AGENDA FOR THE SPECIAL MEETING
DUNSMUIR CITY COUNCIL
COUNCIL CHAMBERS
5902 DUNSMUIR AVE, DUNSMUIR, CA
SEPTEMBER 22, 2016
CLOSED SESSION: NONE
REGULAR SESSION: 3:00 PM

As a courtesy, please turn off cell phones and electronic devices while the meeting is in session. Thank you.

1. **CALL TO ORDER**
2. **ROLL CALL**
3. **FLAG SALUTE**
4. **APPROVAL OF AGENDA**
5. **APPROVAL OF MINUTES: None**
6. **COMMITTEE REPORTS: None**
   a. **Economic Development/Tourism**
   b. **Finance**
   c. **Public Facilities and Services**
   d. **Public Safety**
   e. **Airport**
   f. **Solid Waste**
   g. **Mossbrae**
   h. **Audio Visual**

7. **ANNOUNCEMENTS AND PUBLIC COMMENT**

   Regular City Council meetings are televised on Channel 15 to keep City residents informed of City Council actions and deliberations that affect the community. Meetings are scheduled to be televised on the 1st and 3rd Thursday of each month. Meetings that take place on dates other than the 1st and 3rd Thursday will not be televised.

   As this is a Special Meeting, this time is set aside for citizens to address the City Council on matters listed in the Special Meeting agenda. Only those items addressed in the notice of Special Meeting may be discussed in public comment. In the alternative, the City Council may request speakers to provide their public comments regarding a given item at the time of consideration of that item. **Each speaker is allocated three (3) minutes to speak. Speakers may not cede their time to another speaker.** Comments should be limited to matters on the Special Meeting agenda. Speaker forms are available from the City Clerk, 5915 Dunsmuir Ave, Dunsmuir, on the City's website, or on the podium. The City Council can only take action on matters that are on the Agenda. If you have documents to present to members of the City Council, please provide a minimum of seven (7) copies.

8. **ANNOUNCEMENTS AND REPORTS FROM COUNCIL AND STAFF:**
Members of the Council or staff may ask questions, request reports for a later meeting, or ask that an item be placed on a future agenda on any subject within the Council's jurisdiction.

9. **CONSENT AGENDA: None**
The Consent Agenda consists of proposed actions on business matters which are considered routine and for which approval is based on previously approved City policy or practice. The Consent Agenda will be approved by a single motion to "Adopt the Consent Agenda" and Council Members will vote without debate. Council Members may remove a Consent Agenda matter for any reason and request that it be placed on the Agenda for discussion and consideration. Matters removed from the Consent Agenda will be placed on the agenda as an item of "New Business" for discussion and consideration.

10. **PUBLIC HEARING: None**

Public Hearing Protocol:

a. **Mayor will describe the purpose of the Public Hearing.**
b. **City Staff will provide the Staff Report.**
c. **City Staff will respond to questions from the City Council.**
d. **Mayor will open the Public Hearing.**
e. **Citizens wanting to comment will come to the podium, provide the City Clerk with their name and address and provide their comments.**
f. **Mayor will close the Public Hearing.**

11. **OLD BUSINESS: None**

12. **NEW BUSINESS:**

A. Discuss Feasibility Study for Butterfly Bridge and authorize staff to submit a Federal Highway Bridge Program Application in the amount of $2,500,000.

13. **ADJOURNMENT:**

Copies of this agenda were posted at City Hall, Dunsmuir City Library, Dunsmuir Park and Recreation District Office and at the Post Office on or before Wednesday, September 21, 2016 at 3:00.

The City of Dunsmuir does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disability or any other legally protected classes in employment or provision of services. Persons who need accommodations for a disability at a public meeting may call City Hall at (530) 235-4822 for assistance. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to accommodate participation in the meeting.

CERTIFICATION

This is the official Dunsmuir City Council Agenda, created and posted in accordance with the Dunsmuir City Council Protocols.

Julie Iskra, Deputy City Clerk

09-21-2016
Date

Federal Highway Administration
Central Federal Lands Highway Division
Federal Lands Highway Bridge Program

CA HBP Dunsmuir (1)

Phase 1 Bridge Feasibility Study
Butterfly Bridge

FEDERAL LANDS HIGHWAY

CITY OF DUNSMUIR CALIFORNIA

Caltrans

Federal Highway Administration
Central Federal Lands Highway Division

PHASE 1 BRIDGE EVALUATION FEASIBILITY STUDY

Caltrans, District No. 2

Siskiyou County

California

FEDERAL LANDS HIGHWAY

CA HBP Dunsmuir (1)

Butterfly Avenue Bridge in the City of Dunsmuir

Prepared By:

JACOBS

JACOBS ENGINEERING GROUP, INC
707 17th Street, Suite 2300
Denver, CO 80202

August, 2016

INTRODUCTION

The Butterfly/Bush St Bridge in Dunsmuir, CA is a single span steel girder bridges that crosses the Sacramento River. It has a scour rating of 2 (Scour Critical) as extensive scour has occurred at the west bridge foundation. In addition, FEMA FIRM maps show that the bridge is inundated during the 50-year storm event.

The Town of Dunsmuir and Caltrans have requested Central Federal Lands Highway Division (CFL)'s assistance in evaluating the bridge and making repair/replacement recommendations. The proposed approach to the project is a two phase process:

- Phase 1 would be to perform preliminary structural evaluations, geotechnical assessments, topographic surveys, and analysis of the hydraulics of the site using the hydrology data from a recent FIRM report. Included is an overview of the environmental requirements for the potential improvement options. The alternatives considered and data gathered is summarized in this Feasibility Study Report (FSR). The purpose of this Phase 1 activity is to determine if a full bridge replacement is absolutely necessary, or if less expensive retro-fit solution is feasible. Phase 1 will establish the scope and the budget for programming purposes what is to be done in Phase 2.
- Phase 2 is dependent on the results of Phase 1. If a retro-fit is feasible, Phase 2 would be a streamlined contract package to design the repairs including environmental compliance and permitting. If a bridge replacement is the recommended course of action, Phase 2 would be a full bridge design. Due to the urgent scour issue, the project schedule will be condensed as much as possible in any scenario.

For additional information, please see the Scoping Observation Report prepared by Jacobs Engineering Group Inc., dated February 25, 2015.

The Butterfly Avenue Bridge spans over the upper Sacramento River which runs through the City of Dunsmuir. The River is considered a blue ribbon trout stream. The City has a private stocking permit from the Department of Fish and Game and fly fishing is a major component of the Town's strong recreational economy. The City of Dunsmuir's official motto is: *"Home of the best water on earth".*

State and Vicinity Maps are shown above. The Butterfly Bridge is highlighted in red in the lower image of the City of Dunsmuir.

The Butterfly Avenue Bridge is an existing single span steel girder bridge that crosses the Sacramento River on Bush Street. The crossing is one of three existing crossings that serve approximately 30 to 40 residences on the east side of the river. The two other crossings, Bridge Street and South 1st Street, are fully functional and provide redundant access to all of the residences east of the river.

The original structure, constructed in 1915, was a three span facility approximately 80 feet in length. The original abutments were modified and the bridge was widened and converted to a single span (approximately 80 feet in length) in 1956.

The western abutment is adjacent to the Union Pacific Railroad (UPRR), where both a mainline and spur run parallel to and west of the Sacramento River, and in general adjacent to Interstate 5. While any improvement to this structure will likely involve the UPRR, the City has a long standing history and well established relationship with the UP, which may be necessary with the western abutment located so close to the tracks.

