Meeting of the Central Valley Flood Protection Board
January 23, 2015

Staff Report

Union Pacific Railroad Bridge (No. 143.71) Replacement, Sutter County

1.0 – ITEM

Consider Central Valley Flood Protection Board (Board) approval to replace an existing timber bridge with a new concrete bridge and embankment in the west overbank area of the Feather River floodway (Attachment A) by draft Permit No. 18931 (Attachment B). Permit approval also requires approval of two proposed variances to the California Code of Regulations, Title 23 (Title 23) standards.

2.0 – APPLICANT

Union Pacific Railroad Company (UPRR)

3.0 – PROJECT LOCATION

The project is located in the right (west) overbank area of the Feather River floodway just waterward of the west levee, and just north of the city of Yuba City (approximate population of 65,000, 2010 census) in Sutter County.

The bridge is designated by UPRR as No. 143.71 in its Valley Subdivision, and is located within a right (looking northbound) curve of the railroad. The Feather River low flow channel is approximately 1,800-feet east of the project site with the river flowing north to south. During flood flows the river overtops the channel and spreads across the floodway over agricultural lands and overland vegetation bounded by federal State Plan of Flood Control project levees.

4.0 – PROJECT DESCRIPTION

UPRR field observations indicate that the existing 510-foot, 34-span timber bridge was constructed in 1939 and does not meet current UPRR safety standards. The timber piles have deteriorated and have reached the end of their useful life and they require replacement (see Attachment C for representative photos).

A 300-foot long section of the new bridge (beginning at the existing northern abutment) will be constructed on an embankment of approximately 21,000 cubic-yards of imported fill supported by driven steel H-piles. The adjacent 240-foot, 8-span concrete section will be constructed of precast concrete caps and girders supported by seven (7) bents of steel H-piles.

UPRR will need to construct temporary access ramps, and acquire both temporary access and permanent right-of-way to complete the project.

5.0 – AUTHORITY OF THE BOARD

California Water Code § 8534, 8590 – 8610.5, and 8700 – 8710

Title 23:

- § 6 - Need for a Permit
- § 11 - Variances
- § 13 - Evidentiary Hearings
- § 108 - Existing Encroachments
- § 112 - Streams Regulated and Nonpermissible Work Periods
- § 120 - Levees
- § 116 - Borrow and Excavation Activities – Land and Channel
- § 128 - Bridges

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with this project from all pertinent agencies are shown below:

- The U.S. Army Corps of Engineers (USACE) comment letter was received on September 5, 2014, and indicated that the USACE District Engineer has no objection to the project, subject to conditions. This letter has been incorporated into the permit as Exhibit A.

- Levee District 1 (LD1) conditionally endorsed this project at their January 12, 2015 meeting (Attachment D). The endorsement includes approval of the proposed variances, subject to a project design modification resulting in zero computed raise in water surface elevation (WSE), and a letter of commitment from UPRR regarding

coordinated design and construction of a future stoplog structure where the railroad crosses the Feather River west levee just north of the bridge (Attachment E).

Board staff has incorporated LD1 endorsement condition Nos. 2 through 4, 9 through 13, and 15 in Special Conditions FOURTEEN, FIFTEEN, SIXTEEN, FORTY-FOUR and FIFTY-TWO, FIFTY-FOUR, FIFTY-ONE, FIFTY-THREE, FOURTY-FOUR, and TWENTY, respectively. Staff has determined that UPRR has complied with condition Nos. 6 and 8. Board staff has not incorporated condition Nos. 1, 5, 7, and 14 for the following reasons:

Condition No. 1 – The permit is written to comply with Title 23 standards as modified by the proposed variances. Compliance with other standards was considered during Board staff's review of the project, but references to those standards are not necessary to include in permit conditions.

Condition No. 5 – The Board, and if needed the USACE, will review and approve UPRR requests for any additional work under this permit as outlined in Special Conditions TWENTY-EIGHT and TWENTY-NINE. Board staff will immediately transmit any UPRR request for additional work to LD1's District Engineer to seek the District's comments.

Condition No. 7 – On December 17, 2014 Board staff met with representatives of UPRR, LD1, and SBFCA. At this meeting it was determined that the proposed stoplog structure would be processed by Board staff as a separate SBFCA permit application, and that SBFCA and UPRR would collaborate with one another to develop a coordinated design and construction plans. Board staff received a permit application from SBFCA on December 18, 2014. Board staff and LD1 received the commitment letter from UPRR on January 14, 2015 requested byLD1 at its January 12, 2015 Board meeting. For these reasons there is no need to incorporate any additional language into the Board permit related to LD 1 Condition No. 7.

Condition No. 14 –Transmittal of an executed copy of the Board permit to LD1 is standard practice of the Board staff, and therefore requires no condition of the permittee.

7.0 – PROJECT ANALYSIS

7.1 – Project Construction Details

The H-piles are proposed to be driven along the existing mainline track within the floodway and outside of the west levee footprint. An approximately 300-foot long

section of the new bridge at the northern abutment would be supported by approximately 21,000 cubic yards of imported earth fill placed at a 2:1 (horizontal : vertical) slope (see Attachment F for project design drawings). The fill would be placed up to the bottom of the bridge deck to support the ballast and tracks, would be compacted in lifts per Title 23 standards, and would extend beyond the existing UPRR 100-foot right-of-way (ROW). This requires UPRR to permanently acquire additional ROW (See Section 7.6).

Temporary earthen ramps are proposed to be constructed along the Feather River west levee within the existing UPRR ROW. The ramps require approximately 400 cubic yards of fill, will not require excavation of the west levee, and will be removed while leaving the levee unaltered upon project completion.

7.2 – Hydraulic Summary

Both UPRR bridges (No. 143.71 - the subject bridge) and the 2,300-foot, 68-span Feather River main channel bridge (No. 143.11) to the east are shown in Attachment A. The subject bridge conveys flood flows in the overbank area, while the main channel bridge conveys flood flows within the main channel. The entire floodway and both bridges were modeled in the hydraulic model developed for this project.

The proposed project is located in a FEMA-designated Zone A of the 100-year floodplain (1988 Flood Insurance Rate Maps). The 200-year flood discharge of approximately 165,000 cubic feet per second was obtained from the one-dimensional unsteady HEC-RAS model developed by the Sutter Butte Flood Control Agency (SBFCA) for its Feather River West Levee Project (FRWLP).

The designed soffit elevation of the new bridge is about one (1) foot lower in elevation than the existing bridge (Attachment F). This lowering of the soffit is necessary due to the increased deck depth of the new concrete bridge as compared to that of the existing timber bridge. The proposed bridge will be subject to pressurized flow (the soffit will be submerged) by approximately 0.6 feet at the 200-year discharge. The Feather River main channel bridge is also subject to pressurized flow by about 0.5 feet at the 200-year discharge under existing conditions. In order to construct the new bridge with a lowered soffit elevation along the existing railroad alignment, the UPRR has requested variances (described in Section 7.4) from the Board's Title 23 standards §§128(a)(3) and §128 (a)(16).

The 200-year WSE at the upstream and downstream faces of the proposed bridge was initially computed to be 78.78 feet for both pre- and post-project conditions (Attachment G). In response to concerns raised by LD1 regarding model design, UPRR revised the hydraulic model to remove ineffective flow areas in the floodway. The revised model

resulted in minor changes to the WSE profile with a computed decrease of 0.03 feet at the downstream bridge face, and a maximum increase of 0.04 feet just upstream of the bridge.

LD1's conditional approval (see Section 6.0) requested the UPRR to modify its bridge design in order to achieve zero computed WSE increase. In response to this request UPRR modified its design by adding one additional span at the southeastern end of the concrete bridge section. This modification replaces a portion of the existing railroad embankment currently blocking the floodway with an additional 30-foot width of open bridge to convey flood flows. The increased floodway conveyance offsets all prior computed increases in WSE based on the initial bridge design, and satisfies the requirements of LD1's endorsement Condition No. 8 that the new bridge result in no WSE increase.

Based on its review of the hydraulic analyses the Board staff, with concurrence from the USACE, has determined that the proposed project is anticipated to result in no significant adverse hydraulic impacts to the Feather River floodway or Sacramento River Flood Control Project (SRFCP) levees.

7.3 – Geotechnical Summary

The proposed H piles are designed to be driven to the point of refusal, if possible, or to a minimum 112 ton capacity with a factor of safety of five (5) per UPRR Engineering Standards. The estimated H pile design depth is 80 feet. Board staff concurs that this approach is reasonable.

Fill material will be placed in four to six inch lifts and compacted per Title 23 standards. Density tests will be conducted by a certified soils laboratory to verify fill compaction.

Board staff has reviewed the geotechnical design information and has determined that the proposed project is expected to result in no adverse geotechnical impacts to the Feather River floodway or SRFCP levees. All fill, excavation, and temporary structures will be completed in compliance with Draft Permit No. 18931 and Title 23 standards.

7.4 – Project Variances

In accordance with Title 23, § 11 Variances, paragraphs (a) and (b) the UPRR is requesting variances (Attachment H) from Title 23 bridge standards §§ 128(a)(3) and 128(a)(16), because they have determined that construction of the replacement bridge to Title 23 standards without the requested variances would be infeasible.

Board standard § 128(a)(3) requires that bridge piers and bents within the floodway be constructed parallel to the direction of flow. Because the existing bridge alignment is

along on a curve within the floodplain, UPRR deems it to be infeasible to design bents that are parallel to direction of flow while still providing the required static and dynamic load bearing capacity on the curved bridge structure. As a result, some of the piers must be aligned askew to the primary flow direction but parallel with the existing pier alignment (perpendicular to the track). The proposed design reduces the number of pier bents from 34 to 7, which substantially decreases the risk of debris collection, and provides a more hydraulically efficient design.

Board standard §128(a)(16) requires the bottom soffit of structural members of a replacement railroad bridge to be no lower than the soffit of the existing bridge. If this bridge were to be designed with the new soffit at an elevation equal to the existing bridge soffit, the UPRR would need to construct a substantial track raise (up to 1.08 feet) and make extensive modifications to existing at-grade crossings, public roads, and infrastructure for several miles in both directions from the bridge. This work would also require replacing the modern 2,300-foot long bridge (No. 143.11) over the Feather River main channel, which is not in need of replacement at this time. Furthermore, replacement of the main channel bridge would increase the total project cost by millions of dollars, and would trigger additional environmental impacts that would most likely result in incidental take of endangered species under the jurisdiction of the National Marine Fisheries Service as well as potential riparian vegetation and species impacts. Public safety risks associated with replacement of the main channel bridge would also be increased during construction. For all these reasons the substantial track raise, main channel bridge replacement and other associated work has been deemed infeasible by the UPRR.

Board staff, in coordination with the USACE, has reviewed UPRR's design and determined that UPRR has provided sufficient justification for the proposed variances and that the design does not cause any significant adverse impacts to the SRFCP. In making this determination, Board staff has taken into consideration all of the technical factors surrounding these variances, and has met and collaboratively reviewed the proposed bridge design with LD1's District Engineer, SBFCA representatives, and the UPRR.

7.5 –Impacts to the FRWLP

SBFCA's FRWLP is currently under construction under Board Permits 18793-1 (2013), 18793-2 (2014) and 18793-3 (2014).

The proposed bridge centerline is approximately 100 feet east (at the existing north abutment) and approximately 300 feet east (at the existing southern abutment) of the Feather River west levee's waterside toe.

As described in Section 4.0, the new bridge will include an approximate 300-foot long section adjacent to the existing northwest abutment which will be constructed on imported fill. H-piles for this section are proposed to be driven along the existing mainline track outside of the levee footprint, and the fill for this abutment will be placed outside the levee footprint. This 300-foot section of fill will increase the factor of safety for horizontal stress loading and track movement and would also result in a more durable, longer lasting, and safer bridge.

Temporary earthen construction ramps will be installed to avoid levee excavation and will be removed after construction without any residual impact to the FRWLP.

Because the permanent proposed work is outside of the FRWLP footprint, and there are no significant anticipated adverse hydraulic impacts from the project, Board staff has determined that there are no expected adverse impacts to the FRWLP.

In coordination with construction of the replacement bridge, SBFCA is also collaborating with UPRR to finalize design of a stoplog structure to be installed just northwest of the bridge project where the railroad crosses the Feather River west levee. The stoplog structure is needed to address an approximate one (1) foot freeboard deficiency (at the 200-year discharge) in the levee elevation at the railroad crossing. SBFCA, in coordination with UPRR, is designing the stoplog structure so that it may be installed in coordination with planned UPRR track outages. SBFCA has submitted a separate Board permit application for the stoplog structure as a component of its Feather River West Levee Project.

7.6 –Real Estate Considerations

UPRR proposes to permanently acquire approximately 1.13 acres of fee property and acquire temporary construction access to approximately 1.4 acres from adjacent landowners prior to construction.

8.0 – CEQA ANALYSIS

Board staff has prepared the following California Environmental Quality Act (CEQA) determination:

The Board determined that the proposed action is statutorily exempt under the provisions of CEQA and the State CEQA Guidelines. The overall activities involve issuing a permit for replacement of an existing railroad bridge under a Statutory Exemption (Public Resources Code § 21080(b)(10); CEQA Guidelines Section 15275 (a)) covering the institution or increase of passenger or commuter service on rail lines, including modernization of existing stations and parking facilities.

9.0 – CALIFORNIA WATER CODE SECTION 8610.5 CONSIDERATIONS

- Evidence that the Board admits into its record from any party, federal, State or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

  The Board has considered all the evidence presented in this matter, including the application for Permit No. 18931, supporting technical documentation provided by UPRR, as well as all evidence submitted up through the hearing on this matter.

- The best available science related to the scientific issues presented by the executive officer, legal counsel, the Department of Water Resources, or other parties that raise credible scientific issues:

  In making its findings, the Board has used the best available science relating to the issues presented by all parties. On the important issue of hydraulic impacts UPRR used HEC-RAS one-dimensional flow models. These models are considered by experts as the best available scientific tools for the purpose of modeling river hydraulics in this region.

- Effects of the decision on the facilities of the State Plan of Flood Control (SPFC), and consistency of the proposed project with the Central Valley Flood Protection Plan (CVFPP) as adopted by Board Resolution 2012-25 on June 29, 2012:

  The proposed UPRR bridge replacement is expected to result in no adverse hydraulic or geotechnical impacts on the facilities of the SPFC (as described in Sections 7.2 and 7.3 herein) and is consistent with the CVFPP and current Title 23 standards because the project is anticipated to produce no significant increases in water surface elevation, substantial increases in channel velocities, or adverse geotechnical impacts on SPFC facilities.

- Effects of reasonable projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

  UPRR has determined that the proposed replacement bridge project does not conflict with either the FRWLP or Sutter County General Plan documents, nor are there any calculated and known foreseeable impacts anticipated to affect the proposed project.

10.0 – STAFF RECOMMENDATION

Staff recommends that the Board:

Find:

- the project to be statutorily exempt from CEQA;

Approve:

- the requested variances to TItle23, §§ 128(a)(3) and 128(a)(16) standards pursuant to §§ 11(a) and (b), as summarized in Section 7.4 herein;
- draft Encroachment Permit No. 18931, in substantially the form provided; and

Direct:

- the Executive officer to take the necessary actions to execute the permit and file a Notice of Exemption pursuant to CEQA with the State Clearinghouse.

