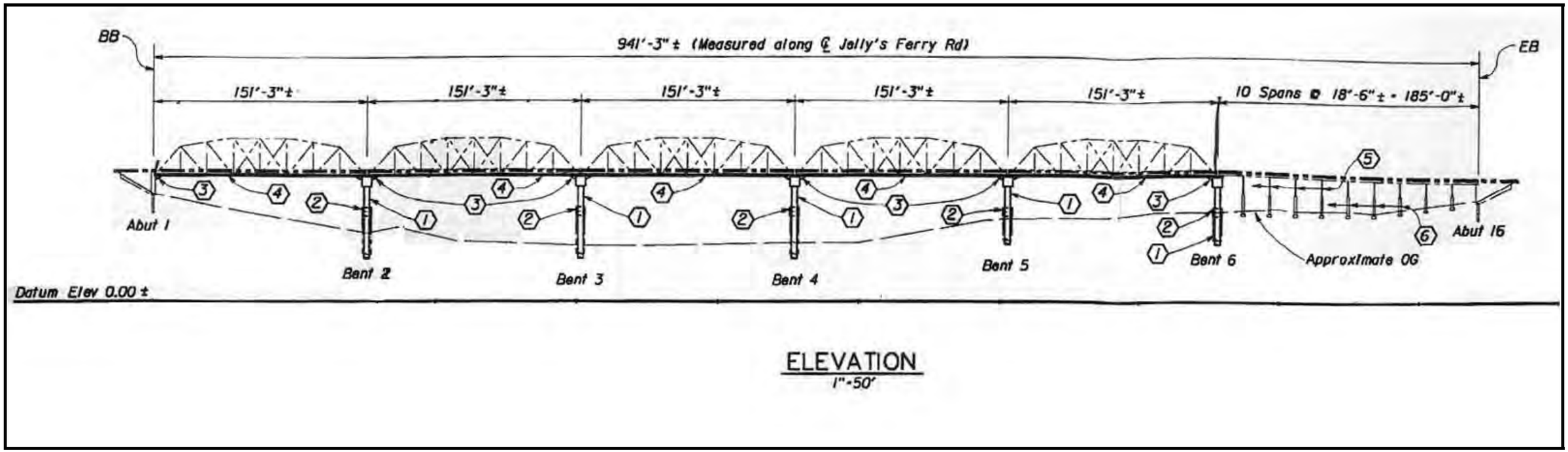


Figure 2: Sketch of Existing Bridge (looking upstream)

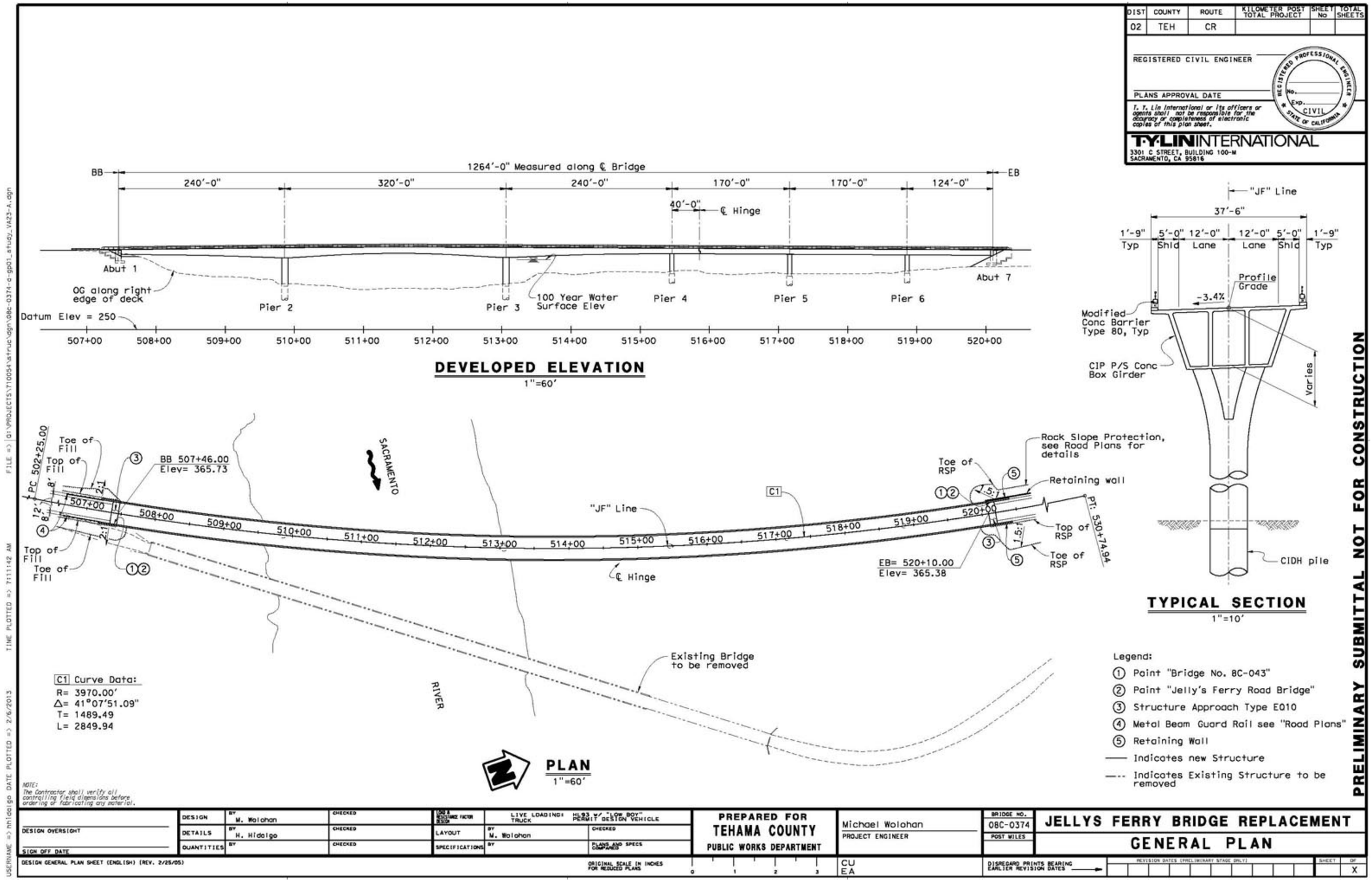
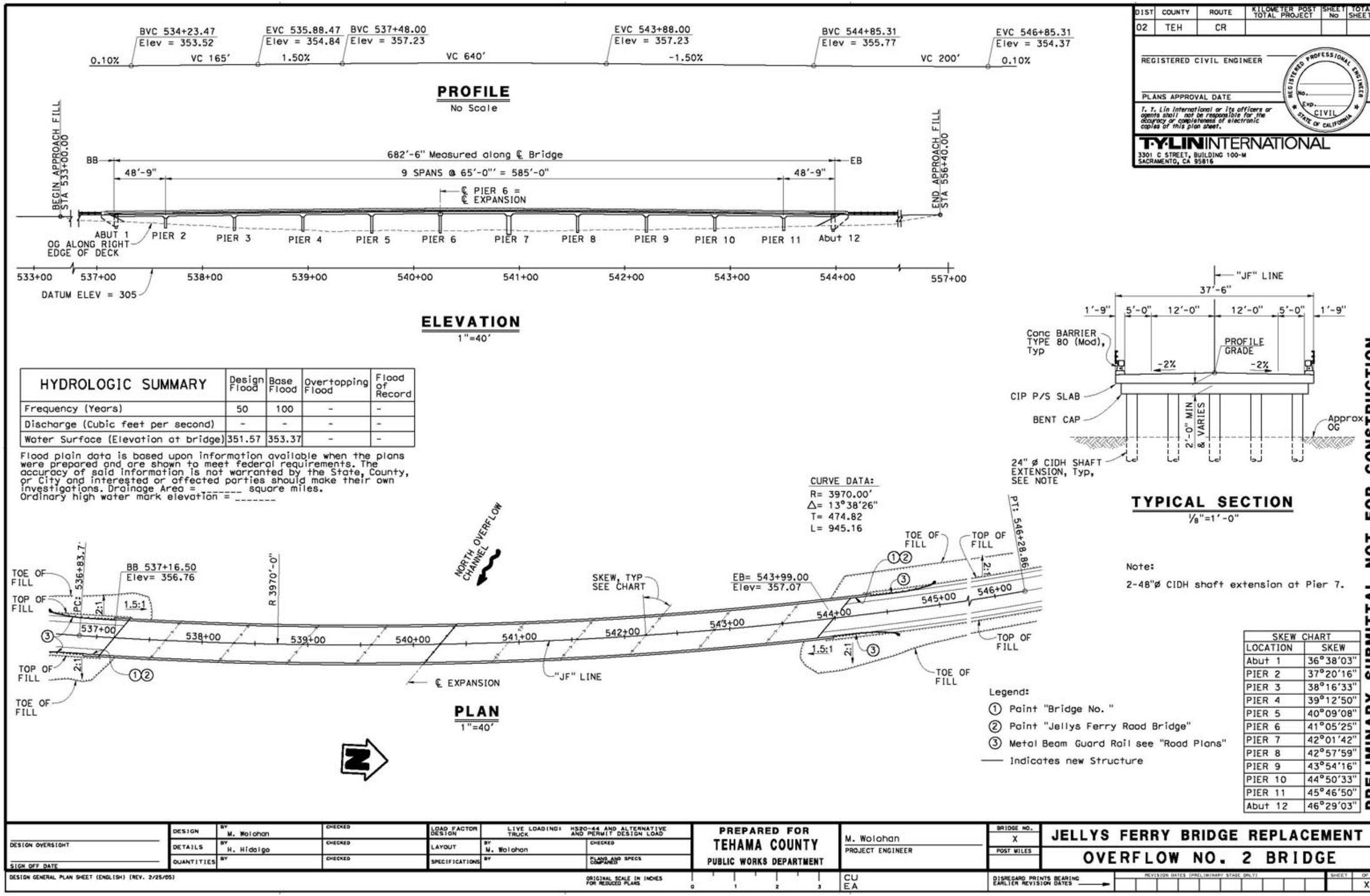


Figure 3: Preferred Bridge Preliminary General Plan, Sacramento River



SKEW CHART	
LOCATION	SKEW
Abut 1	36°38'03"
PIER 2	37°20'16"
PIER 3	38°16'33"
PIER 4	39°12'50"
PIER 5	40°09'08"
PIER 6	41°05'25"
PIER 7	42°01'42"
PIER 8	42°57'59"
PIER 9	43°54'16"
PIER 10	44°50'33"
PIER 11	45°46'50"
Abut 12	46°29'03"

HYDROLOGIC SUMMARY	Design Flood	Base Flood	Overtopping Flood	Flood of Record
Frequency (Years)	50	100	-	-
Discharge (Cubic feet per second)	-	-	-	-
Water Surface (Elevation at bridge)	351.57	353.37	-	-

Flood plain data is based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State, County, or City and interested or affected parties should make their own investigations. Drainage Area = _____ square miles.
Ordinary high water mark elevation = _____