The roadway following the eastern abutment descends quickly with a near 18% downgrade to Butterfly Avenue. A pedestrian sidewalk is located only along the north side of the bridge.

The superstructure consists of two steel through girders, which support steel floor beams and a reinforced concrete deck. Reinforced concrete gravity abutments make up the substructure. Based on review of the August 22, 2013 Bridge Inspection Report, the structure:

- Is Fracture Critical (only supported by two beams... should one fail, the bridge fails)
- Is Not Structurally Deficient
- Is Not Functionally Obsolete
- Is Scour Critical with Unstable Abutments
- Has a Sufficiency Rating of 67.9

A list of Bridge Inspection Reports dating back to 2001 is provided in ***Appendix A.***

BACKGROUND

Concerns regarding scour at Abutment 1 have been noted since 1981. Abutment 1 is the west abutment adjacent to the railroad tracks; on the right side when looking downstream. The 2013 Bridge Inspection indicates that the scour is on the left side of Abutment 1 and is about 20 feet long x 1.5 feet high and extends back under the footing approximately 3 feet. These conditions appear to have remained unchanged since the last assessment. It was the intent of this study to address how to resolve these concerns with the recommended improvements.

The structure's scour potential has been assessed in accordance with the Federal Highway Administration Technical Advisory T5140.23, "Evaluating Scour at Bridges". The National Bridge Inventory Item 113 Code, "Vulnerability to Scour", has been changed to "2" which states:

> *Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by:*
>
> *- a comparison of calculated scour and observed scour during the bridge inspection, or*
>
> *- an engineering evaluation of the observed scour condition reported by the bridge inspector*

Should the bridge scour get worse, failure of the abutments would be imminent, and the bridge would be closed to traffic.

East Abutment (Abutment 2)

West Abutment (Abutment 1)

Caltrans has also been an active participant in attempting to get repairs initiated and has indicated that the Agency is willing to help fund the project. Caltrans had designated funds to perform a scour analysis especially for the westerly abutment, and assess if these improvements could improve the bridge's resistance to scour. Unfortunately, the City of Dunsmuir has very limited resources and is essentially unable to administer any significant project development or construction work at that time. The City has a local engineering consultant (PACE) that has been involved in the bridge mitigation. However, the City's contracting limitations and the local engineering firm's capacity have resulted in a six year evaluation period with no appreciable resolution of the problem.

It is the desire of the community to engage CFL to perform the bridge repair assessments of the scour issues associated with the bridge, and determine if the bridge can be salvaged by performing scour/abutment mitigation improvements, or if the bridge crossing should be scheduled for reconstruction.

CURRENT CONDITIONS

EXISTING BRIDGE. The existing structure is a single span bridge with two built-up welded steel through girders, a reinforced concrete deck, steel floor beams, and reinforced concrete gravity abutments. The total bridge length is approximately 83'-0" feet in length with a bearing-to-bearing span length of approximately 80'-0". The out-to-out width of the through girders is 25'-3". Concrete curbs, each measuring approximately 1'-7 ¾" wide, encase the through girders and leave approximately 22 feet of clear space between the curb faces. This spaced is shared by two lanes of traffic, although no lines are present to delineate lanes and shoulders. A 3'-11 ¼" wide sidewalk was added to the exterior side on the upstream (north) side of the bridge at some point in past.

Superstructure. The through girders are encased in concrete curb and form the bulk of the bridge rail. An additional bicycle rub rail has been added to the downstream girder. The through girder separating the travel lanes and the sidewalk does not have a rub rail. The narrow sidewalk on the upstream side has a welded pipe rail on the outside of the sidewalk.

Substructure. The existing abutments appear to be a combination of the original 1915 abutments, modifications completed in association with the 1956 widening, and more recent repairs/modifications. As-Constructed plans have not been able to be located to date. One of the original stone masonry supports (nearest Abutment 2) has been left in place, but is not connected to the current structure. **According to the bridge reports, a Scour Plan of Action was produced in 1997, however no copy has been found. It is our understanding, no formal scour mitigation efforts have taken place, which is why this study and evaluation of options is necessary.**

WESTERN APPROACH.
The western approach includes Sacramento Avenue (running parallel to the river) and a two-track Union Pacific (UP) installation (that also runs parallel to the river) in between Sacramento Avenue and the Sacramento River. The distance from the western bridge approach (Abutment 1) to the centerline of the two UP tracks is about 40 feet. The distance from the centerline of the UP tracks to the centerline of Sacramento Avenue is approximately 70 feet.

Vehicles turning off of Sacramento Avenue on to Bush Street (the bridge alignment) required eastbound traffic to stop before reaching the UP tracks. A railroad cross buck and standard without gate are located just off the bridge to alert both westbound and east bound traffic of an approaching train. A stop sign is also present to control westbound traffic coming off the bridge.

The western approach is level and concrete railroad crossings of Bush Street exist for both the mainline and siding. A paved approach to railway facilities exists between the bridge and the tracks on the north side of Bush Street.

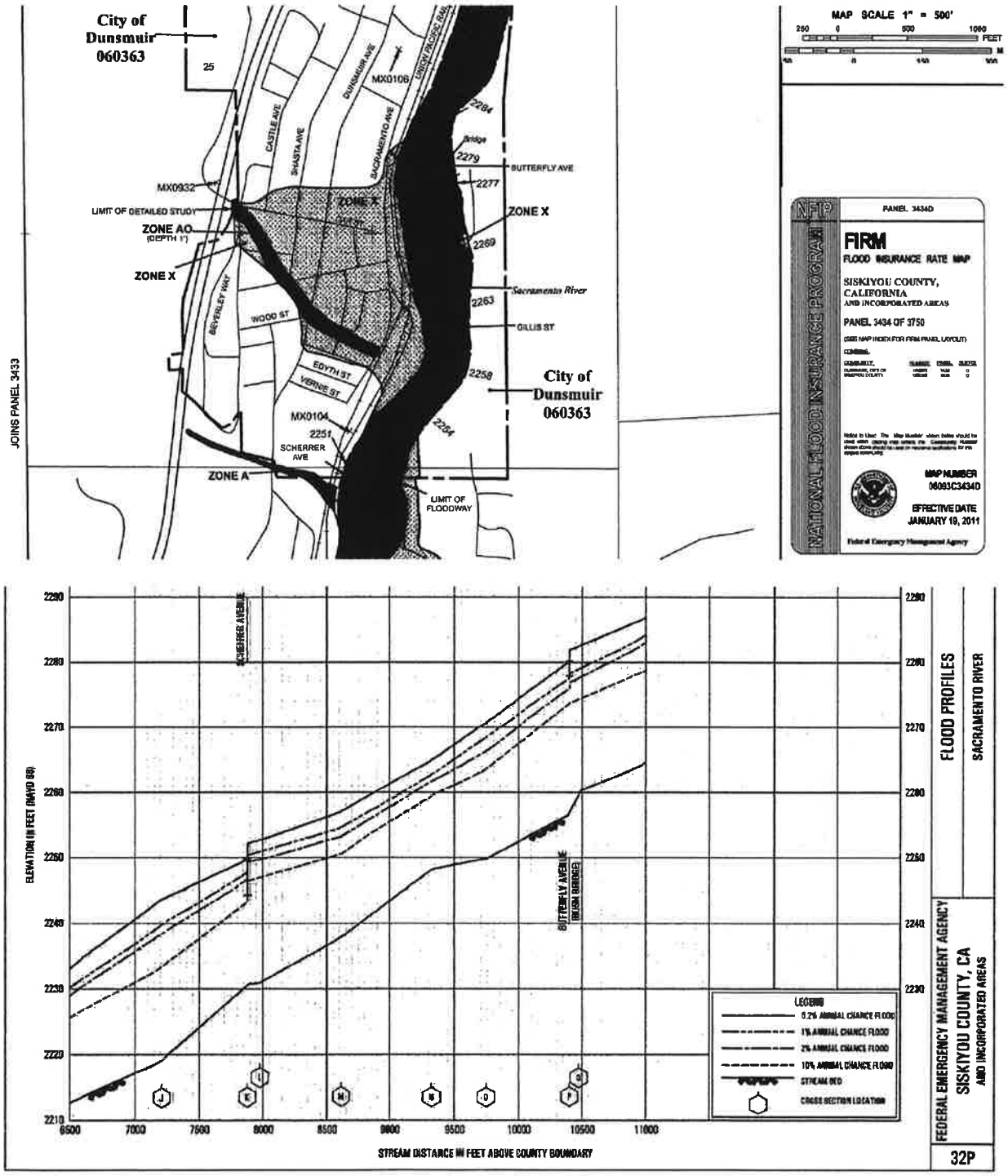
EASTERN APPROACH. The eastern approach (Abutment 2) drops abruptly from the end of the existing bridge deck until it intersects Butterfly Avenue which runs parallel to the river. The approach grade is approximately 18% with the bridge being higher than Butterfly Avenue. Review of the FIRM indicates that Butterfly Avenue is completely inundated during the 100-year event. There is a residential approach on the south side of Bush Street prior to intersecting Butterfly Avenue. There is also a painted pedestrian crosswalk that crosses Butterfly Avenue on the north side of Bush Street.

