Meeting of the Central Valley Flood Protection Board
September 27, 2019

Permit Staff Report

M348 South Fork Kaweah River Bridge Replacement Project, Tulare County

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1.0 – ITEM

Consider approval of Permit No. 19456. (Attachment A)

2.0 - APPLICANT

County of Tulare (County).

3.0 – PROJECT LOCATION

The project is located on M348 (South Fork Drive), a rural, mountain road over the South Fork of the Kaweah River, approximately 12 miles south east of the community of Three Rivers. (South Fork Kaweah River, County of Tulare, Attachment B)

4.0 – PROJECT DESCRIPTION

The County is proposing to replace the existing South Fork Drive bridge with a single span cast-in-place prefabricated steel girder bridge with cast-in-place deck. The proposed single lane bridge will span approximately 94-feet (ft.) and it will be supported by abutments with cast-in-drilled-hole pile footings, and Rock Slope Protection (RSP) for erosion protection. The project also includes work to realign the approach roadway with the new bridge.

5.0 – AUTHORITY OF THE BOARD

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

California Code of Regulations, Title 23, Division 1 (Title 23):

- § 6, Need for a Permit
- § 13.3, Consent Calendar
- § 112, Streams Regulated and Nonpermissible Work Periods
- § 128, Erosion Control
- § 128, Bridges

6.0 - PROJECT ANALYSIS

The South Fork Kaweah River in the project area was adopted by the Board as a regulated stream in 1996. The existing, single lane South Fork Drive bridge is 82-feet-long, 12-feet-wide and was built in 1952. According to Federal Highway Administration Sufficiency Rating, the existing bridge qualifies for replacement funding because it has a sufficiency rating of 44.9, which make it functionally obsolete. The bridge provides access to the South Fork Campground and one local resident. The County is proposing to replace the bridge with a single lane bridge approximately 94-feet-long by 18-feet-wide. Improvements will also include realigning approach roadways and placing RSP.

The Project components will consist of:

1. Construction of a single span prefabricated steel girder bridge with cast in place deck. The bridge will be 94-feet-long and will accommodate 1 travel lane without shoulders.
2. Realigning approximately 200 ft. of the approach roadway in each direction of the bridge in order to tie the existing roadway into the new bridge.
3. Placing Class 8 RSP in front of and on the sides of both abutments.
4. Removing the existing superstructure and abutments once construction of the new bridge is complete.

The proposed Project meets all applicable Title 23 standards.

6.1 – Hydraulic Analysis

The U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center-River Analysis System (HEC-RAS) hydrodynamic program was used to assess the potential hydraulic impacts associated with the proposed bridge. The 100-year flood flow in project area is approximately 10,060 cfs, with water surface elevation of 3,260.9 ft., just

upstream of the existing bridge. The hydraulic model evaluated the South Fork Kaweah River for a model run of more than 500 ft., upstream and downstream of the bridge, and developed pre-project and post-project scenarios to assess the hydraulic impacts due to the project. Results of the model indicate that after construction of the new bridge, the water surface elevation just upstream of the new bridge will be reduced by approximately 0.08 ft. The following table summarizes the results from the analysis.

South Fork Kaweah River		
	Existing	Proposed
Design Flow (cfs)	10,060	
Water surface elevation (ft.)	3260.93	3260.85
Change in WSEs (ft.)	-0.08	

The proposed bridge over the South Fork Kaweah River will have a minimum soffit elevation of 3,264.2 ft. which is 0.8 ft. higher than the exiting bridge. This elevation provides a 3.3 ft. clearance over the 100-year WSE. Because of the higher soffit elevation, there will be an increased flowage area under the bridge, thus reducing flood risk.

6.2 – Geotechnical Analysis

There are no levees within the project area, therefore, a geotechnical analysis was not required.

7.0 – AGENCY COMMENTS AND ENDORSEMENTS

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

- There is no Local Maintaining Agency for the project area.

- Correspondence from the U.S Army Corps of Engineers (USACE) has been received for this application. The USACE Sacramento District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project.

8.0 – CEQA ANALYSIS

The Board, as a responsible agency under CEQA, has reviewed the Initial Study/Mitigated Negative Declaration (IS/MND) (SCH No. 2019011029, January 2019), and the Mitigation Monitoring and Reporting Program (MMRP) for the M348 South Fork Kaweah River Bridge (No. 46C0195) Replacement Project, prepared by the lead agency, County of Tulare. These documents, including project design, may be viewed or downloaded from the Board website at: http://cvfpb.ca.gov/event/september-2019-regular-business-meeting/ under a link for this agenda item. The documents are also available for review in hard copy at the Board and County offices.

The County determined that the M348 South Fork Kaweah River Bridge (No. 46C0195) Replacement Project would not have a significant effect on the environment and filed a Notice of Determination with the County's Clerk/Recorder on April 4, 2019. The County has revised the project and/or incorporated mandatory mitigation measures into the project plans to avoid or mitigate such impacts to a point where no significant adverse impacts will occur. These mitigation measures are included in the County's IS/MND and address impacts to biological resources, cultural resources, hydrology and water quality, and hazards and hazardous materials, and noise. The mitigation measures are further described in the County's adopted IS/MND.

The Board, as a responsible agency, is responsible for mitigating and avoiding only the direct and indirect environmental effects of those parts of the project which it decides to carry out, finance, or approve (CEQA Guidelines § 15096(g); Public Resources Code § 21002.1(d)). The Board's responsibility under CEQA is limited to imposing conditions or mitigation related to effects on the State Plan of Flood Control.

In accordance with CEQA Guidelines § 15096, Board staff independently reviewed the County's IS/MND, and finds the environmental documents prepared by the lead agency adequately address hydrology impacts, including potential flood risk, for the Board's approval of Permit No. 19456 to authorize work for a bridge replacement, which is within the Board's responsibility as it relates to effects on the State's flood control system. The IS/MND conclusions related to flood risk are further supported by the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center-River Analysis System (HEC-RAS) hydrodynamic program used to assess the potential hydraulic impacts associated with the proposed bridge, which confirms that the bridge replacement project will result in less than significant hydraulic impacts.

In accordance with CEQA Guidelines § 15096(f) and (g), staff recommends that the Board make responsible agency findings that approval of Permit No.19456 will not result in any significant adverse impacts related to flood risk. The project will not

adversely impact the State Plan of Flood Control; therefore, no additional mitigation measures within the Board's jurisdiction are required.

The documents and other materials which constitute the record of the Board's proceedings in this matter are in the custody of the Executive Officer, Central Valley Flood Protection Board, 3310 El Camino Ave., Suite 170, Sacramento, California 95821.

9.0 – CA WATER CODE SECTION 8610.5 AND OTHER CONSIDERATIONS

California Water Code Section 8610.5 (c) provides that the Board shall consider all the following matters, if applicable:

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

   Staff requests that the Board consider this staff report, any attachments and materials to which the report refers, and any evidence submitted to it prior to or at the hearing.

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

   The new bridge will be designed to fit within the site constraints and in accordance with AASHTO's (American Association of State Highway and Transportation Officials) Load and Resistance Factor Design Bridge Design Specifications and Caltrans' Seismic Design Criteria. Furthermore, project conditions were simulated using a HEC-RAS model and other accepted industry standards for hydrology and hydraulics, which have been applied to the review of this permit. The finding of the HEC-RAS simulation shows a reduction in water surface elevation for a 100-year flood event.

3. Effects of the proposed decision on facilities of the entire State Plan of Flood Control (SPFC):

   There are no SPFC facilities within a 20-mile radius of the project site, and changes in WSEs are localized and negligible.

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

   The proposed bridge over the South Fork Kaweah River channel will result in an increased flowage area. It will also provide enhanced seismic resistance, load capacity, and it will be built to withstand a 100-year flood event. As such the replacement of the bridge improves public safety, and there are no expected adverse effects to the proposed project from reasonably projected future events.

10.0 – STAFF RECOMMENDATION

Staff recommends that the Board:

Adopt:

- CEQA finding: The Board, acting as a responsible agency under CEQA, has independently reviewed and considered the environmental documents prepared for the project. Approving Permit 19456 would not result in any significant adverse impacts related to flood risk and no additional mitigation measures are required within the Board's jurisdiction; and,

Approve:

- Encroachment Permit No. 19456 in substantially the form provided in Attachment A; and

Direct:

- The Executive Officer to take the necessary actions to execute the permit and file a CEQA Notice of Determination with the State Clearinghouse.