Figure 4: Preferred Bridge Preliminary General Plan, North Overflow

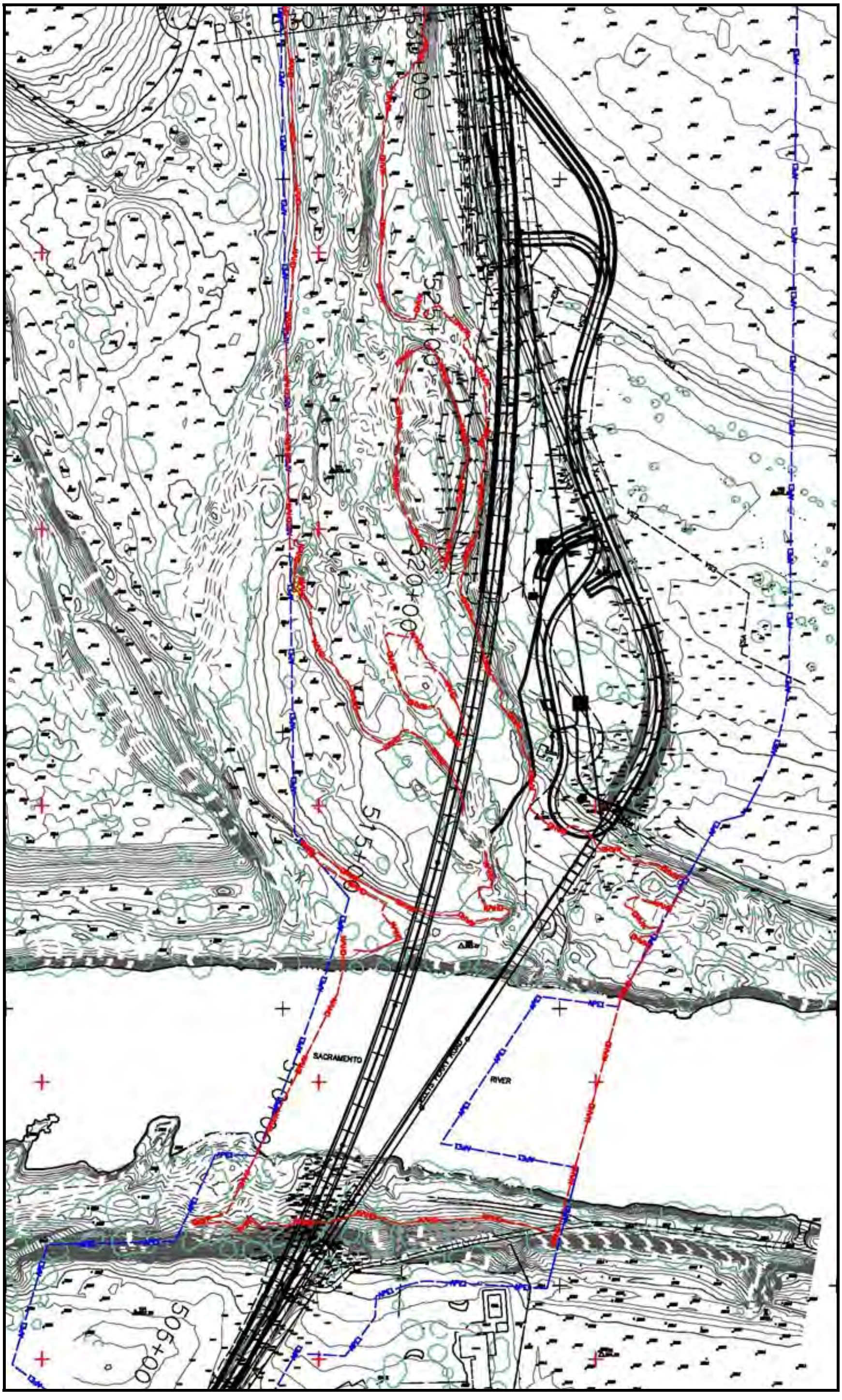


Figure 5: Site Topography, Sacramento River Bridge

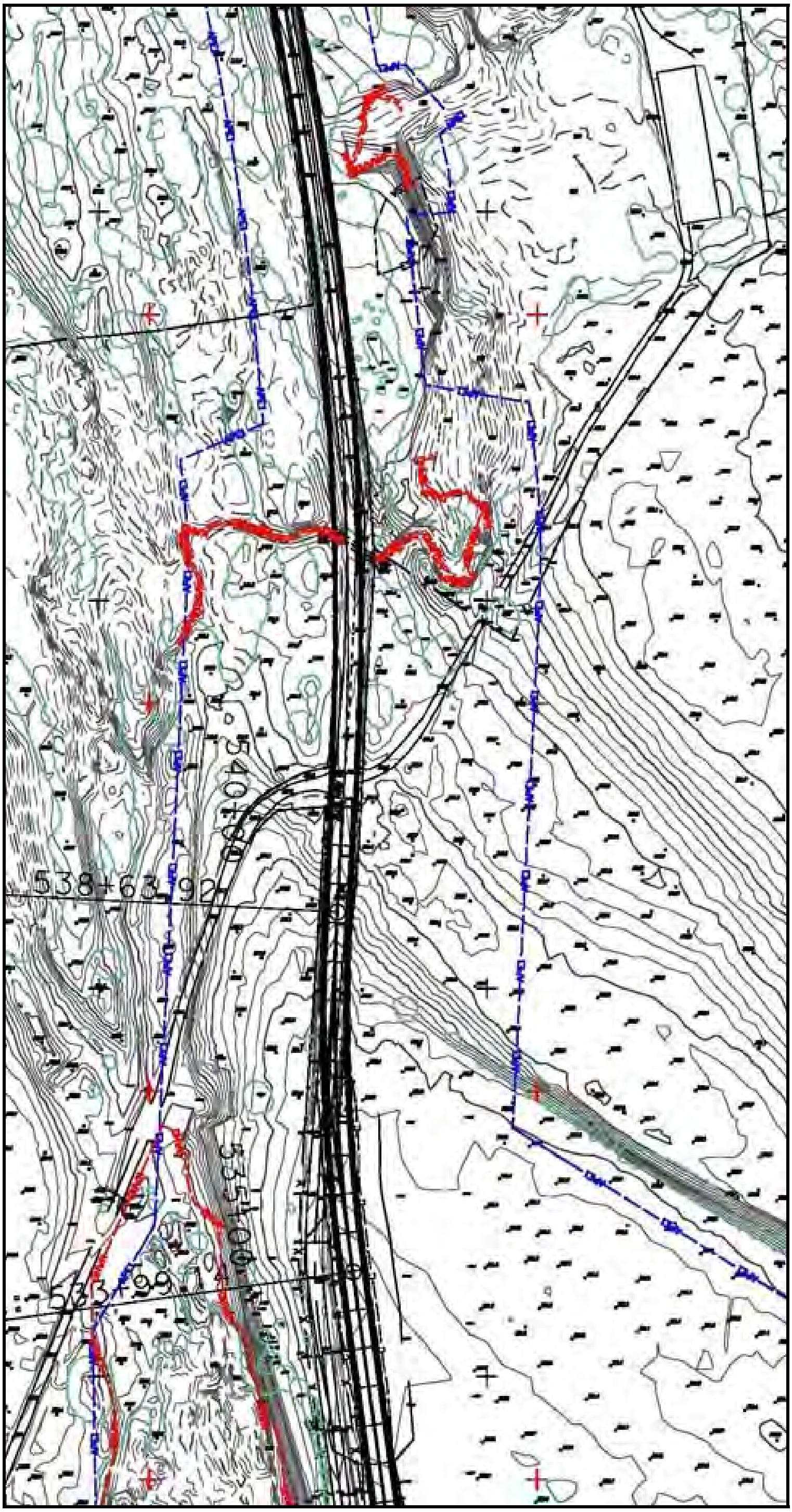


Figure 6: Site Topography, North Overflow

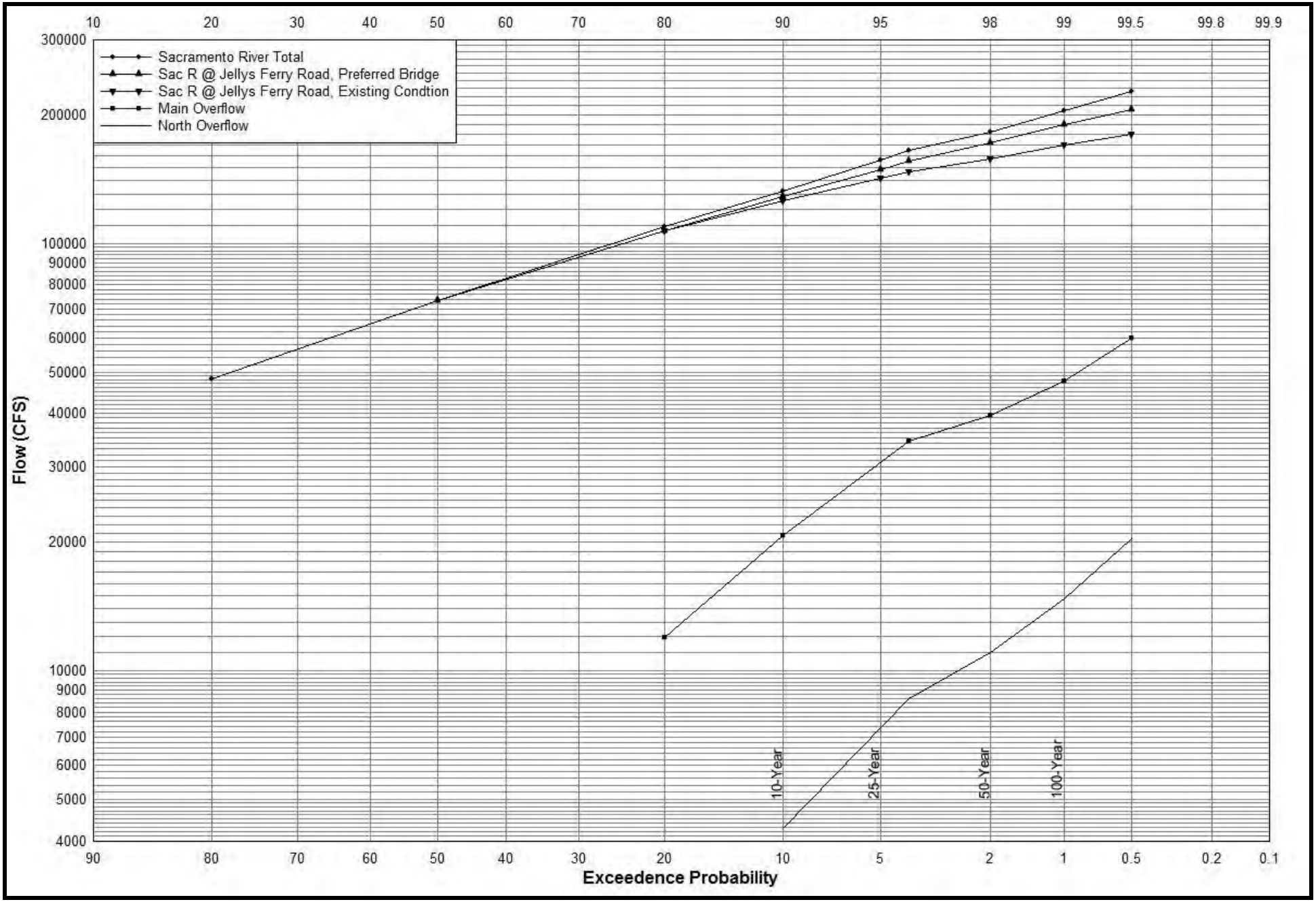


Figure 7: Flood Frequency Curves, Sacramento River and Selected Overflow Paths

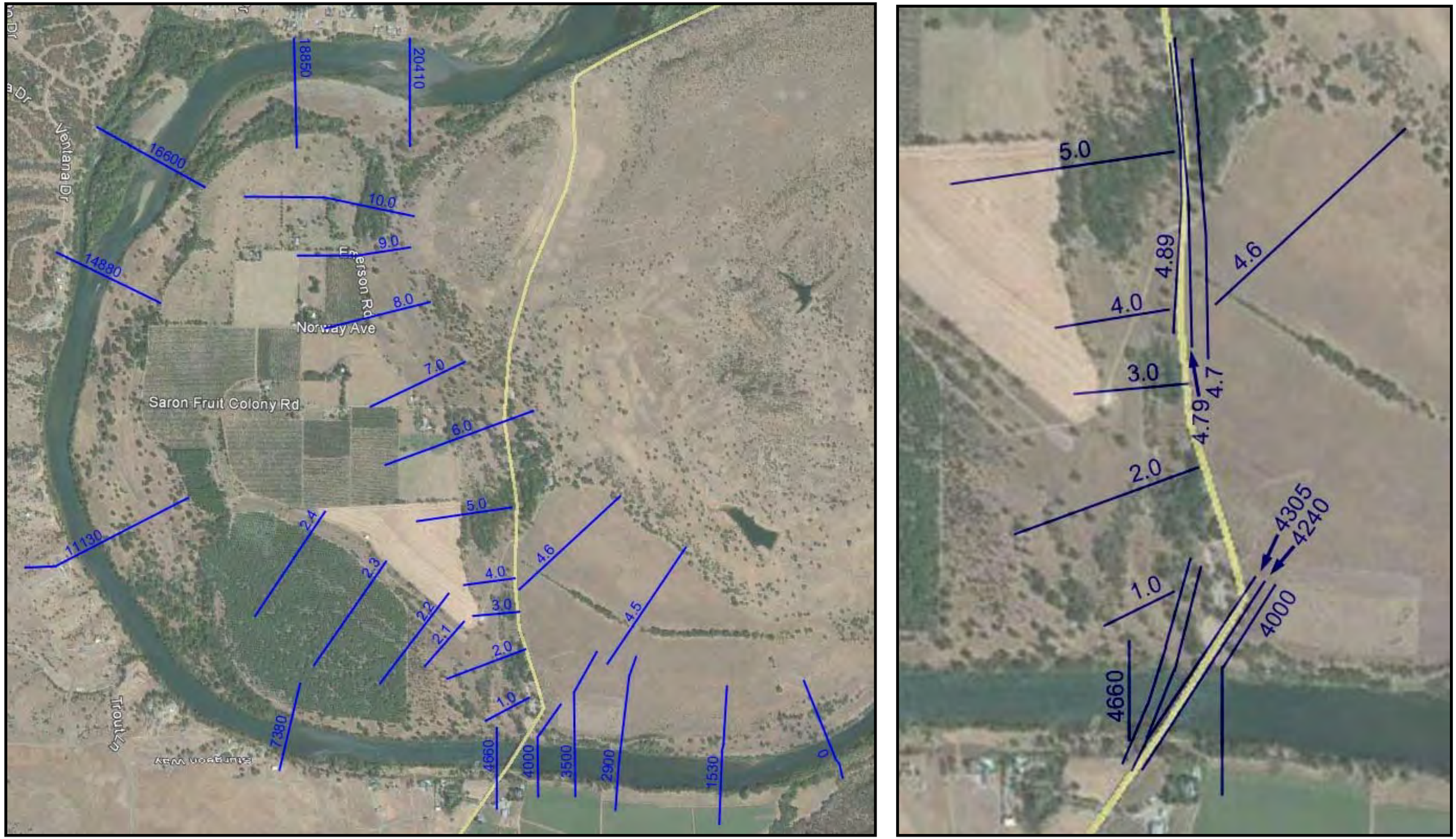


Figure 8: Locations of Cross-sections Used in Backwater Model

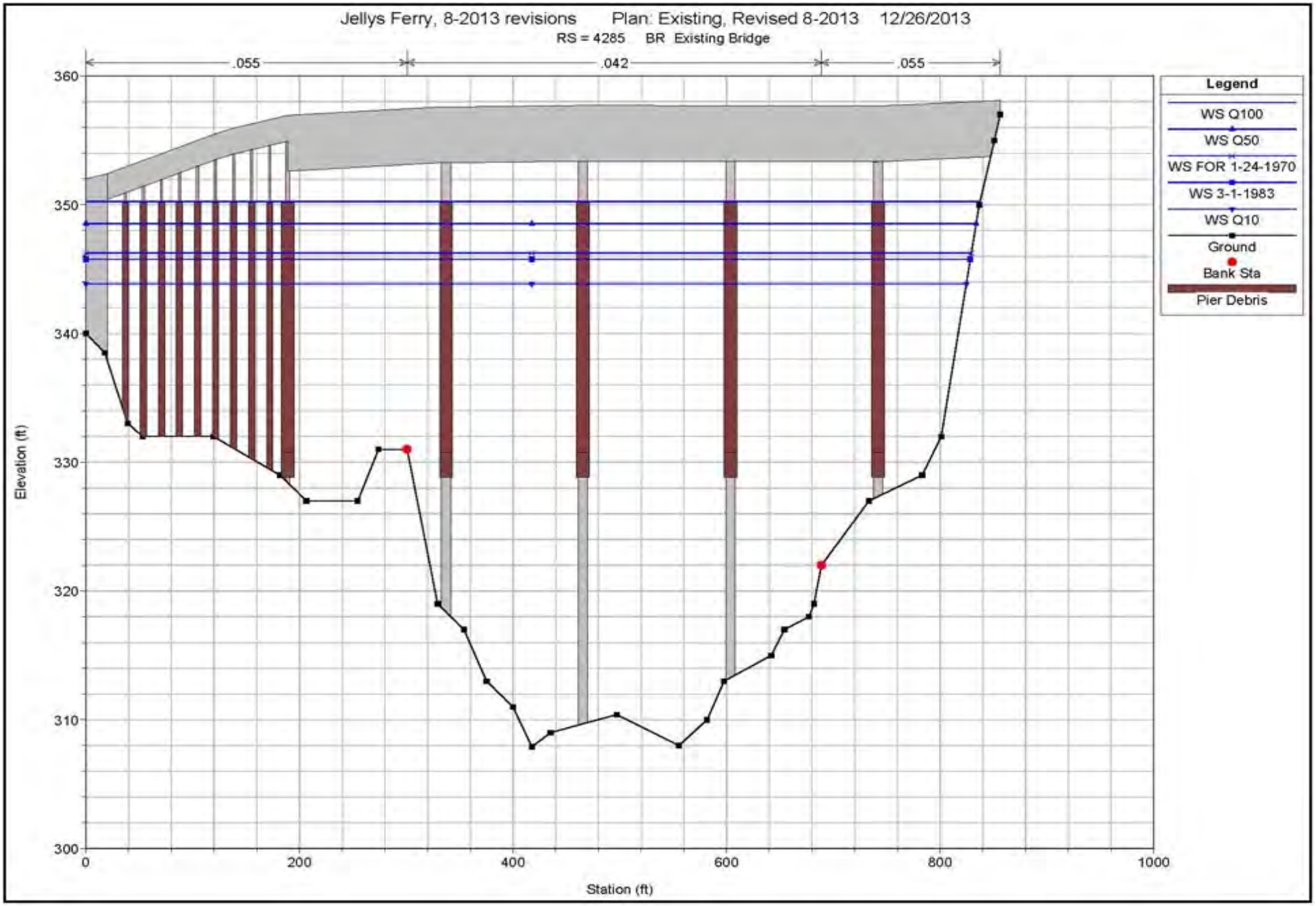


Figure 9: Existing Sacramento River Bridge as Represented in Backwater Model

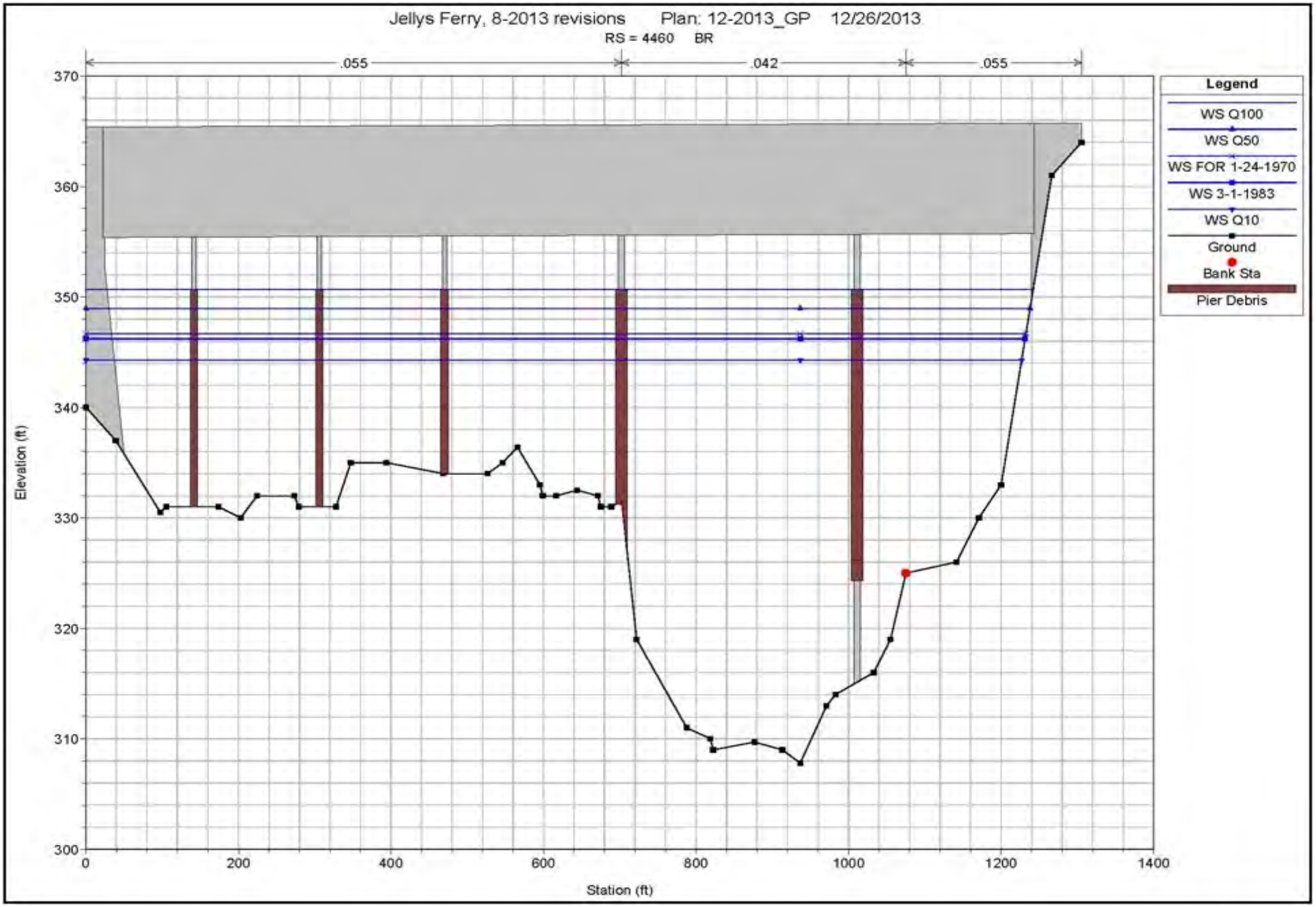


Figure 10: Preferred Sacramento River Bridge as Represented in Backwater Model

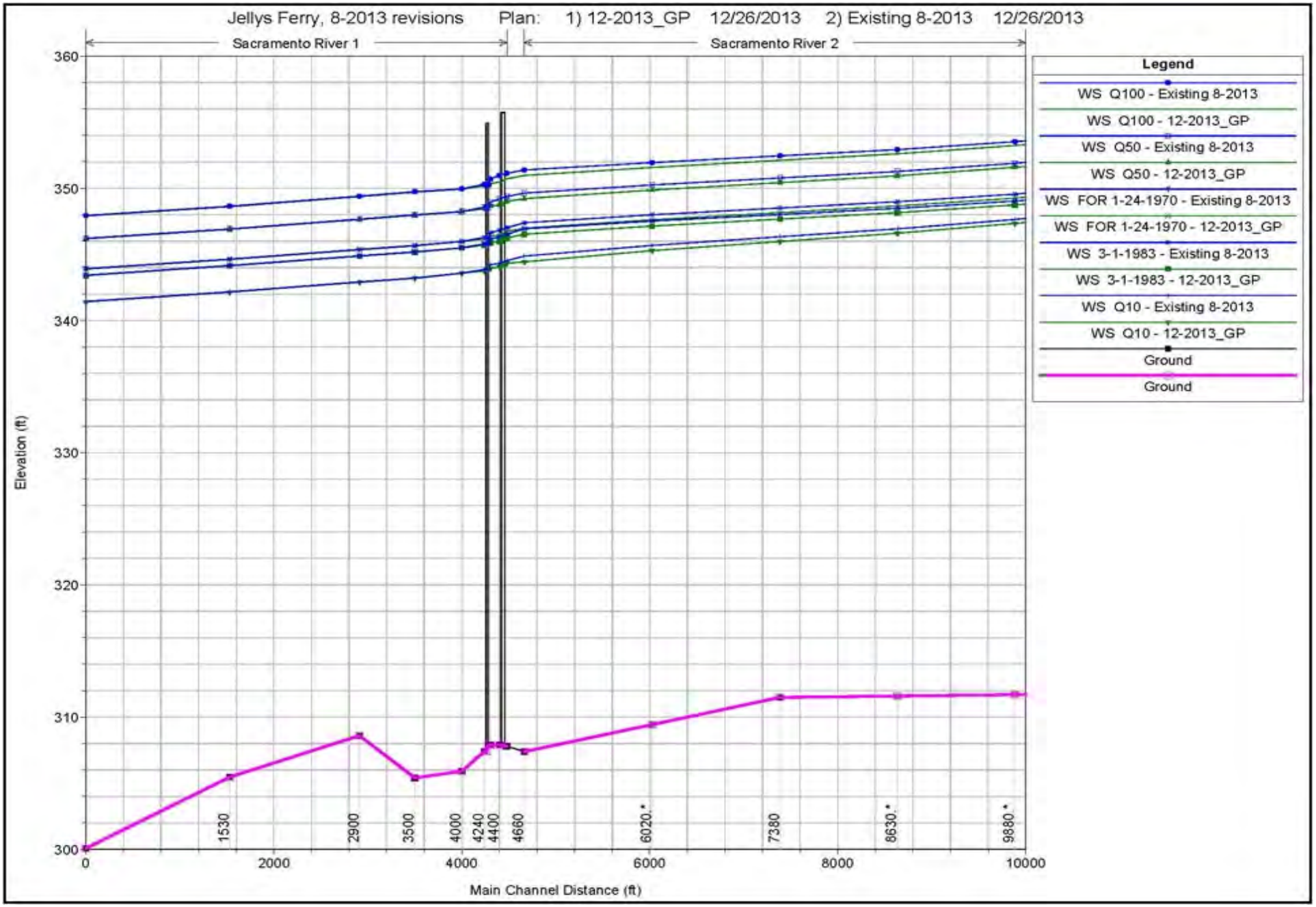


Figure 11: Sacramento River Flood Profiles for Existing Condition and Preferred Bridge

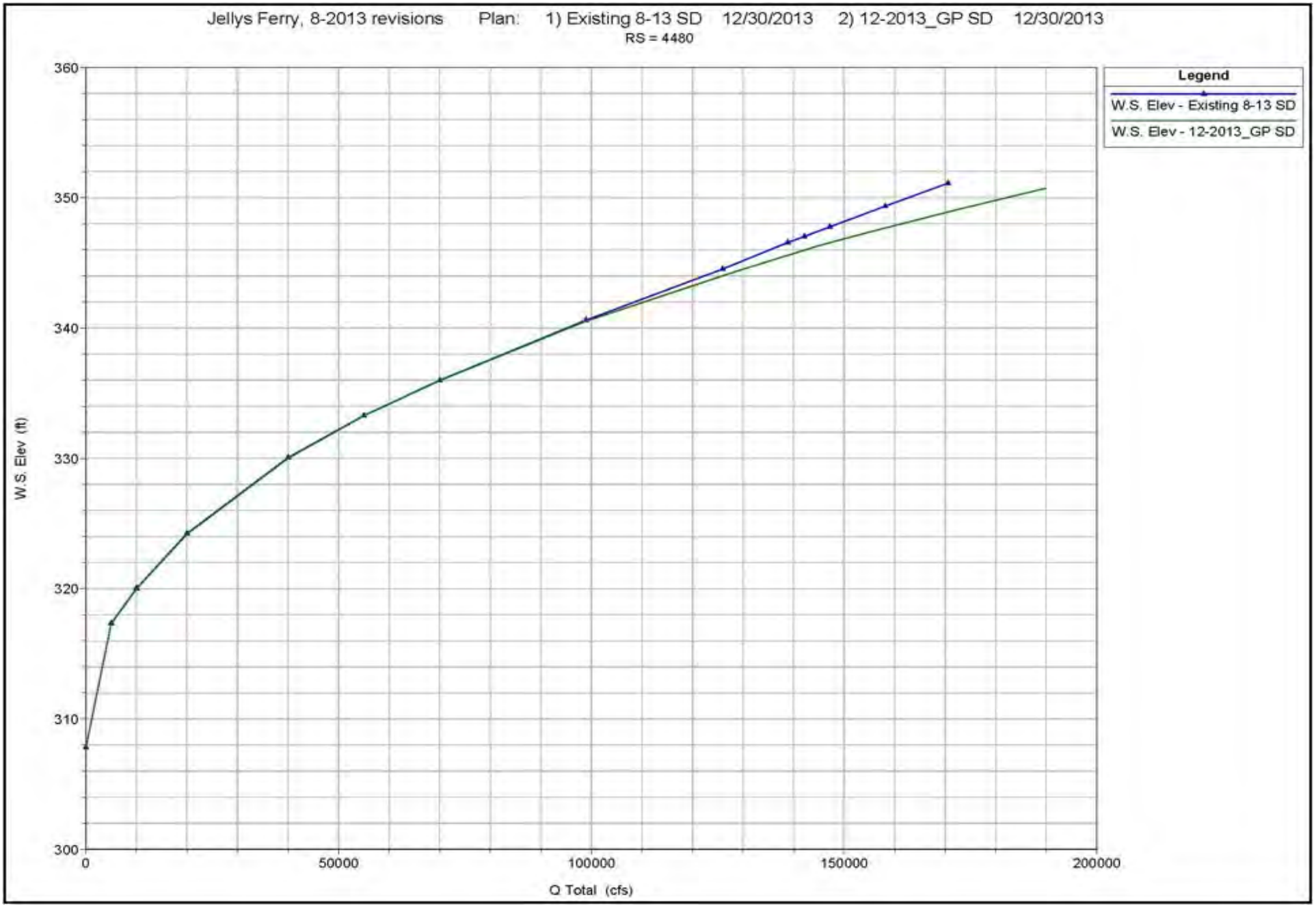


Figure 12: Sacramento River Stage Discharge Curves for Existing Conditions and Preferred Bridge at Cross-section 4480