EXISTING DRAINAGE / CHANNEL HYDRAULICS

Six of the largest flood events on the Upper Sacramento River since 1911, in decreasing order of magnitude, occurred in January 1974, February 1940, January 1914, December 1964, March 1916, and December 1955. The flood of 1974 was estimated to have a peak discharge of 21,000 cfs at the Butterfly Bridge. The estimated discharge, based on high-water marks surveyed in 1977, was determined to have a recurrence interval of approximately 50 years. Damages in the City of Dunsmuir area from the 1974 flood were estimated to be nearly 5 million with 25 homes destroyed.

During a CFL team site visit (02/02/2015), the river was flowing with approximately 3-ft of depth. Five days later (02/07/2015), a rain storm (with no visible snow on the watershed prior to the rain) resulted in the River overtopping some of the banks downstream of the Butterfly Bridge.

The National Flood Insurance Program, Flood Insurance Rate Map (FIRM) for the project reach was updated in 2011. The FIRM indicates that the floodway is designated Zone AE and that the 100-year water surface closely approximates the low chord of the bridge.



As shown in the profile, the Butterfly Bridge is inundated at the 50-year event, providing no freeboard or room for debris during the design event. A complete copy of the FIRM and Flood Insurance Study are provided in Appendix B.

CHANNEL REACH

The channel bed surface is described in the Bridge Inspection Reports as "Rocks". Visual inspection indicates that the channel is composed of material with a d50 of about 1-foot. Larger, 4-foot diameter rocks (and less) are visually apparent.

Much of the pertinent information for the hydraulic analysis was obtained from the latest FEMA Flood Insurance Study (FIS) for Siskiyou County, dated January 19, 2011.

The channel top width of the Sacramento River within the project area is approximately 100 feet and is incised approximately 20 feet. At and just upstream (approximately 100 feet) of the bridge the gradient is about 3.8 percent. Upstream of the crossing area the general channel gradient is about 0.9%. The effective Flood Insurance Rate Map (FIRM), dated January 19, 2011 shows a floodplain top width of approximately 400 feet at the existing Butterfly Avenue bridge location.

The FIRM indicates that the floodway is designated Zone AE (meaning Base Flood Elevations have been established) and that the 100-year water surface is close to the low chord of the bridge. The Flood Profile in the FIS shows the bridge has very little freeboard for the 50-year event (2% Annual Chance), therefore not providing the desired freeboard or room for debris during the design event. The above Flood Profile also shows the 100-year event (1% Annual Chance) encroaching on the bridge structure, and the 500-year event (0.2% Annual Chance) overtopping the bridge.

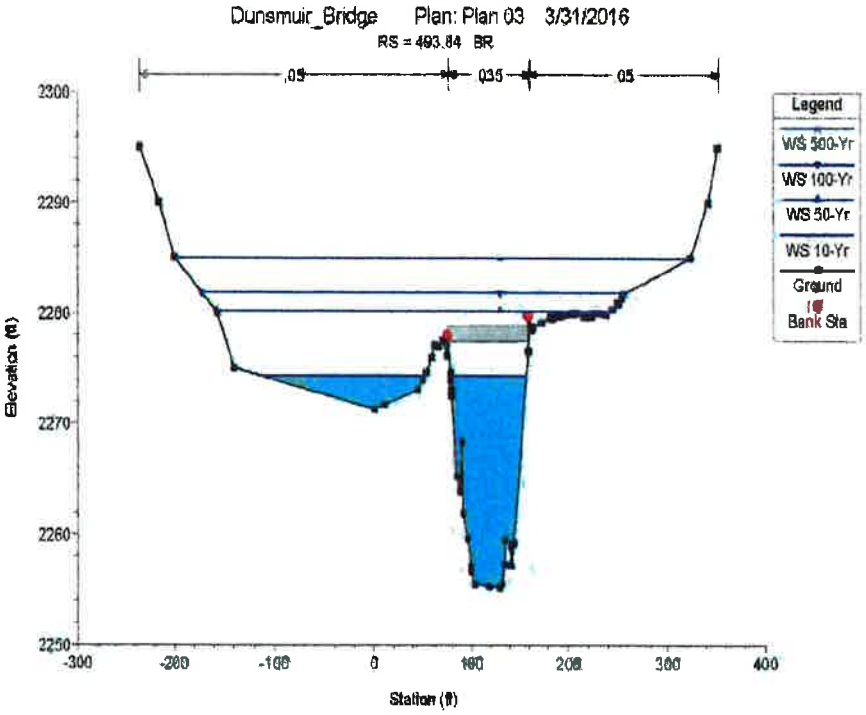
Data Collection and Hydraulic Modeling

Cross sections of the river channel were surveyed on February 26, 2016. The total channel reach of the cross section survey was approximately 1,000 feet (approximately 500 feet both upstream and downstream of the Butterfly Avenue Bridge).

At the time of the field survey, it was estimated that water was flowing approximately 6 to 7 feet deep. Because of the high depth and velocity of the flow, it was not possible to get ground shots within the bottom of the river channel. The survey crews were able to use an extender rod to hold the pole and GPS unit into the bank below the water surface. In this manner, they were able to obtain ground data for approximately six feet horizontally beyond the water surface (estimated to be approximately three feet vertically below the water surface). With this information, the design team "adjusted" the bottom of the river channel by an additional three feet below the lowest surveyed elevation on each bank in order to better approximate the bottom of channel elevation. This adjustment produced channel bottom elevations that closely match those shown on the Flood Profile from the FIS.