11.0 – LIST OF ATTACHMENTS

A. Draft Permit No. 19456
B. Location Maps & Site Photos
C. Project Plans
D. Hydraulic Analysis Summary

Reviewers:

Design Review:	Nate Kibret, Engineer, Permitting Section
Environmental Review:	James Herota, Senior Environmental Scientist
Document Review:	Gary W. Lemon, P.E., Permitting Section Chief
	Michael C. Wright, P.E., Acting Chief Engineer
Legal Review:	Sarah Backus, Staff Counsel

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 19456 BD

This Permit is issued to:

County of Tulare
5961 South Mooney Blvd.
Visalia, California 93277

To replace the existing South Fork Drive bridge with a single span cast-in-place prefabricated steel girder bridge with cast-in-place deck. The proposed single lane bridge will span approximately 94-feet and it will be supported by abutments with cast-in-drilled-hole pile footings, and Rock Slope Protection (RSP) for erosion protection. The project also includes work to realign the approach roadway with the new bridge.

The project is located where South Fork Drive crosses Kaweah River, approximately 12 miles south east of the community of Three Rivers, at 36.35142˚N 118.77878˚W, Kaweah River, Tulare 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. 19456 BD

LIABILITY AND INDEMNIFICATION

THIRTEEN: The permittee shall defend, indemnify, and hold harmless the Central Valley Flood Protection Board (Board) and the State of California, including its agencies or departments thereof, including but not limited to, any and all boards, commissions, officers, agents, employees, and representatives (Indemnities), against any and all claims, liabilities, charges, losses, expenses, and costs including the State's attorneys' fees (Liabilities), that may arise from, or by reason of: (1) any action or inaction by the Indemnities in connection with the issuance or denial of any permit, lease, or other entitlement; (2) as a result of approvals or authorizations given by the Board to the permittee pursuant to, or as a result of, permittee's permit application; (3) provisions of the issued permit or lease, provisions of CEQA, an environmental document certified or adopted by the Board related to the permit application, or any other regulations, requirements, or programs by the State, except for any such Liabilities caused solely by the gross negligence or intentional acts or the State or its officers, agents, and employees.

FOURTEEN: Permittee shall reimburse the Board in full for all reasonable costs and attorneys' fees, including, but not limited to, those charged to it by the California Office of Attorney General, that the Board incurs in connection with the defense of any action brought against the Board challenging this permit or any other matter related to this permit or the work performed by the State in its issuance of this permit. In addition, the permittee shall reimburse the Board for any court costs and reasonable attorneys' fees that the Board/Indemnities may be required by a court to pay as a result of such action. The permittee may participate in the defense of the action, but its participation shall not

relieve it of its obligations under the conditions of this permit.

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, the Department of Water Resources, and their respective officers, agents, employees, successors and assigns, 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 Board and the Department of Water Resources expressly reserve the right to supplement or take over their defense, in their sole discretion.

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

AGENCY CONDITIONS

SEVENTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications dated May 17, 2019, except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Board.

EIGHTEEN: Permittee shall pay to the Board, an inspection fee(s) to cover inspection cost(s), including staff and/or consultant time and expenses, for any inspections before, during, post-construction, and regularly thereafter as deemed necessary by the Board.

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

TWENTY: Correspondence was received from the Department of the Army (U.S. Army Corps of Engineers, Sacramento District) dated 09/10/2019, signifying that the District Engineer has no comments or recommendations regarding flood control because the proposed project does not affect a federally constructed project.

TWENTY-ONE: The Board reserves the right to add additional, or modify existing, conditions when there is a change in ownership and/or maintenance responsibility of the work authorized under this permit.

PRE-CONSTRUCTION

TWENTY-TWO: Upon receipt of a signed copy of the issued permit the permittee shall contact the Board by telephone at (916) 574-0609, and submit the enclosed postcard, to schedule a preconstruction conference with the inspector that is assigned to your project. Failure to do so at least 10 working days prior to start of work may result in a delay of the project.

CONSTRUCTION

TWENTY-THREE: No construction work of any kind shall be done during the flood season from November 1 to July 15, without prior approval of the Board. Failure to submit a Time Variance Request to the Board at least 10 working days prior to November 1, may result in a delay of the project.

TWENTY-FOUR: Temporary staging, stockpiled material, equipment, and temporary buildings shall not remain in the Kaweah River, South Fork channel during the flood season from November 1 to July 15.

TWENTY-FIVE: The soffit of the bridge shall be a minimum of 3,264-feet above the 100-year flood plane elevation of 3,267.5-feet, NAVD 88 Datum.

TWENTY-SIX: Piers, bents, and abutments being dismantled shall be removed to at least 1 foot below the natural ground line and at least 3 feet below the bottom of the low-water channel.

POST-CONSTRUCTION

TWENTY-SEVEN: The work area shall be restored to at least the condition that existed prior to commencement of work.

TWENTY-EIGHT: All debris generated by this project shall be properly disposed of outside the South Fork Kaweah River Floodway.

TWENTY-NINE: Upon completion of the project, the permittee shall submit as-constructed drawings to the Board.

OPERATIONS AND MAINTENANCE

THIRTY: Trees, brush, sediment, and other debris shall be kept cleared from the bridge site and disposed of outside the South Fork Kaweah River Floodway to maintain the design flow capacity and flowage area.

THIRTY-ONE: 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, the Department of Water Resources, or any other agency responsible for maintenance and shall, at all times, allow officials from these agencies to access the Sacramento River Designated and any adjacent areas as necessary for flood control.

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

within 30-days of being notified in writing by the Board. In the event of an emergency a shorter timeframe may be required. If the permittee does not comply, the Board, or a designated agency or company authorized by the Board, may modify or remove the encroachment(s) at the permittee's expense.

THIRTY-THREE: The method and schedule of removing the bridge shall be approved by the Board prior to start of work.