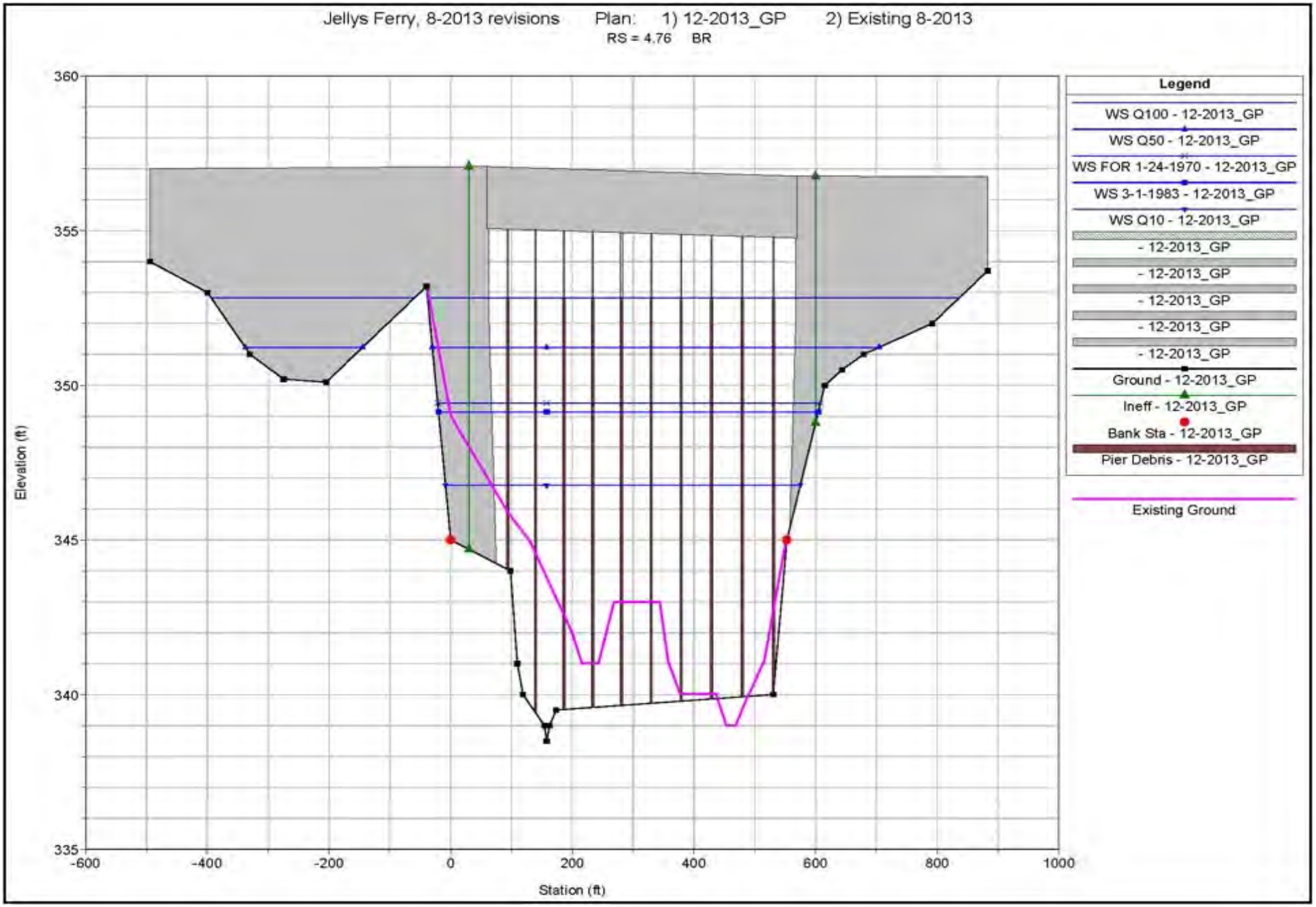


Figure 13: Existing Condition and Preferred North Overflow Bridge as Represented in Backwater Model

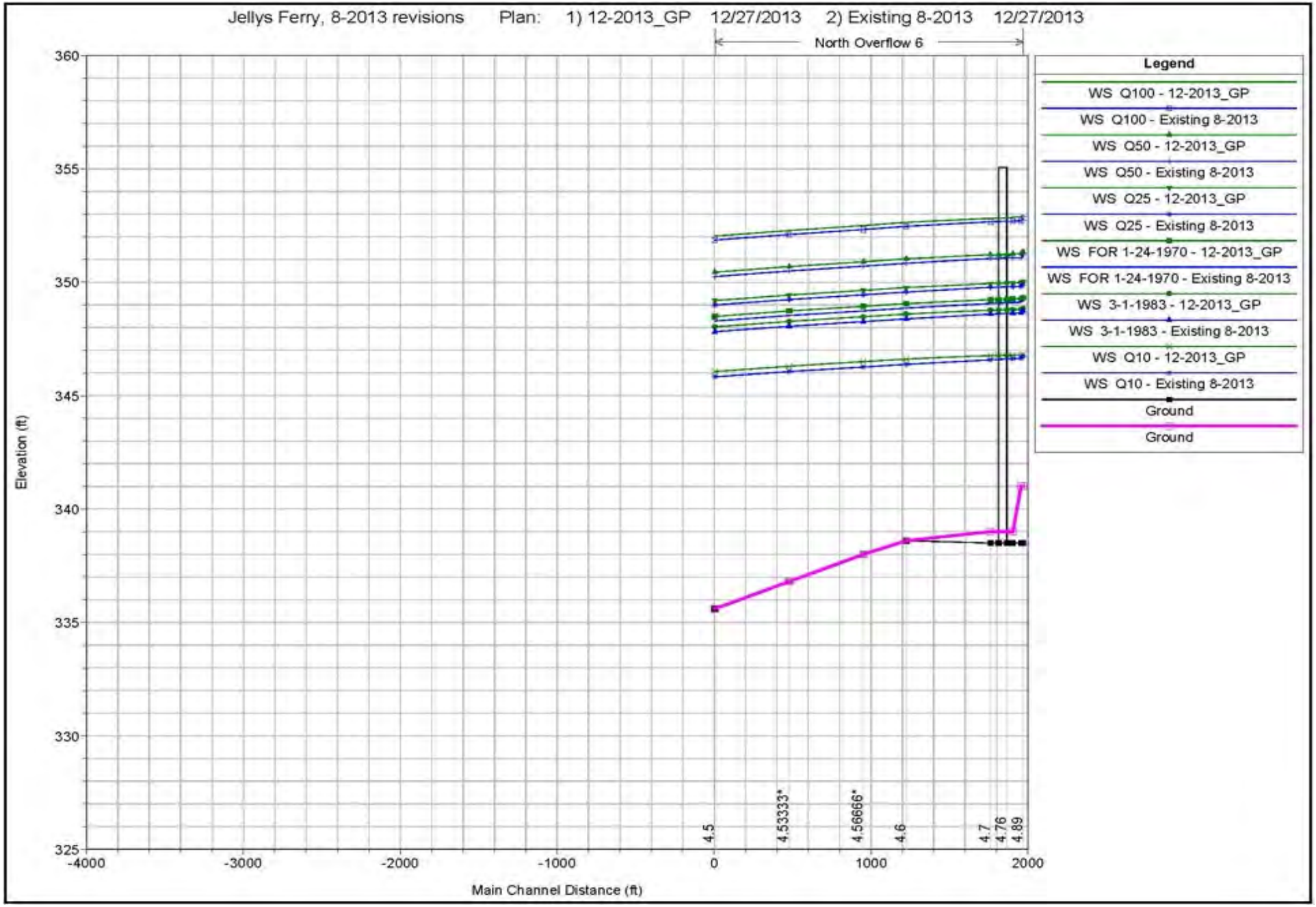


Figure 14: North Overflow Profiles for Existing Condition and Preferred Bridge

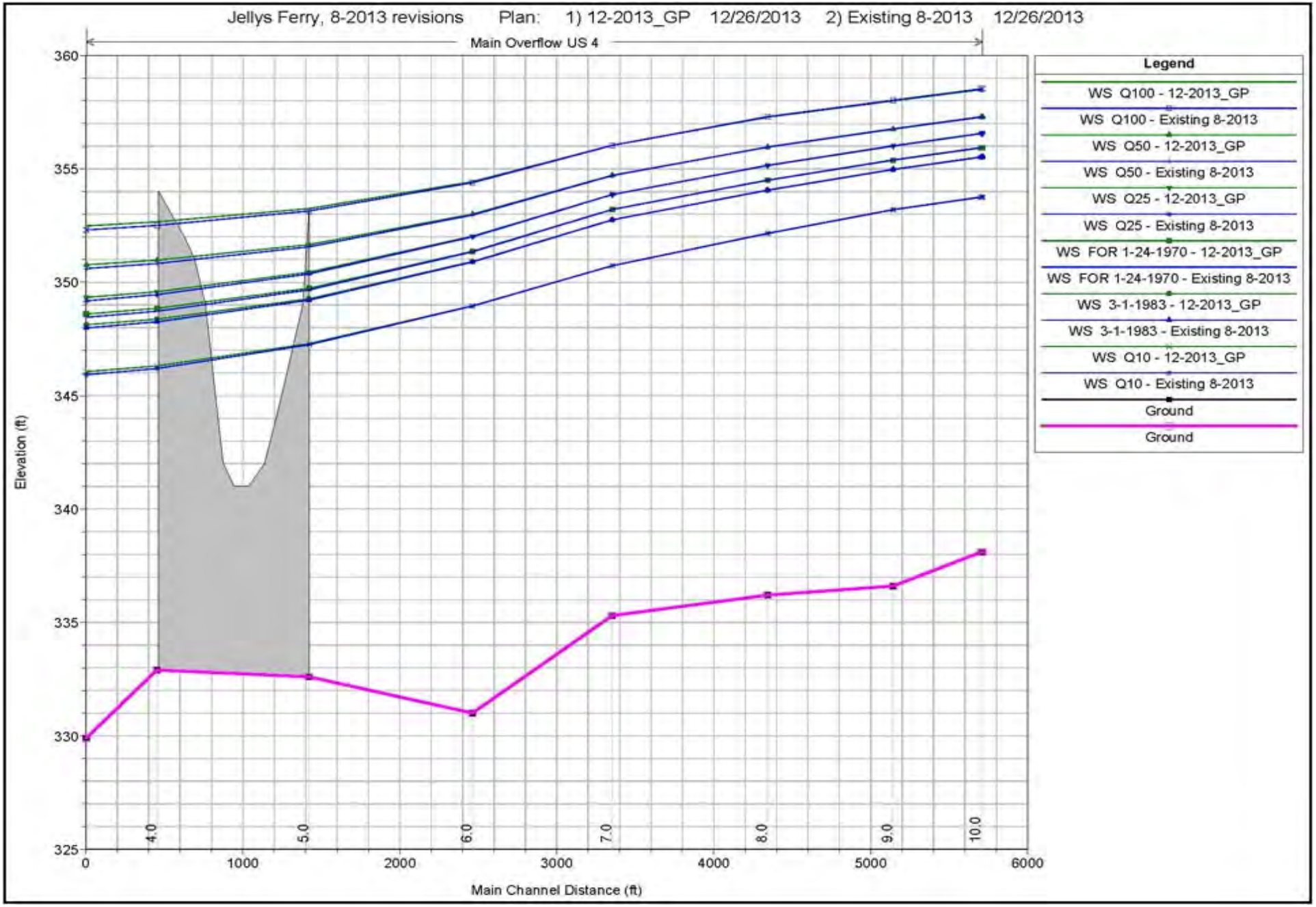


Figure 15: Main Overflow Profiles for Existing Condition and Preferred Bridge

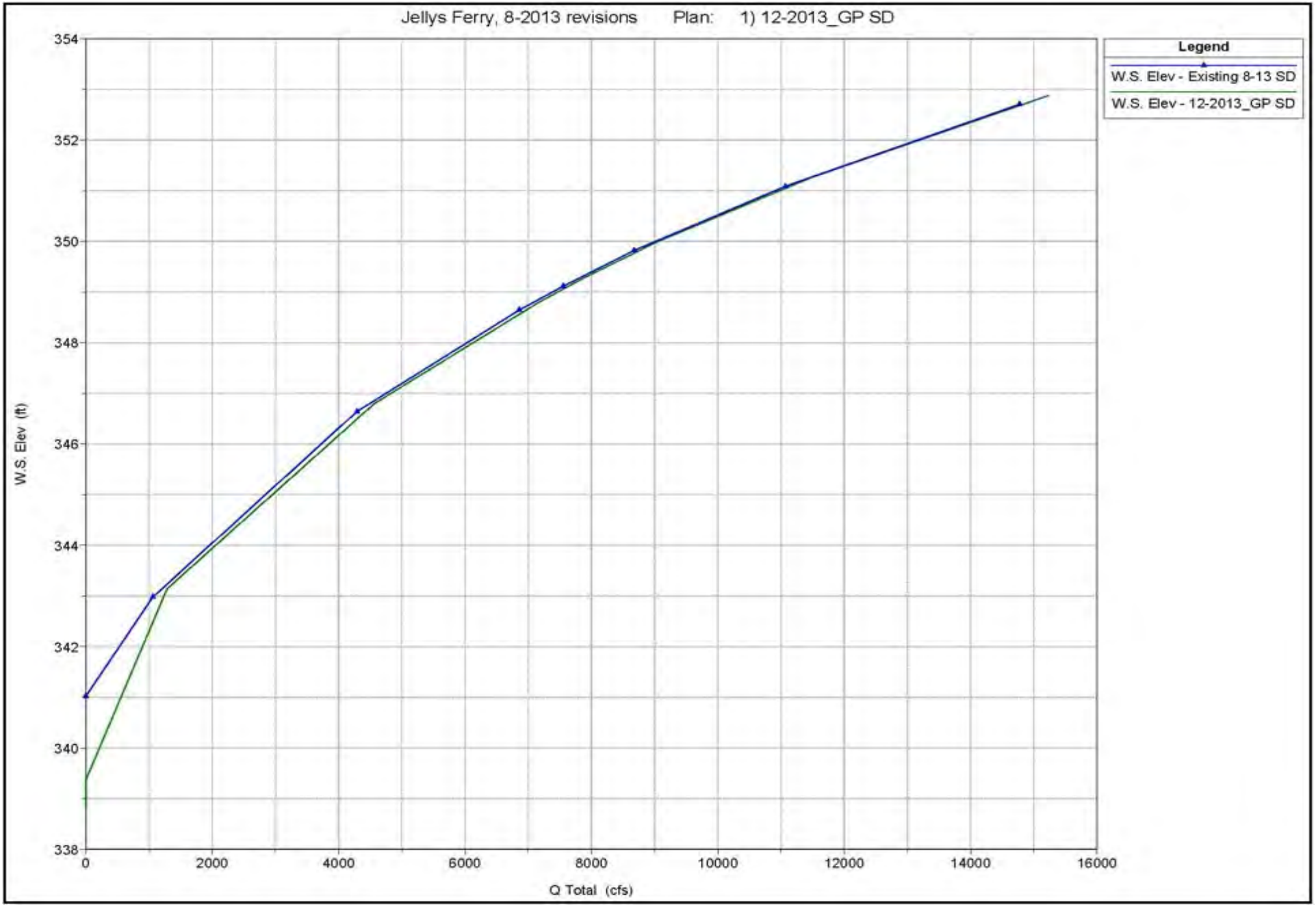


Figure 16: North Overflow Stage Discharge Curves for Existing Conditions and Preferred Bridge at Cross-section 4.88

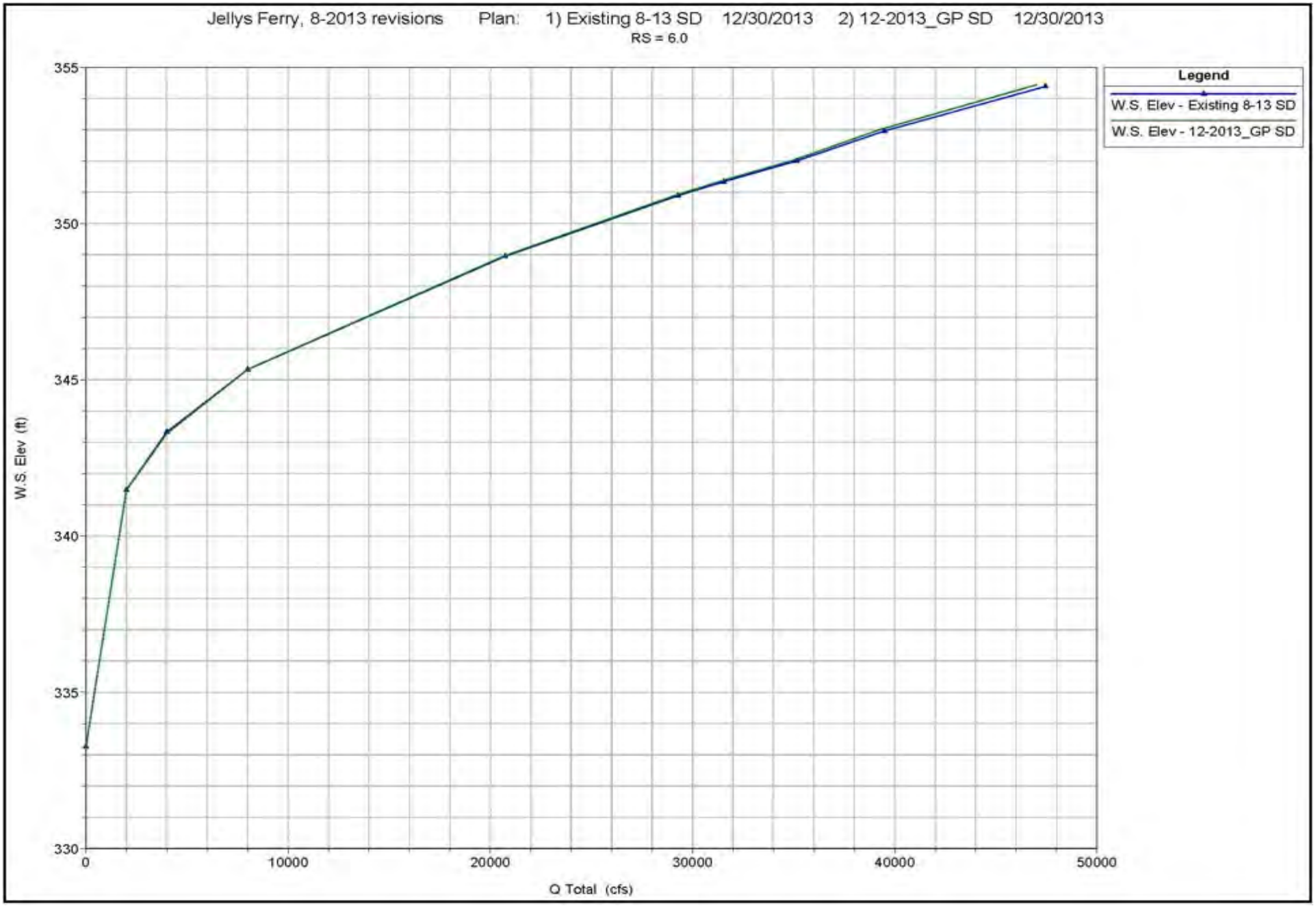


Figure 17: Main Overflow Stage Discharge Curve, Existing Condition and Preferred Bridge at Cross-section 6.0 (downstream limit of FEMA SHFA)