The topography in the vicinity of the Butterfly Avenue Bridge was done in more detail, such that the shape of the channel near and around the abutments could be more precisely modeled.

The surveyed cross sections were then imported into the Army Corps of Engineers HEC-RAS program. The cross sections produced by the limits of the field survey (approximately top of bank to top of bank) do not fully convey the larger flows (greater than 10-year). Therefore the outer limits of the cross sections were supplemented with data obtained from USGS quadrangle mapping and available LiDAR data. (See Appendix C)



Because the data used to develop the river cross sections is a combination of surveyed data and other sources, we attempted to obtain the existing model that was the basis of the effective FIRM in order to have a basis of data comparison. The City of Dunsmuir, Pace Engineering, and Siskiyou County were all contacted, and requests were made for the hydraulic models. To date, this information has not been received, and may not be available.

Flow rates for the Sacramento River were obtained from the FIS, and are as follows:

Flood Frequency (years)	Flow Rate (cubic feet/second)
10	13,000
50	22,000
100	27,000
500	40,000

The flood of 1974 was estimated to have a peak discharge of 21,000 cfs at the Butterfly Bridge. The estimated discharge, based on high-water marks surveyed in 1977, was determined to have a recurrence interval of approximately 50 years, which is consistent with the data table above.

Criteria

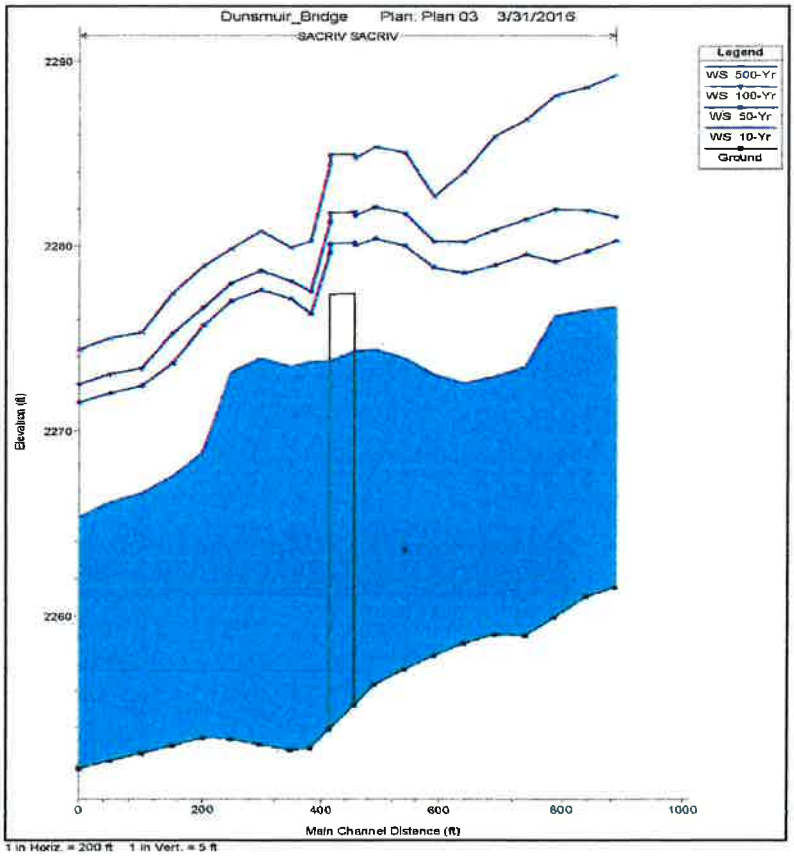
According to Table 7.1-A of the Federal Lands Highways Project Design and Development Manual (PDDM) for Bridged Waterways:

- Capacity design of the channel should be passing the 50-year event with a minimum of 2 feet of freeboard.
- Stability of the structure is based on a 100-year design flood, and is checked for the 500-year flood with a minimum factor of safety of 1.0 for the 500-year flood.

New bridges, if developed, will be designed in accordance with these criteria.

The Flood Profiles and past observations show that the 50-year freeboard requirement ***is not met*** by the existing bridge.

Results of Hydraulic Analysis



The HEC-RAS model was found to closely replicate the water surface elevations and floodplain top widths as indicated on the FIRM and Flood Profiles in the FIS. Results at the Butterfly Avenue Bridge are slightly different; ***the model shows that the 50-year event overtops the bridge***, whereas the FIS Flood Profile indicates that it passes under the bridge with very little freeboard. The 50-year and 100-year water surfaces in the HEC-RAS model at the upstream side of the bridge are both approximately three feet higher than what is shown on the Flood Profile.

Because many factors can affect computed water surface elevations, especially in the vicinity of bridges or other obstructions, there are several possible reasons for these differences, such as:

- using estimated channel bottom elevations based on the observed depth of flow;
- aggradation or degradation of the channel bottom (the FIS indicates that topography and aerial maps from 1955 were used in the original hydraulic analysis); or
- using different channel and overbank roughness values than what was originally modeled.

As shown in the hydraulic cross sections, even the 10-yr event is not fully contained within the banks of the Sacramento River in the vicinity of the Butterfly Bridge. Due to the site constraints, we don't believe it will be possible to install a new bridge with enough capacity under the structure to meet the design requirements.

At issue are the following constraints:

- There is development upstream and downstream that prohibit widening the channel to sufficiently contain the design flow event.
- Raising the profile of the bridge is constrained on both of the abutments; with the railroad tracks located on the west side, and a severely steep profile to align with the Butterfly Crossroad on the east side.
- The existing cross section is already experiencing scour damage. All alternatives for scour mitigation will likely reduce the openness under the structure, rather than widen it significantly.

It should be noted that while this is a necessary structure providing access to several homes, it is not the only structure providing access. Downstream, two other crossings, Bridge Street and South 1st Street, are fully functional and provide redundant access to all of the residences east of the river.

Therefore, with the limitations described above, replacement of the structure for hydraulic purposes does not appear justified, as it is not anticipated that any proposed rehabilitation measures to the existing bridge structure would significantly alter the hydraulic opening though the structure such that Base Flood Elevations would be revised.

With no proposed rehabilitation measures that would significantly alter the hydraulic opening through this bridged crossing, the study team does not anticipate any changes to the existing Base Flood Elevations. As a result, the remaining improvements within this report will not require a Conditional Letter of Map Revision (CLOMR) from FEMA. With this intent, for preliminary assessment purposes, the HEC-RAS model that was developed for this project represents a reasonable simulation of the effective model. Should any design revisions be proposed in the future that would change the Base Flood Elevations (either upstream or downstream of the structure), a more precise duplication of the effective model would then be necessary along with the development of a CLOMR.