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

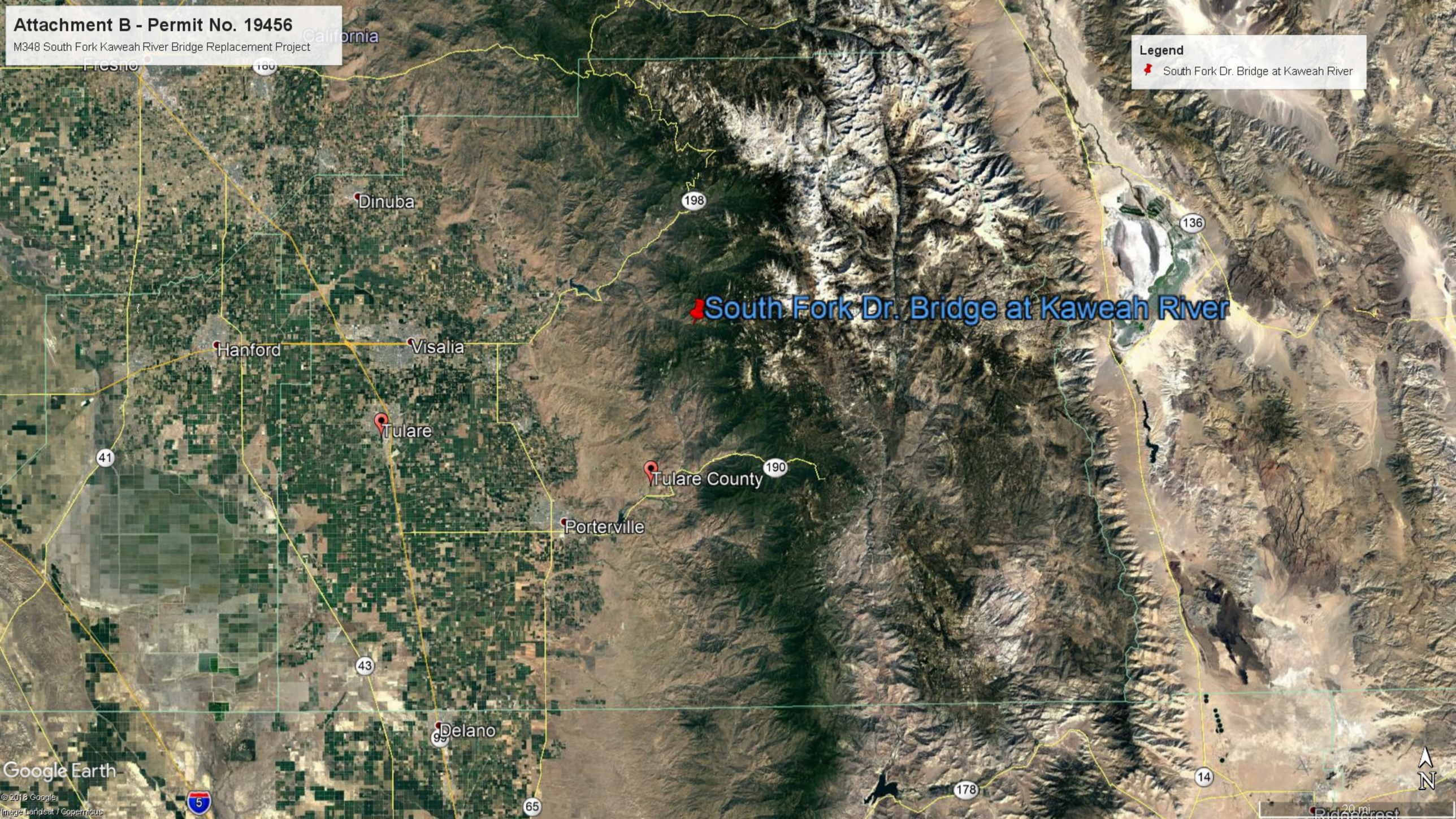
PROJECT ABANDONMENT / CHANGE IN PLAN OF FLOOD CONTROL

THIRTY-FIVE: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Board at the permittee's or successor's cost and expense.

THIRTY-SIX: The abandoned or dismantled bridge shall be completely removed and disposed of outside the limits of the South Fork Kaweah River Floodway.

THIRTY-SEVEN: 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 in the discretion of the Board the 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 the project is not maintained or is damaged by any cause. The permittee shall remove the encroachment(s) within 30-days of being notified in writing by the Board. In the event of an emergency a shorter timeframe may be required. If the permittee does not comply the Board will remove the encroachment(s) at the permittee's expense.

END OF CONDITIONS


Attachment B - Permit No. 19456
M348 South Fork Kaweah River Bridge Replacement Project
Legend
South Fork Dr. Bridge at Kaweah River
California
Fresno
180
Dinuba
198
136
South Fork Dr. Bridge at Kaweah River
Hanford
Visalia
Tulare
41
Tulare County
190
Porterville
43
Delano
99
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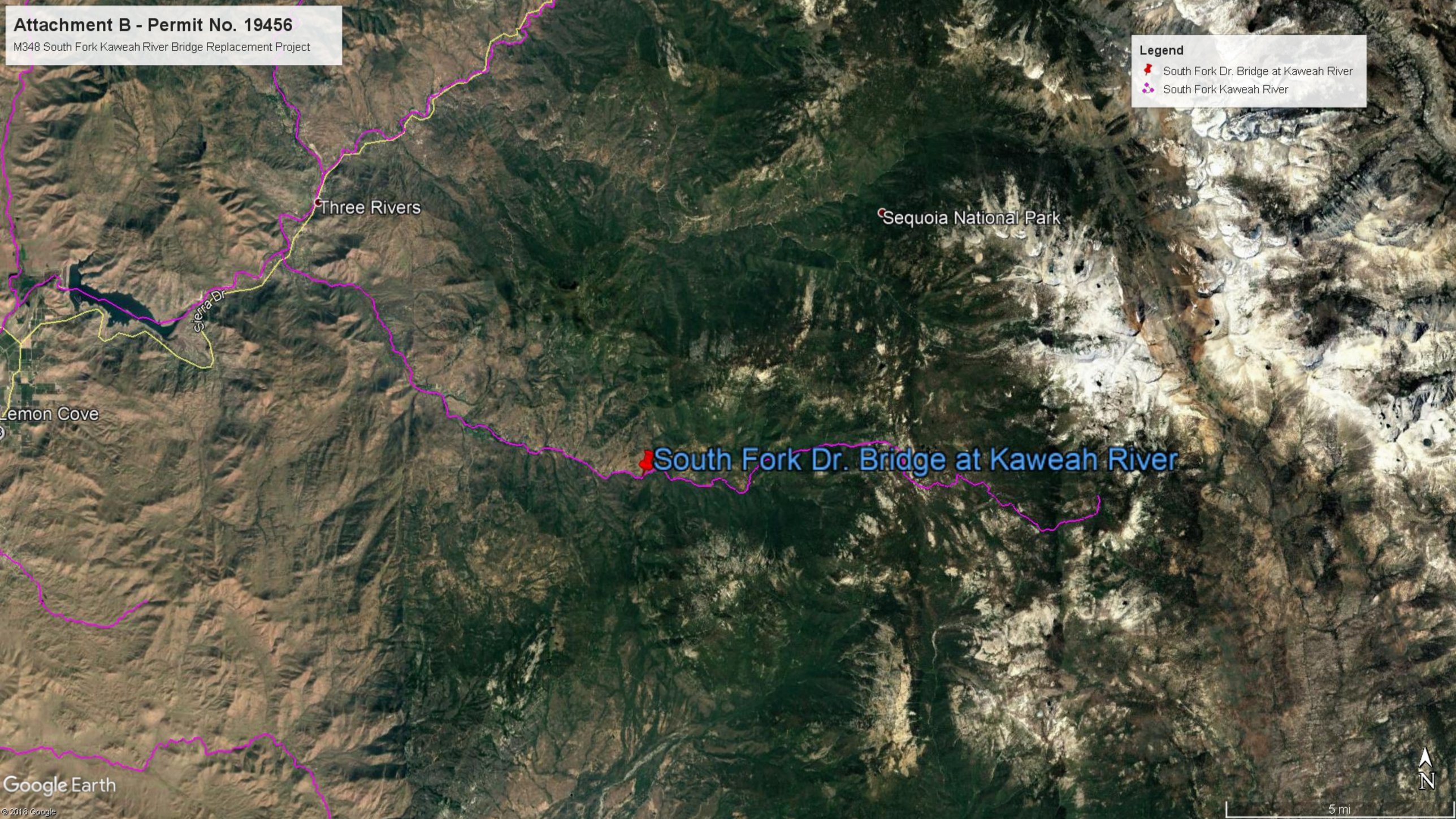
Attachment B - Permit No. 19456
M348 South Fork Kaweah River Bridge Replacement Project
Legend
South Fork Dr. Bridge at Kaweah River
South Fork Kaweah River
Three Rivers
Sequoia National Park
Sierra Dr
Lemon Cove
South Fork Dr. Bridge at Kaweah River
Google Earth
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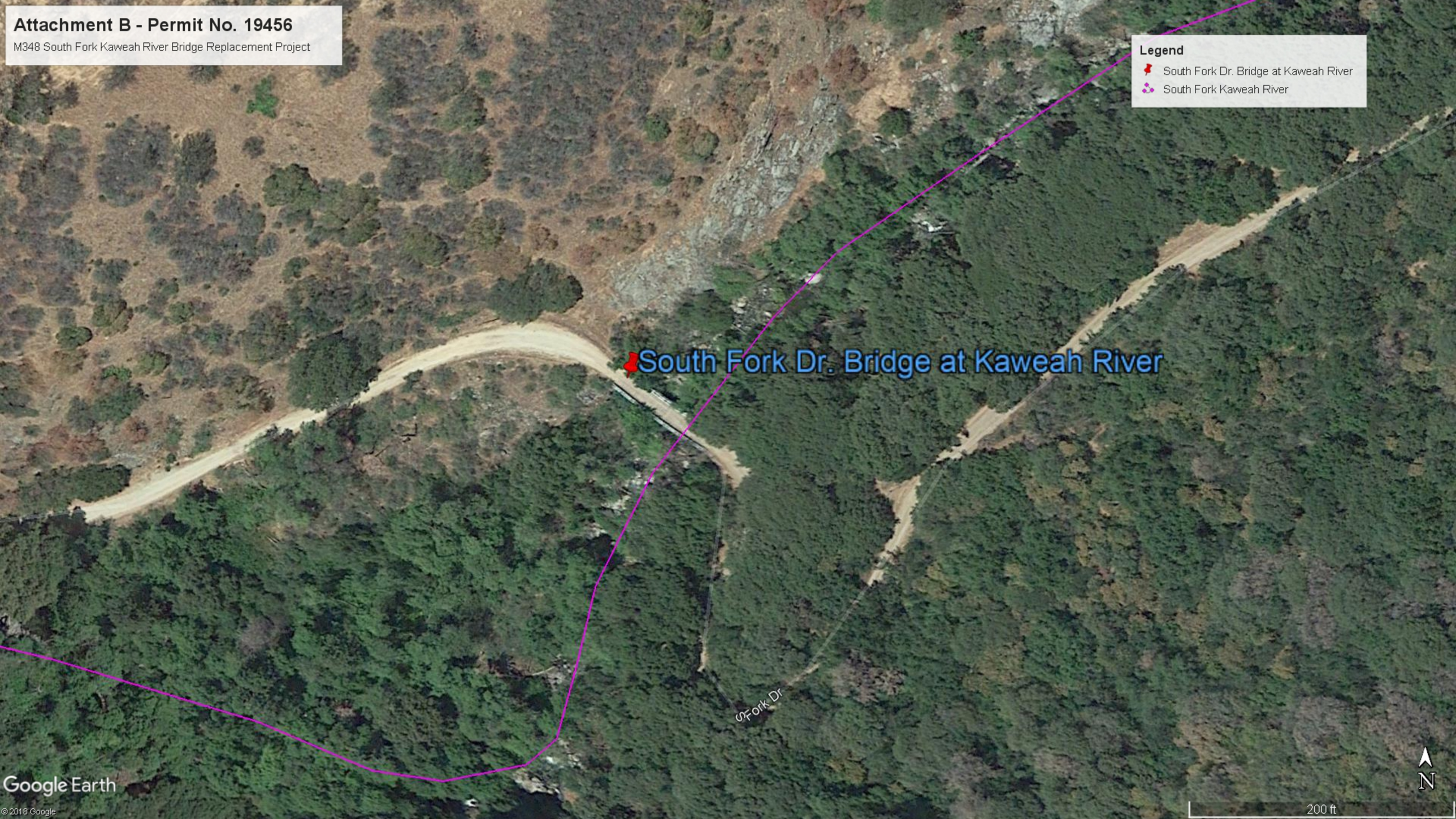