11.0 – LIST OF ATTACHMENTS

A – Project Maps

B – Draft Permit No. 18931

Exhibit A: USACE Comment Letter

C – Project Photos

D – LD1 Endorsement

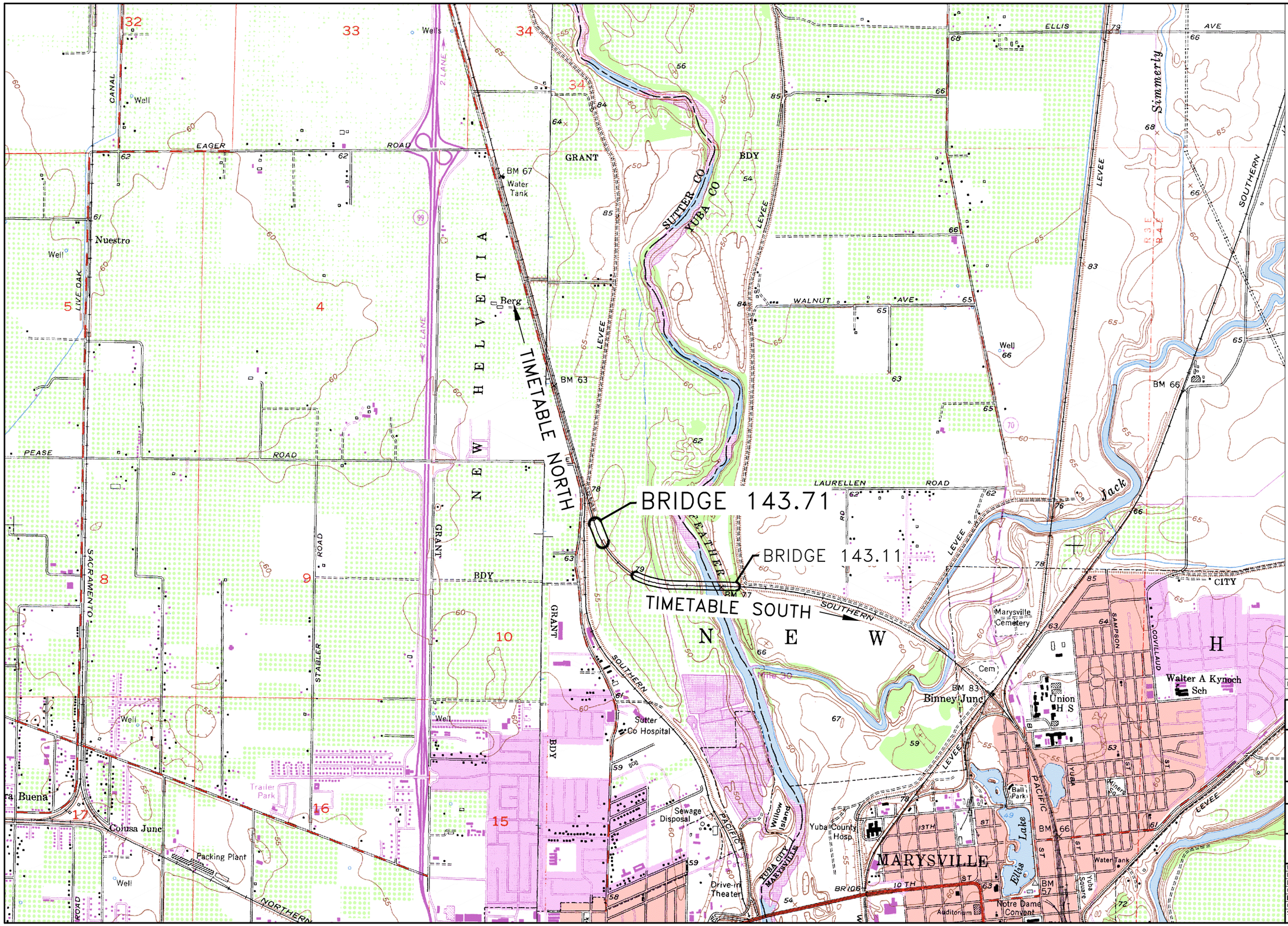
E – UPRR Stoplog Commitment Letter

F – Project Drawings

G – Hydraulic Summary Information

H – UPRR Variance Request

Prepared By:	Nancy Moricz, PE, Senior Engineer, Planning Branch
Geotechnical Review:	Deb Biswas, PE, Engineer, Water Resources, Planning Branch
Environmental Review:	Andrea Buckley, Senior Environmental Scientist
Staff Report Review:	Eric Butler, PE, Supervising Engineer, Planning Branch Chief
	Len Marino, PE, Chief Engineer
	Leslie Gallagher, Acting Executive Officer



0 2000'

SOURCE:
USGS TOPOGRAPHIC MAP:
SUTTER (1973), CA
YUBA CITY (1973), CA
CONTOUR INTERVAL: 5'

BRIDGE LOCATION:
SECTION 10
TOWNSHIP 15 NORTH
RANGE 3 EAST

LAT: 39° 09' 57"
LONG: 121° 37' 16"

SUTTER COUNTY, CALIFORNIA

NO.	DATE	REVISIONS

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

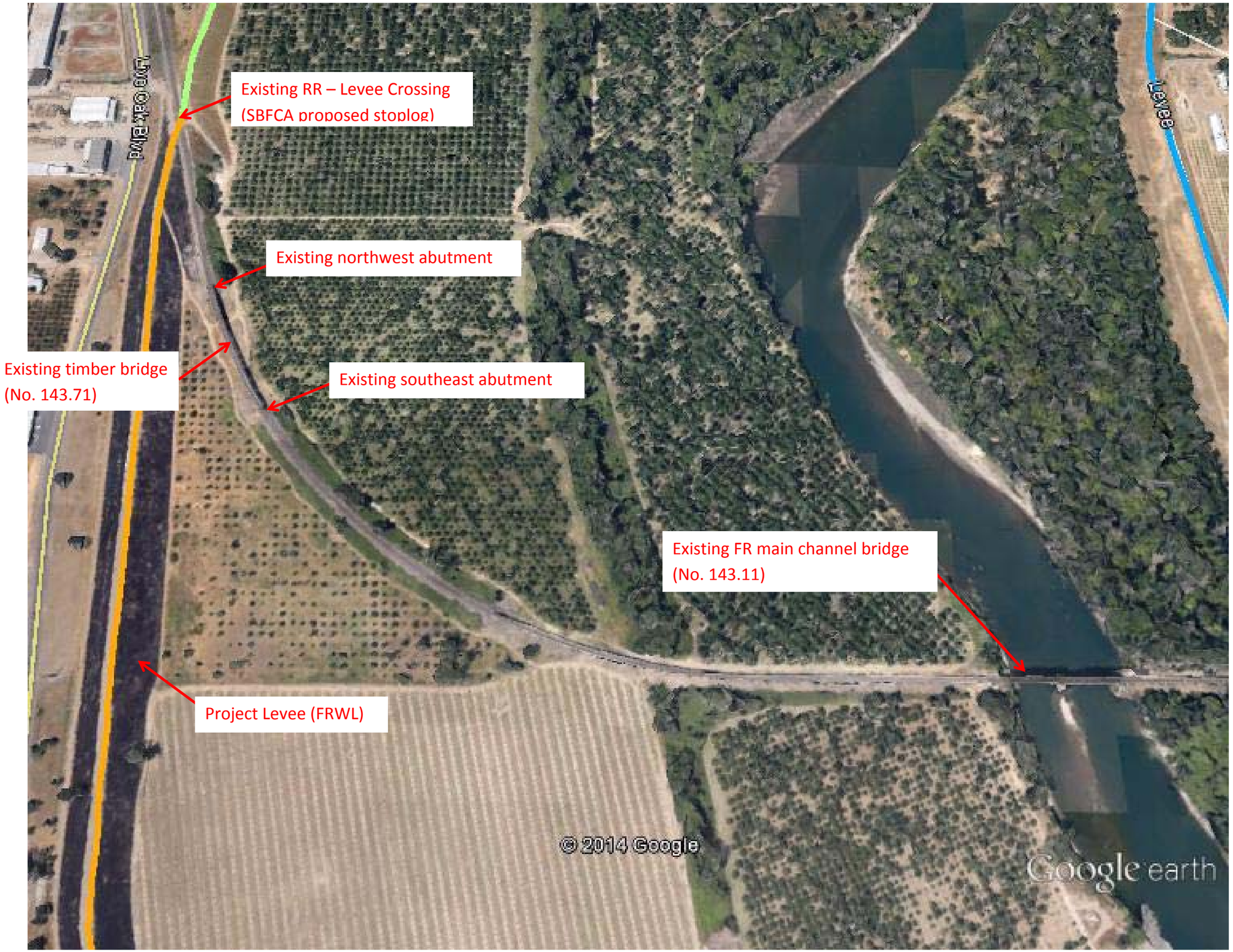
LOCATION: BRIDGE 143.71 - VALLEY SUBDIVISION

FACILITY: 7-SPAN 30" PCB x 211' REPLACING 34-SPAN TST-BD x 511'

DWG TITLE: TOPOGRAPHIC LOCATION MAP

WORK ORDER:	DATE: 11-26-13	SURVEY: 12-11-12
UP ENGINEER:		
DESIGN BY:		
CHECKED BY:		
DRAWN BY: GVP	DWG. SEQUENCE F-1	C E NUMBER
CHECKED BY: BS		
SCALE: AS SHOWN		

ATTACHMENT A - Project Maps


Live Oak Blvd
Levee
Existing RR – Levee Crossing
(SBFCA proposed stoplog)
Existing northwest abutment
Existing timber bridge
(No. 143.71)
Existing southeast abutment
Existing FR main channel bridge
(No. 143.11)
Project Levee (FRWL)
© 2014 Google
Google earth

ATTACHMENT A - Project Maps

ATTACHMENT A - Project Maps

ATTACHMENT A - Project Maps


Feather River East Levee
Existing FR main channel bridge
(No. 143.11)
© 2014 Google
Google earth

TO BERG 8
DUNSMUIR
(TIMETABLE NORTH)

100-YR FLOODPLAIN (TYP.)

UPRR R-O-W (TYP.)

PROPOSED FILL (TYP.)

BRIDGE 143.71
7-SPAN, 210' LONG, PRESTRESSED CONCRETE
BOX (PCB) GIRDER
REPLACING 34-SPAN, 510' LONG, TIMBER STRINGER
TRESTLE - BALLAST DECK (TST-BD)

FLOW

HEC RAS SECTION 30.250
100-YR WSE=76.40
200-YR WSE=79.22

HEC RAS SECTION 30.000
100-YR WSE=76.06
200-YR WSE=78.95

HEC RAS SECTION 29.828
100-YR WSE=75.94
200-YR WSE=78.86

HEC RAS SECTION 29.826
100-YR WSE=75.85
200-YR WSE=78.78

HEC RAS SECTION 29.822
100-YR WSE=75.87
200-YR WSE=78.80

HEC RAS SECTION 29.821
100-YR WSE=75.88
200-YR WSE=78.81

BRIDGE 143.11
16-SPAN, 480' LONG, PRESTRESSED
CONCRETE BOX
2-SPAN, 332' LONG, THROUGH TRUSS
PINNED - OPEN DECK (TTP-OD)
50-SPAN, 1,492' LONG, PRESTRESSED
CONCRETE BOX

HEC RAS SECTION 29.750
100-YR WSE=75.83
200-YR WSE=78.78

NGS BENCHMARK PID KS0918
ELEV. 78.89'

TO BINNEY JCT. &
EAST ROSEVILLE
(TIMETABLE SOUTH)

FLOW

N

0 400'

NO.	DATE	REVISIONS

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

LOCATION: BRIDGE 143.71 - VALLEY SUBDIVISION

FACILITY: 7-SPAN 30" PCB x 211' REPLACING 34-SPAN TST-BD x 511'

DWG TITLE: POST PROJECT WORK MAP

WORK ORDER:	DATE: 11-26-13	SURVEY: 12-11-12
UP ENGINEER:		
DESIGN BY:		
CHECKED BY:		
DRAWN BY: GVP	DWG. SEQUENCE F-2	C E NUMBER
CHECKED BY: BS		
SCALE: AS SHOWN		

ATTACHMENT A - Project Maps

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18931 BD

This Permit is issued to:

Union Pacific Railroad
1400 DouglasSt., Stop 0910
Omaha, Nebraska 68179-0910

To replace the existing 510 foot, 34-span timber bridge with a 210 foot, 7-span concrete bridge supported on steel H-piles and approximately 300 linear-feet of imported fill (approximately 21,000 cubic yards) compacted to a 2:1 (horizontal:vertical) slope. The work will require construction of temporary access ramps, requiring approximately 400 cubic yards of imported fill, which shall be removed after project completion.

The project is located at Union Pacific Railroad (UPRR) Bridge No.143.71 approximately one-half mile north of Yuba City on a northbound right curve of track running approximately southeast to northwest through the west overbank area of the Feather River floodway. (Section 10, T15N, R3E, MDB&M, Levee District 1, Feather River, Sutter County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: _____

_____
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18931 BD

THIRTEEN: All work completed under this permit, as directed by the general and special conditions herein, shall be accomplished to ensure that the work is not injurious to adopted plans of flood control, regulated streams, and designated floodways under Central Valley Flood Protection Board (Board) jurisdiction, as defined in California Code of Regulations, Title 23. This permit only applies to the completion of work in the project description located within, or adjacent to and having bearing on Board jurisdiction, and which directly or indirectly affects the Board's jurisdiction. This special condition shall apply to all subsequent conditions herein.

LIABILITY AND IMDEMNIFICATION

FOURTEEN: The permittee shall defend, indemnify, and hold the Board and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State") and Levee District No. 1 of Sutter County (LD1), safe and harmless, of and from all claims and damages related to the Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

FIFTEEN: The permittee is responsible for all liability associated with construction, operation, and

maintenance of the permitted facilities and shall defend, indemnify, and hold the Board and the State of California; including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State") and LD1, safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

SIXTEEN: The Board, Department of Water Resources, and LD1 shall not be held liable for damages to the permitted encroachment(s) resulting from releases of water from reservoirs, flood fight, operation, maintenance, inspection, or emergency repair.

SEVENTEEN: If the permittee does not comply with the conditions of the permit and enforcement by the Board is required, the permittee shall be responsible for bearing all costs associated with the enforcement action, including reasonable attorney's fees. Permittee acknowledges that State law allows the imposition of fines in enforcement matters.

AGENCY CONDITIONS

EIGHTEEN: The permittee shall comply with all conditions set forth in the letter from the U.S. Army Corps of Engineers District Engineer dated September 5, 2014, which is attached to this permit as Exhibit A and is incorporated by reference.

NINETEEN: The permittee shall contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

TWENTY: LD1 shall be notified at least five (5) days prior to any construction activities.

TWENTY-ONE: The permittee agrees to incur all costs for compliance with local, State, and Federal permitting. If any conditions issued by other agencies conflict with any of the conditions of this permit, then the permittee shall resolve conflicts between any of the terms and conditions that agencies might impose under the laws and regulations it administers and enforces.

REAL ESTATE

TWENTY-TWO: If the construction project extends onto land owned in fee and/or easement by the Sacramento and San Joaquin Drainage District acting by and through the Board, the permittee should secure an easement, license, or temporary entry permit from the Board prior to commencement of work. Contact Angelica Aguilar at (916) 653-5782.

TWENTY-THREE: Prior to construction, the permittee, shall have obtained legal rights to all property where work to be performed under this permit is located.

PRE-CONSTRUCTION

TWENTY-FOUR: The permittee shall contact the Board by telephone at (916) 574-0609, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 20 working days prior to start of work may result in delay of the project.

TWENTY-FIVE: Thirty (30) calendar days prior to start of any demolition and/or construction activities within the floodway, the permittee shall submit to the Chief Engineer two sets of plans, specifications and supporting geotechnical and/ or hydraulic impact analyses, for any and all temporary, in channel cofferdam(s), gravel work pad(s), work trestle(s), scaffolding, piles, and/or other appurtenances that are to remain in the floodway during the flood season from November 1 through April 15. The Board shall acknowledge receipt of this submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Board may request additional information as needed and will seek comment from the U.S. Army Corps of Engineers and / or local maintaining agency when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) calendar days.

TWENTY-SIX: Prior to commencement of work, the permittee shall create a photo record, including associated descriptions, of the existing bridge site conditions. The photo record shall be certified (signed and stamped) by a licensed land surveyor or licensed civil engineer registered in the State of California and submitted to the Board within 30 days of beginning the project.

TWENTY-SEVEN: The permittee shall provide supervision and inspection services acceptable to the Board.

CONSTRUCTION

TWENTY-EIGHT: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit (stated in the permit description), shall be done in the area without prior approval of the Board.

TWENTY-NINE: All addenda or other changes made to the submitted documents by the permittee after issuance of this permit shall be submitted to the Chief Engineer for review and approval prior to incorporation into the permitted project. The submittal shall include supplemental plans, specifications, and supporting geotechnical, hydrology and hydraulics, or other technical analyses. The Board shall acknowledge receipt of the addendum or change submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Board may request additional information as needed and will seek comment from the U.S. Army Corps of Engineers and / or the local maintaining agency when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) calendar days. Upon approval of the submitted documents the permit shall be revised, if needed, prior to construction related to the proposed changes.

THIRTY: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Board.

THIRTY-ONE: The stability of the Feather River west levee shall be maintained at all times during construction.

THIRTY-TWO: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15.

THIRTY-THREE: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

THIRTY-FOUR: The method and schedule of removing the bridge shall be submitted to and approved by the Board's Chief Engineer prior to the start of work.

THIRTY-FIVE: Piers, bents, and abutments being dismantled shall be removed to at least one (1) foot below the natural ground.

THIRTY-SIX: The abandoned or dismantled bridge shall be completely removed and disposed of outside the limits of the levee section and floodway.

THIRTY-SEVEN: Backfill material for excavations shall be placed in four (4) to six (6) inch layers and compacted to at least the density of the adjacent, firm, undisturbed material.

THIRTY-EIGHT: All fill materials shall be placed in four (4) to six (6) inch layers and compacted to a relative compaction of not less than 90 percent per ASTM D 1557-91 or 97 percent per ASTM D 698-91 above optimum moisture content. Fill material within two feet of the bridge shall be compacted by appropriate hand operated compaction equipment. Field density tests shall be taken by a certified soils laboratory to verify compaction of the fill placed.

THIRTY-NINE: Temporary access ramps shall be removed from the floodway during flood season from November 1 through April 15, and after completion of the project.

FORTY: All debris generated by this project shall be disposed of outside the floodway.

FORTY-ONE: The permittee shall be responsible for all damages due to settlement, consolidation, or heave from any construction-induced activities.

FORTY-TWO: Any damage to the levee crown roadway or access ramps that will be utilized for access for this project shall be promptly repaired to the condition that existed prior to this project.

FORTY-THREE: Except with respect to the activities expressly allowed under this permit, the work area shall be restored to the condition that existed prior to start of work.

POST-CONSTRUCTION

FORTY-FOUR: Within 120 days of completion of the project, the permittee shall submit to the Board, the Department of Water Resources, and LD1 a copy of mylar as-built drawings, a copy of UPRR's

bridge Operations and Maintenance manual for the bridge and embankment, and a certification report, stamped and signed by a licensed civil engineer registered in the State of California, certifying the work was performed and inspected in accordance with the Board permit conditions and submitted drawings and specifications.

OPERATIONS AND MAINTENANCE

FORTY-FIVE: The permittee shall be responsible for repair of any damages to the levee, channel, banks, floodway, or any other flood control facilities due to construction, operation, or maintenance of the proposed project.