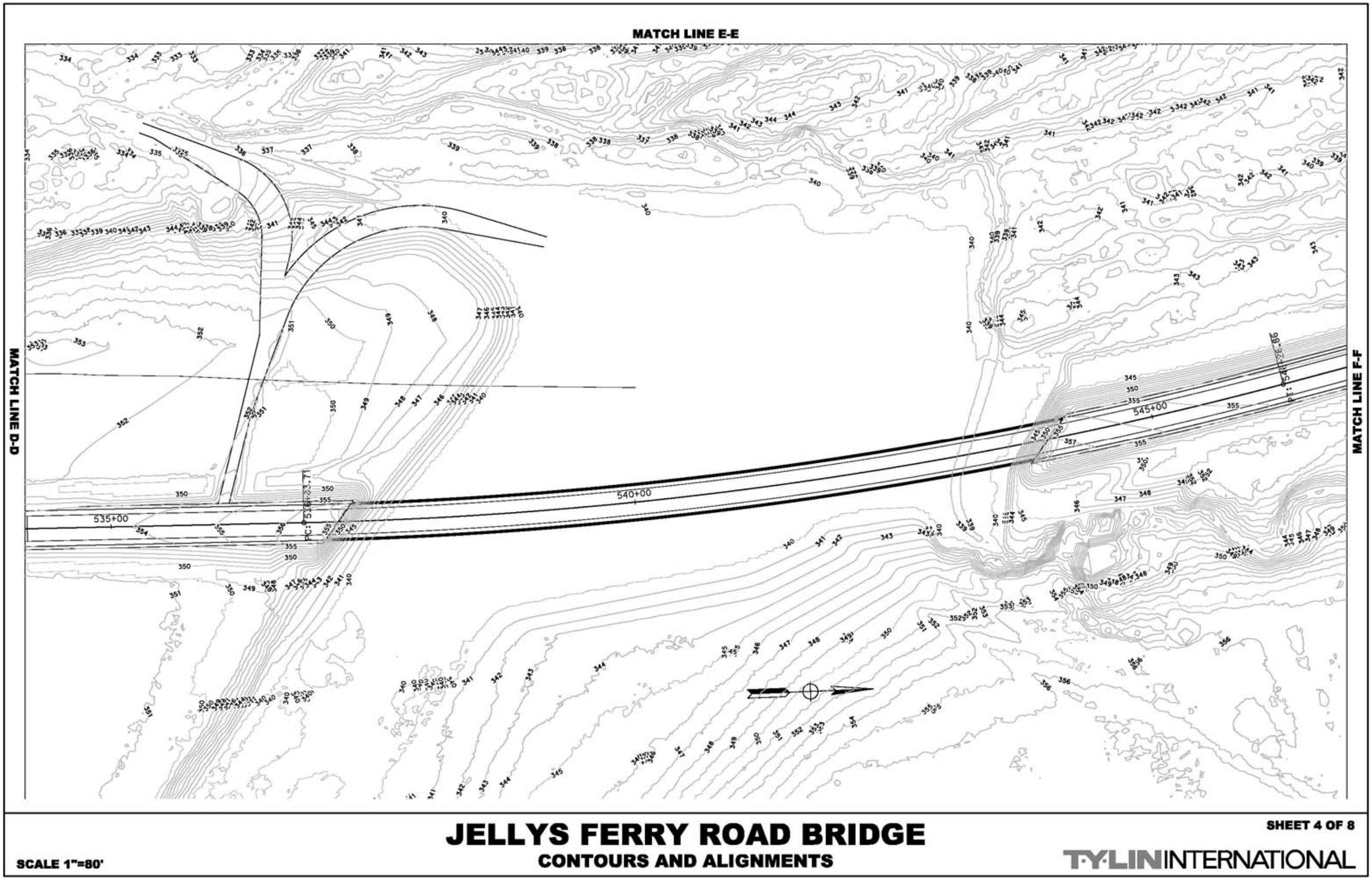


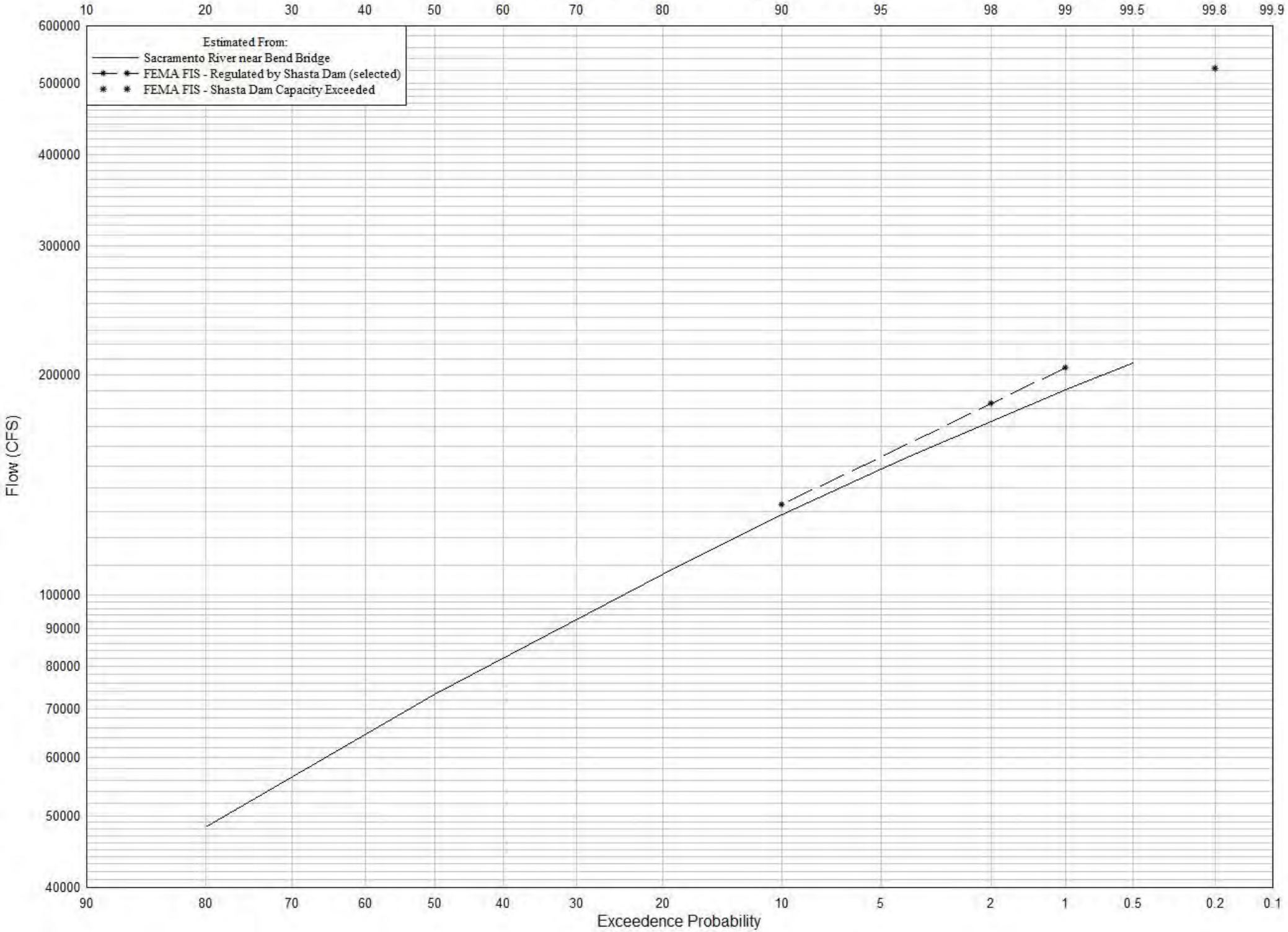
Figure 18: Grading Plan Reflecting Conveyance Improvement at North Overflow Split from Main Overflow

APPENDIX A

Additional Hydrologic Figures

Jellys Ferry Road over Sacramento River

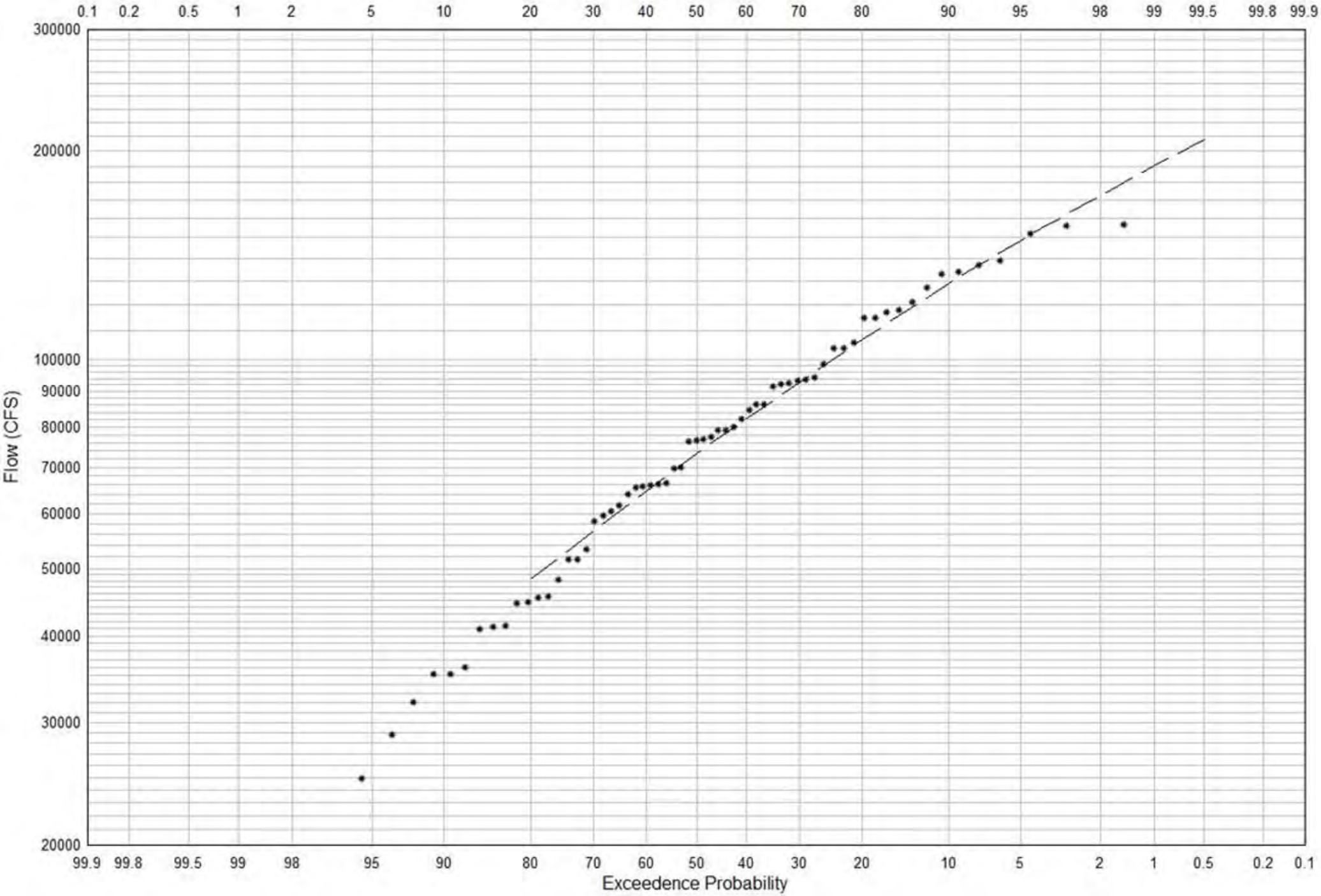
Candidate Flood Frequency Curves



Sacramento River near Bend Bridge

USGS Streamgage 113771000: 65-years, 8900 sq-mi effective

Operating



APPENDIX B

Additional Hydraulic Data

HEC-RAS Plan: Existing 8-2013 Backwater Model Summary Output, Existing Condition, No Drift

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sacramento River	2	20410	Q100	205000	324.9	357.3		358.5	0.001025	10.0	26743	1465.1	0.32
Sacramento River	2	20410	Q50	183000	324.9	355.8		356.9	0.000985	9.4	24632	1450.5	0.31
Sacramento River	2	20410	FOR 1-24-1970	157000	324.9	353.9		354.9	0.001000	9.1	21893	1412.9	0.31
Sacramento River	2	18850	Q100	157544	323.7	356.7		357.2	0.000420	6.3	32144	1668.7	0.21
Sacramento River	2	18850	Q50	143512	323.7	355.3		355.7	0.000424	6.1	29673	1664.4	0.21
Sacramento River	2	18850	FOR 1-24-1970	125462	323.7	353.3		353.7	0.000447	6.0	26415	1626.3	0.21
Sacramento River	2	16600	Q100	157544	322.2	356.0		356.4	0.000320	5.5	35851	1659.2	0.18
Sacramento River	2	16600	Q50	143512	322.2	354.5		354.9	0.000332	5.4	33347	1657.5	0.18
Sacramento River	2	16600	FOR 1-24-1970	125462	322.2	352.5		352.8	0.000350	5.3	29990	1655.2	0.19
Sacramento River	2	14880	Q100	157544	315.7	355.3		355.8	0.000345	6.2	30801	1324.1	0.19
Sacramento River	2	14880	Q50	143512	315.7	353.8		354.3	0.000348	6.1	28801	1322.7	0.19
Sacramento River	2	14880	FOR 1-24-1970	125462	315.7	351.8		352.2	0.000352	5.8	26120	1320.9	0.19
Sacramento River	2	13630.*	Q100	157544	314.4	354.9		355.4	0.000333	6.1	32217	1469.8	0.19
Sacramento River	2	13630.*	Q50	143512	314.4	353.4		353.9	0.000339	6.0	29983	1465.6	0.19
Sacramento River	2	13630.*	FOR 1-24-1970	125462	314.4	351.3		351.8	0.000347	5.8	26994	1461.9	0.19
Sacramento River	2	12380.*	Q100	157544	313.1	354.5		355.0	0.000354	6.2	32584	1609.6	0.19
Sacramento River	2	12380.*	Q50	143512	313.1	352.9		353.4	0.000366	6.1	30104	1607.2	0.20
Sacramento River	2	12380.*	FOR 1-24-1970	125462	313.1	350.9		351.3	0.000383	6.0	26785	1592.9	0.20
Sacramento River	2	11130	Q100	131161	311.8	354.2		354.5	0.000281	5.4	32151	1747.0	0.17
Sacramento River	2	11130	Q50	123515	311.8	352.6		353.0	0.000320	5.5	29361	1743.7	0.18
Sacramento River	2	11130	FOR 1-24-1970	111714	311.8	350.4		350.9	0.000372	5.7	25654	1726.0	0.19
Sacramento River	2	9880.*	Q100	131161	311.7	353.5		354.1	0.000383	6.5	25163	1514.4	0.20
Sacramento River	2	9880.*	Q50	123515	311.7	351.9		352.5	0.000421	6.5	22748	1373.9	0.21
Sacramento River	2	9880.*	FOR 1-24-1970	111714	311.7	349.7		350.3	0.000471	6.6	19818	1307.0	0.22
Sacramento River	2	8630.*	Q100	131161	311.6	352.9		353.6	0.000403	6.9	21509	1041.3	0.21
Sacramento River	2	8630.*	Q50	123515	311.6	351.3		351.9	0.000429	6.9	19862	943.4	0.21
Sacramento River	2	8630.*	FOR 1-24-1970	111714	311.6	349.1		349.7	0.000452	6.7	18007	790.3	0.22
Sacramento River	2	7380	Q100	131161	311.5	352.4		353.1	0.000363	6.8	21249	787.1	0.20
Sacramento River	2	7380	Q50	123515	311.5	350.8		351.4	0.000382	6.8	19955	752.5	0.20
Sacramento River	2	7380	FOR 1-24-1970	111714	311.5	348.6		349.2	0.000396	6.6	18335	718.1	0.20
Sacramento River	2	6020.*	Q100	131161	309.4	351.9		352.6	0.000370	6.9	21249	869.3	0.20
Sacramento River	2	6020.*	Q50	123515	309.4	350.2		350.9	0.000386	6.8	19870	775.4	0.20
Sacramento River	2	6020.*	FOR 1-24-1970	111714	309.4	348.0		348.7	0.000400	6.6	18203	724.7	0.21
Sacramento River	2	4660	Q100	131161	307.4	351.4		352.1	0.000413	7.0	20094	697.1	0.21
Sacramento River	2	4660	Q50	123515	307.4	349.6		350.3	0.000442	7.0	18881	694.6	0.22
Sacramento River	2	4660	FOR 1-24-1970	111714	307.4	347.3		348.1	0.000468	6.9	17311	691.3	0.22
Sacramento River	1	4480	Q100	170535	307.8	351.1		351.8	0.000402	7.9	30015	1243.0	0.23
Sacramento River	1	4480	Q50	158097	307.8	349.3		350.1	0.000429	7.9	27822	1238.8	0.23
Sacramento River	1	4480	FOR 1-24-1970	142105	307.8	347.0		347.8	0.000471	7.9	24948	1233.3	0.24
Sacramento River	1	4400	Q100	170535	307.9	351.0		351.8	0.000447	8.4	28289	1214.1	0.24
Sacramento River	1	4400	Q50	158097	307.9	349.2		350.0	0.000478	8.4	26132	1211.7	0.25
Sacramento River	1	4400	FOR 1-24-1970	142105	307.9	346.8		347.7	0.000528	8.4	23298	1208.5	0.25
Sacramento River	1	4305	Q100	170535	307.9	350.7	332.6	351.7	0.000524	9.0	23485	838.5	0.26
Sacramento River	1	4305	Q50	158097	307.9	348.9	330.9	349.9	0.000542	8.9	22031	834.5	0.26
Sacramento River	1	4305	FOR 1-24-1970	142105	307.9	346.6	329.9	347.6	0.000570	8.7	20132	830.0	0.27
Sacramento River	1	4285		Bridge									
Sacramento River	1	4240	Q100	170535	307.4	350.3		351.5	0.000578	9.5	22341	812.5	0.27
Sacramento River	1	4240	Q50	158097	307.4	348.6		349.7	0.000600	9.3	20938	809.9	0.27
Sacramento River	1	4240	FOR 1-24-1970	142105	307.4	346.3		347.4	0.000631	9.2	19104	806.4	0.28
Sacramento River	1	4000	Q100	170535	305.9	350.0		351.3	0.000609	9.8	20864	749.0	0.28
Sacramento River	1	4000	Q50	158097	305.9	348.2		349.5	0.000625	9.7	19584	741.5	0.28
Sacramento River	1	4000	FOR 1-24-1970	142105	305.9	346.0		347.2	0.000644	9.4	17930	730.9	0.28
Sacramento River	1	3500	Q100	190228	305.4	349.7		350.9	0.000603	9.8	28154	1550.1	0.28
Sacramento River	1	3500	Q50	171934	305.4	348.0		349.2	0.000622	9.7	25460	1528.1	0.28
Sacramento River	1	3500	FOR 1-24-1970	149447	305.4	345.7		346.9	0.000647	9.5	21991	1497.4	0.28
Sacramento River	1	2900	Q100	190228	308.6	349.4		350.6	0.000607	9.3	26829	1408.8	0.27
Sacramento River	1	2900	Q50	171934	308.6	347.7		348.8	0.000617	9.1	24413	1373.0	0.27
Sacramento River	1	2900	FOR 1-24-1970	149447	308.6	345.4		346.5	0.000631	8.8	21338	1330.9	0.27
Sacramento River	1	1530	Q100	190228	305.5	348.6		349.7	0.000569	9.2	27288	1255.0	0.27
Sacramento River	1	1530	Q50	171934	305.5	346.9		348.0	0.000565	8.9	25194	1193.7	0.27
Sacramento River	1	1530	FOR 1-24-1970	149447	305.5	344.7		345.6	0.000566	8.5	22544	1145.3	0.26
Sacramento River	1	0	Q100	190228	300.1	347.9	330.5	348.9	0.000500	9.1	29582	1232.2	0.26
Sacramento River	1	0	Q50	171934	300.1	346.2	329.1	347.1	0.000500	8.8	27465	1214.8	0.25
Sacramento River	1	0	FOR 1-24-1970	149447	300.1	343.9	327.2	344.8	0.000501	8.5	24725	1189.8	0.25
North Overflow	6	4.89	Q100	1	341.0	352.8		352.8	0.000000	0.0	6591	1190.5	0.00
North Overflow	6	4.89	Q50	1	341.0	351.2		351.2	0.000000	0.0	4888	911.3	0.00
North Overflow	6	4.89	FOR 1-24-1970	1	341.0	349.2		349.2	0.000000	0.0	3419	628.9	0.00