Attachment B - Permit No. 19456
M348 South Fork Kaweah River Bridge Replacement Project
Legend
South Fork Dr. Bridge at Kaweah River
South Fork Kaweah River
South Fork Dr. Bridge at Kaweah River
S Fork Dr
Google Earth
© 2018 Google
N
200 ft

South Fork Drive Bridge at the South Fork Kaweah River

Site Photographs

Taken March 24, 2017

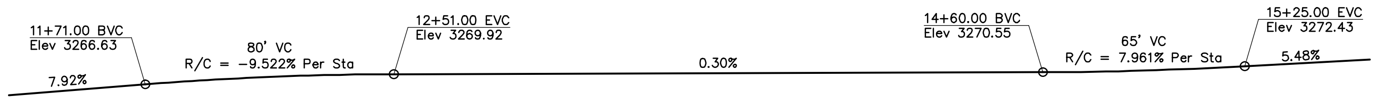
South Fork Drive Bridge approach looking southeast

South Fork Drive Bridge looking southeast

South Fork Kaweah River channel looking upstream

Eastern abutment of the South Fork Drive Bridge looking upstream

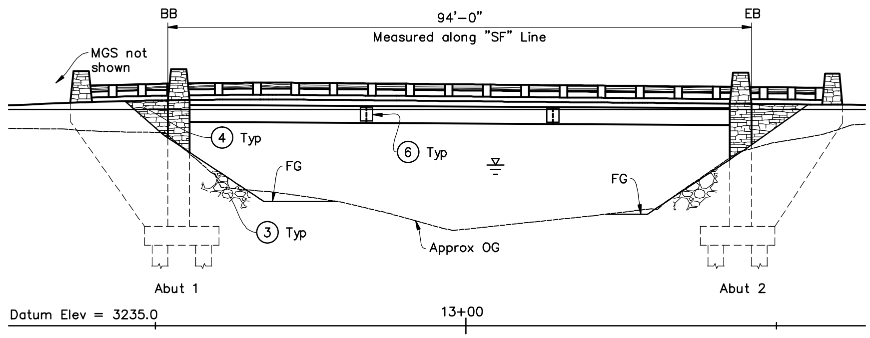
Attachment C - Project Plans



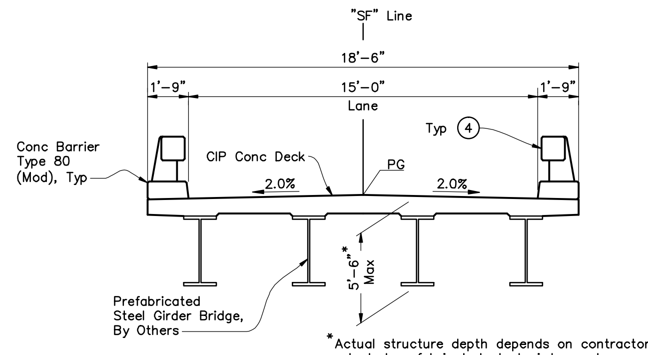
PROFILE GRADE
NO SCALE

INDEX TO BRIDGE PLANS

Sheet No.	Title
S1	General Plan
S2	Deck Contours
S3	Foundation Plan
S4	Abutment Layout
S5	Abutment Details No. 1
S6	Abutment Details No. 2
S7	Abutment Details No. 3
S8	Typical Section
S9	Girder Layout
S10	Architectural Details
S11	Log of Test Borings



ELEVATION
1"=10'



*Actual structure depth depends on contractor selected prefabricated steel girder system

TYPICAL SECTION
3/8"=1'-0"

Legend:

1. Paint "Br No. 46CXXXX"
2. Paint Year of Completion Stamp (Provided by County)
3. Rock Slope Protection, see Road Plans
4. Architectural Treatment, see "Architectural Details" sheet
5. MGS, see Road Plans
6. Optional Field Splice, actual field slice locations and details are the responsibility of the contractor.

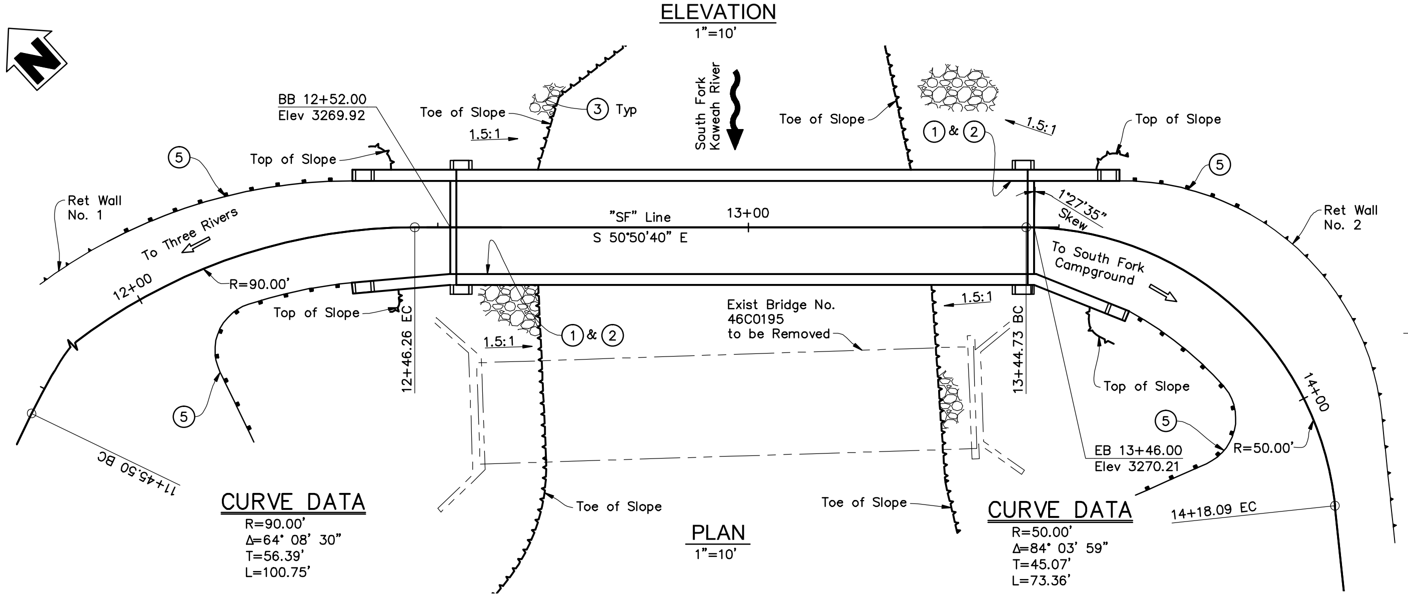
▽ Indicates Q100 Highwater Elevation 3260.9'

- - - Existing structure

For General Notes and Quantities, see "DECK CONTOURS" sheet.