FORTY-SIX: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Board, Department of Water Resources, or any other agency responsible for maintenance.

FORTY-SEVEN: All debris that may accumulate around the bridge supports and abutments within the floodway shall be completely removed from the floodway following each flood season.

FORTY-EIGHT: If the bridge is damaged to the extent that it may impair the channel or floodway capacity, it shall be repaired or removed prior to the next flood season.

FORTY-NINE: If the permitted encroachment(s) result in any adverse hydraulic impact or scouring the permittee shall provide appropriate mitigation acceptable to the Board.

FIFTY: If erosion occurs adjacent to the permitted encroachment(s), the permittee shall repair the eroded areas and place adequate mitigation on the affected areas to prevent further erosion.

FIFTY-ONE: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by the Board to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Board or Department of Water Resources. If the permittee does not comply, the Board may modify or remove the encroachment(s) at the permittee's expense.

FIFTY-TWO: At the request of either the permittee, Board, or LD1 the permittee shall conduct joint inspections of the bridge and embankment to assess the integrity and operation of the project, and to assess and respond to any adverse impacts on the floodway or adjacent properties.

PROJECT ABANDONMENT, CHANGE IN PLAN OF FLOOD CONTROL

FIFTY-THREE: If the project, or any portion thereof, is to be abandoned in the future, the permittee shall abandon the project under direction of the Board and Department of Water Resources, at the permittee's cost and expense.

FIFTY-FOUR: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood

control plan or project or if damaged by any cause. If the permittee does not comply, the Board may remove the encroachment(s) at the permittee's expense.

END OF CONDITIONS

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

REPLY TO
ATTENTION OF

Sep 05 2014

Flood Protection and Navigation Section (18931)

Ms. Leslie M. Gallagher, Acting Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, CA 95821

Dear Ms. Gallagher:

We have reviewed a permit application by Union Pacific Railroad (UPRR) (application number 18931). This project includes stabilizing and replacing the existing timber string trestle UPRR Bridge on the right overflow bank of the Feather River with a new 7 span, 210 feet long bridge deck, precast caps and girders supported by H-piles. Approximately 300 feet of the bridge from the northwest abutment will be supported by clean fill compacted in lifts and finished to a 2:1 slope. The project is located at Mile Post 143.71 on the Valley Subdivision of UPRR near Yuba City, at 39.165833°N 121.621111°W NAD83, Sutter County, California.

The District Engineer has no objection to approval of this application by your Board from a flood control standpoint, subject to the following conditions:

a. That no work shall be performed and no stockpiles of material or equipment shall remain in the channel during the flood season of November 1 to April 15, unless otherwise approved in writing by your Board.

b. That in the event trees and brush are cleared, they shall be properly disposed of by either complete burning or complete removal outside the limits of the project right-of-way.

c. That in the event erosion occurs at the site, the eroded areas shall be repaired and bank protection shall be placed to prevent future erosion.

d. That the proposed work shall not reduce the channel flow capacity or change the channel flow in such a way that may cause damage to the existing embankment.

e. That the proposed work shall not interfere with the integrity or hydraulic capacity of the flood risk reduction project; easement access; or maintenance, inspection, and flood fighting procedures.

f. That the existing bridge shall be completely removed from the project right-of-way.

There is not enough information provided to determine if there is a permit action under Section 10 and/or Section 404. Please advise the applicant to contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Division, 1325 J Street, Room 1350, Sacramento, California 95814, telephone (916) 557-5250.

A copy of this letter is being furnished to Mr. Don Rasmussen, Chief Flood Project Integrity and Inspection Branch, 3310 El Camino Avenue, Suite 200, Sacramento, CA, 95821.

Sincerely,

Rick L. Poeppelman, P.E.
Chief, Engineering Division

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 1: Top of rail profile from near Bridge 143.71, looking TT North.

PHOTO 2: Top of rail profile from near Bridge 143.71, looking TT South.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 9: Upstream face of Bridge 143.71, looking TT North.

PHOTO 10: Upstream face of Bridge 143.71, looking TT North.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 11: Upstream face of Bridge 143.71, looking TT West.

PHOTO 12: Upstream face of Bridge 143.71, looking TT West.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 17: Downstream face of Bridge 143.71, looking TT North.

PHOTO 18: Downstream face of Bridge 143.71, looking TT East.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 19: Downstream face of Bridge 143.71, looking TT North.

PHOTO 20: Downstream face of Bridge 143.71, looking TT South.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 21: Downstream face of Bridge 143.71, looking TT East.

PHOTO 22: Downstream face of Bridge 143.71, looking TT East.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 23: View of TT North upstream face abutment, looking TT West.

PHOTO 24: View of TT North upstream face abutment, looking TT West.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 31: View at of typical bent, looking TT South.

PHOTO 32: View at of typical bent, looking TT West.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 33: View access road with span 25, looking TT East.

PHOTO 34: View access road with span 25, looking TT East.

UPRR Bridge 143.71 – Valley Subdivision
Roseville Division

11 December 2012
Near Berg, California

UPRR BRIDGE SURVEY – PHOTOLOG

PHOTO 35: View underneath bridge.

PHOTO 36: View of timber bridge, looking TT North.

State of California

DEPARTMENT OF WATER RESOURCES
CENTRAL VALLEY FLOOD PROTECTION BOARD

California Natural Resources Agency

APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMIT

Application No. _____
(For Office Use Only)

1. Description of proposed work being specific to include all items that will be covered under the issued permit.

UPRR is proposing to stabilize and replace the existing timber string trestle bridge located at MP 143.71 on the Valley Subdivision. Approximately 300 feet of Bridge 143.71 from the geographic northwest abutment will be supported by clean earth fill compacted in lifts and finished to a 2:1 slope. The remainder of the bridge will be replaced with a new 7-span, 210-foot-long bridge deck, precast caps and girders supported by H-piles.

2. Project Location: Sutter County, in Section 10

Township: 15 North (N) (S), Range: 3 East (E) (W), M. D. B. & M.

Latitude: 39°09'57" Longitude: -121°37'16"

Stream : Feather River , Levee : Feather River West Designated Floodway: None - FEMA Zone A

APN: 18-070-002 & 18-070-001

3. Stephen L. Cheney (Name of Applicant / Land *Owner*) of Union Pacific Railroad, 1400 Douglas St., Stop 0910 (Address)

Omaha (City) Nebraska (State) 68179-0910 (Zip Code) (402) 544-3227 (Telephone Number)

slcheney@up.com (E-mail)

4. John Schoonover (Name of Applicant's Representative) of CH2M HILL (Company)

Redding (City) CA (State) 96001 (Zip Code) (530) 229-3305 (Telephone Number)

John.Schoonover@ch2m.com (E-mail)

5. Endorsement of the proposed project from the Local Maintaining Agency (LMA):

We, the Trustees of Levee District #1 (see additional info below) (Name of LMA) approve this plan, subject to the following conditions:

☐ Conditions listed on back of this form ☒ Conditions Attached ☐ No Conditions

William H. Hemp 1/15/15
Trustee Date

Trustee Date

Trustee Date

Trustee Date

APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMIT

6. Names and addresses of adjacent property owners sharing a common boundary with the land upon which the contents of this application apply. If additional space is required, list names and addresses on back of the application form or an attached sheet.

Name	Address	Zip Code
DiFiore Enterprises, L.P.	5028 Carlson Road Yuba City, CA	95993
Boone Declaration 91 Trust	7746 Larkin Road Live Oak, CA	95953

7. Has an environmental determination been made of the proposed work under the California Environmental Quality Act of 1970? ☐ Yes ☑ No ☐ Pending

If yes or pending, give the name and address of the lead agency and State Clearinghouse Number:

This project is exempt under CEQA as a project "for the institution or increase of passenger or commuter services on rail or highway rights-of-way already in use." CEQA § 21080(b)(10) and 14 CCR § 15275. A Notice of Exemption should be issued for this project.

SCH No. _____

8. When is the project scheduled for construction? July 2014

9. Please check exhibits accompanying this application.

   A. ☑ Regional and vicinity maps showing the location of the proposed work.

   B. ☑ Drawings showing plan view(s) of the proposed work to include map scale.

   C. ☑ Drawings showing the cross section dimensions and elevations (vertical datum?) of levees, berms, stream banks, flood plain,

   D. ☑ Drawings showing the profile elevations (vertical datum?) of levees, berms, flood plain, low flow, etc.

   E. ☑ A minimum of four photographs depicting the project site.

Steve Chung — Signature of Applicant — 12/10/2013 — Date

Include any additional information:

#5: LMA endorsement pending approval from Levee District One board meeting scheduled for 12/9/13.

LEVEE DISTRICT NO. 1 – ENDROSEMENT CONDITIONS

Levee District No. 1 of Sutter County (LD1) has the following conditions to be included on the Central Valley Flood Protection Board Encroachment Permit for the Union Pacific Railroad Company Bridge 143.71 replacement project. The conditions are as follows:

1. All improvements shall meet or exceed Central Valley Flood Protection Board Title 23, Department of Water Resources, DWR Urban Levee Design Criteria, FEMA, **Levee District No. 1 of Sutter County**, and U.S Army Corps of Engineers Standards and requirements.

2. The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the **Levee District No. 1 of Sutter County**, Central Valley Flood Protection Board, and the State of California; including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

3. The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board, **Levee District No. 1 of Sutter County**, and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages related to the Central Valley Flood Protection Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

4. The Central Valley Flood Protection Board, Department of Water Resources, and **Levee District No.1 of Sutter County** shall not be held liable for any damages to the permitted encroachment(s) resulting from flood fight, operation, maintenance, inspection, or emergency repair.

5. All work endorsed by this permit shall be in accordance with the submitted drawings and specifications. No further work, other than approved by this permit, shall be done in the area without prior endorsement of **Levee District No. 1 of Sutter County**.

6. Bridge piers and bents within the floodway shall be constructed parallel to the direction of stream flow in accordance with Section 128(a) (3) of Title 23 unless a variance is obtained from CVFPB, USACE, and DWR.

7. The permittee has requested a variance to Section 128(a) (16) of Title 23 which requires the soffit of the replacement bridge to be no lower than the existing bridge. If the CVFPB, USACE, and DWR grant the variance, the permittee shall provide a letter of commitment to allow a stop log structure to be installed on the rail line at the west levee of the Feather River, allow Sutter Butte Flood Control Agency to construct the stop log structure, and to allow Levee District No. 1 of Sutter County the right to operate and maintain the stop log structure. The permittee shall acknowledge that the stop log structure will be closed during some flood events.

8. The project shall not increase the 1-in-100 and/or the 1-in-200 water surface elevation compared to post construction conditions assuming effective flow area below the bridge.

9. A copy of operation and maintenance manual for the bridge and embankment shall be provided to **Levee District No. 1 of Sutter County** upon completion of the work. The O&M manual shall include provisions for annual inspection which meet or exceed the CVFPB, DWR, USACE, and **Levee District No. 1 of Sutter County** standards. The results of the annual inspection shall be provided to **Levee District No. 1 of Sutter County** prior to November 1 each year.

10. The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

11. The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation and maintenance of the flood control project to interfere, the permittee shall be required, at permittee’s sole cost and expense, to modify or remove the permitted encroachment(s).

12. If the project or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project, at the permittee’s or successor’s sole cost and expense.

13. A set of As-Built Mylar plans and specifications shall be provided to **Levee District No. 1 of Sutter County** upon completion of the work.

14. A copy of the final Central Valley Flood Protection Board Permit shall be provided to **Levee District No. 1 of Sutter County** upon approval of the permit by the CVFPB Board.

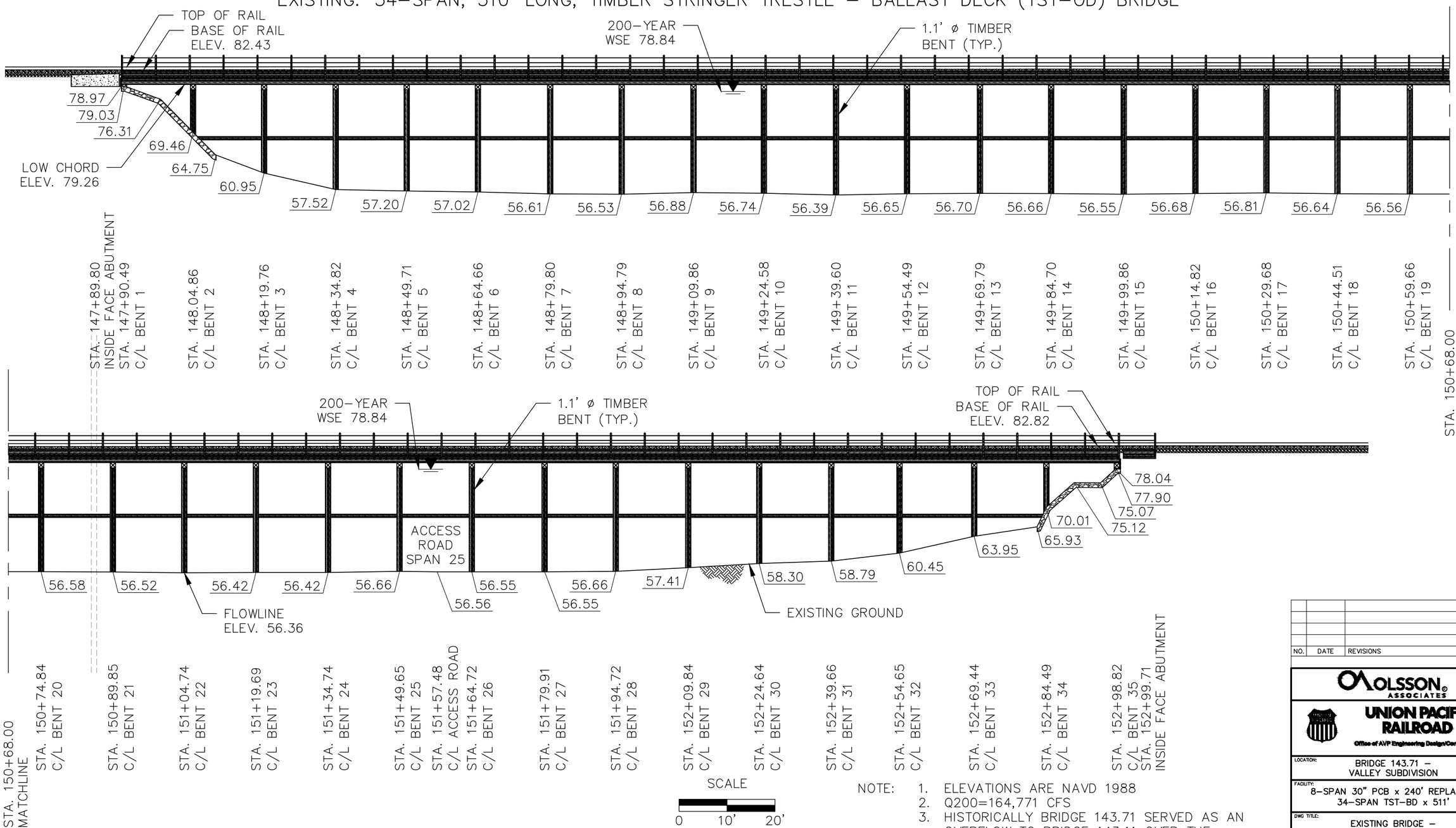
15. **Levee District No. 1 of Sutter County** shall be notified five (5) working days prior to any construction activities.