HEC-RAS Plan: Existing 8-2013 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
North Overflow	6	4.88	Q100	14773	341.0	352.7		352.8	0.000245	2.5	6468	1171.7	0.15
North Overflow	6	4.88	Q50	11067	341.0	351.1		351.2	0.000287	2.4	4800	895.3	0.15
North Overflow	6	4.88	FOR 1-24-1970	7554	341.0	349.1		349.2	0.000384	2.2	3364	625.0	0.17
North Overflow	6	4.79	Q100	14773	339.0	352.7		352.8	0.000223	2.5	6603	1186.8	0.14
North Overflow	6	4.79	Q50	11067	339.0	351.1		351.2	0.000253	2.3	4905	886.6	0.15
North Overflow	6	4.79	FOR 1-24-1970	7554	339.0	349.1		349.2	0.000313	2.1	3518	599.6	0.16
North Overflow	6	4.7	Q100	14773	339.0	352.7		352.8	0.000207	2.5	6744	1231.7	0.14
North Overflow	6	4.7	Q50	11067	339.0	351.0		351.1	0.000228	2.3	5019	857.7	0.14
North Overflow	6	4.7	FOR 1-24-1970	7554	339.0	349.1		349.1	0.000271	2.1	3645	602.1	0.15
North Overflow	6	4.6	Q100	14773	338.6	352.5		352.6	0.000334	3.2	5159	866.9	0.18
North Overflow	6	4.6	Q50	11067	338.6	350.8		351.0	0.000353	3.0	3918	668.0	0.18
North Overflow	6	4.6	FOR 1-24-1970	7554	338.6	348.9		349.0	0.000349	2.6	2886	408.1	0.17
North Overflow	6	4.56666*	Q100	14773	338.0	352.3		352.5	0.000421	3.5	4593	785.6	0.20
North Overflow	6	4.56666*	Q50	11067	338.0	350.7		350.9	0.000416	3.2	3553	532.0	0.19
North Overflow	6	4.56666*	FOR 1-24-1970	7554	338.0	348.7		348.9	0.000409	2.8	2683	368.6	0.18
North Overflow	6	4.53333*	Q100	14773	336.8	352.1		352.3	0.000443	3.6	4402	665.3	0.20
North Overflow	6	4.53333*	Q50	11067	336.8	350.5		350.7	0.000435	3.3	3470	512.5	0.20
North Overflow	6	4.53333*	FOR 1-24-1970	7554	336.8	348.5		348.7	0.000426	2.9	2605	352.6	0.19
North Overflow	6	4.5	Q100	14773	335.6	351.9	344.3	352.1	0.000501	3.8	4188	632.0	0.21
North Overflow	6	4.5	Q50	11067	335.6	350.2	343.5	350.4	0.000500	3.5	3296	503.3	0.21
North Overflow	6	4.5	FOR 1-24-1970	7554	335.6	348.3	342.6	348.4	0.000500	3.1	2436	335.7	0.20
Main Overflow US	4	10.01	Q100	47456	338.1	358.5		358.7	0.000651	3.6	17227	2234.2	0.17
Main Overflow US	4	10.01	Q50	39488	338.1	357.3		357.5	0.000725	3.6	14480	2221.6	0.18
Main Overflow US	4	10.01	FOR 1-24-1970	31538	338.1	355.9		356.1	0.000831	3.6	11484	2207.7	0.19
Main Overflow US	4	10.0	Q100	47456	338.1	358.5		358.7	0.000653	3.6	17212	2234.2	0.17
Main Overflow US	4	10.0	Q50	39488	338.1	357.3		357.4	0.000728	3.6	14463	2221.5	0.18
Main Overflow US	4	10.0	FOR 1-24-1970	31538	338.1	355.9		356.1	0.000835	3.6	11464	2207.6	0.19
Main Overflow US	4	9.0	Q100	47456	336.6	358.0		358.2	0.000866	4.0	13141	1528.1	0.20
Main Overflow US	4	9.0	Q50	39488	336.6	356.8		357.0	0.000936	3.9	11220	1519.9	0.20
Main Overflow US	4	9.0	FOR 1-24-1970	31538	336.6	355.4		355.6	0.000991	3.7	9191	1341.5	0.20
Main Overflow US	4	8.0	Q100	47456	336.2	357.3		357.6	0.000767	4.6	11627	1379.2	0.24
Main Overflow US	4	8.0	Q50	39488	336.2	356.0		356.3	0.000870	4.5	9797	1369.0	0.25
Main Overflow US	4	8.0	FOR 1-24-1970	31538	336.2	354.5		354.8	0.001019	4.3	7832	1277.8	0.26
Main Overflow US	4	7.0	Q100	47456	335.3	356.0		356.6	0.001204	6.2	7946	952.1	0.31
Main Overflow US	4	7.0	Q50	39488	335.3	354.7		355.2	0.001217	5.8	6937	682.3	0.30
Main Overflow US	4	7.0	FOR 1-24-1970	31538	335.3	353.2		353.6	0.001259	5.3	5934	651.2	0.30
Main Overflow US	4	6.0	Q100	47456	331.0	354.4		355.1	0.002426	6.9	6949	782.1	0.38
Main Overflow US	4	6.0	Q50	39488	331.0	353.0		353.7	0.002668	6.7	5912	674.1	0.39
Main Overflow US	4	6.0	FOR 1-24-1970	31538	331.0	351.3		352.0	0.002957	6.5	4875	599.7	0.40
Main Overflow US	4	5.0	Q100	47456	332.6	353.1		353.5	0.000957	5.0	9900	1159.0	0.25
Main Overflow US	4	5.0	Q50	39488	332.6	351.6		351.9	0.001045	4.7	8370	833.1	0.25
Main Overflow US	4	5.0	FOR 1-24-1970	31538	332.6	349.7		350.0	0.001245	4.6	6889	750.9	0.27
Main Overflow US	4	4.99		Lat Struct									
Main Overflow US	4	4.0	Q100	32684	332.9	352.5		352.8	0.000502	4.4	7689	665.0	0.20
Main Overflow US	4	4.0	Q50	28422	332.9	350.8		351.1	0.000577	4.4	6655	588.1	0.21
Main Overflow US	4	4.0	FOR 1-24-1970	23985	332.9	348.7		349.0	0.000749	4.4	5470	540.0	0.24
Main Overflow US	4	3.0	Q100	32684	329.9	352.3		352.6	0.000405	4.6	8410	693.0	0.19
Main Overflow US	4	3.0	Q50	28422	329.9	350.6		350.9	0.000445	4.5	7278	633.7	0.19
Main Overflow US	4	3.0	FOR 1-24-1970	23985	329.9	348.4		348.7	0.000530	4.5	5985	553.4	0.21
Main Overflow DS	3	2.0	Q100	59067	331.0	352.0		352.3	0.000512	5.0	14818	1199.4	0.21
Main Overflow DS	3	2.0	Q50	48419	331.0	350.3		350.6	0.000510	4.7	12845	1131.8	0.21
Main Overflow DS	3	2.0	FOR 1-24-1970	37733	331.0	348.2		348.4	0.000563	4.5	10443	1080.6	0.21
Main Overflow DS	3	1.99		Lat Struct									
Main Overflow DS	3	1.0	Q100	39374	328.9	351.6	341.0	351.9	0.000545	5.2	8497	877.6	0.22
Main Overflow DS	3	1.0	Q50	34582	328.9	349.8	340.4	350.2	0.000627	5.2	7452	867.1	0.23
Main Overflow DS	3	1.0	FOR 1-24-1970	30391	328.9	347.4	339.9	347.9	0.000903	5.6	6053	864.4	0.27

HEC-RAS Plan: Existing 8-2013 Backwater Model Summary Output, Existing Condition With Drift

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sacramento River	2	20410	Q100	205000	324.9	357.3		358.5	0.001023	9.9	26758	1465.1	0.32
Sacramento River	2	20410	Q50	183000	324.9	355.9		356.9	0.000984	9.4	24646	1450.7	0.31
Sacramento River	2	20410	FOR 1-24-1970	157000	324.9	353.9		354.9	0.000999	9.1	21902	1413.1	0.31
Sacramento River	2	18850	Q100	157544	323.7	356.7		357.2	0.000419	6.3	32162	1668.7	0.21
Sacramento River	2	18850	Q50	143512	323.7	355.3		355.7	0.000423	6.1	29691	1664.6	0.21
Sacramento River	2	18850	FOR 1-24-1970	125462	323.7	353.3		353.7	0.000446	6.0	26426	1626.4	0.21
Sacramento River	2	16600	Q100	157544	322.2	356.1		356.4	0.000320	5.5	35871	1659.2	0.18
Sacramento River	2	16600	Q50	143512	322.2	354.5		354.9	0.000331	5.4	33366	1657.5	0.18
Sacramento River	2	16600	FOR 1-24-1970	125462	322.2	352.5		352.8	0.000349	5.3	30002	1655.2	0.18
Sacramento River	2	14880	Q100	157544	315.7	355.3		355.8	0.000344	6.2	30819	1324.2	0.19
Sacramento River	2	14880	Q50	143512	315.7	353.8		354.3	0.000347	6.0	28818	1322.8	0.19
Sacramento River	2	14880	FOR 1-24-1970	125462	315.7	351.8		352.2	0.000352	5.8	26131	1320.9	0.19
Sacramento River	2	13630.*	Q100	157544	314.4	354.9		355.4	0.000332	6.1	32237	1469.8	0.19
Sacramento River	2	13630.*	Q50	143512	314.4	353.4		353.9	0.000338	6.0	30003	1465.6	0.19
Sacramento River	2	13630.*	FOR 1-24-1970	125462	314.4	351.4		351.8	0.000347	5.8	27007	1461.9	0.19
Sacramento River	2	12380.*	Q100	157544	313.1	354.5		355.0	0.000353	6.2	32607	1609.6	0.19
Sacramento River	2	12380.*	Q50	143512	313.1	353.0		353.4	0.000365	6.1	30127	1607.2	0.20
Sacramento River	2	12380.*	FOR 1-24-1970	125462	313.1	350.9		351.3	0.000382	6.0	26801	1593.1	0.20
Sacramento River	2	11130	Q100	131161	311.8	354.2		354.5	0.000281	5.4	32178	1747.2	0.17
Sacramento River	2	11130	Q50	123515	311.8	352.6		353.0	0.000319	5.5	29388	1743.8	0.18
Sacramento River	2	11130	FOR 1-24-1970	111714	311.8	350.4		350.9	0.000371	5.7	25673	1726.1	0.19
Sacramento River	2	9880.*	Q100	131161	311.7	353.5		354.1	0.000383	6.5	25188	1514.5	0.20
Sacramento River	2	9880.*	Q50	123515	311.7	351.9		352.5	0.000420	6.5	22772	1375.7	0.21
Sacramento River	2	9880.*	FOR 1-24-1970	111714	311.7	349.7		350.3	0.000470	6.6	19834	1307.2	0.22
Sacramento River	2	8630.*	Q100	131161	311.6	352.9		353.6	0.000402	6.9	21528	1042.3	0.21
Sacramento River	2	8630.*	Q50	123515	311.6	351.3		352.0	0.000428	6.9	19879	944.5	0.21
Sacramento River	2	8630.*	FOR 1-24-1970	111714	311.6	349.1		349.7	0.000451	6.7	18018	790.6	0.22
Sacramento River	2	7380	Q100	131161	311.5	352.5		353.1	0.000362	6.8	21263	787.4	0.20
Sacramento River	2	7380	Q50	123515	311.5	350.8		351.5	0.000381	6.8	19969	752.9	0.20
Sacramento River	2	7380	FOR 1-24-1970	111714	311.5	348.6		349.2	0.000395	6.6	18345	718.3	0.20
Sacramento River	2	6020.*	Q100	131161	309.4	351.9		352.6	0.000369	6.9	21266	869.3	0.20
Sacramento River	2	6020.*	Q50	123515	309.4	350.2		350.9	0.000386	6.8	19885	776.1	0.20
Sacramento River	2	6020.*	FOR 1-24-1970	111714	309.4	348.0		348.7	0.000400	6.6	18214	725.0	0.21
Sacramento River	2	4660	Q100	131161	307.4	351.4		352.1	0.000412	7.0	20109	697.1	0.21
Sacramento River	2	4660	Q50	123515	307.4	349.6		350.4	0.000441	7.0	18896	694.6	0.22
Sacramento River	2	4660	FOR 1-24-1970	111714	307.4	347.4		348.1	0.000467	6.9	17322	691.3	0.22
Sacramento River	1	4480	Q100	170467	307.8	351.1		351.8	0.000401	7.9	30042	1243.1	0.23
Sacramento River	1	4480	Q50	157990	307.8	349.4		350.1	0.000428	7.9	27851	1238.9	0.23
Sacramento River	1	4480	FOR 1-24-1970	142056	307.8	347.0		347.8	0.000469	7.9	24969	1233.3	0.24
Sacramento River	1	4400	Q100	170467	307.9	351.0		351.8	0.000445	8.3	28317	1214.1	0.24
Sacramento River	1	4400	Q50	157990	307.9	349.2		350.0	0.000476	8.4	26161	1211.7	0.24
Sacramento River	1	4400	FOR 1-24-1970	142056	307.9	346.9		347.7	0.000526	8.4	23320	1208.5	0.25
Sacramento River	1	4305	Q100	170467	307.9	350.7	332.6	351.7	0.000522	9.0	23504	838.6	0.26
Sacramento River	1	4305	Q50	157990	307.9	349.0	330.9	350.0	0.000540	8.9	22052	834.5	0.26
Sacramento River	1	4305	FOR 1-24-1970	142056	307.9	346.7	329.9	347.7	0.000568	8.7	20147	830.0	0.26
Sacramento River	1	4285		Bridge									
Sacramento River	1	4240	Q100	170467	307.4	350.3		351.5	0.000578	9.4	22340	812.5	0.27
Sacramento River	1	4240	Q50	157990	307.4	348.6		349.7	0.000599	9.3	20935	809.9	0.27
Sacramento River	1	4240	FOR 1-24-1970	142056	307.4	346.3		347.4	0.000630	9.2	19103	806.4	0.28
Sacramento River	1	4000	Q100	170467	305.9	350.0		351.3	0.000609	9.8	20863	749.0	0.28
Sacramento River	1	4000	Q50	157990	305.9	348.2		349.5	0.000624	9.6	19582	741.5	0.28
Sacramento River	1	4000	FOR 1-24-1970	142056	305.9	346.0		347.2	0.000644	9.4	17929	730.9	0.28
Sacramento River	1	3500	Q100	190207	305.4	349.7		350.9	0.000603	9.8	28151	1550.1	0.28
Sacramento River	1	3500	Q50	171896	305.4	348.0		349.2	0.000622	9.7	25454	1528.1	0.28
Sacramento River	1	3500	FOR 1-24-1970	149436	305.4	345.7		346.9	0.000647	9.5	21989	1497.4	0.28
Sacramento River	1	2900	Q100	190207	308.6	349.4		350.6	0.000607	9.3	26826	1408.7	0.27
Sacramento River	1	2900	Q50	171896	308.6	347.7		348.8	0.000617	9.1	24408	1373.0	0.27
Sacramento River	1	2900	FOR 1-24-1970	149436	308.6	345.4		346.5	0.000631	8.8	21336	1330.9	0.27
Sacramento River	1	1530	Q100	190207	305.5	348.6		349.7	0.000569	9.2	27286	1254.9	0.27
Sacramento River	1	1530	Q50	171896	305.5	346.9		347.9	0.000565	8.9	25190	1193.7	0.27
Sacramento River	1	1530	FOR 1-24-1970	149436	305.5	344.7		345.6	0.000566	8.5	22543	1145.3	0.26
Sacramento River	1	0	Q100	190207	300.1	347.9	330.5	348.9	0.000500	9.1	29579	1232.2	0.26
Sacramento River	1	0	Q50	171896	300.1	346.2	329.1	347.1	0.000500	8.8	27461	1214.7	0.25
Sacramento River	1	0	FOR 1-24-1970	149436	300.1	343.9	327.2	344.8	0.000501	8.5	24724	1189.8	0.25
North Overflow	6	4.89	Q100	1	341.0	352.8		352.8	0.000000	0.0	6601	1192.0	0.00
North Overflow	6	4.89	Q50	1	341.0	351.2		351.2	0.000000	0.0	4905	914.3	0.00
North Overflow	6	4.89	FOR 1-24-1970	1	341.0	349.2		349.2	0.000000	0.0	3424	629.2	0.00

HEC-RAS Plan: Existing 8-2013 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
North Overflow	6	4.88	Q100	14794	341.0	352.7		352.8	0.000245	2.5	6477	1173.2	0.15
North Overflow	6	4.88	Q50	11105	341.0	351.1		351.2	0.000286	2.4	4817	898.4	0.15
North Overflow	6	4.88	FOR 1-24-1970	7565	341.0	349.1		349.2	0.000383	2.2	3369	625.4	0.17
North Overflow	6	4.79	Q100	14794	339.0	352.7		352.8	0.000223	2.5	6613	1188.1	0.14
North Overflow	6	4.79	Q50	11105	339.0	351.1		351.2	0.000252	2.3	4921	890.5	0.15
North Overflow	6	4.79	FOR 1-24-1970	7565	339.0	349.1		349.2	0.000313	2.1	3523	599.9	0.16
North Overflow	6	4.7	Q100	14794	339.0	352.7		352.8	0.000207	2.5	6754	1233.1	0.14
North Overflow	6	4.7	Q50	11105	339.0	351.1		351.1	0.000228	2.3	5035	862.7	0.14
North Overflow	6	4.7	FOR 1-24-1970	7565	339.0	349.1		349.1	0.000271	2.1	3650	602.4	0.15
North Overflow	6	4.6	Q100	14794	338.6	352.5		352.6	0.000334	3.2	5166	868.0	0.18
North Overflow	6	4.6	Q50	11105	338.6	350.9		351.0	0.000353	3.0	3930	670.4	0.18
North Overflow	6	4.6	FOR 1-24-1970	7565	338.6	348.9		349.0	0.000349	2.6	2889	408.5	0.17
North Overflow	6	4.56666*	Q100	14794	338.0	352.3		352.5	0.000420	3.5	4600	786.9	0.20
North Overflow	6	4.56666*	Q50	11105	338.0	350.7		350.9	0.000416	3.2	3563	534.3	0.19
North Overflow	6	4.56666*	FOR 1-24-1970	7565	338.0	348.7		348.9	0.000409	2.8	2686	368.7	0.18
North Overflow	6	4.53333*	Q100	14794	336.8	352.1		352.3	0.000443	3.6	4408	666.6	0.20
North Overflow	6	4.53333*	Q50	11105	336.8	350.5		350.7	0.000435	3.3	3479	513.7	0.20
North Overflow	6	4.53333*	FOR 1-24-1970	7565	336.8	348.5		348.7	0.000426	2.9	2608	352.7	0.19
North Overflow	6	4.5	Q100	14794	335.6	351.9	344.4	352.1	0.000501	3.8	4193	633.9	0.21
North Overflow	6	4.5	Q50	11105	335.6	350.3	343.5	350.5	0.000500	3.5	3305	504.3	0.21
North Overflow	6	4.5	FOR 1-24-1970	7565	335.6	348.3	342.6	348.4	0.000500	3.1	2438	335.9	0.20
Main Overflow US	4	10.01	Q100	47456	338.1	358.5		358.7	0.000651	3.6	17232	2234.3	0.17
Main Overflow US	4	10.01	Q50	39488	338.1	357.3		357.5	0.000725	3.6	14483	2221.6	0.18
Main Overflow US	4	10.01	FOR 1-24-1970	31538	338.1	355.9		356.1	0.000831	3.6	11485	2207.7	0.19
Main Overflow US	4	10.0	Q100	47456	338.1	358.5		358.7	0.000652	3.6	17217	2234.2	0.17
Main Overflow US	4	10.0	Q50	39488	338.1	357.3		357.4	0.000727	3.6	14466	2221.5	0.18
Main Overflow US	4	10.0	FOR 1-24-1970	31538	338.1	355.9		356.1	0.000834	3.6	11465	2207.6	0.19
Main Overflow US	4	9.0	Q100	47456	336.6	358.0		358.3	0.000866	4.0	13145	1528.1	0.20
Main Overflow US	4	9.0	Q50	39488	336.6	356.8		357.0	0.000935	3.9	11223	1519.9	0.20
Main Overflow US	4	9.0	FOR 1-24-1970	31538	336.6	355.4		355.6	0.000990	3.7	9192	1341.6	0.20
Main Overflow US	4	8.0	Q100	47456	336.2	357.3		357.6	0.000766	4.6	11631	1379.3	0.24
Main Overflow US	4	8.0	Q50	39488	336.2	356.0		356.3	0.000869	4.5	9800	1369.0	0.25
Main Overflow US	4	8.0	FOR 1-24-1970	31538	336.2	354.5		354.8	0.001018	4.3	7834	1278.0	0.26
Main Overflow US	4	7.0	Q100	47456	335.3	356.0		356.6	0.001202	6.2	7950	953.4	0.31
Main Overflow US	4	7.0	Q50	39488	335.3	354.7		355.2	0.001215	5.8	6939	682.4	0.30
Main Overflow US	4	7.0	FOR 1-24-1970	31538	335.3	353.2		353.7	0.001258	5.3	5935	651.3	0.30
Main Overflow US	4	6.0	Q100	47456	331.0	354.4		355.1	0.002419	6.9	6956	782.8	0.38
Main Overflow US	4	6.0	Q50	39488	331.0	353.0		353.7	0.002662	6.7	5917	674.3	0.39
Main Overflow US	4	6.0	FOR 1-24-1970	31538	331.0	351.3		352.0	0.002954	6.5	4877	599.9	0.40
Main Overflow US	4	5.0	Q100	47456	332.6	353.2		353.5	0.000954	5.0	9915	1165.5	0.25
Main Overflow US	4	5.0	Q50	39488	332.6	351.6		351.9	0.001042	4.7	8379	833.8	0.25
Main Overflow US	4	5.0	FOR 1-24-1970	31538	332.6	349.7		350.0	0.001242	4.6	6894	750.9	0.27
Main Overflow US	4	4.99		Lat Struct									
Main Overflow US	4	4.0	Q100	32663	332.9	352.5		352.8	0.000499	4.4	7700	666.3	0.20
Main Overflow US	4	4.0	Q50	28384	332.9	350.8		351.1	0.000574	4.4	6664	588.4	0.21
Main Overflow US	4	4.0	FOR 1-24-1970	23974	332.9	348.7		349.0	0.000746	4.4	5476	540.2	0.24
Main Overflow US	4	3.0	Q100	32663	329.9	352.3		352.6	0.000403	4.6	8422	693.0	0.19
Main Overflow US	4	3.0	Q50	28384	329.9	350.6		350.9	0.000442	4.5	7288	634.1	0.19
Main Overflow US	4	3.0	FOR 1-24-1970	23974	329.9	348.5		348.8	0.000528	4.4	5991	553.8	0.21
Main Overflow DS	3	2.0	Q100	59046	331.0	352.0		352.3	0.000509	5.0	14840	1199.4	0.21
Main Overflow DS	3	2.0	Q50	48381	331.0	350.3		350.6	0.000507	4.7	12865	1132.5	0.21
Main Overflow DS	3	2.0	FOR 1-24-1970	37722	331.0	348.2		348.4	0.000561	4.5	10457	1080.8	0.21
Main Overflow DS	3	1.99		Lat Struct									
Main Overflow DS	3	1.0	Q100	39306	328.9	351.6	341.0	351.9	0.000541	5.2	8511	877.7	0.22
Main Overflow DS	3	1.0	Q50	34475	328.9	349.8	340.4	350.2	0.000620	5.2	7466	867.1	0.23
Main Overflow DS	3	1.0	FOR 1-24-1970	30342	328.9	347.4	339.8	347.9	0.000895	5.6	6064	864.4	0.27