For Hydrologic Summary, Scour Data Table, and Pile Data Table, see "FOUNDATION PLAN" sheet.

For Retaining Walls, see "RETAINING WALL NO. 1" and "RETAINING WALL NO. 2" plans.



CURVE DATA
R=90.00'
Δ=64° 08' 30"
T=56.39'
L=100.75'

PLAN
1"=10'

CURVE DATA
R=50.00'
Δ=84° 03' 59"
T=45.07'
L=73.36'

Note:
The contractor shall verify all controlling field dimensions before ordering or fabricating any material.

90% SUBMITTAL

REGISTERED PROFESSIONAL ENGINEER
SCOTT McCAULEY
No. 71495
CIVIL
STATE OF CALIFORNIA

REVISIONS			
No.	DESCRIPTION	DATE	BY

TULARE COUNTY
RESOURCE MANAGEMENT AGENCY
5961 SOUTH MOONEY BLVD.
VISALIA, CA 93277

COUNTY OF TULARE CALIFORNIA

GENERAL PLAN
MOUNTAIN ROAD 348 (M348) AT SOUTH FORK OF THE KAWEAH RIVER BRIDGE REPLACEMENT
TULARE COUNTY

SCALE	AS SHOWN
DIVISION	06
JOB NO.	T10300
DESIGNED	DES BY
DRAWN	R. KOTEY
CHECKED	DES CHK
FILE	T10300A-A-GP01.DWG
DATE	02-26-2019
SHEET No.	S1

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S:\CLIENT\TULARE\T10-300 SOUTH FORK KAWEAH RIVER\CAD 2015\BRIDGE\T10300A-A-GP01.DWG 5/16/2019 8:32 AM

Technical Memorandum

To: Lance Schrey, Quincy Engineering, Inc.

From: Cathy Avila, PE, Principal, Avila and Associates

Date: May 21, 2019

RE: **Hydrology and Hydraulic Analysis for the Interim Conditions of the Replacement of the South Fork Drive (Road M348) Bridge at South Fork Kaweah River (Bridge # 46C0195), Tulare County, California**

The South Fork Drive (Road M348) Bridge (bridge) at South Fork (SF) Kaweah River in Tulare County, California is proposed for replacement by Tulare County in 2019. The proposed bridge is a single span prefabricated steel girder bridge with a cast in place concrete deck. The bridge will be 18ft-6in wide and will accommodate 1 travel lane without shoulders as shown in the attached General Plan (See Appendix A). The superstructure will be supported by reinforced concrete seat abutments on CIDH pile footings.

The new bridge will be constructed just upstream of the existing bridge. The existing bridge will remain in place during construction and will be removed once the new bridge is complete. The purpose of this Technical Memorandum is to determine the hydraulics associated with the 100-year discharge in the interim condition where both the existing and proposed bridges will remain in place together.

SF Kaweah River flows westerly through the central part of Tulare County (County) draining an approximate 36.4-square mile basin at the bridge site. The discharges used for the bridge hydraulic analysis are shown in Table 1.

Table 1. Estimated discharges and water surface elevations for the interim bridge condition

	Design	Base
Frequency (years)	50	100
Discharge (cubic feet per second)	6,580	10,060
Interim Water Surface (elevation in feet at upstream face of Existing Bridge)	3261.8	3264.4
Interim Water Surface (elevation in feet at upstream face of Proposed Bridge)	3257.6	3259.1

GENERAL

The existing bridge is located approximately 30 miles east of Visalia as shown in Figure 1. The existing bridge was constructed in 1952. It is a single span bridge consisting of a welded steel pony truss (8-panel, double-wide, single-high Bailey truss) with timber deck on rolled steel stringers (total of 10) on rolled steel floor beams (total of 9) supported by reinforced concrete seat abutments on spread footings. It has a sufficiency rating as of 2012 of 59.5 and is functionally obsolete. The Tulare County DOT and Public Works proposes to replace the existing bridge using Highway Bridge Program (HBP) funds.

Figure 1. Bridge location map

The datum elevation used for this study is NAVD-88[1]. The proposed bridge will be located upstream from the existing bridge. As shown in Figure 2, the proposed bridge is a single span prefabricated steel girder bridge with a cast in place concrete deck. The bridge will be 18ft-6in wide and will accommodate 1 travel lane without shoulders as shown in the attached General Plan (See Appendix A). The superstructure will be supported by reinforced concrete seat abutments on CIDH pile footings.

[1] Benchmark elevation shown on topographic survey by Lane Engineers, Inc. on June 15, 2016 provided via E-mail from Lance Schrey, Project Engineer, Quincy Engineering dated October 03, 2016.

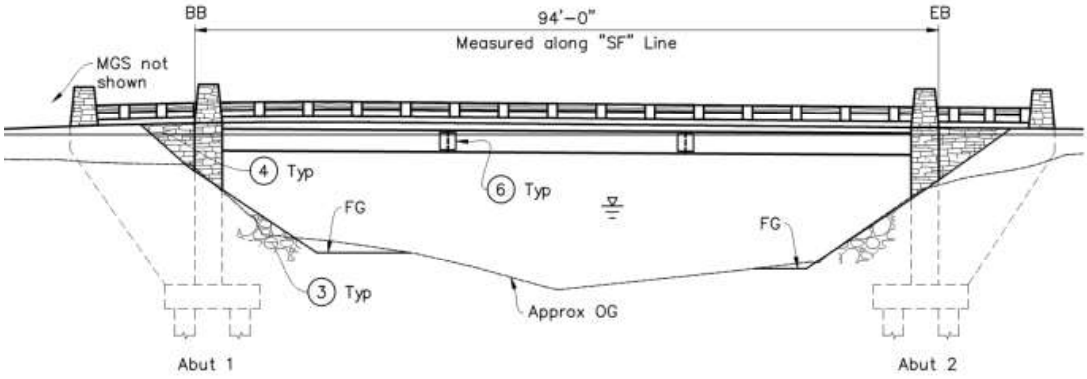

Figure 2. Proposed bridge profile view

BRIDGE HISTORY

Avila and Associates reviewed the pertinent bridge maintenance records for the existing bridge to review the typical impacts to bridges along this reach. Details of the bridge and a summary of the maintenance records are shown in Table 2.

Table 2. Bridge details and summary of maintenance records

	S. Fork Drive at SF Kaweah River
Bridge Number	46C0195
Bridge Length (ft)	82
Span Lengths (ft)	1 @ 80
Bridge Type	Welded steel pony truss (8-panel, double-wide, single-high Bailey truss) with timber deck on rolled steel stringers (total of 10) on rolled steel floor beams (total of 9) all on RC seat abutments on spread footings.
Debris Challenges	None noted.
Cross Sections Available for	1978, 1992, 2002, 2012
NBIS Item 113 (scour) code	U
ELI Flag 361 Condition State	1
Pier Type	N/A
Year Built	1952
Year Widened	N/A
Scour Challenges	1992[2], 1994[3], 2000[4], 2002[5], 2004[6], 2006[7], 2008[8], 2010[9], 2012[10]

[2] The footing at abutment 2 is exposed up to 3' 2". There is no undermining.
[3] Same as 1992.
[4] At abutment 1, the stream bed is 2'-0" below the top of the footing. The footing is not undermined.
[5] The footing at Abutment 1 is exposed over its full length. The stream bed is 1m below the top of footing. There is no undermining.
[6] Same as 2002.
[7] Same as 2004.
[8] Same as 2006.
[9] Same as 2008.
[10] Same as 2010.