TO BINNEY JCT. &
EAST ROSEVILLE
(TIMETABLE SOUTH)

TO BERG &
DUNSMUIR
(TIMETABLE NORTH)

BRIDGE 143.71 – VALLEY SUBDIVISION

EXISTING: 34–SPAN, 510' LONG, TIMBER STRINGER TRESTLE – BALLAST DECK (TST–OD) BRIDGE



SCALE
0 10' 20'

NOTE:
1. ELEVATIONS ARE NAVD 1988
2. Q200=164,771 CFS
3. HISTORICALLY BRIDGE 143.71 SERVED AS AN OVERFLOW TO BRIDGE 143.11 OVER THE FEATHER RIVER WITH A COMBINED DRAINAGE AREA OF 3,974 SQ. MI.
4. BENTS SKEWED WITH RESPECT TO FEATHER RIVER FLOOD FLOW

NO.	DATE	REVISIONS

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

LOCATION: BRIDGE 143.71 – VALLEY SUBDIVISION

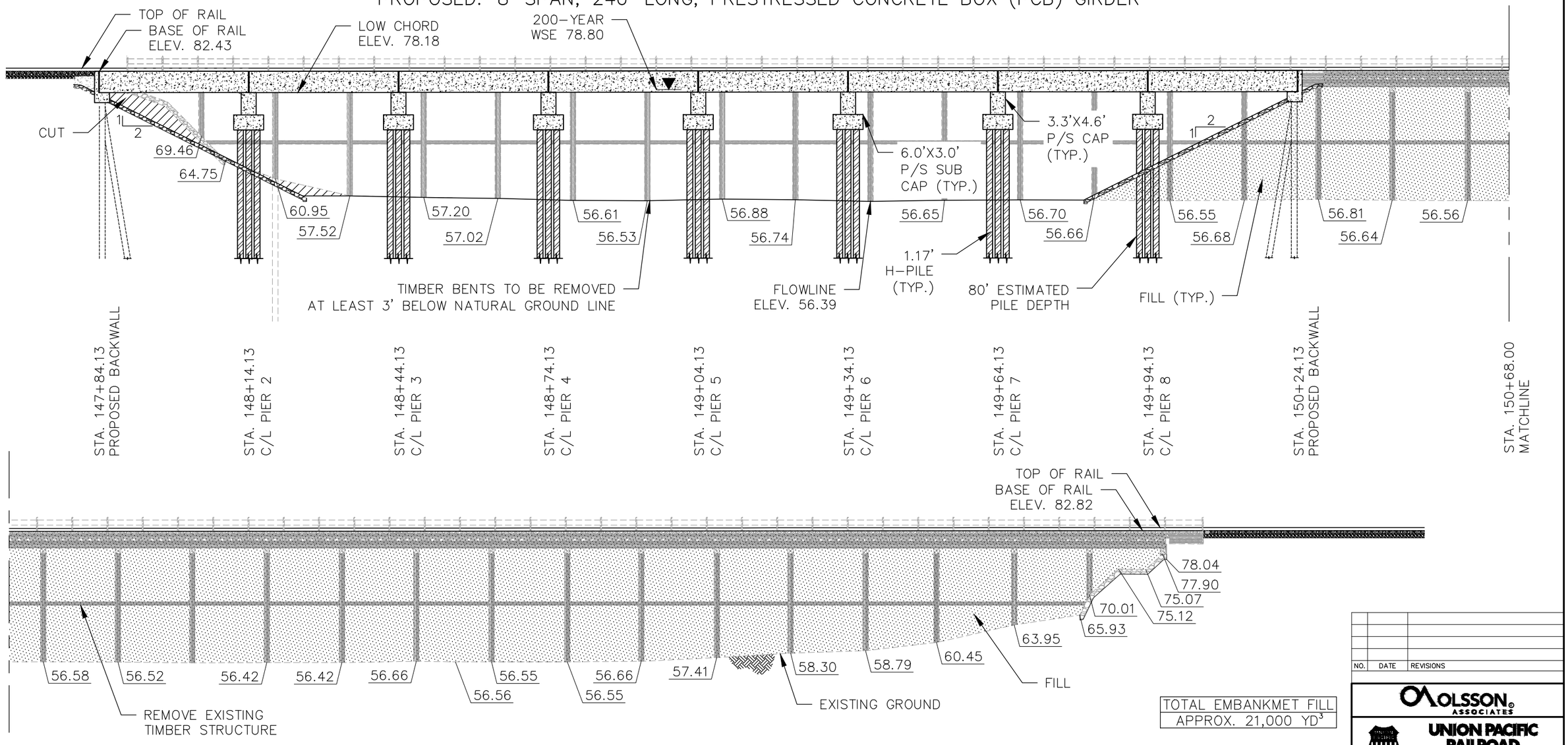
FACILITY: 8–SPAN 30" PCB x 240' REPLACING 34–SPAN TST–BD x 511'

DWG TITLE: EXISTING BRIDGE – UPSTREAM FACE PROFILE

WORK ORDER:	DATE: 1–13–15	SURVEY: 12–11–12
UP ENGINEER:		
DESIGN BY:		
CHECKED BY:		
DRAWN BY: DSL/ZDS	DWG. SEQUENCE F–3	C E NUMBER
CHECKED BY: BS		
SCALE: AS SHOWN		

BRIDGE 143.71 – VALLEY SUBDIVISION

PROPOSED: 8–SPAN, 240' LONG, PRESTRESSED CONCRETE BOX (PCB) GIRDER



TOTAL EMBANKMET FILL
APPROX. 21,000 YD^3

SCALE
0 10' 20'

NOTE:
1. ELEVATIONS ARE NAVD 1988
2. Q200=164,743 CFS
3. HISTORICALLY BRIDGE 143.71 SERVED AS AN OVERFLOW TO BRIDGE 143.11 OVER THE FEATHER RIVER WITH A COMBINED DRAINAGE AREA OF 3,974 SQ. MI.
4. FILL MATERIAL WILL BE PLACED IN 4" TO 6" LIFTS AND COMPACTED TO A RELATIVE COMPACTION OF NOT LESS THAT 90% ASTM D1557–91 ABOVE OPTIMUM MOISTURE CONTENT OR 97% PER ASTM D698–1 AT OR ABOVE OPTIMUM MOISTURE CONTENT.
5. BENTS SKEWED WITH RESPECT TO FEATHER RIVER FLOOD FLOW.

NO.	DATE	REVISIONS

OLSSON ASSOCIATES

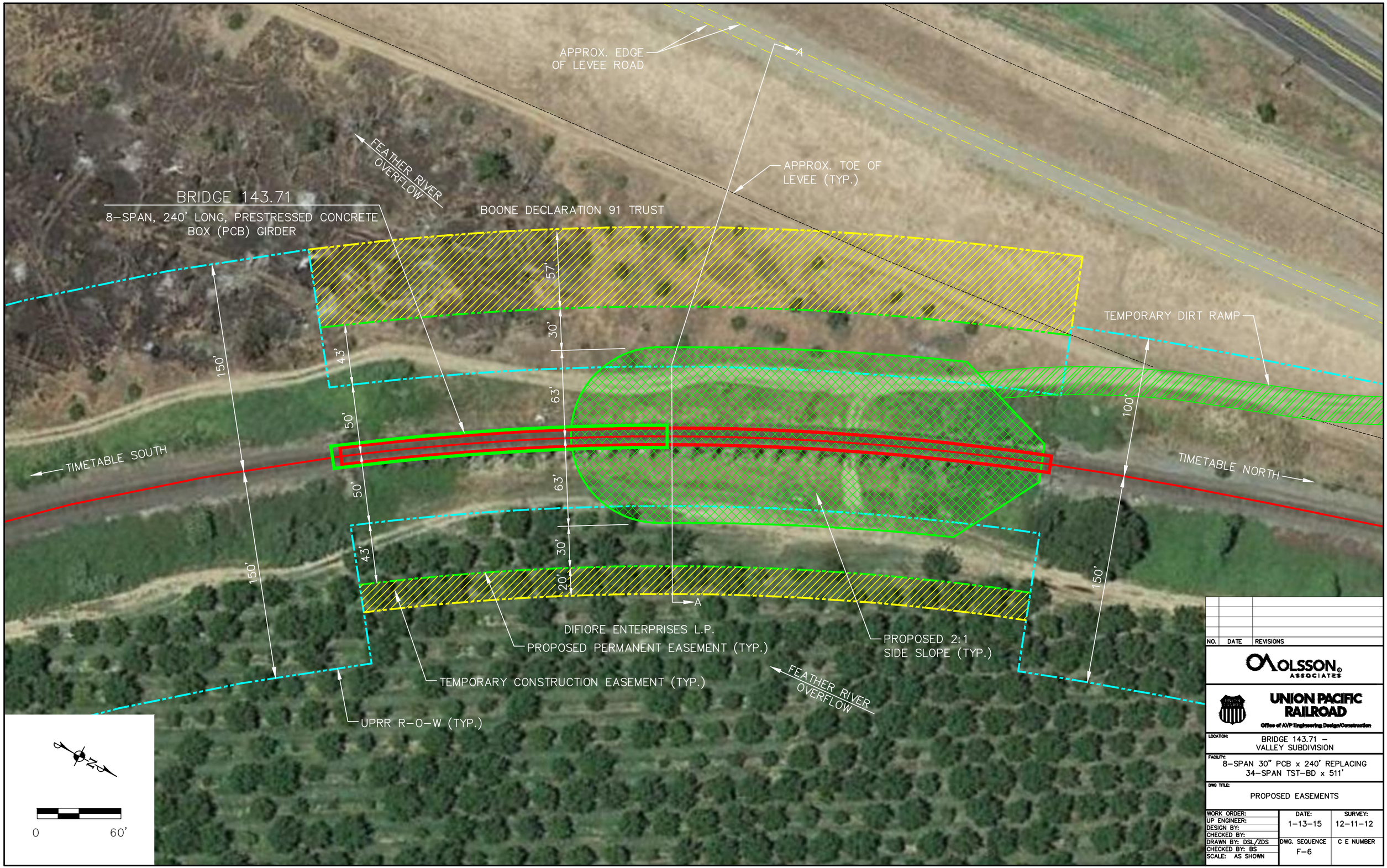
UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

LOCATION: BRIDGE 143.71 – VALLEY SUBDIVISION

FACILITY: 8–SPAN 30" PCB x 240' REPLACING 34–SPAN TST–BD x 511'

DWG TITLE: PROPOSED BRIDGE – UPSTREAM FACE PROFILE

WORK ORDER:	DATE: 1–13–15	SURVEY: 12–11–12
UP ENGINEER:		
DESIGN BY:		
CHECKED BY:		
DRAWN BY: DSL/ZDS	DWG. SEQUENCE F–4	C E NUMBER
CHECKED BY: BS		
SCALE: AS SHOWN		



NO.	DATE	REVISIONS

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

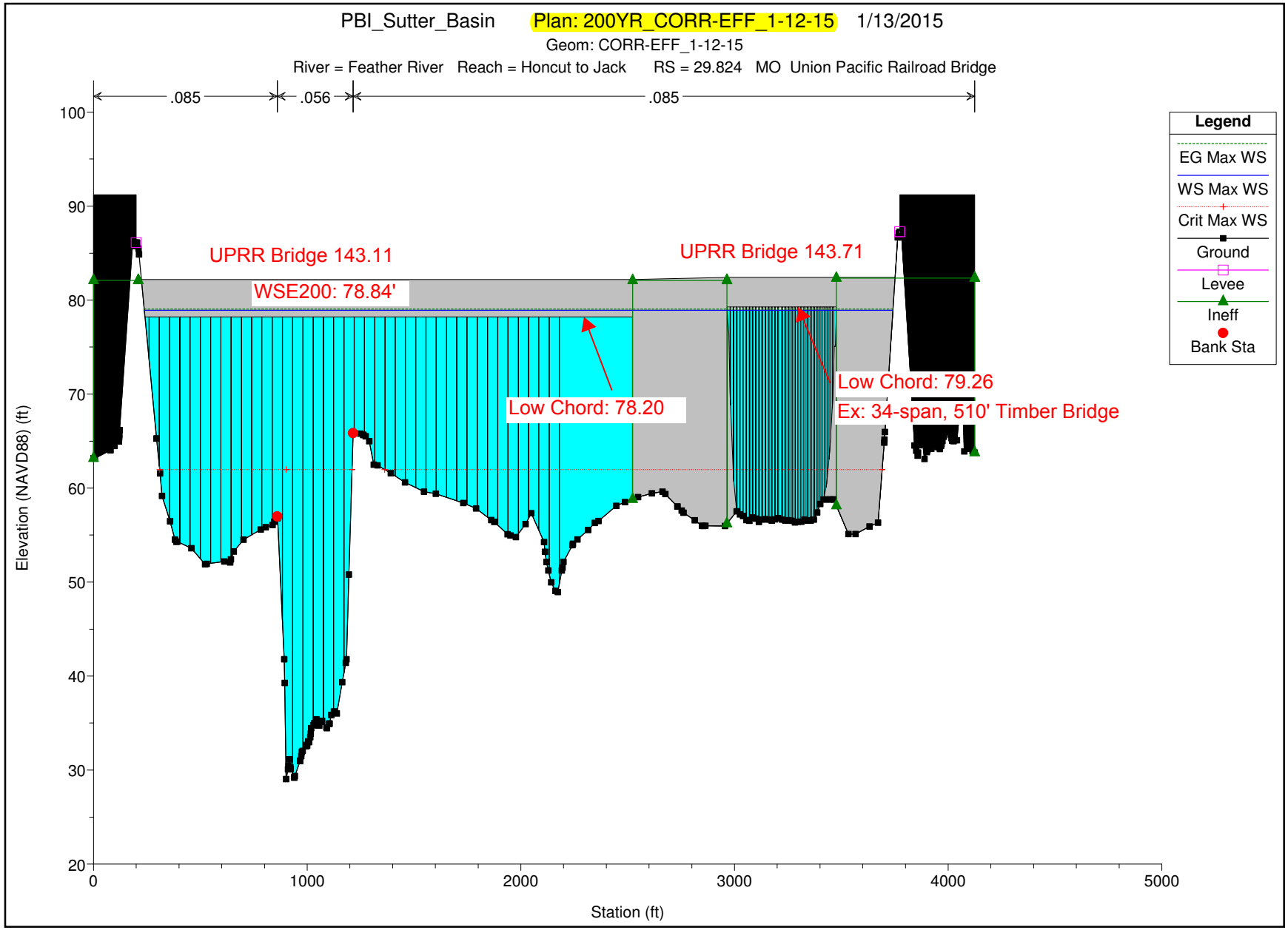
LOCATION: BRIDGE 143.71 – VALLEY SUBDIVISION

FACILITY: 8–SPAN 30" PCB x 240' REPLACING 34–SPAN TST–BD x 511'

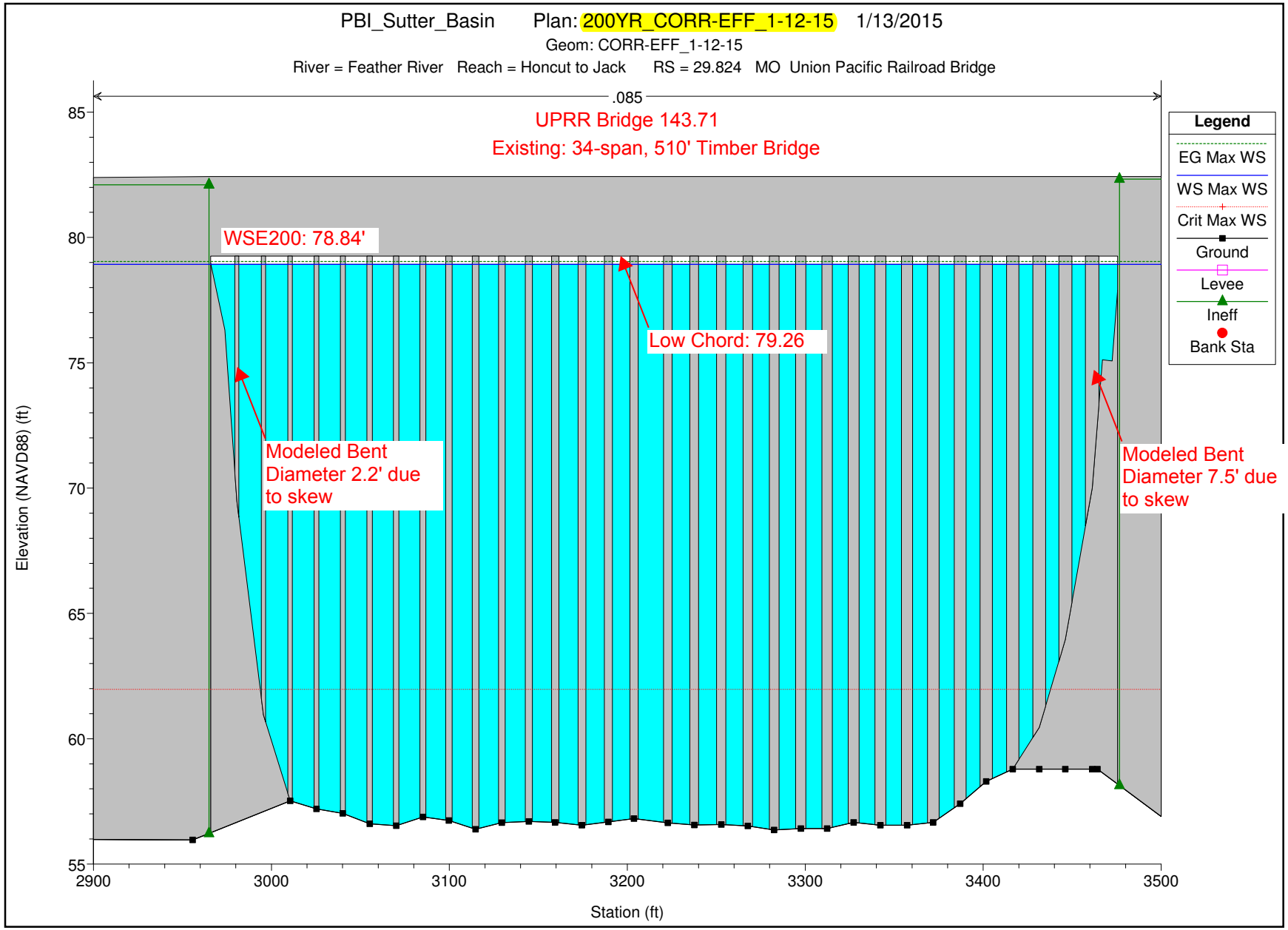
DWG TITLE: PROPOSED EASEMENTS

WORK ORDER:	DATE:	SURVEY:
UP ENGINEER:	1–13–15	12–11–12
DESIGN BY:		
CHECKED BY:		
DRAWN BY: DSL/ZDS	DWG. SEQUENCE	C E NUMBER
CHECKED BY: BS	F–6	
SCALE: AS SHOWN		