HEC-RAS Plan: 12-2013_GP Backwater Model Summary Output, Preferred Project, No Drift

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sacramento River	2	20410	Q100	205000	324.9	357.2		358.3	0.001046	10.0	26556	1464.8	0.33
Sacramento River	2	20410	Q50	183000	324.9	355.7		356.8	0.001008	9.5	24428	1447.9	0.32
Sacramento River	2	20410	FOR 1-24-1970	157000	324.9	353.8		354.8	0.001022	9.1	21717	1366.6	0.32
Sacramento River	2	18850	Q100	158002	323.7	356.6		357.1	0.000432	6.4	31896	1668.4	0.21
Sacramento River	2	18850	Q50	143735	323.7	355.1		355.6	0.000436	6.2	29406	1661.4	0.21
Sacramento River	2	18850	FOR 1-24-1970	125588	323.7	353.1		353.6	0.000459	6.0	26178	1623.3	0.21
Sacramento River	2	16600	Q100	158002	322.2	355.9		356.2	0.000330	5.6	35569	1659.0	0.18
Sacramento River	2	16600	Q50	143735	322.2	354.3		354.7	0.000342	5.5	33042	1657.3	0.19
Sacramento River	2	16600	FOR 1-24-1970	125588	322.2	352.3		352.7	0.000361	5.3	29708	1655.0	0.19
Sacramento River	2	14880	Q100	158002	315.7	355.1		355.6	0.000355	6.3	30548	1324.0	0.20
Sacramento River	2	14880	Q50	143735	315.7	353.6		354.1	0.000359	6.1	28529	1322.6	0.19
Sacramento River	2	14880	FOR 1-24-1970	125588	315.7	351.6		352.0	0.000363	5.9	25867	1320.7	0.19
Sacramento River	2	13630.*	Q100	158002	314.4	354.7		355.2	0.000344	6.2	31915	1469.2	0.19
Sacramento River	2	13630.*	Q50	143735	314.4	353.2		353.6	0.000350	6.1	29660	1465.0	0.19
Sacramento River	2	13630.*	FOR 1-24-1970	125588	314.4	351.1		351.6	0.000359	5.9	26693	1461.7	0.19
Sacramento River	2	12380.*	Q100	158002	313.1	354.3		354.8	0.000367	6.3	32226	1609.3	0.20
Sacramento River	2	12380.*	Q50	143735	313.1	352.7		353.2	0.000381	6.2	29719	1606.8	0.20
Sacramento River	2	12380.*	FOR 1-24-1970	125588	313.1	350.6		351.1	0.000398	6.1	26426	1591.7	0.20
Sacramento River	2	11130	Q100	132406	311.8	353.9		354.3	0.000297	5.5	31727	1745.1	0.18
Sacramento River	2	11130	Q50	124182	311.8	352.3		352.7	0.000336	5.6	28911	1730.9	0.18
Sacramento River	2	11130	FOR 1-24-1970	112172	311.8	350.2		350.6	0.000391	5.8	25223	1725.4	0.20
Sacramento River	2	9880.*	Q100	132406	311.7	353.2		353.9	0.000407	6.6	24737	1513.5	0.21
Sacramento River	2	9880.*	Q50	124182	311.7	351.6		352.2	0.000443	6.7	22348	1357.4	0.21
Sacramento River	2	9880.*	FOR 1-24-1970	112172	311.7	349.4		350.1	0.000496	6.7	19446	1302.9	0.22
Sacramento River	2	8630.*	Q100	132406	311.6	352.6		353.3	0.000424	7.0	21191	1022.4	0.21
Sacramento River	2	8630.*	Q50	124182	311.6	350.9		351.7	0.000449	7.0	19570	891.9	0.22
Sacramento River	2	8630.*	FOR 1-24-1970	112172	311.6	348.7		349.4	0.000473	6.8	17764	783.2	0.22
Sacramento River	2	7380	Q100	132406	311.5	352.1		352.8	0.000383	6.9	20988	780.2	0.21
Sacramento River	2	7380	Q50	124182	311.5	350.4		351.1	0.000400	6.9	19700	745.5	0.21
Sacramento River	2	7380	FOR 1-24-1970	112172	311.5	348.2		348.9	0.000414	6.7	18097	713.9	0.21
Sacramento River	2	6020.*	Q100	132406	309.4	351.6		352.3	0.000389	7.0	20942	839.3	0.21
Sacramento River	2	6020.*	Q50	124182	309.4	349.9		350.6	0.000405	6.9	19587	763.1	0.21
Sacramento River	2	6020.*	FOR 1-24-1970	112172	309.4	347.6		348.3	0.000420	6.7	17944	717.3	0.21
Sacramento River	2	4660	Q100	132406	307.4	351.0	328.0	351.7	0.000439	7.2	19817	696.5	0.22
Sacramento River	2	4660	Q50	124182	307.4	349.2	327.3	350.0	0.000467	7.2	18600	694.0	0.22
Sacramento River	2	4660	FOR 1-24-1970	112172	307.4	347.0	326.3	347.7	0.000494	7.0	17036	690.7	0.23
Sacramento River	1	4480	Q100	189773	307.8	350.7	335.6	351.6	0.000522	8.9	29525	1242.1	0.26
Sacramento River	1	4480	Q50	171519	307.8	349.0	333.8	349.9	0.000528	8.7	27393	1238.0	0.26
Sacramento River	1	4480	FOR 1-24-1970	149139	307.8	346.8	330.8	347.6	0.000538	8.4	24621	1232.7	0.26
Sacramento River	1	4460		Bridge									
Sacramento River	1	4400	Q100	189773	307.9	350.5		351.5	0.000587	9.5	27685	1213.4	0.27
Sacramento River	1	4400	Q50	171519	307.9	348.7		349.8	0.000596	9.3	25600	1211.1	0.27
Sacramento River	1	4400	FOR 1-24-1970	149139	307.9	346.5		347.5	0.000610	9.0	22880	1208.0	0.27
Sacramento River	1	4305	Q100	189773	307.9	350.4		351.5	0.000593	9.5	27370	1237.6	0.28
Sacramento River	1	4305	Q50	171519	307.9	348.6		349.7	0.000602	9.3	25243	1233.9	0.28
Sacramento River	1	4305	FOR 1-24-1970	149139	307.9	346.4		347.4	0.000615	9.0	22473	1229.5	0.28
Sacramento River	1	4240	Q100	189773	307.4	350.2		351.4	0.000649	10.0	26114	1212.3	0.29
Sacramento River	1	4240	Q50	171519	307.4	348.5		349.6	0.000659	9.8	24027	1209.7	0.29
Sacramento River	1	4240	FOR 1-24-1970	149139	307.4	346.2		347.4	0.000675	9.5	21309	1206.3	0.29
Sacramento River	1	4000	Q100	189773	305.9	349.9		351.2	0.000650	10.1	25207	1149.0	0.29
Sacramento River	1	4000	Q50	171519	305.9	348.2		349.5	0.000652	9.9	23249	1141.4	0.28
Sacramento River	1	4000	FOR 1-24-1970	149139	305.9	346.0		347.2	0.000655	9.5	20718	1130.9	0.28
Sacramento River	1	3500	Q100	189773	305.4	349.7		350.9	0.000604	9.8	28087	1549.7	0.28
Sacramento River	1	3500	Q50	171519	305.4	348.0		349.1	0.000622	9.7	25398	1527.6	0.28
Sacramento River	1	3500	FOR 1-24-1970	149139	305.4	345.7		346.9	0.000646	9.5	21957	1497.1	0.28
Sacramento River	1	2900	Q100	189773	308.6	349.4		350.5	0.000607	9.3	26769	1407.8	0.27
Sacramento River	1	2900	Q50	171519	308.6	347.6		348.8	0.000617	9.1	24358	1372.3	0.27
Sacramento River	1	2900	FOR 1-24-1970	149139	308.6	345.4		346.5	0.000630	8.7	21308	1330.5	0.27
Sacramento River	1	1530	Q100	189773	305.5	348.6		349.7	0.000568	9.2	27236	1252.8	0.27
Sacramento River	1	1530	Q50	171519	305.5	346.9		347.9	0.000565	8.9	25146	1192.9	0.27
Sacramento River	1	1530	FOR 1-24-1970	149139	305.5	344.6		345.6	0.000565	8.5	22520	1144.9	0.26
Sacramento River	1	0	Q100	189773	300.1	347.9	330.4	348.8	0.000500	9.1	29529	1231.8	0.26
Sacramento River	1	0	Q50	171519	300.1	346.2	328.8	347.1	0.000500	8.8	27416	1214.4	0.25
Sacramento River	1	0	FOR 1-24-1970	149139	300.1	343.9	327.2	344.8	0.000500	8.4	24701	1189.5	0.25
North Overflow	6	4.89	Q100	1	338.5	353.0	338.7	353.0	0.000000	0.0	7132	1218.5	0.00
North Overflow	6	4.89	Q50	1	338.5	351.3	338.7	351.3	0.000000	0.0	6111	943.1	0.00
North Overflow	6	4.89	FOR 1-24-1970	1	338.5	349.3	338.7	349.3	0.000000	0.0	4856	662.0	0.00

HEC-RAS Plan: 12-2013_GP (Continued)

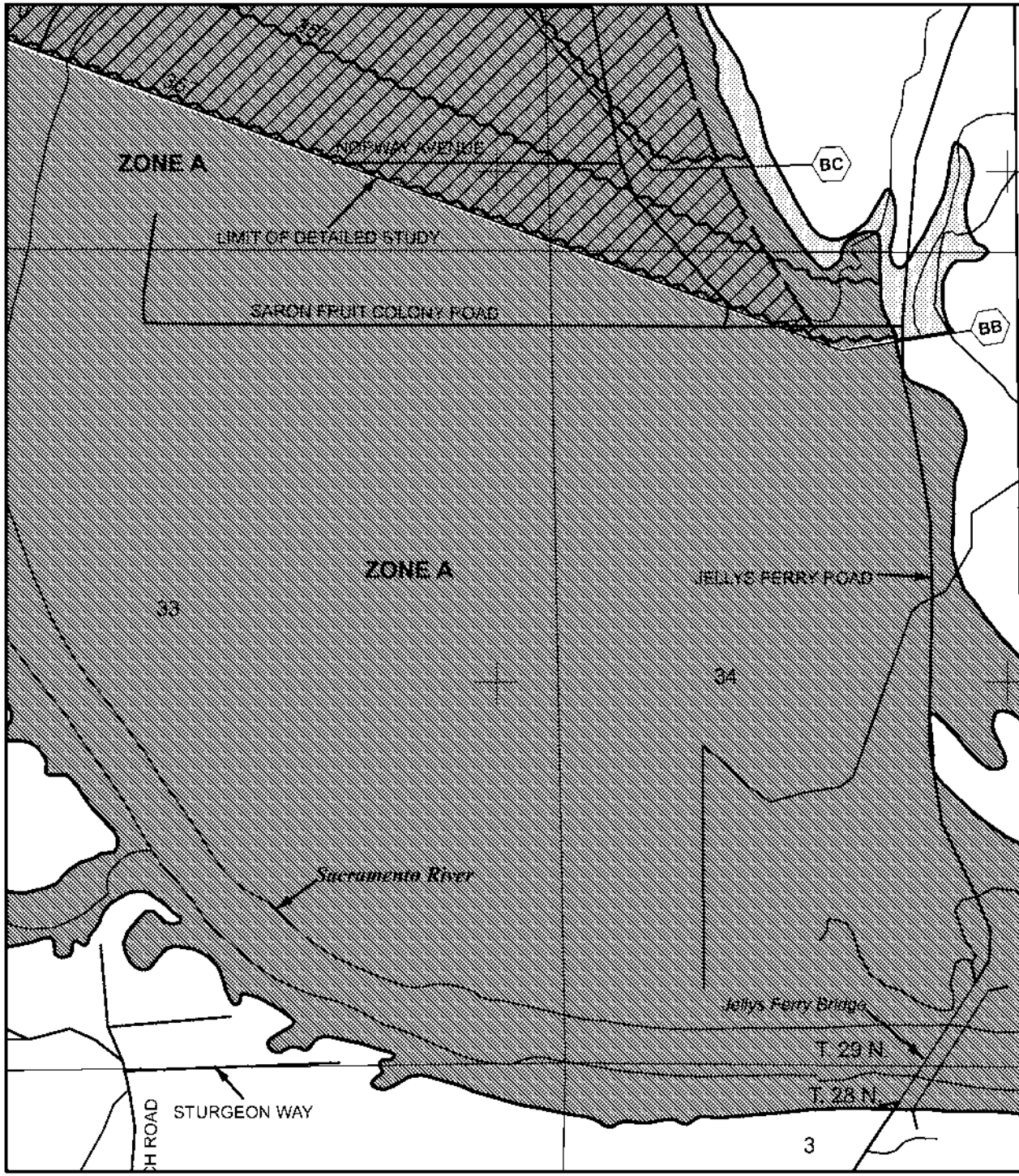
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
North Overflow	6	4.88	Q100	15228	338.5	352.9	343.1	353.0	0.000125	2.2	7081	1204.2	0.11
North Overflow	6	4.88	Q50	11482	338.5	351.3	342.5	351.3	0.000116	1.9	6072	933.0	0.10
North Overflow	6	4.88	FOR 1-24-1970	7862	338.5	349.3	341.9	349.3	0.000112	1.7	4827	660.8	0.10
North Overflow	6	4.79	Q100	15228	338.5	352.9	343.1	352.9	0.000134	2.3	6747	1213.9	0.11
North Overflow	6	4.79	Q50	11482	338.5	351.3	342.6	351.3	0.000123	2.0	5828	932.8	0.11
North Overflow	6	4.79	FOR 1-24-1970	7862	338.5	349.3	341.9	349.3	0.000116	1.7	4692	626.7	0.10
North Overflow	6	4.76		Bridge									
North Overflow	6	4.7	Q100	15228	338.5	352.8	343.0	352.9	0.000134	2.3	6672	1255.1	0.12
North Overflow	6	4.7	Q50	11482	338.5	351.2	342.5	351.3	0.000122	2.0	5790	892.2	0.11
North Overflow	6	4.7	FOR 1-24-1970	7862	338.5	349.2	341.9	349.3	0.000114	1.7	4697	598.9	0.10
North Overflow	6	4.6	Q100	15228	338.6	352.6		352.8	0.000331	3.2	5314	890.9	0.18
North Overflow	6	4.6	Q50	11482	338.6	351.0		351.2	0.000353	3.0	4052	692.7	0.18
North Overflow	6	4.6	FOR 1-24-1970	7862	338.6	349.1		349.2	0.000349	2.7	2970	420.1	0.17
North Overflow	6	4.56666*	Q100	15228	338.0	352.5		352.7	0.000417	3.5	4735	815.9	0.20
North Overflow	6	4.56666*	Q50	11482	338.0	350.9		351.1	0.000418	3.2	3659	556.2	0.19
North Overflow	6	4.56666*	FOR 1-24-1970	7862	338.0	348.9		349.1	0.000409	2.9	2758	371.9	0.18
North Overflow	6	4.53333*	Q100	15228	336.8	352.3		352.5	0.000445	3.6	4522	694.7	0.20
North Overflow	6	4.53333*	Q50	11482	336.8	350.7		350.9	0.000437	3.3	3570	527.0	0.20
North Overflow	6	4.53333*	FOR 1-24-1970	7862	336.8	348.7		348.9	0.000427	2.9	2677	355.8	0.19
North Overflow	6	4.5	Q100	15228	335.6	352.0	344.4	352.3	0.000501	3.8	4302	672.9	0.21
North Overflow	6	4.5	Q50	11482	335.6	350.4	343.6	350.6	0.000501	3.5	3394	513.7	0.21
North Overflow	6	4.5	FOR 1-24-1970	7862	335.6	348.5	342.6	348.6	0.000500	3.1	2506	363.3	0.20
Main Overflow US	4	10.01	Q100	46998	338.1	358.5		358.6	0.000647	3.6	17148	2233.9	0.17
Main Overflow US	4	10.01	Q50	39265	338.1	357.3		357.4	0.000723	3.6	14441	2221.4	0.18
Main Overflow US	4	10.01	FOR 1-24-1970	31412	338.1	355.9		356.1	0.000830	3.6	11452	2207.5	0.19
Main Overflow US	4	10.0	Q100	46998	338.1	358.5		358.6	0.000649	3.6	17133	2233.8	0.17
Main Overflow US	4	10.0	Q50	39265	338.1	357.3		357.4	0.000725	3.6	14423	2221.3	0.18
Main Overflow US	4	10.0	FOR 1-24-1970	31412	338.1	355.9		356.1	0.000833	3.6	11432	2207.4	0.19
Main Overflow US	4	9.0	Q100	46998	336.6	358.0		358.2	0.000858	4.0	13095	1527.9	0.20
Main Overflow US	4	9.0	Q50	39265	336.6	356.7		357.0	0.000930	3.9	11198	1519.8	0.20
Main Overflow US	4	9.0	FOR 1-24-1970	31412	336.6	355.4		355.6	0.000987	3.7	9174	1340.1	0.20
Main Overflow US	4	8.0	Q100	46998	336.2	357.3		357.6	0.000758	4.5	11597	1379.1	0.24
Main Overflow US	4	8.0	Q50	39265	336.2	356.0		356.2	0.000863	4.5	9785	1368.9	0.25
Main Overflow US	4	8.0	FOR 1-24-1970	31412	336.2	354.5		354.8	0.001015	4.3	7821	1276.8	0.26
Main Overflow US	4	7.0	Q100	46998	335.3	356.0		356.6	0.001181	6.1	7946	952.1	0.30
Main Overflow US	4	7.0	Q50	39265	335.3	354.7		355.2	0.001201	5.7	6941	682.4	0.30
Main Overflow US	4	7.0	FOR 1-24-1970	31412	335.3	353.2		353.6	0.001249	5.3	5934	651.2	0.30
Main Overflow US	4	6.0	Q100	46998	331.0	354.4		355.2	0.002344	6.8	6987	786.1	0.37
Main Overflow US	4	6.0	Q50	39265	331.0	353.0		353.7	0.002601	6.6	5941	676.0	0.38
Main Overflow US	4	6.0	FOR 1-24-1970	31412	331.0	351.4		352.0	0.002914	6.4	4889	601.2	0.40
Main Overflow US	4	5.0	Q100	46998	332.6	353.2		353.6	0.000912	4.9	10027	1211.5	0.24
Main Overflow US	4	5.0	Q50	39265	332.6	351.7		352.0	0.001004	4.7	8450	839.1	0.25
Main Overflow US	4	5.0	FOR 1-24-1970	31412	332.6	349.7		350.0	0.001204	4.5	6943	751.2	0.26
Main Overflow US	4	4.99		Lat Struct									
Main Overflow US	4	4.0	Q100	31771	332.9	352.7		352.9	0.000456	4.2	7796	678.5	0.19
Main Overflow US	4	4.0	Q50	27784	332.9	351.0		351.2	0.000531	4.2	6742	591.6	0.21
Main Overflow US	4	4.0	FOR 1-24-1970	23551	332.9	348.8		349.1	0.000695	4.3	5539	542.3	0.23
Main Overflow US	4	3.0	Q100	31771	329.9	352.5		352.8	0.000368	4.4	8533	693.0	0.18
Main Overflow US	4	3.0	Q50	27784	329.9	350.8		351.0	0.000409	4.3	7383	637.1	0.19
Main Overflow US	4	3.0	FOR 1-24-1970	23551	329.9	348.6		348.9	0.000492	4.3	6067	558.9	0.20
Main Overflow DS	3	2.0	Q100	57367	331.0	352.2		352.5	0.000461	4.8	15065	1199.4	0.20
Main Overflow DS	3	2.0	Q50	47337	331.0	350.5		350.8	0.000467	4.6	13058	1139.4	0.20
Main Overflow DS	3	2.0	FOR 1-24-1970	36967	331.0	348.3		348.6	0.000515	4.4	10629	1084.1	0.20
Main Overflow DS	3	1.99		Lat Struct									
Main Overflow DS	3	1.0	Q100	57367	328.9	351.5		352.0	0.000823	6.4	10991	877.4	0.27
Main Overflow DS	3	1.0	Q50	47337	328.9	349.8		350.3	0.000866	6.1	9496	867.1	0.27
Main Overflow DS	3	1.0	FOR 1-24-1970	36967	328.9	347.5		348.0	0.001036	6.1	7521	864.5	0.29