HEC-RAS ANALYSIS

Hydraulic parameters (water surface elevations and velocity) were obtained from the U.S. Army Corps of Engineers HEC-RAS (Hydraulic Engineering Center River Analysis System) version 5.0.1 model based on: 1) survey information supplied by Quincy Engineering, 2) as-built data contained in the bridge maintenance records provided by Caltrans, and 3) a field investigation by Avila and Associates on March 24, 2015. Cross sections surveyed for the HEC-RAS model are shown in Figure 3.

Figure 3. Plan view of HEC-RAS cross sections for the interim condition

Existing Conditions

The Manning "n" values of 0.04 for the channel and overbanks at 0.055 were used in the model. These are consistent with the USGS estimates (HH Barnes, 1967) and field reviews by Avila and Associates as shown in Figure 4.

Figure 4. Looking downstream at the channel. The overbank areas are heavily vegetated with relatively high manning "n" values.

The existing bridge was input into the model as a single span bridge with a minimum soffit elevation of 3265.8 feet, as illustrated in Figure 5.

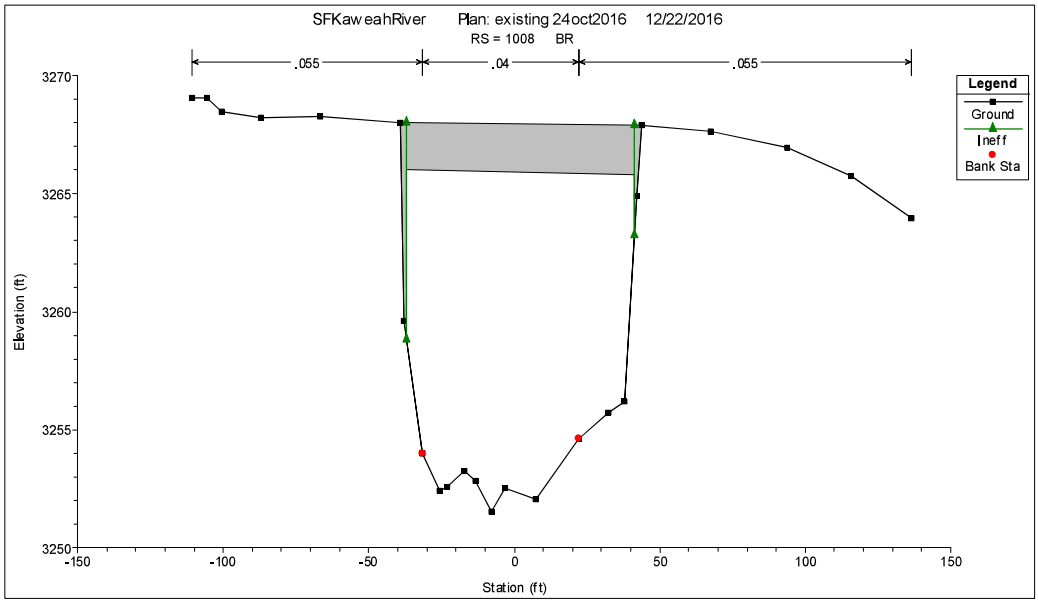

Figure 5. HEC-RAS cross section for the upstream existing conditions

Starting Water Surface Elevation

Various starting water surface elevations were evaluated. In all cases, the WSE profile converged approximately 430 feet downstream from the bridge as shown in Figure 6.

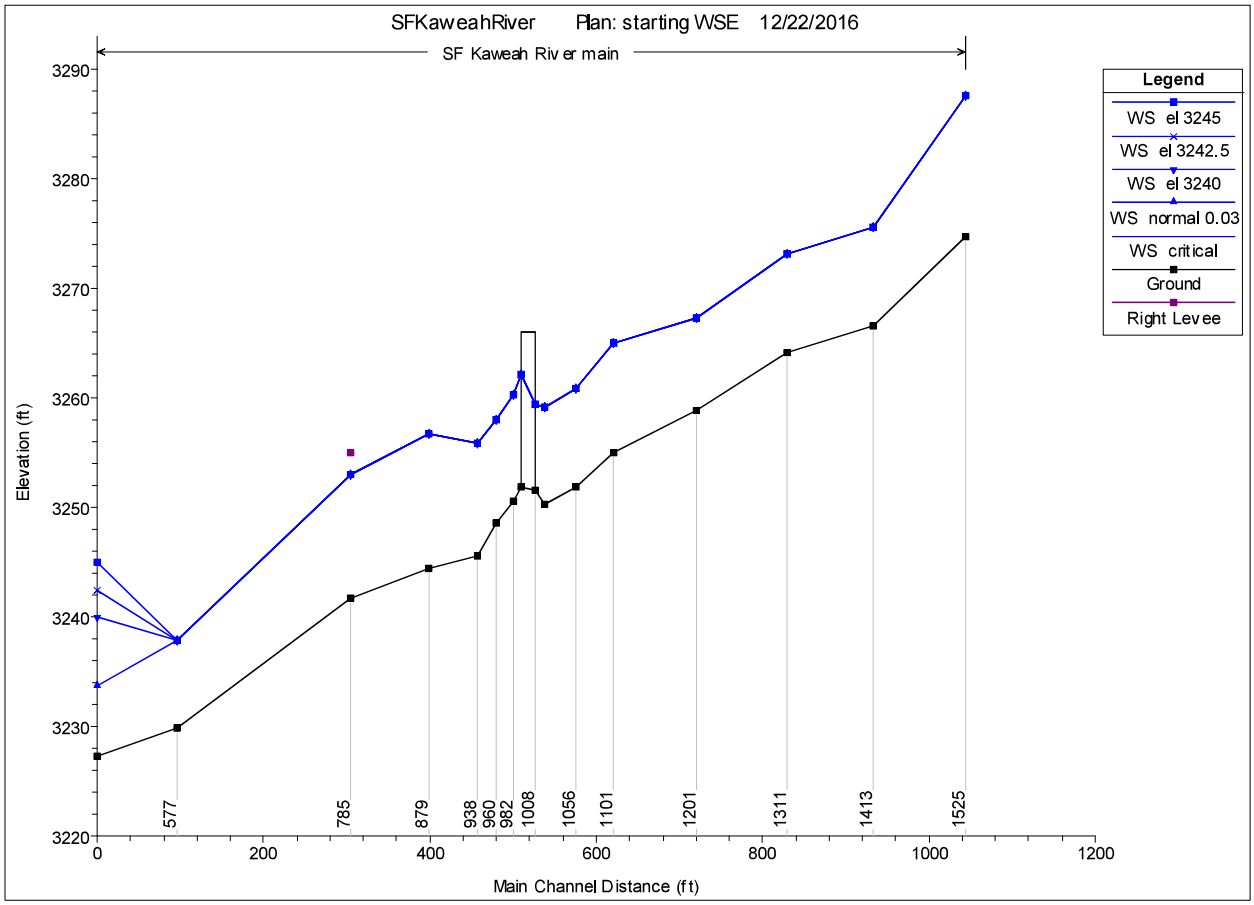

Figure 6. Starting Water Surface Elevation convergence for the 100-year discharge

Interim Model

The HEC-RAS model was re-run for the proposed bridge. The only change to the model for the interim conditions was adding the proposed bridge. The proposed bridge is approximately 30 feet upstream from the existing bridge and is also a single span bridge with a span approximately 8.5 feet longer than existing. It will have a minimum soffit elevation approximately 1.5 feet lower than existing and will be approximately 2 feet wider than existing as shown in Figure 7.