Existing Condition

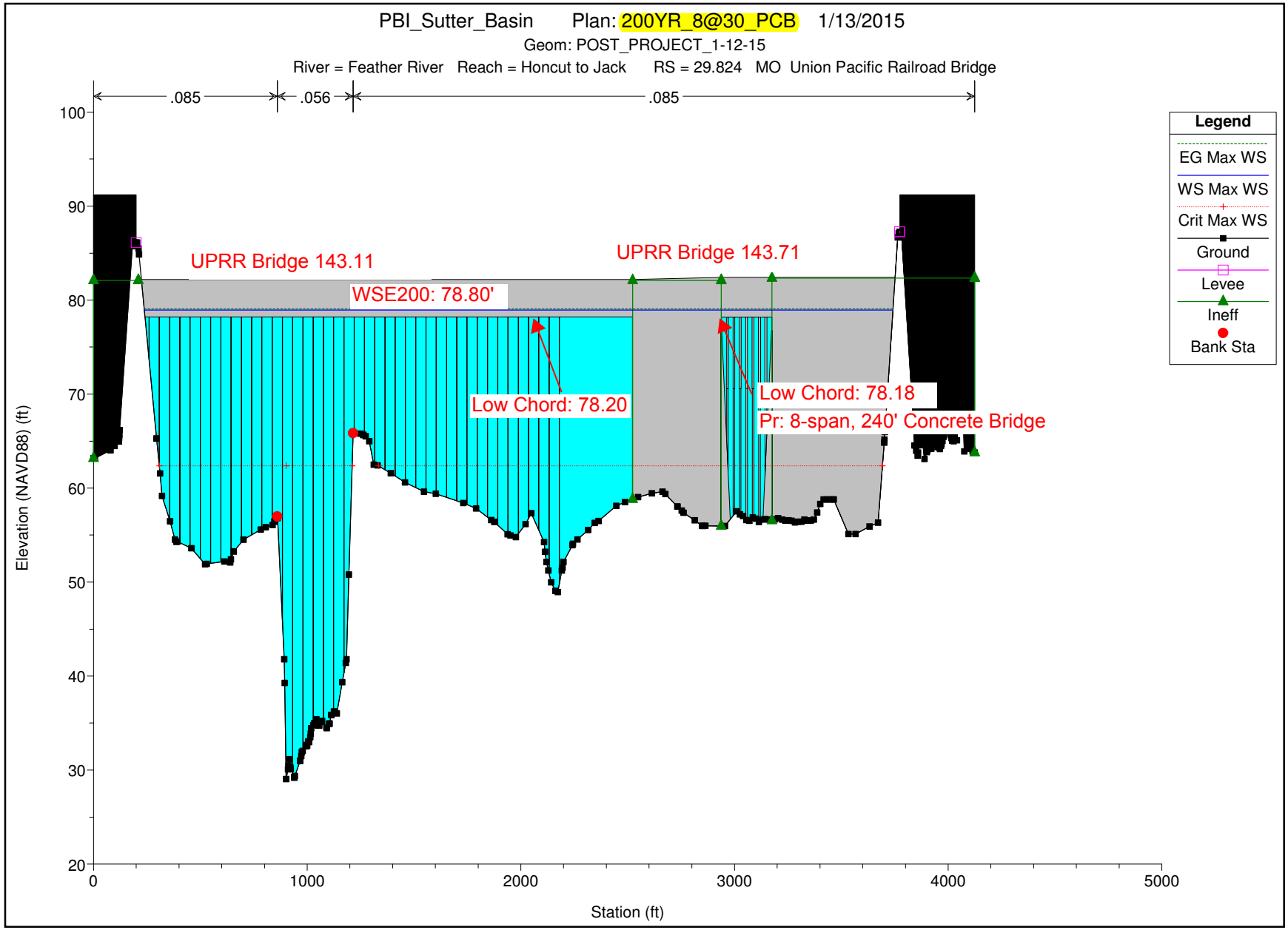


Existing Condition

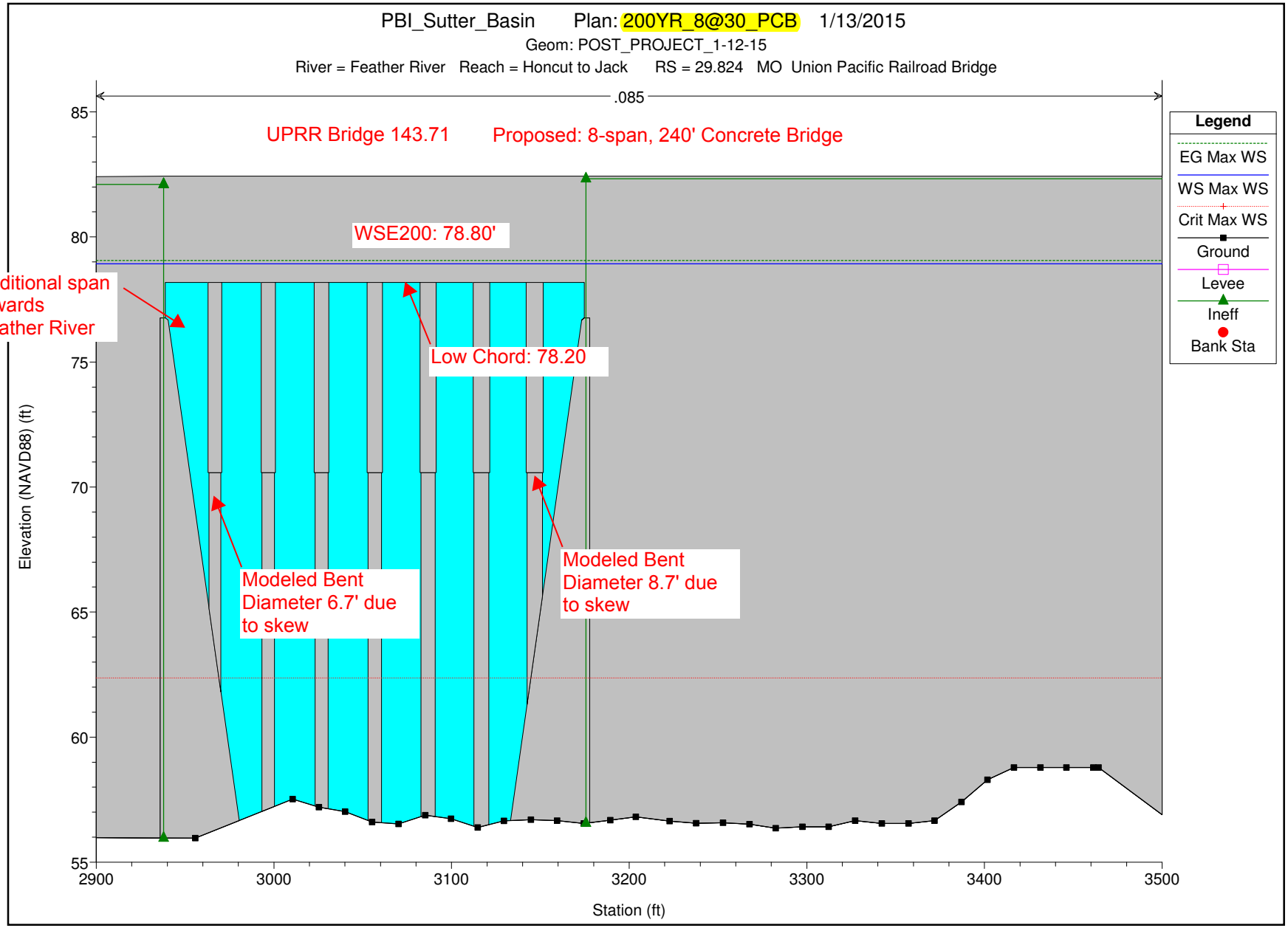


Notes: 1) Ineffective Flow Areas Removed
2) Due to curve in UPRR Bridge within Feather River floodplain, bents have increased skew to north

Proposed Condition



Proposed Condition



Notes: 1) Ineffective Flow Areas Removed
2) Due to curve in UPRR Bridge within Feather River floodplain, bents have increased skew to north

200-Year HEC-RAS Output Table - January 13, 2015

HEC-RAS River: Feather River Reach: Honcut to Jack Profile: Max WS (Continued)

Reach	River Sta	Profile	Plan	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)	
Honcut to Jack	31.05			Lat Struct									
Honcut to Jack	31.00	Max WS	200YR_CE_1-12-15	166484.50	28.39	79.72		79.81	0.000123	3.47	88722.80	3555.41	0.10
Honcut to Jack	31.00	Max WS	200YR_8@30_PCB	166533.70	28.39	79.71		79.80	0.000124	3.47	88692.79	3555.36	0.10
Honcut to Jack	30.75	Max WS	200YR_CE_1-12-15	166154.80	20.87	79.58		79.69	0.000151	3.78	79458.04	3366.58	0.10
Honcut to Jack	30.75	Max WS	200YR_8@30_PCB	166179.70	20.87	79.57		79.68	0.000151	3.78	79429.06	3366.52	0.10
Honcut to Jack	30.50	Max WS	200YR_CE_1-12-15	165746.20	30.08	79.40		79.51	0.000154	3.84	81600.56	3411.01	0.11
Honcut to Jack	30.50	Max WS	200YR_8@30_PCB	165744.60	30.08	79.39		79.50	0.000154	3.84	81570.45	3410.95	0.11
Honcut to Jack	30.25	Max WS	200YR_CE_1-12-15	165312.00	31.86	79.23		79.32	0.000130	3.05	82050.14	3534.77	0.09
Honcut to Jack	30.25	Max WS	200YR_8@30_PCB	165342.30	31.86	79.22		79.31	0.000130	3.05	82018.23	3534.72	0.09
Honcut to Jack	30.21			Lat Struct									
Honcut to Jack	30.2			Lat Struct									
Honcut to Jack	30.00	Max WS	200YR_CE_1-12-15	164959.80	22.29	78.96		79.13	0.000205	4.34	63427.07	2937.63	0.12
Honcut to Jack	30.00	Max WS	200YR_8@30_PCB	164929.40	22.29	78.95		79.12	0.000205	4.34	63403.07	2937.57	0.12
Honcut to Jack	29.828	Max WS	200YR_CE_1-12-15	164802.30	29.01	78.88		78.97	0.000141	3.65	83161.57	3502.80	0.10
Honcut to Jack	29.828	Max WS	200YR_8@30_PCB	164804.50	29.01	78.87		78.96	0.000141	3.66	83128.35	3502.73	0.10
Honcut to Jack	29.826	Max WS	200YR_CE_1-12-15	164771.40	29.04	78.84		79.00	0.000199	4.33	67499.83	3502.68	0.12
Honcut to Jack	29.826	Max WS	200YR_8@30_PCB	164742.90	29.04	78.80		78.98	0.000230	4.66	61522.26	3502.46	0.13
Honcut to Jack	29.824			Mult Open									
Honcut to Jack	29.822	Max WS	200YR_CE_1-12-15	164740.20	28.81	78.83		78.97	0.000181	4.13	67933.16	3503.64	0.11
Honcut to Jack	29.822	Max WS	200YR_8@30_PCB	164742.90	28.81	78.80		78.99	0.000236	4.71	62343.58	3503.43	0.13
Honcut to Jack	29.821	Max WS	200YR_CE_1-12-15	164740.20	28.59	78.81		78.97	0.000194	4.27	60564.83	3503.66	0.12
Honcut to Jack	29.821	Max WS	200YR_8@30_PCB	164773.80	28.59	78.81		78.97	0.000194	4.27	60568.76	3503.67	0.12
Honcut to Jack	29.82			Lat Struct									
Honcut to Jack	29.75	Max WS	200YR_CE_1-12-15	164678.30	29.23	78.78		78.88	0.000101	3.52	78692.13	3238.39	0.10
Honcut to Jack	29.75	Max WS	200YR_8@30_PCB	164742.70	29.23	78.78		78.88	0.000101	3.52	78697.19	3238.42	0.10
Honcut to Jack	29.741			Lat Struct									
Honcut to Jack	29.501	Max WS	200YR_CE_1-12-15	164461.10	30.04	78.69		78.75	0.000070	2.76	96165.34	4474.71	0.09
Honcut to Jack	29.501	Max WS	200YR_8@30_PCB	164527.10	30.04	78.69		78.75	0.000070	2.76	96172.23	4474.72	0.09

UPRR Bridge 143.11 and 143.71: Valley

The hydraulic analysis utilized the Sutter Butte Flood Control Agency (SBFCA) Feather River West Levee Project unsteady HEC-RAS 4.1.0.

UPRR Bridge 143.71: Valley Subdivision - Bridge Replacement (Feather River)
CVFPB Encroachment Permit No. 18931
Existing: 34-span, 510' long timber bridge

Table 1: Proposed 8-span, 240' long Concrete Bridge WSE Summary

Cross Section	Frequency	$WSE_{EXISTING}$ *	$WSE_{POST\ PROJECT}$ *	Δ WSE POST - EXISTING	$V_{EXISTING}$ (ft/s)	$V_{POST\ (ft/s)}$	Δ V POST - EXISTING
31.000	200-year	79.72	79.71	-0.01	3.47	3.47	0.00
30.750	200-year	79.58	79.57	-0.01	3.78	3.78	0.00
30.500	200-year	79.40	79.39	-0.01	3.84	3.84	0.00
30.250	200-year	79.23	79.22	-0.01	3.05	3.05	0.00
30.000	200-year	78.96	78.95	-0.01	4.34	4.34	0.00
29.828	200-year	78.88	78.87	-0.01	3.65	3.66	0.01
29.826	200-year	78.84	78.80	-0.04	4.33	4.66	0.33
29.824	UPRR Bridges 143.11 and 143.71: Valley Subdivision						
29.822	200-year	78.83	78.80	-0.03	4.13	4.71	0.58
29.821	200-year	78.81	78.81	0.00	4.27	4.27	0.00
29.820	Lateral Structure						
29.750	200-year	78.78	78.78	0.00	3.52	3.52	0.00
29.741	Lateral Structure						
29.501	200-year	78.69	78.69	0.00	2.76	2.76	0.00
29.500	200-year	78.69	78.69	0.00	2.76	2.76	0.00

Base of Rail:	82.43	ft	Existing Area:	7,133	ft^2
Existing Low Chord:	79.26	ft	Proposed Area:	3,086	ft^2
Proposed Low Chord:	78.18	ft			

* UPRR Bridge 143.71 Valley Sub bents skewed to represent track curve

1) The hydraulic analysis was based on utilizing the SBFCA unsteady flow HEC-RAS model, incorporating Olsson's bridge survey information, and removal of the ineffective flow areas.
2) The design discharges at UPRR Bridges 143.11 and 143.71 is approximately Q200 = 164,750 cfs

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
1400 Douglas Street Omaha, Nebraska 68179

January 14, 2015

Mr. Mike Inamine, P.E.
Executive Director
Sutter Butte Flood Control Agency
Post Office Box M
Yuba City, CA 95991

This letter serves to confirm that UPRR Structures Department has approved the design plans for the Flood Gate Structure at MP143.91, Valley Subdivision (Feather River Levee, Yuba City, CA, approx. lat/long 39.168830, -121.622661). UPRR Structures will continue to work with the project designer to address any outstanding issues and finalize the design.

Please note, an Agreement will need to be finalized for work to proceed. Approval from UPRR Structures Department has been forwarded through normal channels (UPRR Industry/Public Projects Group/UPRR Law Department) to set up the Agreement.

Also note, final approval is conditional upon final review of the IFC design plans and applicable construction submittals, as well as review and approval of a Flood Gate Closure Plan;

- The closure plan shall be submitted by the Sutter Butte Flood Control Agency and shall include a detailed description of procedures to coordinate access and installation of the flood gate with UPRR, as well as procedures for annual testing/installation.
- The designer and contractor shall submit a detailed work plan for review and approval when available and coordinate with UPRR as necessary to avoid service interruptions. The designer and contractor shall carefully review the construction sequence and identify any steps which may cause delay or service interruptions. The contractor shall submit applicable construction submittals (excavation/shoring, falsework, phasing and work plans, etc.) to UPRR for review and approval prior to work.

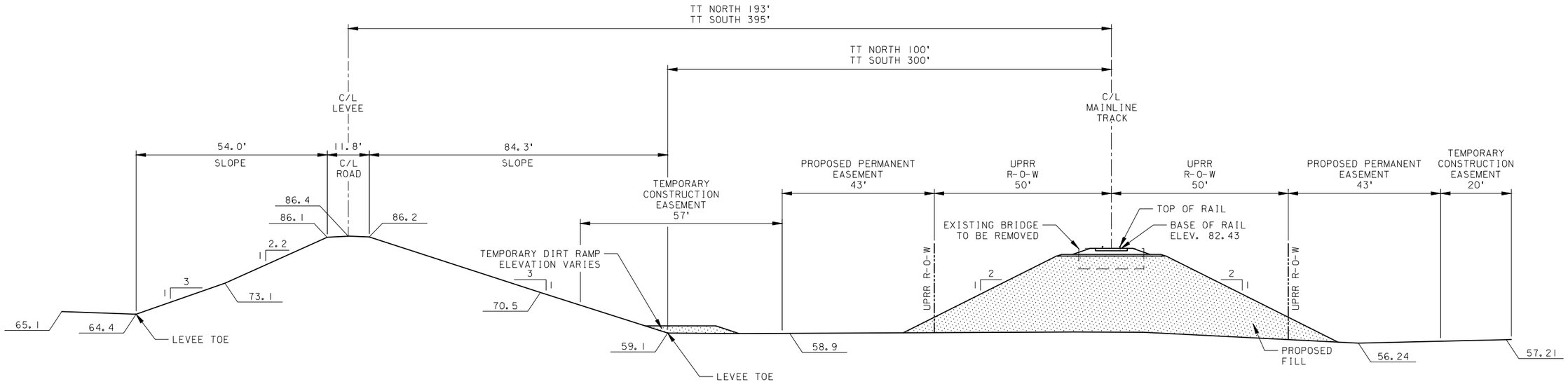
At this time, UPRR has no objection to installing the proposed flood gate structure during the SBFCA construction window between April 15 and October 31, contingent upon an agreement being in place and approval of all applicable construction submittals prior to work. It shall be understood, however, that installation of the flood gate will proceed on its own construction schedule, and will not be associated with the adjacent bridge replacement. (Upon review of the latest plans and experience with similar installations, it should be possible to install the proposed structure in available track windows without an extended track outage, as long as construction activities are carefully coordinated. UPRR previously provided a summary of likely construction phasing and which steps can be completed under Form B Protection or will require an outage/service interruption.)