HEC-RAS Plan: 12-2013_GP Backwater Model Summary Output, Preferred Project With Drift

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sacramento River	2	20410	Q100	205000	324.9	357.2		358.3	0.001046	10.0	26558	1464.8	0.33
Sacramento River	2	20410	Q50	183000	324.9	355.7		356.8	0.001008	9.5	24431	1447.9	0.32
Sacramento River	2	20410	FOR 1-24-1970	157000	324.9	353.8		354.8	0.001022	9.1	21719	1367.0	0.32
Sacramento River	2	18850	Q100	158002	323.7	356.6		357.1	0.000432	6.4	31900	1668.4	0.21
Sacramento River	2	18850	Q50	143735	323.7	355.1		355.6	0.000436	6.2	29409	1661.4	0.21
Sacramento River	2	18850	FOR 1-24-1970	125588	323.7	353.1		353.6	0.000459	6.0	26180	1623.4	0.21
Sacramento River	2	16600	Q100	158002	322.2	355.9		356.2	0.000330	5.6	35573	1659.0	0.18
Sacramento River	2	16600	Q50	143735	322.2	354.3		354.7	0.000342	5.5	33045	1657.3	0.19
Sacramento River	2	16600	FOR 1-24-1970	125588	322.2	352.3		352.7	0.000361	5.3	29711	1655.0	0.19
Sacramento River	2	14880	Q100	158002	315.7	355.1		355.6	0.000355	6.3	30552	1324.0	0.20
Sacramento River	2	14880	Q50	143735	315.7	353.6		354.1	0.000359	6.1	28532	1322.6	0.19
Sacramento River	2	14880	FOR 1-24-1970	125588	315.7	351.6		352.0	0.000362	5.9	25870	1320.7	0.19
Sacramento River	2	13630.*	Q100	158002	314.4	354.7		355.2	0.000344	6.2	31919	1469.2	0.19
Sacramento River	2	13630.*	Q50	143735	314.4	353.2		353.6	0.000350	6.1	29664	1465.0	0.19
Sacramento River	2	13630.*	FOR 1-24-1970	125588	314.4	351.1		351.6	0.000359	5.9	26696	1461.7	0.19
Sacramento River	2	12380.*	Q100	158002	313.1	354.3		354.8	0.000367	6.3	32230	1609.3	0.20
Sacramento River	2	12380.*	Q50	143735	313.1	352.7		353.2	0.000380	6.2	29723	1606.8	0.20
Sacramento River	2	12380.*	FOR 1-24-1970	125588	313.1	350.6		351.1	0.000398	6.1	26430	1591.7	0.20
Sacramento River	2	11130	Q100	132406	311.8	353.9		354.3	0.000297	5.5	31732	1745.1	0.18
Sacramento River	2	11130	Q50	124182	311.8	352.3		352.7	0.000335	5.6	28916	1730.9	0.18
Sacramento River	2	11130	FOR 1-24-1970	112172	311.8	350.2		350.6	0.000391	5.8	25227	1725.4	0.20
Sacramento River	2	9880.*	Q100	132406	311.7	353.2		353.9	0.000406	6.6	24742	1513.5	0.21
Sacramento River	2	9880.*	Q50	124182	311.7	351.6		352.2	0.000443	6.7	22352	1357.5	0.21
Sacramento River	2	9880.*	FOR 1-24-1970	112172	311.7	349.4		350.1	0.000496	6.7	19449	1303.0	0.22
Sacramento River	2	8630.*	Q100	132406	311.6	352.6		353.3	0.000424	7.0	21195	1022.6	0.21
Sacramento River	2	8630.*	Q50	124182	311.6	350.9		351.7	0.000449	7.0	19573	892.3	0.22
Sacramento River	2	8630.*	FOR 1-24-1970	112172	311.6	348.8		349.4	0.000472	6.8	17767	783.2	0.22
Sacramento River	2	7380	Q100	132406	311.5	352.1		352.8	0.000382	6.9	20991	780.3	0.21
Sacramento River	2	7380	Q50	124182	311.5	350.4		351.1	0.000400	6.9	19702	745.6	0.21
Sacramento River	2	7380	FOR 1-24-1970	112172	311.5	348.2		348.9	0.000414	6.7	18099	714.0	0.21
Sacramento River	2	6020.*	Q100	132406	309.4	351.6		352.3	0.000389	7.0	20945	839.6	0.21
Sacramento River	2	6020.*	Q50	124182	309.4	349.9		350.6	0.000405	6.9	19590	763.2	0.21
Sacramento River	2	6020.*	FOR 1-24-1970	112172	309.4	347.6		348.3	0.000420	6.7	17946	717.4	0.21
Sacramento River	2	4660	Q100	132406	307.4	351.0	328.0	351.7	0.000439	7.2	19820	696.5	0.22
Sacramento River	2	4660	Q50	124182	307.4	349.2	327.3	350.0	0.000467	7.2	18603	694.0	0.22
Sacramento River	2	4660	FOR 1-24-1970	112172	307.4	347.0	326.3	347.7	0.000494	7.0	17039	690.7	0.23
Sacramento River	1	4480	Q100	189783	307.8	350.7	335.6	351.6	0.000522	8.9	29530	1242.1	0.26
Sacramento River	1	4480	Q50	171529	307.8	349.0	333.8	349.9	0.000528	8.7	27399	1238.0	0.26
Sacramento River	1	4480	FOR 1-24-1970	149141	307.8	346.8	330.8	347.6	0.000537	8.4	24625	1232.7	0.26
Sacramento River	1	4460		Bridge									
Sacramento River	1	4400	Q100	189783	307.9	350.5		351.5	0.000587	9.5	27687	1213.4	0.27
Sacramento River	1	4400	Q50	171529	307.9	348.7		349.8	0.000596	9.3	25601	1211.1	0.27
Sacramento River	1	4400	FOR 1-24-1970	149141	307.9	346.5		347.5	0.000610	9.0	22880	1208.0	0.27
Sacramento River	1	4305	Q100	189783	307.9	350.4		351.5	0.000593	9.5	27371	1237.6	0.28
Sacramento River	1	4305	Q50	171529	307.9	348.6		349.7	0.000602	9.3	25244	1233.9	0.28
Sacramento River	1	4305	FOR 1-24-1970	149141	307.9	346.4		347.4	0.000615	9.0	22473	1229.5	0.28
Sacramento River	1	4240	Q100	189783	307.4	350.2		351.4	0.000649	10.0	26115	1212.3	0.29
Sacramento River	1	4240	Q50	171529	307.4	348.5		349.6	0.000659	9.8	24028	1209.7	0.29
Sacramento River	1	4240	FOR 1-24-1970	149141	307.4	346.2		347.4	0.000675	9.5	21310	1206.3	0.29
Sacramento River	1	4000	Q100	189783	305.9	349.9		351.2	0.000650	10.1	25208	1149.0	0.29
Sacramento River	1	4000	Q50	171529	305.9	348.2		349.5	0.000652	9.9	23250	1141.4	0.28
Sacramento River	1	4000	FOR 1-24-1970	149141	305.9	346.0		347.2	0.000655	9.5	20718	1130.9	0.28
Sacramento River	1	3500	Q100	189783	305.4	349.7		350.9	0.000604	9.8	28089	1549.7	0.28
Sacramento River	1	3500	Q50	171529	305.4	348.0		349.1	0.000622	9.7	25400	1527.6	0.28
Sacramento River	1	3500	FOR 1-24-1970	149141	305.4	345.7		346.9	0.000646	9.5	21957	1497.1	0.28
Sacramento River	1	2900	Q100	189783	308.6	349.4		350.5	0.000607	9.3	26770	1407.8	0.27
Sacramento River	1	2900	Q50	171529	308.6	347.6		348.8	0.000617	9.1	24360	1372.3	0.27
Sacramento River	1	2900	FOR 1-24-1970	149141	308.6	345.4		346.5	0.000630	8.7	21309	1330.5	0.27
Sacramento River	1	1530	Q100	189783	305.5	348.6		349.7	0.000568	9.2	27237	1252.9	0.27
Sacramento River	1	1530	Q50	171529	305.5	346.9		347.9	0.000565	8.9	25148	1192.9	0.27
Sacramento River	1	1530	FOR 1-24-1970	149141	305.5	344.6		345.6	0.000565	8.5	22520	1144.9	0.26
Sacramento River	1	0	Q100	189783	300.1	347.9	330.4	348.8	0.000500	9.1	29531	1231.8	0.26
Sacramento River	1	0	Q50	171529	300.1	346.2	328.7	347.1	0.000500	8.8	27418	1214.4	0.25
Sacramento River	1	0	FOR 1-24-1970	149141	300.1	343.9	327.2	344.8	0.000500	8.4	24702	1189.5	0.25
North Overflow	6	4.89	Q100	1	338.5	353.0	338.7	353.0	0.000000	0.0	7135	1219.1	0.00
North Overflow	6	4.89	Q50	1	338.5	351.3	338.7	351.3	0.000000	0.0	6112	943.4	0.00
North Overflow	6	4.89	FOR 1-24-1970	1	338.5	349.3	338.7	349.3	0.000000	0.0	4858	662.1	0.00

HEC-RAS Plan: 12-2013_GP (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
North Overflow	6	4.88	Q100	15218	338.5	352.9	343.1	353.0	0.000125	2.2	7084	1204.8	0.11
North Overflow	6	4.88	Q50	11472	338.5	351.3	342.5	351.3	0.000116	1.9	6073	933.3	0.10
North Overflow	6	4.88	FOR 1-24-1970	7860	338.5	349.3	341.9	349.3	0.000112	1.7	4829	660.9	0.10
North Overflow	6	4.79	Q100	15218	338.5	352.9	343.1	352.9	0.000133	2.3	6749	1214.4	0.11
North Overflow	6	4.79	Q50	11472	338.5	351.3	342.5	351.3	0.000122	2.0	5829	933.2	0.11
North Overflow	6	4.79	FOR 1-24-1970	7860	338.5	349.3	341.9	349.3	0.000116	1.7	4694	626.8	0.10
North Overflow	6	4.76		Bridge									
North Overflow	6	4.7	Q100	15218	338.5	352.8	343.0	352.9	0.000134	2.3	6670	1254.7	0.12
North Overflow	6	4.7	Q50	11472	338.5	351.2	342.5	351.3	0.000122	2.0	5787	890.9	0.11
North Overflow	6	4.7	FOR 1-24-1970	7860	338.5	349.2	341.9	349.3	0.000114	1.7	4696	598.9	0.10
North Overflow	6	4.6	Q100	15218	338.6	352.6		352.8	0.000331	3.2	5311	890.4	0.18
North Overflow	6	4.6	Q50	11472	338.6	351.0		351.2	0.000353	3.0	4048	692.1	0.18
North Overflow	6	4.6	FOR 1-24-1970	7860	338.6	349.1		349.2	0.000349	2.7	2970	420.0	0.17
North Overflow	6	4.56666*	Q100	15218	338.0	352.5		352.7	0.000417	3.5	4732	815.2	0.20
North Overflow	6	4.56666*	Q50	11472	338.0	350.9		351.1	0.000418	3.2	3657	555.6	0.19
North Overflow	6	4.56666*	FOR 1-24-1970	7860	338.0	348.9		349.1	0.000409	2.9	2758	371.9	0.18
North Overflow	6	4.53333*	Q100	15218	336.8	352.3		352.5	0.000445	3.6	4519	694.1	0.20
North Overflow	6	4.53333*	Q50	11472	336.8	350.7		350.9	0.000437	3.3	3568	526.6	0.20
North Overflow	6	4.53333*	FOR 1-24-1970	7860	336.8	348.7		348.9	0.000427	2.9	2677	355.7	0.19
North Overflow	6	4.5	Q100	15218	335.6	352.0	344.4	352.3	0.000501	3.8	4300	672.0	0.21
North Overflow	6	4.5	Q50	11472	335.6	350.4	343.6	350.6	0.000501	3.5	3392	513.5	0.21
North Overflow	6	4.5	FOR 1-24-1970	7860	335.6	348.5	342.6	348.6	0.000500	3.1	2505	363.0	0.20
Main Overflow US	4	10.01	Q100	46998	338.1	358.5		358.6	0.000647	3.6	17150	2233.9	0.17
Main Overflow US	4	10.01	Q50	39265	338.1	357.3		357.4	0.000722	3.6	14442	2221.4	0.18
Main Overflow US	4	10.01	FOR 1-24-1970	31412	338.1	355.9		356.1	0.000830	3.6	11453	2207.5	0.19
Main Overflow US	4	10.0	Q100	46998	338.1	358.5		358.6	0.000649	3.6	17134	2233.8	0.17
Main Overflow US	4	10.0	Q50	39265	338.1	357.3		357.4	0.000725	3.6	14424	2221.3	0.18
Main Overflow US	4	10.0	FOR 1-24-1970	31412	338.1	355.9		356.1	0.000833	3.6	11433	2207.4	0.19
Main Overflow US	4	9.0	Q100	46998	336.6	358.0		358.2	0.000858	4.0	13096	1527.9	0.20
Main Overflow US	4	9.0	Q50	39265	336.6	356.7		357.0	0.000930	3.9	11199	1519.8	0.20
Main Overflow US	4	9.0	FOR 1-24-1970	31412	336.6	355.4		355.6	0.000987	3.7	9175	1340.2	0.20
Main Overflow US	4	8.0	Q100	46998	336.2	357.3		357.6	0.000757	4.5	11598	1379.1	0.24
Main Overflow US	4	8.0	Q50	39265	336.2	356.0		356.2	0.000862	4.5	9786	1368.9	0.25
Main Overflow US	4	8.0	FOR 1-24-1970	31412	336.2	354.5		354.8	0.001014	4.3	7822	1276.8	0.26
Main Overflow US	4	7.0	Q100	46998	335.3	356.0		356.6	0.001180	6.1	7947	952.5	0.30
Main Overflow US	4	7.0	Q50	39265	335.3	354.7		355.2	0.001200	5.7	6942	682.4	0.30
Main Overflow US	4	7.0	FOR 1-24-1970	31412	335.3	353.2		353.6	0.001249	5.3	5934	651.2	0.30
Main Overflow US	4	6.0	Q100	46998	331.0	354.4		355.2	0.002342	6.8	6989	786.3	0.37
Main Overflow US	4	6.0	Q50	39265	331.0	353.0		353.7	0.002599	6.6	5943	676.1	0.38
Main Overflow US	4	6.0	FOR 1-24-1970	31412	331.0	351.4		352.0	0.002914	6.4	4890	601.2	0.40
Main Overflow US	4	5.0	Q100	46998	332.6	353.3		353.6	0.000911	4.9	10031	1213.1	0.24
Main Overflow US	4	5.0	Q50	39265	332.6	351.7		352.0	0.001003	4.7	8453	839.3	0.25
Main Overflow US	4	5.0	FOR 1-24-1970	31412	332.6	349.7		350.1	0.001203	4.5	6944	751.2	0.26
Main Overflow US	4	4.99		Lat Struct									
Main Overflow US	4	4.0	Q100	31781	332.9	352.7		352.9	0.000456	4.2	7799	678.8	0.19
Main Overflow US	4	4.0	Q50	27794	332.9	351.0		351.2	0.000531	4.2	6744	591.6	0.21
Main Overflow US	4	4.0	FOR 1-24-1970	23553	332.9	348.9		349.1	0.000694	4.3	5540	542.4	0.23
Main Overflow US	4	3.0	Q100	31781	329.9	352.5		352.8	0.000368	4.4	8536	693.0	0.18
Main Overflow US	4	3.0	Q50	27794	329.9	350.8		351.0	0.000409	4.3	7385	637.1	0.19
Main Overflow US	4	3.0	FOR 1-24-1970	23553	329.9	348.6		348.9	0.000492	4.3	6068	559.0	0.20
Main Overflow DS	3	2.0	Q100	57377	331.0	352.2		352.5	0.000460	4.8	15069	1199.4	0.20
Main Overflow DS	3	2.0	Q50	47347	331.0	350.5		350.8	0.000467	4.6	13062	1139.5	0.20
Main Overflow DS	3	2.0	FOR 1-24-1970	36969	331.0	348.3		348.6	0.000515	4.4	10633	1084.1	0.20
Main Overflow DS	3	1.99		Lat Struct									
Main Overflow DS	3	1.0	Q100	57377	328.9	351.5		352.0	0.000823	6.4	10994	877.5	0.27
Main Overflow DS	3	1.0	Q50	47347	328.9	349.8		350.3	0.000866	6.1	9499	867.1	0.27
Main Overflow DS	3	1.0	FOR 1-24-1970	36969	328.9	347.5		348.0	0.001034	6.1	7524	864.5	0.29



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0430H

FIRM

FLOOD INSURANCE RATE MAP

TEHAMA COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 430 OF 1775

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
TEHAMA COUNTY	065064	0430	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06103C0430H

EFFECTIVE DATE
SEPTEMBER 29, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

APPENDIX C

Scour Calculations

Potential Pier Scour Using CSU Equation, 100 - Year flood
Jellys Ferry Road over Sacramento River Piers 2 & 3, January 2, 2014

Ys = Depth of potential scour, Ft.

K1 = 1.0 Nose shape coefficient, round

Theta = 0 Angle between direction of flow and pier, degrees

Length of pier = 9.0 Ft

K2 = 1.00 Angle coefficient

K3 = 1.1 Bed condition coefficient

a = Pier Width, assume 9.0 Ft

Y1 = 43.5 Ft, Maximum depth expected in front of pier, 100 - Year flood.

V1 = 9.5 FPS, Maximum velocity in front of pier, 100 - Year flood.

Fr1 = Froude Number in front of pier

Fr1 = V1/[(g x Y1)^(1/2)] = 0.254

Ys/Y1 = 2.0 x K1 x K2 x K3 x [(a/Y1)^0.65] x Fr1^0.43 = 0.44

Ys = Y1 x (Ys/Y1) = 19.1 Ft.

Potential Pier Scour Using CSU Equation, 100 - Year flood
Jellys Ferry Road over Sacramento River Piers 4, 5, & 6, January 2, 2014

Ys = Depth of potential scour, Ft.

K1 = 1.0 Nose shape coefficient, round

Theta = 0 Angle between direction of flow and pier, degrees

Length of pier = 6.0 Ft

K2 = 1.00 Angle coefficient

K3 = 1.1 Bed condition coefficient

a = Pier Width, assume 6.0 Ft

Y1 = 43.5 Ft, Maximum depth expected in front of pier, 100 - Year flood.

V1 = 9.5 FPS, Maximum velocity in front of pier, 100 - Year flood.

Fr1 = Froude Number in front of pier

Fr1 = V1/[(g x Y1)^(1/2)] = 0.254

Ys/Y1 = 2.0 x K1 x K2 x K3 x [(a/Y1)^0.65] x Fr1^0.43 = 0.34

Ys = Y1 x (Ys/Y1) = 14.6 Ft.

NOTE: For Fr1 values less than 0.8 the value of Ys/a is not recommended to exceed 2.4.

Ys = 2.4 x a = 14.4 Ft.

Potential Pier Scour Using CSU Equation, 100 - Year flood
Jellys Ferry Road over North Overflow Channel, January 2, 2014

Ys = Depth of potential scour, Ft.

K1 = 1.0 Nose shape coefficient, round

Theta = 0 Angle between direction of flow and pier, degrees

Length of pier = 30.0 Ft

K2 = 1.00 Angle coefficient

K3 = 1.1 Bed condition coefficient

a = Pier Width, assume 4.0 Ft

Y1 = 14.0 Ft, Maximum depth expected in front of pier, 100 - Year flood.

V1 = 3.0 FPS, Maximum velocity in front of pier, 100 - Year flood.

Fr1 = Froude Number in front of pier

Fr1 = V1/[(g x Y1)^(1/2)] = 0.141

Ys/Y1 = 2.0 x K1 x K2 x K3 x [(a/Y1)^0.65] x Fr1^0.43 = 0.42

Ys = Y1 x (Ys/Y1) = 5.9 Ft.

6.3 LIVE-BED CONTRACTION SCOUR JELLYS FERRY RD, SAC R. CHANNEL

A modified version of Laursen's 1960 equation for live-bed scour at a long contraction is recommended to predict the depth of scour in a contracted section (Laursen 1960). The original equation is given in Appendix C. The modification is to eliminate the ratio of Manning n (see the following Note #3). The equation assumes that bed material is being transported from the upstream section.