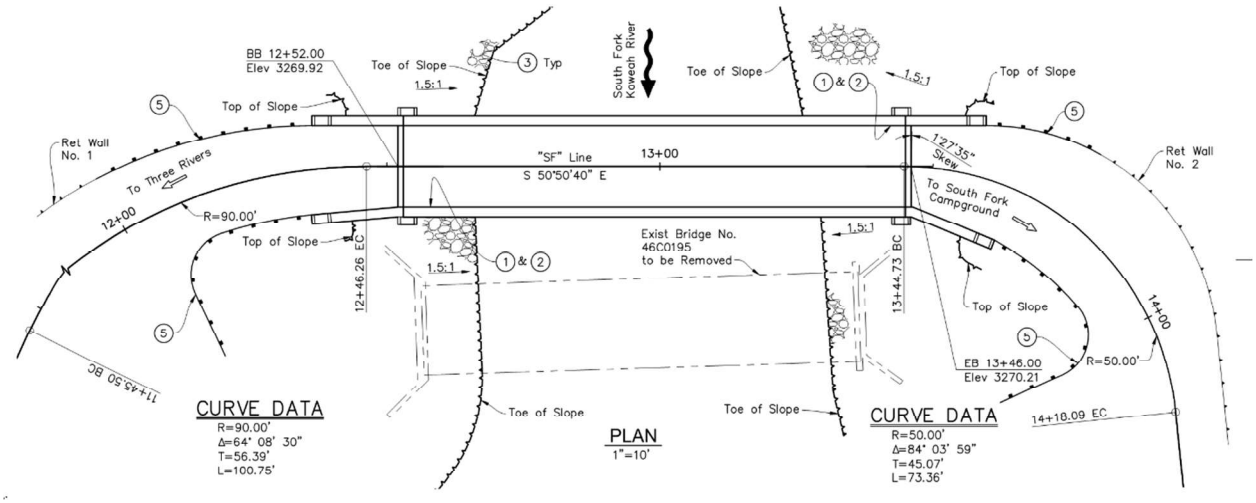

Figure 7. Existing and proposed bridges shown in plan view

Figure 8 and Figure 9 show the water surface elevations for the 50-year and 100-year discharges under the interim conditions. With the interim condition, neither bridge will be under pressure flow.

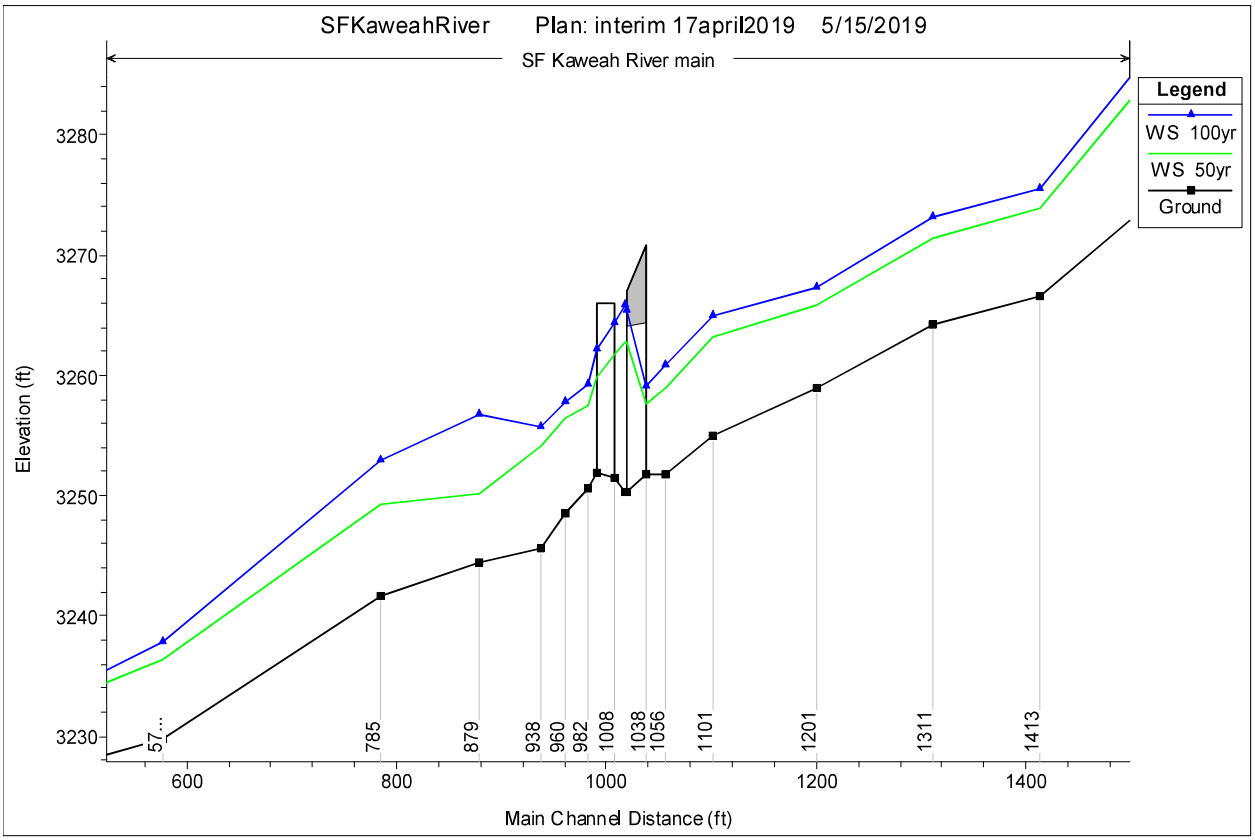

Figure 8. 50- year and 100-yr water surface elevation for the interim condition with both bridges

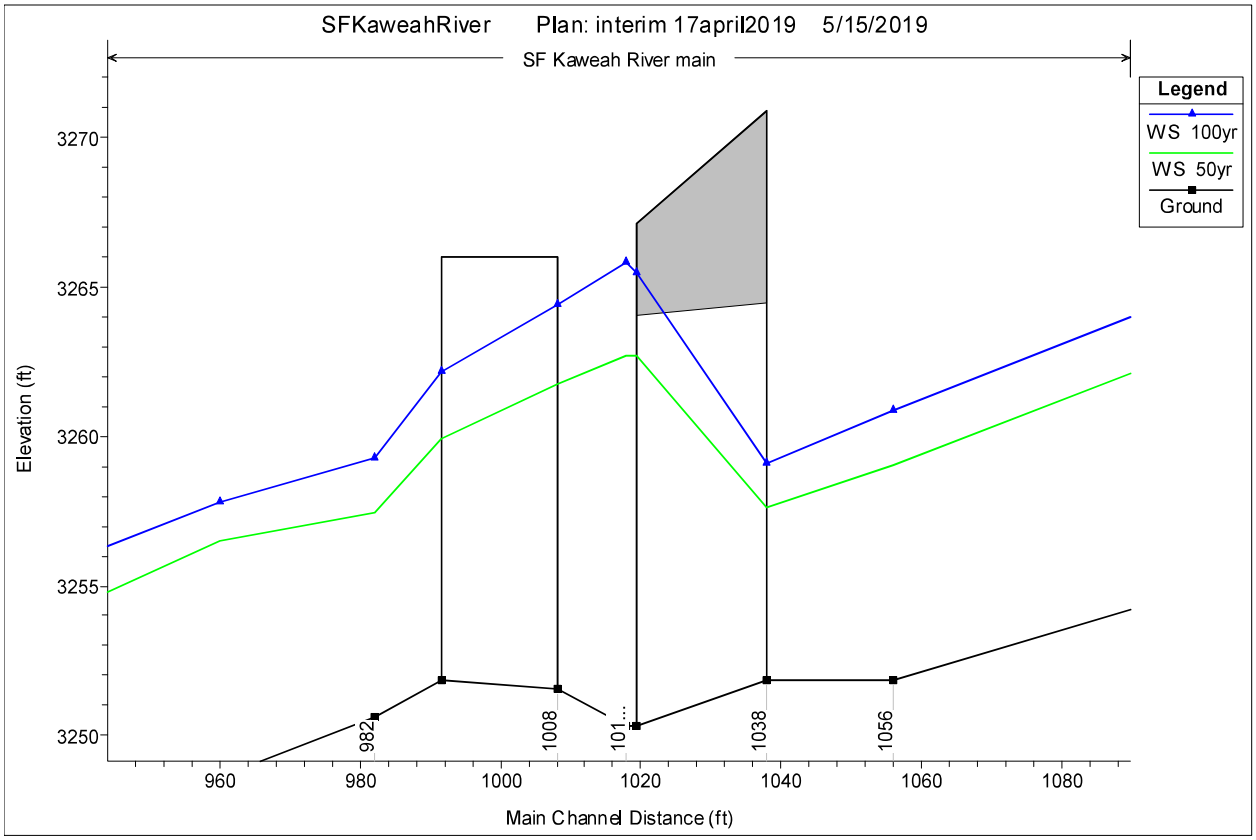

Figure 9. Zoomed in Figure 8.