Note, the flood gate plans were reviewed for conformance to Railroad requirements and possible disruption to Railroad operations. The structure's design and applicability as a waterproof barrier and/or ability to resist flood loading is the responsibility of the designer and is beyond the scope of this review.

If you have any questions or concerns, feel free to contact me directly.

Sincerely,

Martin K. Rump
SR STUCT DESIGNER
Engineering
P 402 544 6458
mkrump@up.com



TYPICAL LEVEE SECTION A

LOOKING TT NORTH

SCALE

0 15' 30'

NOTE: FILL MATERIAL WILL BE PLACED IN 4" TO 6" LIFTS AND COMPACTED TO A RELATIVE COMPACTION OF NOT LESS THAT 90% ASTM D1557-91 ABOVE OPTIMUM MOISTURE CONTENT OR 97% PER ASTM D698-1 AT OR ABOVE OPTIMUM MOISTURE CONTENT.

NO.	DATE	REVISIONS

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

LOCATION: BRIDGE 143.71 - VALLEY SUBDIVISION

FACILITY: 7-SPAN 30" PCB x 211' REPLACING 34-SPAN TST-BD x 511'

DWG TITLE: TYPICAL LEVEE SECTION

WORK ORDER:	DATE: 12-4-13	SURVEY: 12-11-12
UP ENGINEER:		
DESIGN BY:		
CHECKED BY:		
DRAWN BY: DSL	DWG. SEQUENCE F-1A	C E NUMBER
CHECKED BY: BS		
SCALE: AS SHOWN		

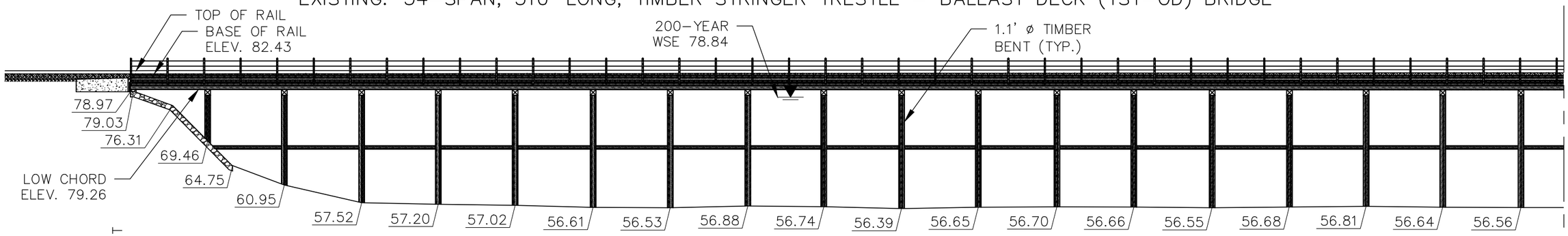
ATTACHMENT F - Project Drawings

TO BINNEY JCT. &
EAST ROSEVILLE
(TIMETABLE SOUTH)

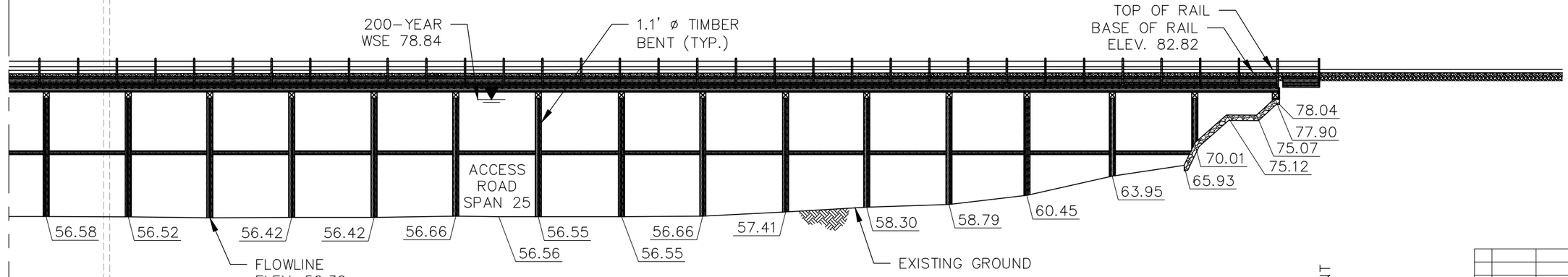
BRIDGE 143.71 – VALLEY SUBDIVISION

TO BERG &
DUNSMUIR
(TIMETABLE NORTH)

EXISTING: 34–SPAN, 510' LONG, TIMBER STRINGER TRESTLE – BALLAST DECK (TST–OD) BRIDGE



STA. 147+89.80
INSIDE FACE ABUTMENT
STA. 147+90.49
C/L BENT 1
STA. 148+04.86
C/L BENT 2
STA. 148+19.76
C/L BENT 3
STA. 148+34.82
C/L BENT 4
STA. 148+49.71
C/L BENT 5
STA. 148+64.66
C/L BENT 6
STA. 148+79.80
C/L BENT 7
STA. 148+94.79
C/L BENT 8
STA. 149+09.86
C/L BENT 9
STA. 149+24.58
C/L BENT 10
STA. 149+39.60
C/L BENT 11
STA. 149+54.49
C/L BENT 12
STA. 149+69.79
C/L BENT 13
STA. 149+84.70
C/L BENT 14
STA. 149+99.86
C/L BENT 15
STA. 150+14.82
C/L BENT 16
STA. 150+29.68
C/L BENT 17
STA. 150+44.51
C/L BENT 18
STA. 150+59.66
C/L BENT 19
STA. 150+68.00
MATCHLINE



STA. 150+68.00
MATCHLINE
STA. 150+74.84
C/L BENT 20
STA. 150+89.85
C/L BENT 21
STA. 151+04.74
C/L BENT 22
STA. 151+19.69
C/L BENT 23
STA. 151+34.74
C/L BENT 24
STA. 151+49.65
C/L BENT 25
STA. 151+57.48
C/L ACCESS ROAD
STA. 151+64.72
C/L BENT 26
STA. 151+79.91
C/L BENT 27
STA. 151+94.72
C/L BENT 28
STA. 152+09.84
C/L BENT 29
STA. 152+24.64
C/L BENT 30
STA. 152+39.66
C/L BENT 31
STA. 152+54.65
C/L BENT 32
STA. 152+69.44
C/L BENT 33
STA. 152+84.49
C/L BENT 34
STA. 152+98.82
C/L BENT 35
STA. 152+99.71
INSIDE FACE ABUTMENT

SCALE
0 10' 20'

NOTE:
1. ELEVATIONS ARE NAVD 1988
2. Q200=164,771 CFS
3. HISTORICALLY BRIDGE 143.71 SERVED AS AN OVERFLOW TO BRIDGE 143.11 OVER THE FEATHER RIVER WITH A COMBINED DRAINAGE AREA OF 3,974 SQ. MI.
4. BENTS SKEWED WITH RESPECT TO FEATHER RIVER FLOOD FLOW

NO.	DATE	REVISIONS

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

LOCATION: BRIDGE 143.71 – VALLEY SUBDIVISION

FACILITY: 8–SPAN 30" PCB x 240' REPLACING 34–SPAN TST–BD x 511'

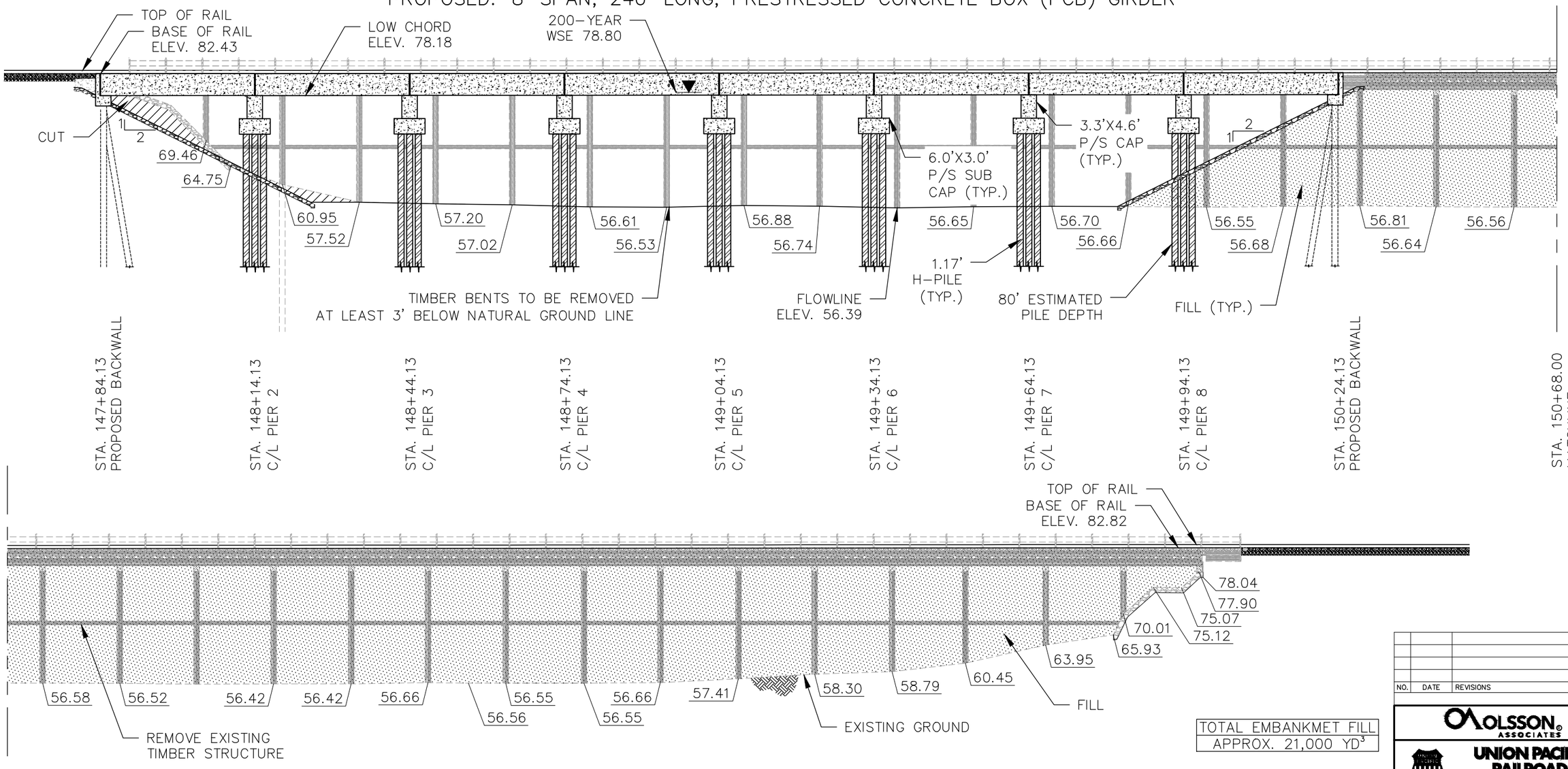
DWG TITLE: EXISTING BRIDGE – UPSTREAM FACE PROFILE

WORK ORDER:	DATE: 1–13–15	SURVEY: 12–11–12
UP ENGINEER:		
DESIGN BY:		
CHECKED BY:		
DRAWN BY: DSL/ZDS	DWG. SEQUENCE F–3	C E NUMBER
CHECKED BY: BS		
SCALE: AS SHOWN		

ATTACHMENT F - Project Drawings

BRIDGE 143.71 – VALLEY SUBDIVISION

PROPOSED: 8–SPAN, 240' LONG, PRESTRESSED CONCRETE BOX (PCB) GIRDER



TOTAL EMBANKMET FILL
APPROX. 21,000 YD^3

SCALE

0 10' 20'

NOTE:

1. ELEVATIONS ARE NAVD 1988
2. Q200=164,743 CFS
3. HISTORICALLY BRIDGE 143.71 SERVED AS AN OVERFLOW TO BRIDGE 143.11 OVER THE FEATHER RIVER WITH A COMBINED DRAINAGE AREA OF 3,974 SQ. MI.
4. FILL MATERIAL WILL BE PLACED IN 4" TO 6" LIFTS AND COMPACTED TO A RELATIVE COMPACTION OF NOT LESS THAT 90% ASTM D1557–91 ABOVE OPTIMUM MOISTURE CONTENT OR 97% PER ASTM D698–1 AT OR ABOVE OPTIMUM MOISTURE CONTENT.
5. BENTS SKEWED WITH RESPECT TO FEATHER RIVER FLOOD FLOW.

NO.	DATE	REVISIONS

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

LOCATION: BRIDGE 143.71 – VALLEY SUBDIVISION

FACILITY: 8–SPAN 30" PCB x 240' REPLACING 34–SPAN TST–BD x 511'

DWG TITLE: PROPOSED BRIDGE – UPSTREAM FACE PROFILE

WORK ORDER:	DATE: 1–13–15	SURVEY: 12–11–12
UP ENGINEER:		
DESIGN BY:		
CHECKED BY:		
DRAWN BY: DSL/ZDS	DWG. SEQUENCE F–4	C E NUMBER
CHECKED BY: BS		
SCALE: AS SHOWN		

ATTACHMENT F - Project Drawings

APPROX. EDGE OF LEVEE ROAD

A

APPROX. TOE OF LEVEE (TYP.)

FEATHER RIVER OVERFLOW

BRIDGE 143.71

8–SPAN, 240' LONG, PRESTRESSED CONCRETE BOX (PCB) GIRDER

BOONE DECLARATION 91 TRUST

TEMPORARY DIRT RAMP

TIMETABLE SOUTH

TIMETABLE NORTH

57'

30'

63'

43'

50'

150'

100'

20'

DIFIORE ENTERPRISES L.P.

PROPOSED PERMANENT EASEMENT (TYP.)

PROPOSED 2:1 SIDE SLOPE (TYP.)

TEMPORARY CONSTRUCTION EASEMENT (TYP.)

FEATHER RIVER OVERFLOW

UPRR R–O–W (TYP.)

0 60'

NO.	DATE	REVISIONS

OLSSON ASSOCIATES

UNION PACIFIC RAILROAD
Office of AVP Engineering Design/Construction

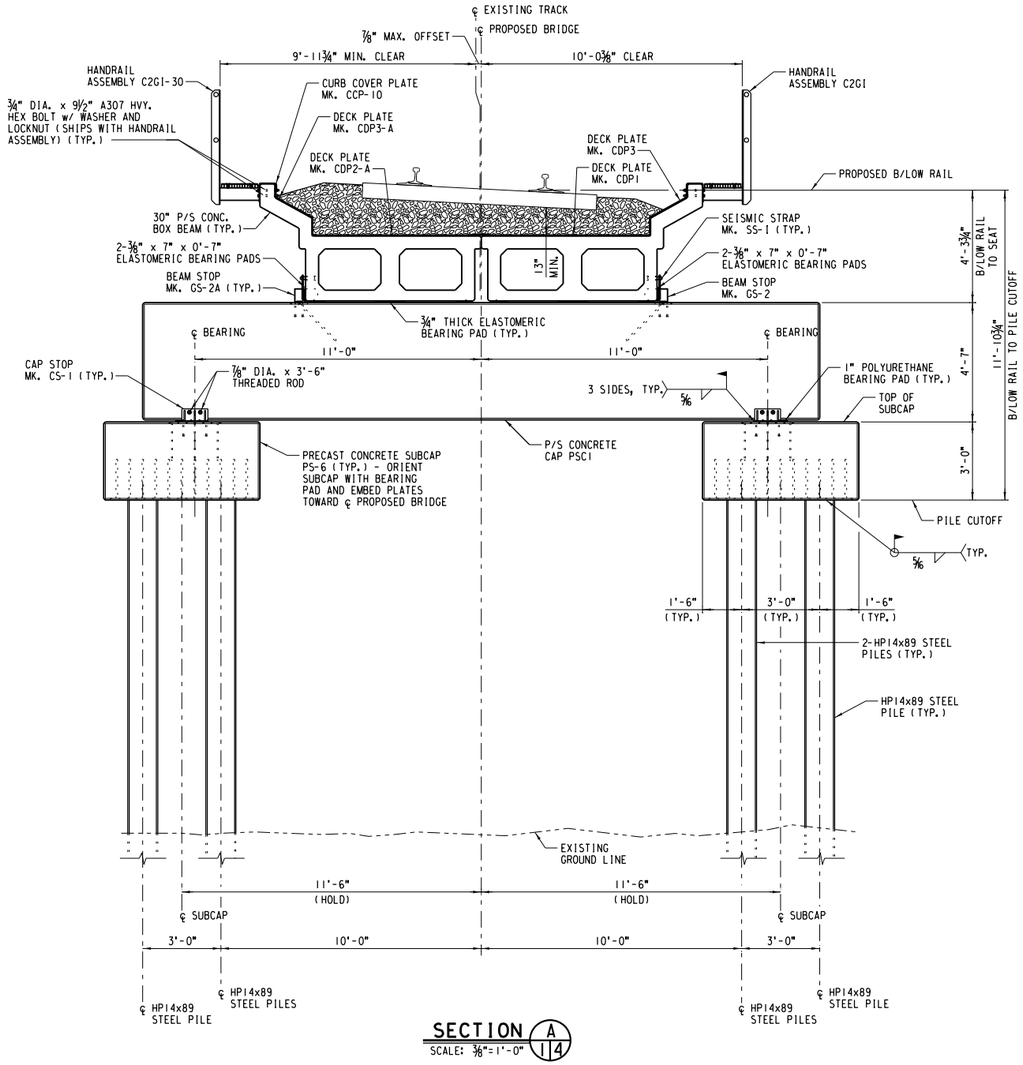
LOCATION: BRIDGE 143.71 – VALLEY SUBDIVISION

FACILITY: 8–SPAN 30" PCB x 240' REPLACING 34–SPAN TST–BD x 511'

DWG TITLE: PROPOSED EASEMENTS

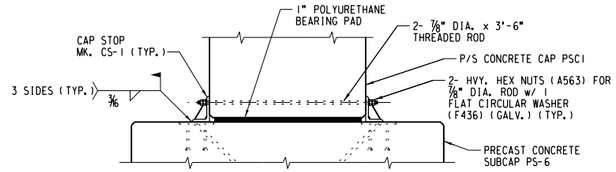
WORK ORDER:	DATE:	SURVEY:
UP ENGINEER:	1–13–15	12–11–12
DESIGN BY:		
CHECKED BY:		
DRAWN BY: DSL/ZDS	DWG. SEQUENCE	C E NUMBER
CHECKED BY: BS	F–6	
SCALE: AS SHOWN		

ATTACHMENT F - Project Drawings



SECTION A

SCALE: 3/8"=1'-0"



CONCRETE SUBCAP CONNECTION DETAIL

SCALE: 3/4"=1'-0"

CAP CONNECTION INSTRUCTIONS:

1. INSTALL THREADED RODS THRU CAP STOPS AND EMBEDDED PIPES IN CAP.
2. DOUBLE NUT EACH END OF THREADED RODS AND HAND TIGHTEN TO FACE OF CAP STOP. BURR THREADS AFTER TIGHTENING.
3. WELD CAP STOPS TO STEEL EMBED PLATES IN CONCRETE SUBCAP WITH FACE OF CAP STOP SNUG TO FACE OF CAP.