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{6/7} \left(\frac{W_1}{W_2}\right)^{k_1} = 1^{6/7}\left(\frac{500}{450}\right)^{0.59} = 1.064 \quad y_2 = (44)(1.064) = 46.8' \qquad (6.2)$$

$$y_s = 46.8 - 44 = 2.8'$$

$y_s = y_2 - y_o$ = (average contraction scour depth) (6.3)

UPPER LIMIT $= 44\left(\frac{500}{450}\right) - 44 = 4.9' > 2.8 \therefore$ OK

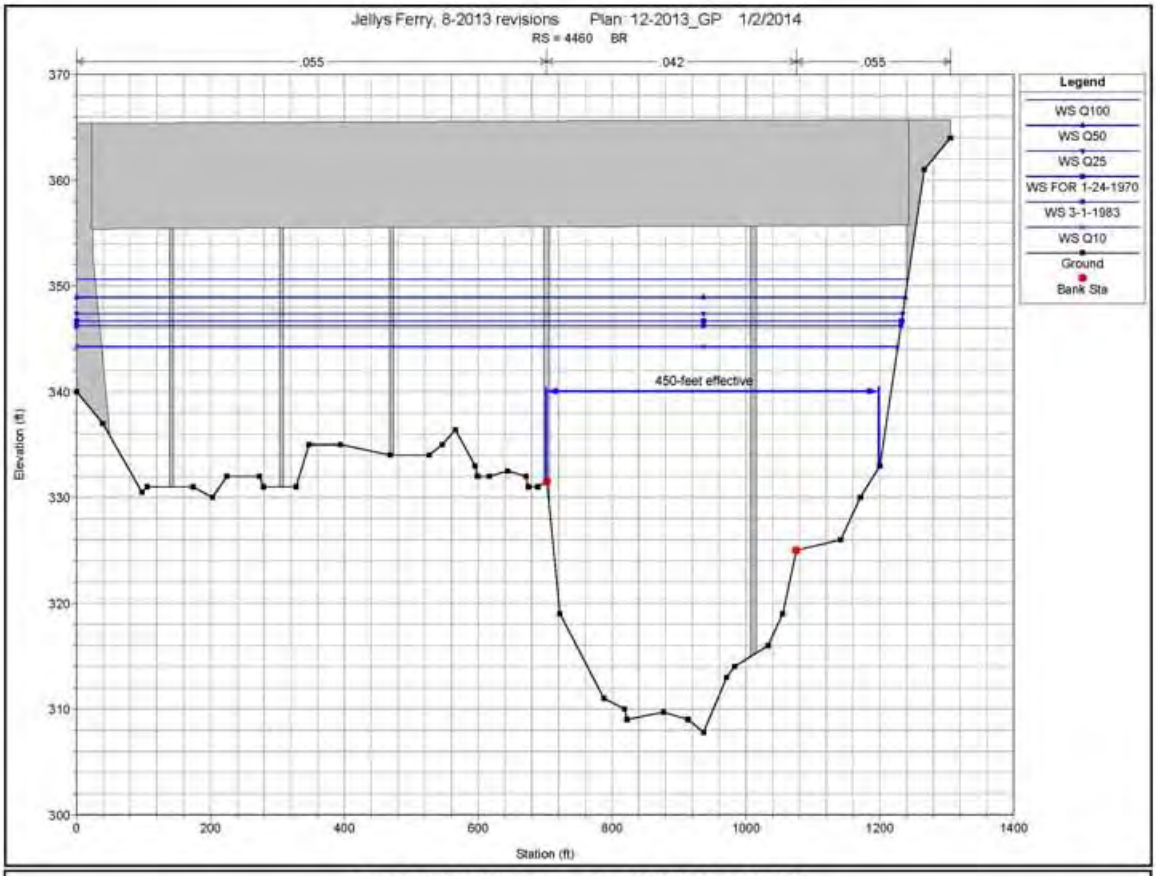
where:

- y_1 = Average depth in the upstream main channel, ft (m) 44'
- y_2 = Average depth in the contracted section, ft (m)
- y_o = Existing depth in the contracted section before scour, ft (m) (see Note 7) 44' *
- Q_1 = Flow in the upstream channel transporting sediment, ft^3/s (m^3/s) 124,500
- Q_2 = Flow in the contracted channel, ft^3/s (m^3/s) 124,500
- W_1 = Bottom width of the upstream main channel that is transporting bed material, ft (m) 500'
- W_2 = Bottom width of main channel in contracted section less pier width(s), ft (m) 450'
- k_1 = Exponent determined below

V_*/ω	k_1	Mode of Bed Material Transport
<0.50	0.59	Mostly contact bed material discharge
0.50 to 2.0	0.64	Some suspended bed material discharge
>2.0	0.69	Mostly suspended bed material discharge

- V_* = $(\tau_o/\rho)^{1/2} = (gy_1 S_1)^{1/2}$, shear velocity in the upstream section, ft/s (m/s)
- ω = Fall velocity of bed material based on the D_{50}, m/s (Figure 6.8)
  For fall velocity in English units (ft/s) multiply ω in m/s by 3.28
- g = Acceleration of gravity (32.2 ft/s^2) (9.81 m/s^2)
- S_1 = Slope of energy grade line of main channel, ft/ft (m/m)
- τ_o = Shear stress on the bed, (lb/ft^2) (Pa (N/m^2))
- ρ = Density of water (1.94 $slugs/ft^3$) (1000 kg/m^3)

Notes: * y_1 USED. USE OF EX DEPTH IN "CONTRACTED" CHANNEL MAY DOUBLE ACCOUNT FOR CONTRACTION SCOUR.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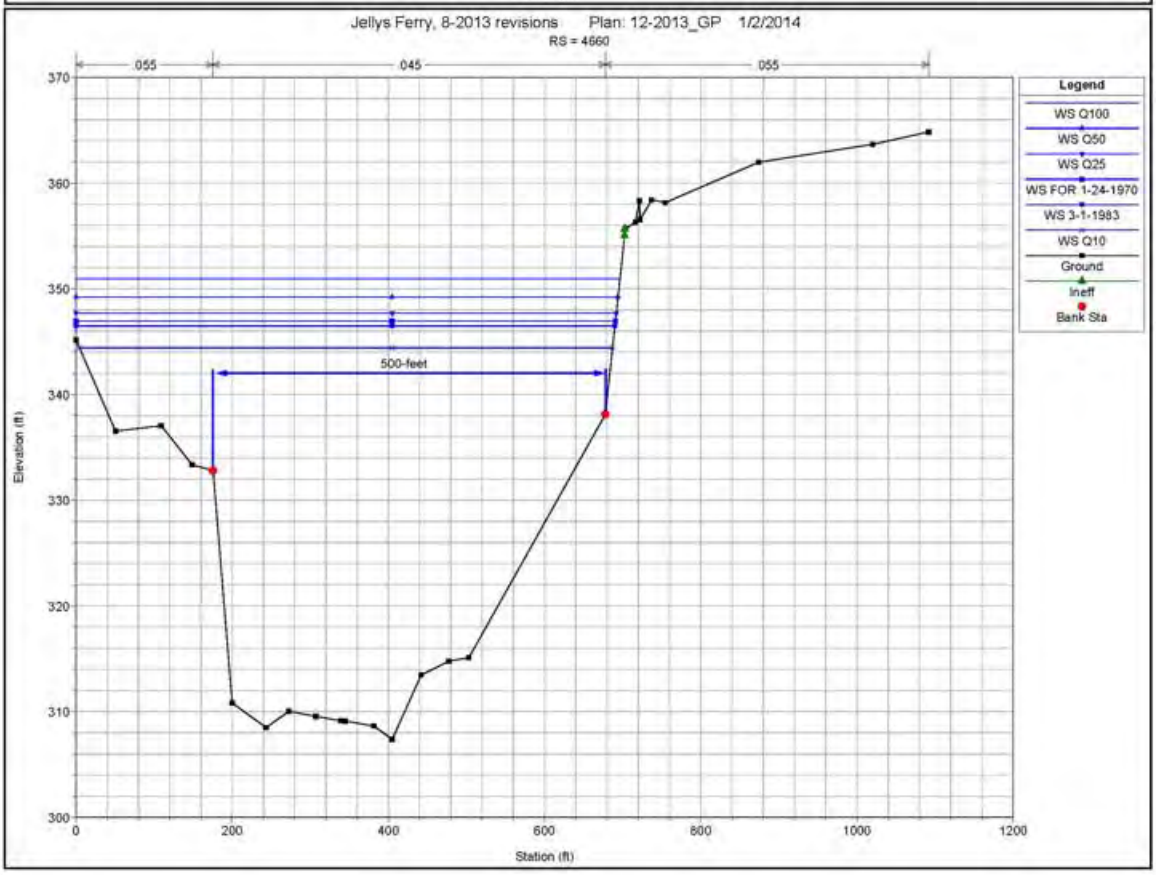
.055
.042
.055
450-feet effective
Legend
WS Q100
WS Q50
WS Q25
WS FOR 1-24-1970
WS 3-1-1983
WS Q10
Ground
Bank Sta
Elevation (ft)
Station (ft)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.055
.045
.055
500-feet
Legend
WS Q100
WS Q50
WS Q25
WS FOR 1-24-1970
WS 3-1-1983
WS Q10
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

6.3 LIVE-BED CONTRACTION SCOUR JELLYS FERRY RD, SAC R. LEFT O.B.

A modified version of Laursen's 1960 equation for live-bed scour at a long contraction is recommended to predict the depth of scour in a contracted section (Laursen 1960). The original equation is given in Appendix C. The modification is to eliminate the ratio of Manning n (see the following Note #3). The equation assumes that bed material is being transported from the upstream section.

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{6/7}\left(\frac{W_1}{W_2}\right)^{k_1} = \left(\frac{50900}{49400}\right)^{6/7}\left(\frac{702}{634}\right)^{0.69} = 1.101 \qquad (6.2)$$

$y_2 = (1.101)(17.5) = 19.3'$

$y_s = 19.3 - 17.5 = 1.8'$

$y_s = y_2 - y_o$ = (average contraction scour depth) (6.3)

where: UPPER LIMIT $= 17.5\left(\frac{702}{634}\right) - 17.5 = 1.9' > 1.8 \therefore$ O.K.

- y_1 = Average depth in the upstream main channel, ft (m) 17.5'
- y_2 = Average depth in the contracted section, ft (m)
- y_o = Existing depth in the contracted section before scour, ft (m) (see Note 7) 17.5'
- Q_1 = Flow in the upstream channel transporting sediment, ft³/s (m³/s) 50,900
- Q_2 = Flow in the contracted channel, ft³/s (m³/s) 49,400
- W_1* = Bottom width of the upstream main channel that is transporting bed material, ft (m) 702'
- W_2* = Bottom width of main channel in contracted section less pier width(s), ft (m) 634'
- k_1 = Exponent determined below

V_*/ω	k_1	Mode of Bed Material Transport
<0.50	0.59	Mostly contact bed material discharge
0.50 to 2.0	0.64	Some suspended bed material discharge
>2.0	0.69	Mostly suspended bed material discharge

- V_* = $(\tau_o/\rho)^{1/2} = (gy_1 S_1)^{1/2}$, shear velocity in the upstream section, ft/s (m/s)
- ω = Fall velocity of bed material based on the D_{50}, m/s (Figure 6.8)
  For fall velocity in English units (ft/s) multiply ω in m/s by 3.28
- g = Acceleration of gravity (32.2 ft/s²) (9.81 m/s²)
- S_1 = Slope of energy grade line of main channel, ft/ft (m/m)
- τ_o = Shear stress on the bed, (lb/ft²) (Pa (N/m²))
- ρ = Density of water (1.94 slugs/ft³) (1000 kg/m³)

Notes: * FLOW AREA DIVIDED BY HYDRAULIC RADIUS OF LEFT OVERBANK FLOODPLAIN

Plan: 12-2013_GP Sacramento River 1 RS: 4460 BR U Profile: Q100

E.G. Elev (ft)	351.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.96	Wt. n-Val.	0.055	0.042	0.055
W.S. Elev (ft)	350.64	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	335.88	Flow Area (sq ft)	11387.42	13488.19	3257.90
E.G. Slope (ft/ft)	0.000732	Area (sq ft)	11387.42	13488.19	3257.90
Q Total (cfs)	189772.90	Flow (cfs)	49451.82	123225.70	17095.38
Top Width (ft)	1176.32	Top Width (ft)	651.90	359.65	164.77
Vel Total (ft/s)	6.75	Avg. Vel. (ft/s)	4.34	9.14	5.25
Max Chl Dpth (ft)	42.84	Hydr. Depth (ft)	17.47	37.50	19.77
Conv. Total (cfs)	7013461.0	Conv. (cfs)	1827597.0	4554069.0	631795.9
Length Wtd. (ft)	40.00	Wetted Per. (ft)	789.01	457.51	169.41
Min Ch El (ft)	307.80	Shear (lb/sq ft)	0.66	1.35	0.88
Alpha	1.35	Stream Power (lb/ft s)	1305.42	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	978.78	1593.40	228.59
C & E Loss (ft)	0.03	Cum SA (acres)	75.69	42.60	15.14

Effective Width = 11387/17.47 = 652'. Less piers, 634'.

Plan: 12-2013_GP Sacramento River 1 RS: 4480 Profile: Q100

E.G. Elev (ft)	351.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.	0.055	0.042	0.055
W.S. Elev (ft)	350.72	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	335.63	Flow Area (sq ft)	12335.09	13918.42	3271.19
E.G. Slope (ft/ft)	0.000522	Area (sq ft)	12335.09	13918.42	3271.19
Q Total (cfs)	189772.90	Flow (cfs)	50863.95	124451.60	14457.37
Top Width (ft)	1242.07	Top Width (ft)	702.54	372.69	166.84
Vel Total (ft/s)	6.43	Avg. Vel. (ft/s)	4.12	8.94	4.42
Max Chl Dpth (ft)	42.92	Hydr. Depth (ft)	17.56	37.35	19.61
Conv. Total (cfs)	8302307.0	Conv. (cfs)	2225229.0	5444589.0	632490.3
Length Wtd. (ft)	20.00	Wetted Per. (ft)	714.90	378.57	170.86
Min Ch El (ft)	307.80	Shear (lb/sq ft)	0.56	1.20	0.62
Alpha	1.42	Stream Power (lb/ft s)	1305.42	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	984.22	1599.69	230.09
C & E Loss (ft)	0.01	Cum SA (acres)	76.00	42.77	15.22

Effective Width = 12335/17.56 = 702'.

Abutment Scour: EFFECTIVE WIDTH = 12335/17.56 = 702'

$q_1 = 50864/702 = 72.5$ CFS/FT

$q_{2c} = 49452/634 = 78.0$ CFS/FT

$\frac{q_{2c}}{q_1} = \frac{78}{72.5} = 1.076$

$Y_{MAX}/Y_c = 1.55$

$Y_c = 1.8'$ FROM CONTRACTION SCOUR CALC.

$Y_{MAX} = (1.55)(1.8) = 2.8'$

COMPLEX HYDRAULICS AT SITE ∴ DESIGN FOR 5' BELOW ELEVATION OF PROXIMATE FLOODPLAIN & INSPECT ON REGULAR SCHEDULE & AFTER LARGE EVENTS

6.3 LIVE-BED CONTRACTION SCOUR JELLYS FERRY RD, NORTH OVERFLOW

A modified version of Laursen's 1960 equation for live-bed scour at a long contraction is recommended to predict the depth of scour in a contracted section (Laursen 1960). The original equation is given in Appendix C. The modification is to eliminate the ratio of Manning n (see the following Note #3). The equation assumes that bed material is being transported from the upstream section.

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{6/7}\left(\frac{W_1}{W_2}\right)^{k_1} = 1^{6/7}\left(\frac{572}{482}\right)^{0.69} = 1.125 \qquad y_2 = 14.4(1.125) = 16.2' \qquad (6.2)$$

$$y_s = 16.2 - 14.4 = 1.8'$$

$y_s = y_2 - y_o$ = (average contraction scour depth) (6.3)

where: UPPER LIMIT $= 14.4\left(\frac{572}{482}\right) - 14.4 = 2.7' > 1.8 \therefore$ O.K.

- y_1 = Average depth in the upstream main channel, ft (m) 14.4'
- y_2 = Average depth in the contracted section, ft (m)
- y_o = Existing depth in the contracted section before scour, ft (m) (see Note 7) 14.4'
- Q_1 = Flow in the upstream channel transporting sediment, ft^3/s (m^3/s) 15,200
- Q_2 = Flow in the contracted channel, ft^3/s (m^3/s) 15,200
- W_1* = Bottom width of the upstream main channel that is transporting bed material, ft (m) 572'
- W_2* = Bottom width of main channel in contracted section less pier width(s), ft (m) 482'
- k_1 = Exponent determined below

V_*/ω	k_1	Mode of Bed Material Transport
<0.50	0.59	Mostly contact bed material discharge
0.50 to 2.0	0.64	Some suspended bed material discharge
>2.0	0.69	Mostly suspended bed material discharge

- V_* = $(\tau_o/\rho)^{1/2} = (gy_1 S_1)^{1/2}$, shear velocity in the upstream section, ft/s (m/s)
- ω = Fall velocity of bed material based on the D_{50}, m/s (Figure 6.8)
  For fall velocity in English units (ft/s) multiply ω in m/s by 3.28
- g = Acceleration of gravity (32.2 ft/s^2) (9.81 m/s^2)
- S_1 = Slope of energy grade line of main channel, ft/ft (m/m)
- τ_o = Shear stress on the bed, (lb/ft^2) (Pa (N/m^2))
- ρ = Density of water (1.94 $slugs/ft^3$) (1000 kg/m^3)

Notes: * FLOW AREA DIVIDED BY HYDRAULIC RADIUS/DEPTH

HEC-RAS Plan: 12-2013_GP River: North Overflow Reach: 6 Profile: Q100

Reach	River Sta	Profile	Q Total	Flow Area	Hydr Radius	Vel Total	Top Width	Top Width Act
			(cfs)	(sq ft)	(ft)	(ft/s)	(ft)	(ft)
6	4.89	Q100	1	7132	11.4	0.0	1218	625
6	4.88	Q100	15228	7081	11.3	2.2	1204	625
6	4.79	Q100	15228	6747	11.8	2.3	1214	570
6	4.76		Bridge					
6	4.7	Q100	15228	6672	12.1	2.3	1255	550
6	4.6	Q100	15228	5314	5.9	2.9	891	891
6	4.56666*	Q100	15228	4735	5.8	3.2	816	816
6	4.53333*	Q100	15228	4522	6.5	3.4	695	695
6	4.5	Q100	15228	4302	6.4	3.5	673	673

Effective Width = 6747/11.8 = 572'

Plan: 12-2013_GP North Overflow 6 RS: 4.76 Profile: Q100

E.G. US. (ft)	352.94	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	352.86	E.G. Elev (ft)	352.93	352.92
Q Total (cfs)	15228.06	W.S. Elev (ft)	352.83	352.82
Q Bridge (cfs)	15228.06	Crit W.S. (ft)	343.24	343.15
Q Weir (cfs)		Max Chl Dpth (ft)	14.33	14.32
Weir Sta Lft (ft)		Vel Total (ft/s)	2.57	2.53
Weir Sta Rgt (ft)		Flow Area (sq ft)	5925.79	6008.36
Weir Submerg		Froude # Chl	0.13	0.13
Weir Max Depth (ft)		Specif Force (cu ft)	38765.65	39600.48
Min El Weir Flow (ft)	356.77	Hydr Depth (ft)	12.29	12.46
Min El Prs (ft)	355.07	W.P. Total (ft)	742.46	749.89
Delta EG (ft)	0.04	Conv. Total (cfs)	881595.9	893707.6
Delta WS (ft)	0.04	Top Width (ft)	482.07	482.07
BR Open Area (sq ft)	6930.36	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	2.57	C & E Loss (ft)	0.00	0.01
Coef of Q		Shear Total (lb/sq ft)	0.15	0.15
Br Sel Method	Energy only	Power Total (lb/ft s)	-495.00	-495.00

Effective Width = 5926/12.29 = 482'

North Overflow Abutment Scour:

$$q_{2c} = \frac{15228}{482} = 31.6 \text{ CFS/FT}$$

$$q_1 = \frac{15228}{572} = 26.6 \text{ CFS/FT}$$

$$\frac{q_{2c}}{q_1} = \frac{31.6}{26.6} = 1.19$$

$$Y_{MAX}/Y_c = 1.65$$

$Y_c = 1.8'$ FROM CONTRACTION SCOUR CALC.

$$Y_{MAX} = (1.65)(1.8) = 3.0'$$

COMPLEX HYDRAULICS AT SITE ∴ DESIGN FOR 5' BELOW BOTTOM OF CHANNEL & INSPECT ON REGULAR SCHEDULE & AFTER LARGE FLOOD EVENTS

APPENDIX D

References

REFERENCES

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APPENDIX E

2D Flow Model Report