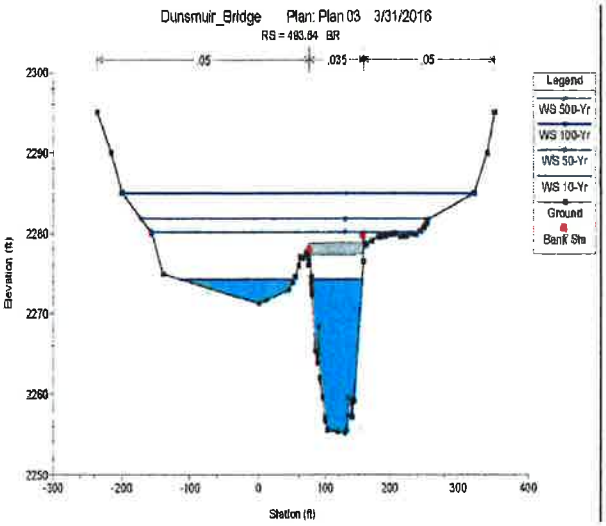
Scour Analysis

The structure's scour potential has been assessed in accordance with the Federal Highway Administration Technical Advisory T5140.23, "Evaluating Scour at Bridges". The National Bridge Inventory Item 113 Code, "Vulnerability to Scour", has been changed to "2" which states:

> ***Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by:***
> - ***a comparison of calculated scour and observed scour during the bridge inspection, or***
> - ***an engineering evaluation of the observed scour condition reported by the bridge inspector***

The channel bed surface is described in the Bridge Inspection Reports as "Rocks". Visual inspection indicates

that the channel is composed of material with a d50 of about 1-foot. Larger, 4-foot diameter rocks (and less) are visually apparent. The geotechnical site review by Shannon & Wilson (March 10, 2016) indicates that the channel consists of sand, gravel, cobbles, and boulders. For the purpose of a preliminary scour analysis, a d50 of 40 mm (coarse gravel) was assumed.



The bridge structure is well-centered within the main channel of the Sacramento River. However, the main channel is offset relative to the overall floodplain width, as can be seen in the river cross sections. Generally the floodplain extends much further beyond the main channel on the left overbank (east side) than on the right overbank (west side). Therefore the east abutment of the bridge would be expected to be more subject to scour than the west abutment due to how much it encroaches into the width of the floodplain on that side.

Despite this floodplain geometry, the west abutment (Abutment 1) has been the subject of concern for the existing bridge much more so than the east abutment. According to City sources, more severe scour has been recently observed on the west abutment, and concerns about the scour on Abutment 1 have been noted since 1981.

East Abutment (Abutment 2)

West Abutment (Abutment 1)

Some reasons why the west abutment may be more subject to scour under normal flow conditions, despite calculations that would suggest the opposite, could include:

- the west abutment is on the outside of a bend
- geological and soils conditions on this side of the channel in the vicinity of the bridge;
- the steepness of the slope on this side; or
- the effectiveness of the countermeasures that have been installed.

For example, the east bank is protected with loose riprap, while the west bank near the toe is also protected

with grouted riprap in some areas. The downstream grouted riprap toe location is inconsistent and in places protrudes into the channel approximately 5 to 8 feet. These protrusions occur immediately downstream from the Abutment 1 spread footing and cause back eddies, upstream flow, and vortices at the abutment face. The configuration of the countermeasures, or perhaps the lack of proper maintenance and/or repair of the riprap following a major flow event, may be exacerbating the scour issues at this location. (See the utility discussion later in this report for how utility foundations may be the reason for this protrusion).

Preliminary scour calculations were used using the HEC-RAS program, which uses the procedures outlined in HEC-18, Evaluating Scour at Bridges. A summary of the results is as follows:

Scour Projections:	East Abutment (Abutment 2)	West Abutment (Abutment 1)
100-Year Scour Depth	12.54'	5.67'
500-Year Scour Depth	21.31'	11.87'

It should be noted that these calculated depths are the maximum theoretical scour depths, without consideration of the existing bedrock elevations (no on-site drilling was completed to determine the depth of the existing bedrock). Often within streams in this type of geological setting, bedrock elevations are shallower than the maximum theoretical scour depth, and structure foundation designs are based on being founded into stable, competent rock rather than having to be as deep as the calculated scour depth. Further geotechnical investigation will be required to determine the depth to bedrock near the existing bridge structure.

Scour Countermeasures

Scour countermeasures are recommended at both abutments. The degree of these measures is dependent on which structural retrofit solution is selected. During the next design phase, with additional geotechnical information provided as the basis for the design, a more detailed scour analysis will be performed. In addition, scour countermeasures will be designed in accordance with HEC-23, Bridge Scour and Stream Instability Countermeasures. Such countermeasures are needed for local scour only (at the bridge abutments), and are not anticipated for contraction scour across the width of the channel.

Countermeasures for local scour at abutments generally consist of measures that will improve flow orientation at the bridge approaches and move local scour away from the abutment. Revetments and riprap placed on abutments and the embankment slopes upstream and downstream of the bridge are typical treatments. Riprap for the bridge abutments will be designed in Accordance with Design Guideline 14 in HEC-23.

Guide banks are earth or rock embankments placed at the abutments. Flow disturbances such as eddies and cross-flow can be eliminated where properly designed and constructed guide banks are placed at a bridge abutment. Since the Dunsmuir Bridge is within a well-defined channel with the abutments on the channel bank slopes, guide banks may not be necessary. In addition, guide banks could potentially remove hydraulic capacity within the channel, which is not desirable since this bridge already overtops during large events. But this option will be further considered during design. Short guide banks extending upstream and downstream of the abutment would move the local scour away from the abutment. Guidebanks will be designed in Accordance with Design Guideline 15 in HEC-23.

EXISTING GEOLOGIC, SEISMIC & FOUNDATION INFORMATION

Geologic Data

Geologic mapping shows the site underlain by Quaternary Volcanic rocks characterized as pyroclastic flow and; Ordovician Gabbroic and Diortitic rocks. It appears that Quaternary alluvial deposits are mapped at and immediately downstream from the bridge location. Graphical representations of the railroad and Interstate-5 on geologic mapping generally depicts obscure geologic contacts and mapped units at the bridge location.

Site Observations

Rock outcroppings were not observed in the channel near the bridge. Channel materials generally consist of sand, gravel, cobbles and boulders. Rock outcrop was observed approximately 600 ft upstream from the bridge on the left channel bank. Observation of this outcrop was made from across the channel. The

rock appears to be massive, intact and possibly igneous or meta-igneous rock. Outside of the channel, rock outcrop consisting of pillow and columnar basalt is present on the right bank west of the railroad tracks approximately 250-ft downstream from the bridge. Basalt is also present in the slopes west of Sacramento Avenue behind existing houses. Generally, higher elevations are associated with basalt outcrop in the vicinity of Sacramento Avenue. The basalt is not continuous along Sacramento Avenue and is in contact with other volcanic (pyroclastic?) flow deposits and river terrace deposits.

The hillside east of the channel has outcrops of gabbroic rock. Steep terrain is associated with the gabbroic outcrop and rock exposures at left bank channel level were only observed 600-ft upstream and 1,500-ft downstream. The outcrop is very intensely weathered and joints are generally steeply dipping out of slope. Other gabbroic outcrop is present higher on the hillside along Mountain Road located above Butterfly Avenue. Between the gabbroic outcrop upstream and downstream from the bridge, the topography flattens around the river channel and outcrop was not observed.

Channel bank protection is present at the bridge and upstream and downstream on both banks. Left bank channel protection consists of 2 to 4 ton rip rap upstream from the bridge. The rip rap extends from the channel bank toe to within 3 ft of the top of Abutment-2 wall. The rip rap is placed loose on the slope and three point contact was not observed in some of the rip rap locations. Riprap does not extend downstream on the left bank. The riprap slope is generally two horizontal to one vertical (2H:1V) or flatter.