See Appendix C for detailed HEC-RAS output.

HYDRAULIC CRITERIA

CVFPB requires 3 feet of freeboard above their design discharge water surface elevation. However, for minor stream where debris is not expected to be an issue, 2 feet of freeboard above their design discharge is allowable. In 2013, the CVFPB determined the Kaweah River was a minor stream for the M319 bridge replacement, approximately 4 miles downstream of the South Fork Drive bridge. Since the project is on the same river and the proposed bridge is reducing the hydraulic impact and potential for debris capture, the Kaweah River could likely be considered a minor stream. The 100-year water surface elevation at the existing bridge under interim conditions is 3264.4 feet. With a minimum soffit elevation of 3265.8 feet, this results in 1.4 feet of freeboard at the existing bridge. The 100-year water surface elevation of the proposed bridge under interim conditions is 3259.1 feet at the upstream face and 3265.5 at the downstream face. With a minimum soffit elevation of 3264.2 feet, this provides 5.1 feet of freeboard at the upstream face. For the 50-year discharge, the downstream face of the proposed bridge is not under pressure flow. In the highly unlikely event the 100-year discharge occurs during the year of construction, the proposed bridge would be under pressure flow at the downstream face. Under interim conditions, the water surface elevation will not be increased from existing conditions upstream of the proposed bridge, or downstream of the existing bridge, for either the 100-year or 50-year flow.

While this does not meet the CVFPB criteria, the low freeboard conditions at the existing bridge will be temporary and limited to the interim condition. Upon the removal of the existing bridge, the freeboard at the proposed bridge will be 3.3 ft as outlined in the Preliminary Hydraulic Report.

DRIFT

Avila and Associates researched the available Bridge Maintenance Reports for the existing bridge to determine if floating debris catches on the bridge. No instances of debris being caught on the bridge were noted.

The proposed bridge will improve the hydraulics; however, due to the longer span and higher minimum soffit elevation.

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Existing Conditions 100-year

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)	
main	1525	100yr	10060	3274.74	3287.59	3287.59	3291.41	0.011764	19.94	775.18	106.37	1.04
main	1413	100yr	10060	3266.6	3279.26	3279.26	3283.16	0.009685	18.22	761.8	100.11	0.95
main	1311	100yr	10060	3264.19	3276.42	3276.42	3279.73	0.008446	16.58	851.72	131.39	0.89
main	1201	100yr	10060	3258.92	3270.3	3270.3	3273.56	0.012185	19.37	830.74	123.3	1.05
main	1101	100yr	10060	3255.03	3267.56	3267.56	3271.6	0.010601	19.75	744.87	90.88	1.01
main	1056	100yr	10060	3251.84	3264.47	3264.47	3268.21	0.008811	17.2	778.62	113.2	0.9
main	1018	100yr	10060	3250.32	3264.55	3262.32	3267.24	0.005247	14.48	846.54	91.35	0.72
main	1008		Bridge									
main	982	100yr	10060	3250.63	3261.36	3261.36	3265.82	0.011246	18.16	648.2	82.98	1.01
main	960	100yr	10060	3248.61	3260.21	3260.21	3263.54	0.009125	17.05	817.4	140.04	0.92
main	938	100yr	10060	3245.56	3258.75	3258.75	3261.82	0.007631	16.01	890.68	181.14	0.84
main	879	100yr	10060	3244.46	3256.77		3257.47	0.002209	8.36	1752.86	245.67	0.45
main	785	100yr	10060	3241.73	3252.93	3252.93	3256.77	0.009965	18	749.99	96.92	0.97
main	577	100yr	10060	3229.84	3242.52	3242.52	3244.72	0.005577	14.52	1212.2	270.69	0.74
main	481	100yr	10060	3227.25	3236.57	3236.57	3239.12	0.01334	18.35	942.54	177.22	1.08

Interim Conditions 100-year

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)	
main	1525	100yr	10060	3274.74	3287.59	3287.59	3291.41	0.011764	19.94	775.18	106.37	1.04
main	1413	100yr	10060	3266.6	3279.26	3279.26	3283.16	0.009685	18.22	761.8	100.11	0.95
main	1311	100yr	10060	3264.19	3276.42	3276.42	3279.73	0.008446	16.58	851.72	131.39	0.89
main	1201	100yr	10060	3258.92	3270.3	3270.3	3273.56	0.012185	19.37	830.74	123.3	1.05
main	1101	100yr	10060	3255.03	3267.56	3267.56	3271.6	0.010601	19.75	744.87	90.88	1.01
main	1056	100yr	10060	3251.84	3264.3	3264.3	3268.35	0.009388	17.58	703.9	112.1	0.93
main	1038		Bridge									
main	1018	100yr	10060	3250.32	3265.57	3261.51	3267.46	0.003016	11.3	952.86	97.54	0.55
main	1008		Bridge									
main	982	100yr	10060	3250.63	3261.13	3261.13	3265.36	0.010983	16.82	635.23	85.67	0.98
main	960	100yr	10060	3248.61	3260.21	3260.21	3263.54	0.009125	17.05	817.4	140.04	0.92
main	938	100yr	10060	3245.56	3258.75	3258.75	3261.82	0.007631	16.01	890.68	181.14	0.84
main	879	100yr	10060	3244.46	3256.77		3257.47	0.002209	8.36	1752.86	245.67	0.45
main	785	100yr	10060	3241.73	3252.93	3252.93	3256.77	0.009965	18	749.99	96.92	0.97
main	577	100yr	10060	3229.84	3242.52	3242.52	3244.72	0.005577	14.52	1212.2	270.69	0.74
main	481	100yr	10060	3227.25	3236.57	3236.57	3239.12	0.01334	18.35	942.54	177.22	1.08

Proposed Conditions 100-year

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)	
main	1525	100yr	10060	3274.74	3287.59	3287.59	3291.41	0.011764	19.94	775.18	106.37	1.04
main	1413	100yr	10060	3266.6	3279.26	3279.26	3283.16	0.009685	18.22	761.8	100.11	0.95
main	1311	100yr	10060	3264.19	3276.42	3276.42	3279.73	0.008446	16.58	851.72	131.39	0.89
main	1201	100yr	10060	3258.92	3270.3	3270.3	3273.56	0.012185	19.37	830.74	123.3	1.05
main	1101	100yr	10060	3255.03	3267.56	3267.56	3271.6	0.010601	19.75	744.87	90.88	1.01
main	1056	100yr	10060	3251.84	3264.3	3264.3	3268.35	0.009388	17.58	703.9	112.1	0.93
main	1038		Bridge									
main	1018	100yr	10060	3250.32	3262.62	3261.56	3265.82	0.007151	14.69	747.11	87.67	0.81
main	982	100yr	10060	3250.63	3261.16	3261.16	3265.25	0.010677	16.62	661.51	85.75	0.97
main	960	100yr	10060	3248.61	3260.42	3260.42	3263.58	0.00867	16.83	886.54	141.77	0.9
main	938	100yr	10060	3245.56	3258.74	3258.74	3261.38	0.00691	15.23	1016.59	181.11	0.8
main	879	100yr	10060	3244.46	3256.77		3257.47	0.002209	8.36	1752.86	245.67	0.45
main	785	100yr	10060	3241.73	3252.93	3252.93	3256.77	0.009965	18	749.99	96.92	0.97
main	577	100yr	10060	3229.84	3242.52	3242.52	3244.72	0.005577	14.52	1212.2	270.69	0.74
main	481	100yr	10060	3227.25	3236.57	3236.57	3239.12	0.01334	18.35	942.54	177.22	1.08