Steve Cheney 7-16-13

APPROVED FOR UNION PACIFIC RAILROAD CO. BY HDR ENGINEERING, INC (OMAHA, NE)

BY: (ORIGINAL SIGNED BY) JASON R. BEHRENS

DATE: 7/2/13

NO.	DATE	REVISIONS
	/ /	
	/ /	
	/ /	
	/ /	

HDR Engineering, Inc.

UNION PACIFIC RAILROAD

Office of AVP Engineering Design/Construction

LOCATION: BRIDGE 143.71 VALLEY SUB. 25.2 MILES SOUTH OF RICHVALE, CA

FACILITY: 7 SPAN 30" PCB x 211' REPLACING 34 SPAN TST-BD x 511'

DWG TITLE: TYPICAL SECTION AND CONSTRUCTION DETAIL

PROJECT ID:	17639	ENGINEER: UP-SLC HDR-NPD	LATITUDE: 39°09'57" N
WORK ORDER:	81263		LONGITUDE: 121°37'16" W
DESIGN BY:	SNP		
CHECKED BY:	KK		
DRAWN BY:	ACB	SHEET NO. 4 of 8	C E NUMBER 119516
CHECKED BY:	SNP		
SCALE: AS NOTED			

PLOTTED: 7/17/2013 5:13:02 AM

HDRPath FILE NAME: P:\dgn\va13437l_bca.dgn

INCHES 1 2 3 4 5 6 7 8 9 10 11 12

ATTACHMENT F - Project Drawings

UPRR Bridge 143.71: Valley Subdivision - Bridge Replacement (Feather River)
CVFPB Encroachment Permit No. 18931
Existing: 34-span, 510' long timber bridge

Table 1: Proposed 7-span, 210' long Concrete Bridge

Cross Section	Frequency	$WSE_{CORR\text{-}EFF\_INEFFECTIVE\ FLOW\ ARES}$	$WSE_{POST\_INNEFECTIVE\ FLOW\ ARES}$	Δ WSE POST - CORR-EFF	$V_{CORR\ EFF}$ (ft/s)	V_{POST} (ft/s)	Δ V CORR-EFF - POST
31.000	200-year	79.72	79.76	0.04	3.47	3.47	0.00
30.750	200-year	79.58	79.61	0.03	3.78	3.78	0.00
30.500	200-year	79.41	79.44	0.03	3.84	3.83	-0.01
30.250	200-year	79.23	79.26	0.03	3.05	3.05	0.00
30.000	200-year	78.96	79.00	0.04	4.34	4.33	-0.01
29.828	200-year	78.88	78.91	0.03	3.65	3.65	0.00
29.826	200-year	78.84	78.85	0.01	4.33	4.69	0.36
29.824	UPRR Bridges 143.11 and 143.71: Valley Subdivision						
29.822	200-year	78.83	78.80	-0.03	4.13	4.77	0.64
29.821	200-year	78.81	78.81	0.00	4.27	4.27	0.00
29.820	Lateral Structure						
29.750	200-year	78.78	78.77	-0.01	3.52	3.52	0.00
29.741	Lateral Structure						
29.501	200-year	78.69	78.68	-0.01	2.76	2.76	0.00
29.500	200-year	78.69	78.68	-0.01	2.76	2.76	0.00

Base of Rail:	82.43	ft	Existing Area:	7,697	ft^2
Existing Low Chord:	79.26	ft	Proposed Area:	2,698	ft^2
Proposed Low Chord:	78.18	ft			

Revised and Final Proposed Design

Table 2: Proposed 8-span, 240' long Concrete Bridge

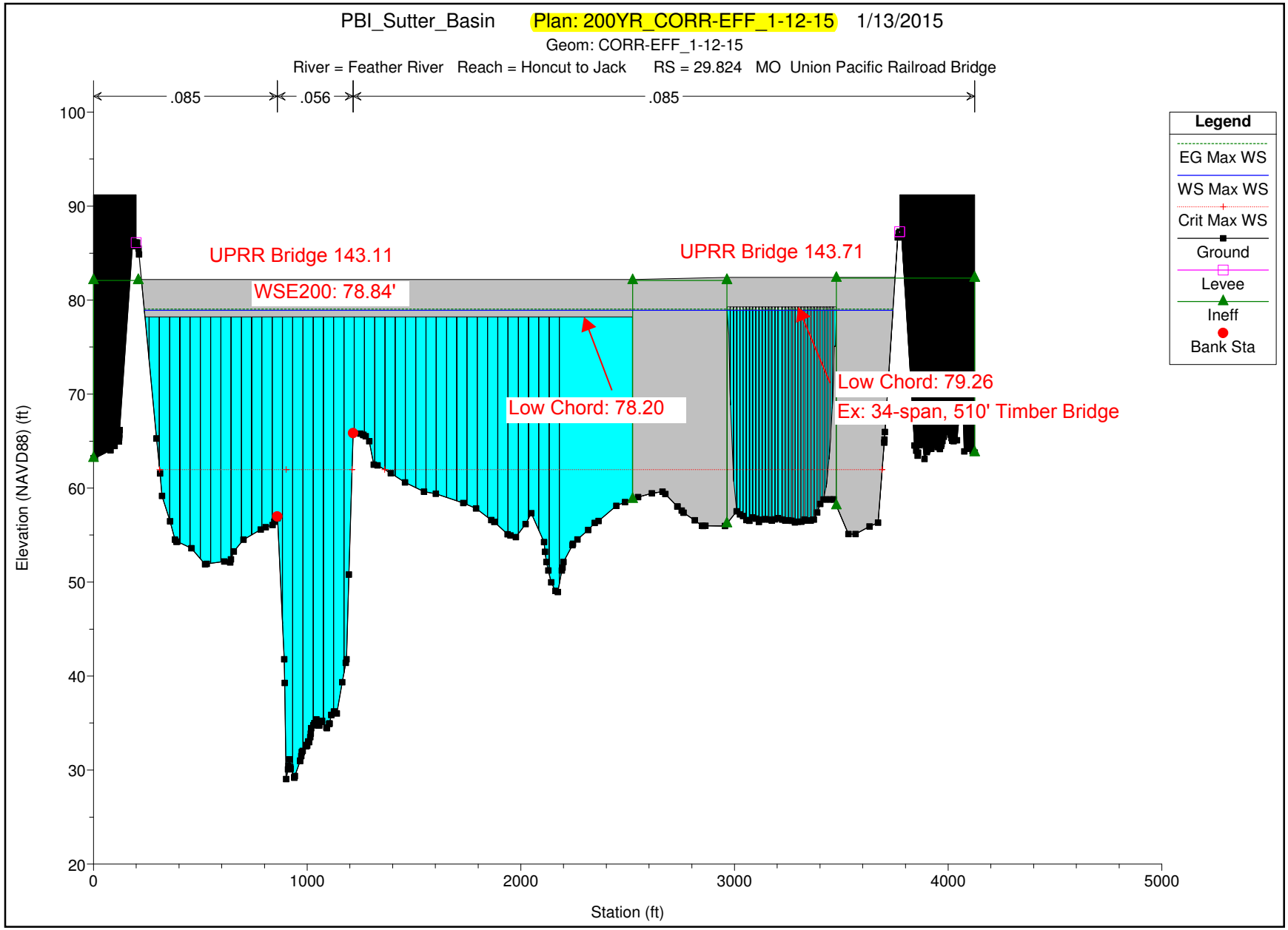
Cross Section	Frequency	$WSE_{CORR\text{-}EFF\_INEFFECTIVE\ FLOW\ ARES}$	$WSE_{POST\_INNEFECTIVE\ FLOW\ ARES}$	Δ WSE POST - CORR-EFF	$V_{CORR\ EFF}$ (ft/s)	V_{POST} (ft/s)	Δ V CORR-EFF - POST
31.000	200-year	79.72	79.71	-0.01	3.47	3.47	0.00
30.750	200-year	79.58	79.57	-0.01	3.78	3.78	0.00
30.500	200-year	79.40	79.39	-0.01	3.84	3.84	0.00
30.250	200-year	79.23	79.22	-0.01	3.05	3.05	0.00
30.000	200-year	78.96	78.95	-0.01	4.34	4.34	0.00
29.828	200-year	78.88	78.87	-0.01	3.65	3.66	0.01
29.826	200-year	78.84	78.80	-0.04	4.33	4.66	0.33
29.824	UPRR Bridges 143.11 and 143.71: Valley Subdivision						
29.822	200-year	78.83	78.80	-0.03	4.13	4.71	0.58
29.821	200-year	78.81	78.81	0.00	4.27	4.27	0.00
29.820	Lateral Structure						
29.750	200-year	78.78	78.78	0.00	3.52	3.52	0.00
29.741	Lateral Structure						
29.501	200-year	78.69	78.69	0.00	2.76	2.76	0.00
29.500	200-year	78.69	78.69	0.00	2.76	2.76	0.00

Base of Rail:	82.43	ft	Existing Area:	7,133	ft^2
Existing Low Chord:	79.26	ft	Proposed Area:	3,086	ft^2
Proposed Low Chord:	78.18	ft			

1) The hydraulic analysis was based on utilizing the SBFCA unsteady flow HEC-RAS model, and incorporating Olsson's bridge survey information
2) The design discharges at UPRR Bridges 143.11 and 143.71 is approximately Q200 = 164,750 cfs

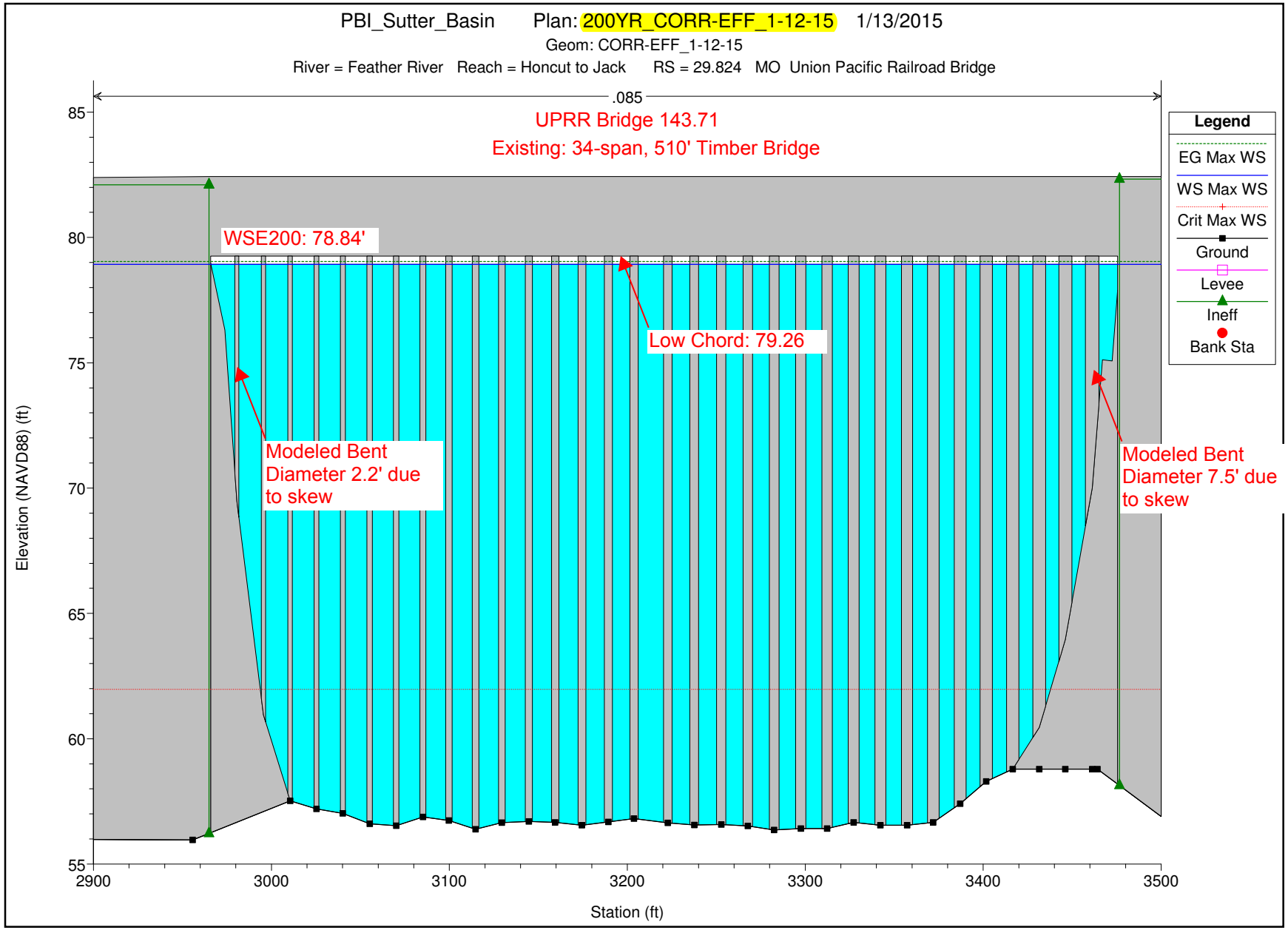
OLSSON ASSOCIATES

Existing Condition



ATTACHMENT G - Hydraulic Summary Information

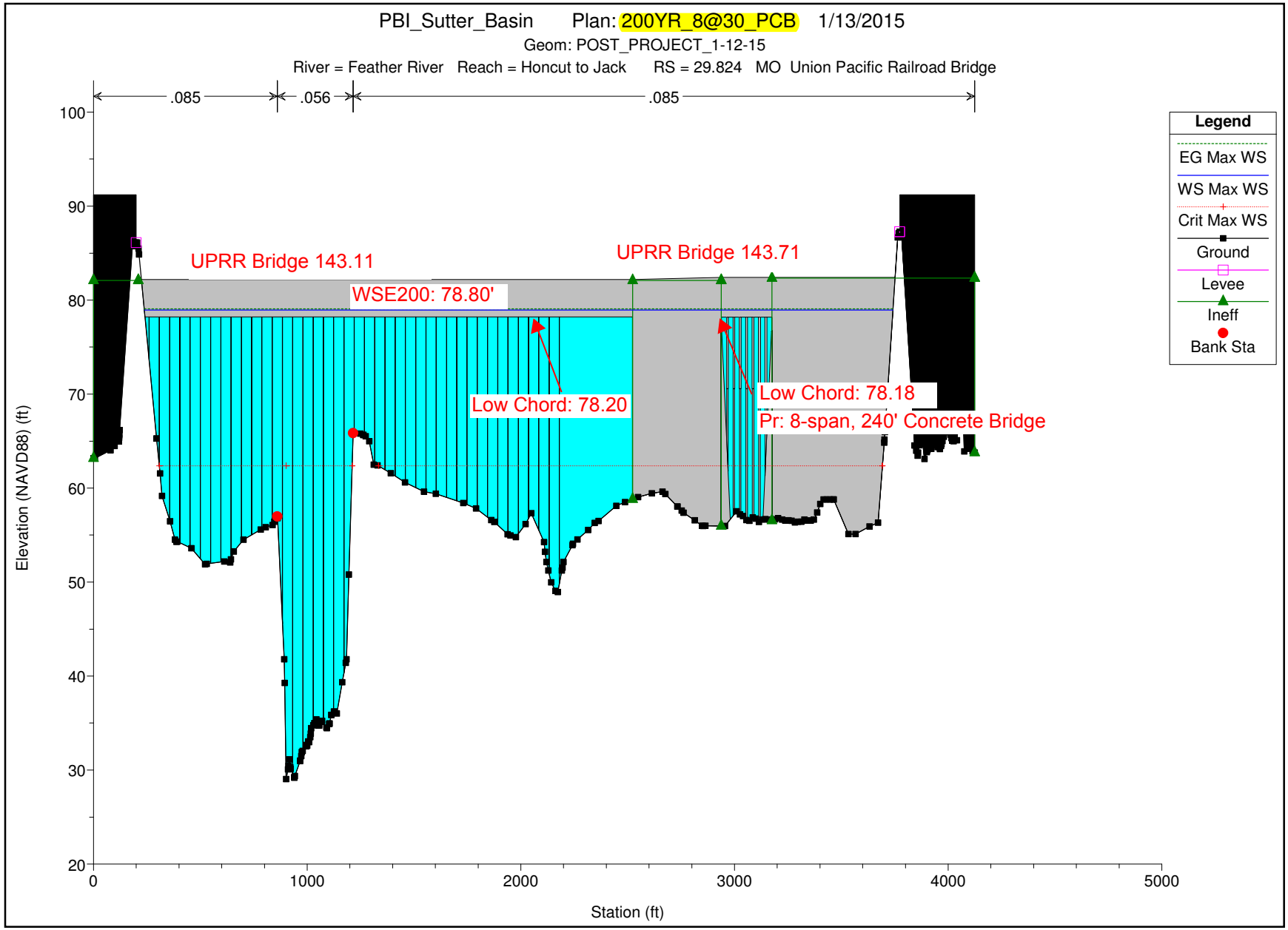
Existing Condition



Notes: 1) Ineffective Flow Areas Removed
2) Due to curve in UPRR Bridge within Feather River floodplain, bents have increased skew to north