The right bank is protected by similar 2 to 4 ton rip rap. Grouted riprap is present near the toe of the channel bank upstream from the bridge but grouting is not consistently applied. Downstream on the right bank, grouted riprap is present. The grout appears only applied to the surface of the riprap to an approximate depth of 1-ft measured perpendicular to the slope. Areas approximately 10-ft wide and from the bank toe up to approximately 4- to 5-ft from top of bank are eroded, exposing the ungrouted riprap below the grouted riprap slope face.

The downstream grouted riprap toe location is inconsistent and in places protrudes into the channel approximately 5- to 8-ft. These protrusions occur immediately downstream from the west abutment spread footing and causes back eddies, upstream flow and vortices at the western abutment face. Riprap slopes are generally at 1.5H:1V and locally steeper on the right bank. *Note: removal of this downstream protruding slope may have upstream benefits at the abutment, but it may also have been placed to protect the downstream utility crossing foundation, the triangular structure immediately downstream of the bridge shown in the picture below. With no as-builts and no plans for the placement of this riprap, the intended purpose is not known. More site analysis is required before this material can be modified. If the utility crossing is not dependent on this protruding protection, it will be removed.*

The Sacramento River flows approximately perpendicular to the bridge alignment with the channel thread located closer to the western third of the bridge. The flow impinges upon the Abutment-1 spread footing and is deflected easterly immediately downstream from the footing by the grouted riprap.

Water depth was not measured, but appeared to be approximately 6 to 7 ft deep. Channel flow was approximately 8 to 9 ft/sec based on timing a wayward basketball that floated downriver as it passed under the bridge width.

The river surface was measured at 16.5 ft below the bridge deck top on the upstream side. Groundwater elevations are likely to match the water elevation in the channel.

EXISTING FOUNDATIONS

Based on: Scoping Observation Report.

The existing bridge is an 83±ft long by 25±ft wide, single-span structure, supported on reinforced concrete abutments on spread footing foundations. The foundations appear poured directly onto existing boulder materials; the eastern abutment foundations are obscured by the channel bank and are unknown. As-built plans are not available and actual foundation types are unknown.

Scour has primarily been a concern for the western abutment, based on previous Caltrans bridge inspection reports. The magnitude of scour along and under the abutment was not determined during the geotechnical site review due to elevated and fast river flows (the picture to the right of the western abutment was taken during a lower flow event, February 2015.)

While the scour has been a concern historically with the west abutment, any site improvements will include scour mitigation at both abutments. Additional investigation is needed to determine if the abutments are founded on stable, competent rock. If they are, additional structural measures may not be necessary since no observable problems have been identified. Scour countermeasures such as placement of additional riprap will be evaluated and developed for both abutments as part of the final design solution.

REMARKS

Data Defects/Deficiencies:

- No test boring or groundwater data is available or provided.
- "As-Built" plans are not available. Some preliminary data was provided with this study, but more detailed structure specific information is needed including coring of the structures and nondestructive testing (NDT) techniques to offer the engineers all of the existing foundation information.
- Scour depth should be evaluated in detail once additional geotechnical and foundation information is available.

For preliminary evaluation the following observations and assumptions are:

- Geologic hazards such as landslides, secondary settlement, liquefaction, etc. are not apparent from this field review.
- Rock outcrop is not exposed within 100-ft of the bridge location based on observations.

Scour Observations:

- Depth to rock is unknown, however, it is likely greater than 30 ft below roadway grade based on topography, channel bank exposures and observed rock outcrop within the channel and in cut along the railroad.
- Depth to scour resistant material is not readily apparent from surface observations alone.

Foundation / Mitigation Measures:

- Driven piles may be feasible (pre-cast concrete, pipe-piles, H-piles) but observed oversize materials in the channel and likely hard driving is a consideration when selecting this foundation type.
- Cast in Drilled Hole Piles (drilled shafts) – appear feasible and would likely need "wet" construction, with inspection tubes and pile integrity testing.
- Micropile foundations may be more suitable for this location considering the utilities, close proximity to the UPRR spur/main line and limited work area access for large construction equipment.
- Spread footings may be a feasible foundation type assuming scour resistant bearing materials are relatively shallow, a minimum embedment into scour resistant materials is required and appropriate scour countermeasures are constructed at the abutment locations.

General Observations:

- The western abutment is a large structure and requires significant force to overcome the structural inertia and may be the reason why scour, while critical, has not gotten worse since the last Caltrans assessment.
- The western abutment is very close to the UPRR facility. Reconstruction of the bridge may require shoring to support the railroad embankment during construction as rail lines will need to be active at all times.
- The Sacramento River 100-yr discharge of 27,000 cfs is limited due to the Box Canyon Dam upstream of this site.
- Reuse of the existing foundations appears feasible, however, Abutment-1 will require establishing additional support beneath and in front of the footing to remove the scoured void and improving bank protection at both abutments is necessary to help improve foundation security.
- The structural capacity of the existing abutments is unknown. Evaluation of the reinforcing steel using both nondestructive testing tools and concrete using coring for determining strength is needed for the abutment re-use design.

STRUCTURAL EVALUATION OF ALTERNATIVES

The goal of this Feasibility Study is determine if full bridge replacement is absolutely necessary or if a less expensive retrofit solution is feasible. This section addresses the structural factors associated with the alternatives evaluation of both new and retrofitted structures.

New Bridge Alternative

Construction of a new bridge would resolve all of the existing scour problems, as the new foundations would be extended to bedrock. With the known challenges identified above, the length and elevation of the bridge is constrained, but incorporating vertical abutments with a smaller footprint at the toe may improve slightly the freeboard and hydraulic capacity. As noted above, with the site constraints of the railroad to the west, and Butterfly Road to the east, we cannot raise the deck elevation, or lengthen the structure to provide any real hydraulic benefit. While attempting to solve these issues is desirable, the cost to construct a new bridge is substantial. Some of the contributing factors to this cost include:

Primary considerations that factor into the estimated cost include:

- Project Location (approximately one hour from Redding, CA) (increasing costs)
- Design and Construction influences/restrictions due to railroad proximity (increasing costs)
- Design and Construction influences due to utility coordination and relocations (increasing costs)
- Environmental constraints and mitigation measures (increasing costs)

Given the above contributing site factors, a construction cost of approximately $1,800,000 is anticipated for the bridge replacement alternative. This dollar value was established using the following assumptions:

New Bridge Alternative	Unit	Quantity	Unit Price	Extension	Assumptions
Mobilization	LPSM	All	$160,000.00	$160,000.00	12 Percent
Survey	LPSM	All	$25,000.00	$25,000.00	
Contractor Quality Control	LPSM	All	$40,000.00	$40,000.00	3 Percent
Contractor Testing	LPSM	All	$65,000.00	$65,000.00	5 Percent
Construction Schedule	LPSM	All	$15,000.00	$15,000.00	
Soil Erosion and Sediment Control	LPSM	All	$175,000.00	$175,000.00	Dewatering, Lead Paint Abatement, Sediment Control
Removal of Structures and Obstructions	LPSM	All	$75,000.00	$75,000.00	Removal of Bridge
Debris Containment System	SQFT	2,520	$10.71	$27,000.00	Added River Protection
Aggregate and Base Courses	SQYD	600	$16.00	$10,000.00	50' x 50' Each Approach
Asphalt Concrete Pavement	SQYD	600	$35.00	$21,000.00	50' x 50' Each Approach
Bridge	SQFT	2,520	$250.00	$630,000.00	90' x 28'
Utility Modifications	LPSM	All	$100,000.00	$100,000.00	Waterline suspension
Rental Equipment and General Labor	LPSM	All	$40,000.00	$40,000.00	
Permanent Traffic Control	LPSM	All	$10,000.00	$10,000.00	
Temporary Traffic Control	LPSM	All	$25,000.00	$25,000.00	Detour Anticipated
UPRR Temporary Traffic Control	HOUR	1,040	$80.00	$82,000.00	Six Month Duration
			20% Contingency:	$300,000.00	
			Total	**$1,800,000.00**	

Many of the above values are based on typical costs associated with CFL bridge projects for a single span structure. This estimate is only for the construction cost of the bridge, and does not include the necessary design, permitting, and construction management.

With the new construction, the existing bridge abutments as well as the existing concrete pier that is in the river will be completely removed. While the new bridge could be constructed behind these structures, removing them will improve the hydraulic efficiency of this crossing, which is one of the primary goals of this project. Removing these structures within the river require diversion and dewatering the work zones. In addition, we added some effort to address the likely abatement required for the older, painted steel sections of the bridge.

With the new bridge foundations extending to bedrock and addressing scour, no additional channel protection is assumed around the bridge abutments.

With the abutment removals and new construction, the area in the immediate vicinity of the bridge approaches will likely need to be repaired (we used approximately 50-ft on both approaches).

There are two utilities on or adjacent to the bridge. While the existing gas line is assumed to be abandoned, the waterline immediately adjacent to the bridge will need to be relocated when the existing pier and waterline foundation structure is removed. Building a new suspension structure for the waterline, with sufficient foundations and a structure to span the banks, is addressed in the estimate.

One advantage associated with the repairs or replacement at this site is that there is another bridge crossing the Sacramento River located nearly ½ mile downstream at Scherrer Avenue. In discussions with the Town, it will be possible to close the Dunsmuir crossing during construction and detour traffic through the Scherrer structure. As such, the traffic control costs were reduced, and the construction efficiency increased.

While local traffic can be diverted, working next to an active railroad line requires separate RR traffic control. The estimates include time for UPRR safety officials providing support for bringing equipment and materials across the active tracks, and working adjacent to the lines when the new foundations are constructed.

Bridge Retrofit And Rehabilitation

Based on the Bridge Inspection Report, the existing superstructure is in relatively good condition. The majority of the problems are related to scour, particularly at the western abutment. Repairs and retrofits could be designed to remedy the scour problems, which would allow the existing superstructure to remain in place.

The design team identified a variety of retrofit solutions capable of addressing the existing scour problems. Structures **Table 1** lists seven potential retrofit solutions for the butterfly bridge. For some of the retrofits proposed, multiple solutions exist within the overarching technique. For example, driving piling or drilled shafts could be used in association with the adjacent deep foundation retrofit technique.

Table 1: Dunsmuir Bridge Retrofit and Rehabilitation Options Matrix

No.	Title	Description / Features	Positive Attributes	Negative Attributes / Risks	Temporary Impacts during construction		Permanent Impacts	Constructability Considerations
					Waterway	Railroad Tracks		
1	**Grout and Revetment**	• Fill the existing void beneath the west abutment with grout or cementious material • Place adequate revetment around abutment to prevent scour	• Easy to construct.	• Size of revetment required could make this solution impractical • Potential for grout "plug" to slip out / fail in future event	• Requires a work zone in front of the abutment that must be dewatered.	• None	• Revetment may occupy volume in the waterway. Could reduce hydraulic capacity if work is not performed on the opposite bank.	• Requires dewatering
2	**Micropile Cutoff wall**	• A grid of mircropiles and concrete cap are installed in front of the existing abutment. • Place riprap over concrete cap.	• System is independent of the bridge	• Can the micropiles be sized and configured to handle the large lateral loads imparted to it from existing foundation during the scour event? • A large number of micropiles are likely required • Low headroom equipment required.	• Requires a work zone in front of the abutment that must be dewatered.	• None	• Places another feature in the waterway. Could reduce hydraulic capacity if work is not performed on the opposite bank.	• Requires dewatering
3	**Micropile Underpinning**	• Micropiles are installed beneath the existing abutment, giving the system a deep foundation. • Micropiles may be installed either from above and drilling through the existing abutment or by working in front of the existing abutment.	• Micropiles can easily be installed in subsurface strata containing rocks and boulders. • No permanent impacts to waterway.	• If the scour depth is excessive, would have relatively long micropile lengths exposed in the scour event. Can these unbraced lengths handle the lateral demands expected? • Given the weight of the existing structure, likely requires a large number of micropiles. • Do a large number of holes through the existing abutment compromise its capacity?	• If installed by working in front of the abutment, requires a dewatered work zone	• If installed from above, may be flagging requirements during construction	• None	• If installed beneath the bridge, requires low-headroom equipment.

No.	Title	Description / Features	Positive Attributes	Negative Attributes / Risks	Temporary impacts during construction		Permanent Impacts	Constructability Considerations
					Waterway	Railroad Tracks		
4	**Drilled shaft Underpinning**	• Drilled shafts are installed beneath the existing abutment, giving the system a deep foundation. • Drilled shafts are installed by working from above and drilling through the existing abutment	• Can complete the work from above • No dewatering required in front of existing abutment. • No permanent impacts to waterway.	• Drilled shafts could be challenging to install with rocks and boulders present • Have the large holes cored through the abutment compromised its integrity? • Does the drilled shaft "engage" the abutment and actually support it?	• None	• May be flagging requirements during construction	• None	• Eliminates the need to work beneath the existing bridge • Can shear rings be "cut" into existing abutment concrete for shaft engagement? • Eliminates the need to dewatered work zone. • May have challenges in keeping drilled hole dry
5	**Adjacent Deep Foundation**	• Construct deep foundation members (drilled shafts, micropiles, etc.) adjacent to the existing abutment. • Connect these members to the existing abutment, thereby supporting it during next scour event.	• Can accept a wide variety of deep foundation types.	• If features are installed in front of the abutment, requires low-headroom equipment • May not have enough physical space on the sides to accommodate the number of mircopiles required. • Compromised aesthetics.	• If drilled shafts, likely need a work platform and dewatered area at river's edge.	• May be flagging requirements during construction	• None	• Eliminates the need to work beneath the existing bridge • Challenge of building a drilling platform at river's edge and getting equipment there.
6	**Straddle Bent**	• Construct a new pier in front of the existing abutment.	• New support can be designed to resist current scour demands.	• If existing abutment remains in place, continued scour could cause failure and collapse onto new pier (and loss of approach road). • If existing abutment is removed, becomes solution #7. Requires extensive work and coordination with RR impacts. • Likely requires superstructure modification for new support point on girders.	• Likely need a work platform and dewatered area at river's edge.	• None	• New piers occupy volume in the waterway. Could impact hydraulics.	• Challenge of building a drilling platform at river's edge and getting equipment there. • Formwork required for columns and possibly cap (if not precast or steel)

No.	Title	Description / Features	Positive Attributes	Negative Attributes / Risks	Temporary Impacts during construction		Permanent Impacts	Constructability Considerations
					Waterway	Railroad Tracks		
7	**Abutment Replacement**	• Remove the existing abutment and replace it with a new abutment. • Requires temporary shoring to support the superstructure. • Requires temporary support of excavation to hold cut behind abutment.	• Completely removes the element causing existing problems. • New abutment can be designed to resist current scour demands.	• Shoring towers at river's edge. • Full closure of highway for a longer period (months?)	• Placement of shoring towers at river's edge. • Likely requires a dewatered work zone.	• Likely requires flagging during construction. • Major coordination with SOE elements installed behind abutment.	• None	• Requires temporary shoring towers. • Likely requires jacking to separate superstructure from abutment. • Extensive SOE required behind abutment.