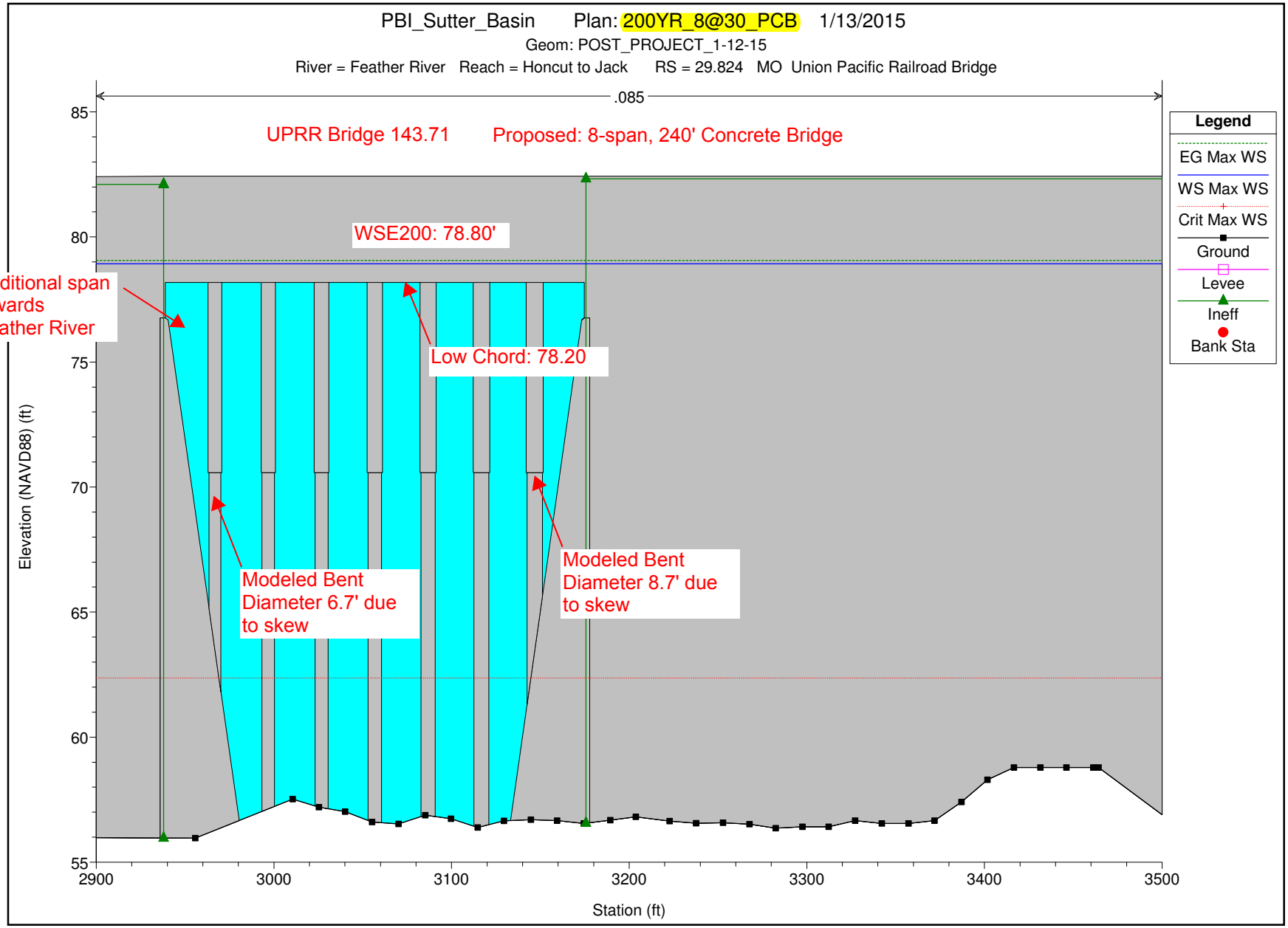
ATTACHMENT G - Hydraulic Summary Information

Proposed Condition



ATTACHMENT G - Hydraulic Summary Information

Proposed Condition



Notes: 1) Ineffective Flow Areas Removed
2) Due to curve in UPRR Bridge within Feather River floodplain, bents have increased skew to north

ATTACHMENT G - Hydraulic Summary Information

200-Year HEC-RAS Output Table - January 13, 2015

HEC-RAS River: Feather River Reach: Honcut to Jack Profile: Max WS (Continued)

Reach	River Sta	Profile	Plan	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)	
Honcut to Jack	31.05			Lat Struct									
Honcut to Jack	31.00	Max WS	200YR_CE_1-12-15	166484.50	28.39	79.72		79.81	0.000123	3.47	88722.80	3555.41	0.10
Honcut to Jack	31.00	Max WS	200YR_8@30_PCB	166533.70	28.39	79.71		79.80	0.000124	3.47	88692.79	3555.36	0.10
Honcut to Jack	30.75	Max WS	200YR_CE_1-12-15	166154.80	20.87	79.58		79.69	0.000151	3.78	79458.04	3366.58	0.10
Honcut to Jack	30.75	Max WS	200YR_8@30_PCB	166179.70	20.87	79.57		79.68	0.000151	3.78	79429.06	3366.52	0.10
Honcut to Jack	30.50	Max WS	200YR_CE_1-12-15	165746.20	30.08	79.40		79.51	0.000154	3.84	81600.56	3411.01	0.11
Honcut to Jack	30.50	Max WS	200YR_8@30_PCB	165744.60	30.08	79.39		79.50	0.000154	3.84	81570.45	3410.95	0.11
Honcut to Jack	30.25	Max WS	200YR_CE_1-12-15	165312.00	31.86	79.23		79.32	0.000130	3.05	82050.14	3534.77	0.09
Honcut to Jack	30.25	Max WS	200YR_8@30_PCB	165342.30	31.86	79.22		79.31	0.000130	3.05	82018.23	3534.72	0.09
Honcut to Jack	30.21			Lat Struct									
Honcut to Jack	30.2			Lat Struct									
Honcut to Jack	30.00	Max WS	200YR_CE_1-12-15	164959.80	22.29	78.96		79.13	0.000205	4.34	63427.07	2937.63	0.12
Honcut to Jack	30.00	Max WS	200YR_8@30_PCB	164929.40	22.29	78.95		79.12	0.000205	4.34	63403.07	2937.57	0.12
Honcut to Jack	29.828	Max WS	200YR_CE_1-12-15	164802.30	29.01	78.88		78.97	0.000141	3.65	83161.57	3502.80	0.10
Honcut to Jack	29.828	Max WS	200YR_8@30_PCB	164804.50	29.01	78.87		78.96	0.000141	3.66	83128.35	3502.73	0.10
Honcut to Jack	29.826	Max WS	200YR_CE_1-12-15	164771.40	29.04	78.84		79.00	0.000199	4.33	67499.83	3502.68	0.12
Honcut to Jack	29.826	Max WS	200YR_8@30_PCB	164742.90	29.04	78.80		78.98	0.000230	4.66	61522.26	3502.46	0.13
Honcut to Jack	29.824			Mult Open									
Honcut to Jack	29.822	Max WS	200YR_CE_1-12-15	164740.20	28.81	78.83		78.97	0.000181	4.13	67933.16	3503.64	0.11
Honcut to Jack	29.822	Max WS	200YR_8@30_PCB	164742.90	28.81	78.80		78.99	0.000236	4.71	62343.58	3503.43	0.13
Honcut to Jack	29.821	Max WS	200YR_CE_1-12-15	164740.20	28.59	78.81		78.97	0.000194	4.27	60564.83	3503.66	0.12
Honcut to Jack	29.821	Max WS	200YR_8@30_PCB	164773.80	28.59	78.81		78.97	0.000194	4.27	60568.76	3503.67	0.12
Honcut to Jack	29.82			Lat Struct									
Honcut to Jack	29.75	Max WS	200YR_CE_1-12-15	164678.30	29.23	78.78		78.88	0.000101	3.52	78692.13	3238.39	0.10
Honcut to Jack	29.75	Max WS	200YR_8@30_PCB	164742.70	29.23	78.78		78.88	0.000101	3.52	78697.19	3238.42	0.10
Honcut to Jack	29.741			Lat Struct									
Honcut to Jack	29.501	Max WS	200YR_CE_1-12-15	164461.10	30.04	78.69		78.75	0.000070	2.76	96165.34	4474.71	0.09
Honcut to Jack	29.501	Max WS	200YR_8@30_PCB	164527.10	30.04	78.69		78.75	0.000070	2.76	96172.23	4474.72	0.09

UPRR Bridge 143.11 and 143.71: Valley

The hydraulic analysis utilized the Sutter Butte Flood Control Agency (SBFCA) Feather River West Levee Project unsteady HEC-RAS 4.1.0.

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Structures Design Group

December 18, 2014

Ms. Nancy Moricz, PE
Senior Engineer, Water Resources
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, California 95821

Subject: Variance Request for UPRR Bridge Project at Milepost 143.71, Valley Subdivision

Dear Ms. Moricz:

As a follow-up to our pre-application meeting with the Central Valley Flood Protection Board (CVFPB) on July 22, 2013, Union Pacific Railroad Company (UPRR) is submitting a request for variances for replacing UPRR's bridge at Milepost (MP) 143.71 (Bridge 143.71) on the Valley Subdivision in Sutter County, California.

A. Summary of the Project

UPRR is proposing to replace and stabilize the bridge located at MP 143.71 on the Valley Subdivision of UPRR near Yuba City in Sutter County, California (Section 10, Township 15 North, Range 3 East at latitude 39°09'57" and longitude -121°37'16"). The existing bridge is a 34-span, 510-foot-long, timber stringer trestle – ballast deck bridge that was built in 1939. The bridge serves UPRR's single mainline track running generally in a northwest-southeast direction through the study area. The area in the vicinity of UPRR Bridge 143.71 has a system of federal levees along the right overbank used for flood protection. The levees cross the track approximately 600 feet north of Bridge 143.71 and parallel the track.

UPRR is proposing to support a portion of the bridge with fill. Approximately 18,000 cubic yards of good clean earth fill would be transported to the project site by rail and placed under approximately 270 feet of the bridge beginning at the geographic northwest abutment, the portion of the bridge parallel to Feather River. The fill would extend to the bottom of the deck to support the ballast and tracks. The fill would be compacted in lifts and finished to a 2:1 slope extending outside of the existing UPRR right-of-way (ROW). UPRR would permanently acquire approximately 1.13 acres of land and temporarily acquire approximately 1.4 acres of land from the adjacent landowners prior to the start of construction so the proposed bridge replacement project would be within UPRR's new ROW when the project is complete. The footprint of the permanent fill would not affect the adjacent levee.

UPRR is proposing the remainder of Bridge 143.71 be replaced with a new, eight-span, 240-foot-long bridge deck of new, precast concrete caps and girders supported by steel H-piles in bents and constructed using an off-track crane. Access to the bridge is via Live Oak Road, the unnamed levee road, and UPRR's existing access road. Temporary dirt ramps would be installed along the Feather River west project levee within the UPRR ROW. The ramps would require approximately 400 yards of dirt fill. The ramps would not require excavation of the levee, and the levee would be returned to existing conditions following completion of the project.

The existing timber bridge would be replaced/removed as part of the proposed project. Additional information about the existing bridge and the proposed replacement and stabilization is available in the enclosed Encroachment Permit Application.

B. Variances

UPRR hereby requests variance from the requirements of CCR Title 23. Specifically:

(1) Section 128 (a)(3)- Bridge piers and bents within the floodway must be constructed parallel to the direction of streamflow

(2) Section 128 (a)(16)- Replacement of railroad bridges must have the soffit members no lower than those of the replacement bridge, but are not required to have a specified amount of clearance above the design flood plane.

The California Code of Regulations Title 23, Division 1, Article 3, Subsection 11 (b) states that:

§ 11. Variances.
(b) When approval of an encroachment requires a variance, the applicant must clearly state in the application why compliance with the board's standards is infeasible or not appropriate.

Regarding the pending application for encroachment permit and request for variance, it is the opinion of the Union Pacific Railroad (applicant) that compliance with the CVFPB standards for the construction of a new bridge at this location are **infeasible** for the following reasons:

1. The replacement bridge must follow the existing track alignment. Due to the fact that this bridge is located on a curve within the floodplain, it is infeasible to design bents that are parallel to flow and still maintain load bearing capacity on the curved bridge. Bents must be placed perpendicular to the track along the curve to bear load.
2. Matching the low superstructure horizontal members (low chord) of the existing bridge would require a substantial track raise of the railroad bridge. Matching the existing low chord would require modification to existing at-grade crossings, public roads, and infrastructure for several miles in each direction of the bridge. Therefore, because of railroad grade restraints, substantially raising the UPRR track is not an option. It should also be noted, the dimension from base of rail to low chord is the minimum distance required to maintain the structural components for a concrete bridge, which substantially increases the hydraulic efficiency of the bridge and decreases the risk of debris collection due to the longer spans.
3. The 143.71 bridge is directly adjacent to a larger (2,304-foot) bridge at MP 143.12 which is a modern bridge and is not in need of replacement. In order to raise the proposed bridge, UPRR may need to completely re-build/ replace the 143.12 bridge that spans the Feather River. This makes a track raise infeasible for the following reasons:
    a. COST- The cost to replace the much larger 143.12 bridge would be several million dollars. As mentioned, this is a modern bridge that does not need to be replaced at this time.
    b. ENVIRONMENTAL IMPACT- The environmental impact of replacing the adjacent 2,304-foot bridge would be measurable. The Feather River is a known anadromous waterway. This bridge has open-deck truss sections that would, at a minimum, require installation of temporary access bridges or work trestles which would likely be installed on piles. Pile driving within spawning habitat can cause impact to fisheries and other aquatic species. Replacement of the adjacent bridge would trigger an incidental take permit from the National Marine Fisheries Service as well as potential impacts to riparian vegetation and species.
    c. PUBLIC SAFETY- Replacement of the 2,304-foot bridge at MP 143.12 to accommodate a track raise at this location would likely require numerous pipe piles to be placed within the river channel to allow crane access alongside the existing open-deck bridge. Pipe piles, though temporary, are often viewed as a public boating hazard and

coast guard or county approval is usually needed to develop a plan to mitigate and protect the boating public.

4. UPRR has designed the replacement bridge to conform to UPRR hydraulic standards. The proposed bridge design includes placement of fill to shorten the bridge length for the following reasons:

a. COST- Due to the fact that this bridge is located on a curve in the track system, it is subject to higher operations and maintenance costs. Shortening the bridge at this location will result in less construction and maintenance cost.

b. SAFETY- Due to the fact that this bridge is located on a curve in the track system, it is subject to different stress and load than a bridge located on a straight section of track. A shortened bridge comprised of partial earthen fill at this location will result in a higher safety factor than the existing timber span bridge. In general terms, the shorter a bridge can be constructed within a curved section of track, the less potential for horizontal stress and track movement to occur under load, which results in a more durable, longer lasting, and ultimately a safer bridge design.

C. Conclusion

We ask you to consider the request for variances enclosed herein. On the basis of the planned **July 2014** construction start date, your timely response to this application is appreciated. We look forward to working with you to complete the review. Please contact John Schoonover with CH2M HILL at 530-229-3305 or John.Schoonover@ch2m.com if you have any questions.

Sincerely,

Steve Cheney

Steve Cheney
Director, Maintenance of Way - Environmental

cc: Debra Schafer/Union Pacific Railroad
Mike Bruckner/Union Pacific Railroad
John Schoonover/CH2M HILL
Branden Strahm, Olsson Associates