While the various retrofit techniques mitigate the scour problems, they do not address other deficiencies such as hydraulic capacity. Some of the retrofit techniques may even worsen those shortcomings. For example, placement of revetment in front of the existing abutment will occupy a greater volume in the channel and could actually decrease available freeboard.

The following discussion expands on the previously identified alternatives in Table 1 above, and presents a more detailed description with supporting figures and a preliminary cost of the various retrofit options. While the discussions are focused on the western abutment, the construction cost estimates are based upon performing similar work at both abutments to provide a long-term solution. Dollar amounts for each specific work element have been rounded up to the closest one-thousand dollar increment and the total then rounded up to the nearest ten-thousand dollar increment.

NOTE: Initially the design team focused on only addressing the above scour and foundation mitigation measures for the western abutment, as this is the abutment addressed as the scour critical location in the previous bridge evaluation reports. Upon further discussion with the design team and CFLHD, and based on the hydraulic indications that scour is ultimately more likely to occur at the eastern abutment, similar scour mitigation and structural retrofit improvements are recommended on both abutments. Therefore, while the following discussions are focused on solutions for the western abutment, the cost estimates for the following retrofit options are being applied to both abutments. As a significant portion of the cost is mobilizing to this site and working in the Sacramento River, implementing protection measures to both abutments seems appropriate rather than bolstering the scour critical side now, and likely having to repair the remaining abutment in the future.

Similar to the replacement option, there are typical costs for providing foundation repairs and scour mitigation. Some of these typical costs that are common to all of the alternatives include:

The existing concrete pier that is in the river will be completely removed.

Scour mitigation measures will be provided. Installing these and the foundation repairs within the river require diversion and dewatering the work zones.

There are two utilities on or adjacent to the bridge. While the existing gas line is assumed to be abandoned, the waterline immediately adjacent to the bridge will need to be relocated when the existing pier and waterline foundation structure is removed. Building a new suspension structure for the waterline, with sufficient foundations and a structure to span the banks, is addressed in the estimate.

One advantage associated with the repairs or replacement at this site is that there is another bridge crossing the Sacramento River located nearly ½ mile downstream at Scherrer Avenue. In discussions with the Town, it will be possible to close the Dunsmuir crossing during construction and detour traffic through the Scherrer structure. As such, the traffic control costs were reduced, and the construction efficiency increased.

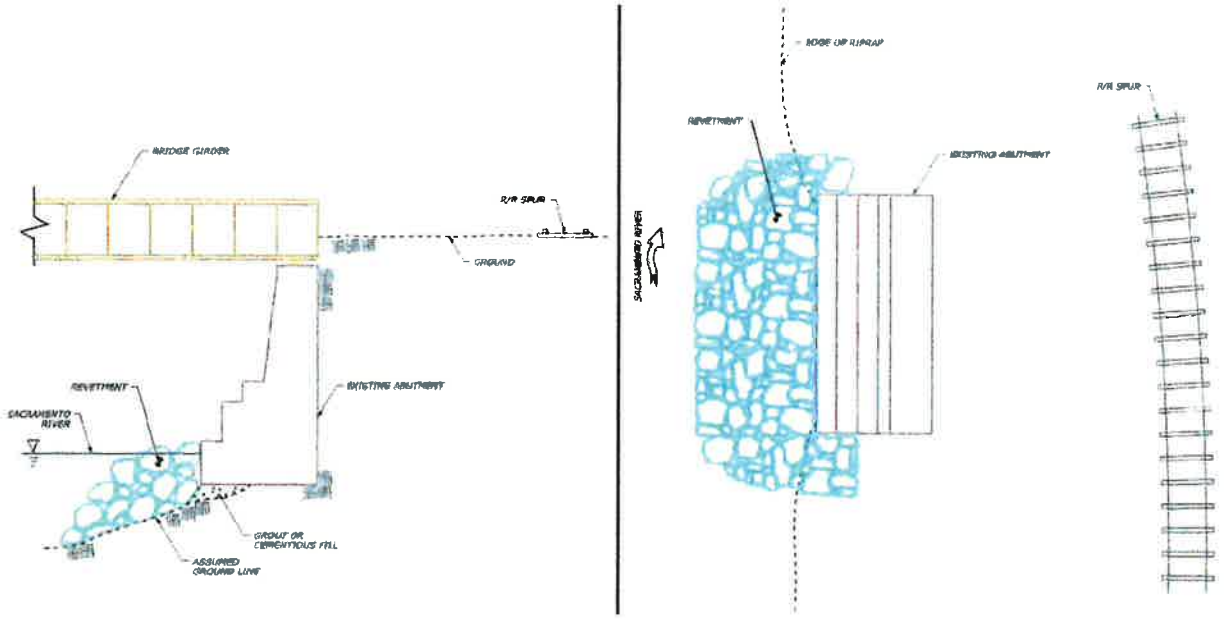
While local traffic can be diverted, working next to an active railroad line requires separate RR traffic control. The estimates include time for UPRR safety officials providing support for bringing equipment and materials across the active tracks, and working adjacent to the lines when the existing foundations are repaired.

Option 1: Grout and Revetment

This solution addresses the scour problem by backfilling the existing void beneath the abutment and placing adequate revetment in front of the existing abutment to resist future scour. While relatively easy to construct, the size of the required revetment could be large. Large revetment could increase construction difficulty. Furthermore, large revetment would reduce channel capacity and worsen hydraulic performance.

The estimated construction cost of this alternate is $647,000.

Option 1: Grout and Revetment	Unit	Quantity	Unit Price	Extension	Remarks
Mobilization	LPSM	All	$58,000.00	$58,000.00	12 Percent
Survey	LPSM	All	$5,000.00	$5,000.00	
Contractor Quality Control	LPSM	All	$14,000.00	$14,000.00	3 Percent
Contractor Testing	LPSM	All	$23,000.00	$23,000.00	5 Percent
Construction Schedule	LPSM	All	$7,000.00	$7,000.00	
Soil Erosion and Sediment Control	LPSM	All	$150,000.00	$150,000.00	Dewatering / Sediment Control
Removal of Structures and Obstructions	LPSM	All	$15,000.00	$15,000.00	Old Pier and grouted debris
Riprap	CUYD	130	$400.00	$52,000.00	Both Abutments
Grout	CUYD	15	$1,000.00	$15,000.00	Both Abutments
Utility Modifications	LPSM	All	$100,000.00	$100,000.00	Waterline suspension
Rental Equipment and General Labor	LPSM	All	$30,000.00	$30,000.00	
Permanent Traffic Control	LPSM	All	$3,000.00	$3,000.00	
Temporary Traffic Control	LPSM	All	$25,000.00	$25,000.00	Detour Anticipated
UPRR Temporary Traffic Control	HOUR	520	$80.00	$42,000.00	Three Month Duration
			20% Contingency:	$108,000.00	
			Total	**$647,000.00**	

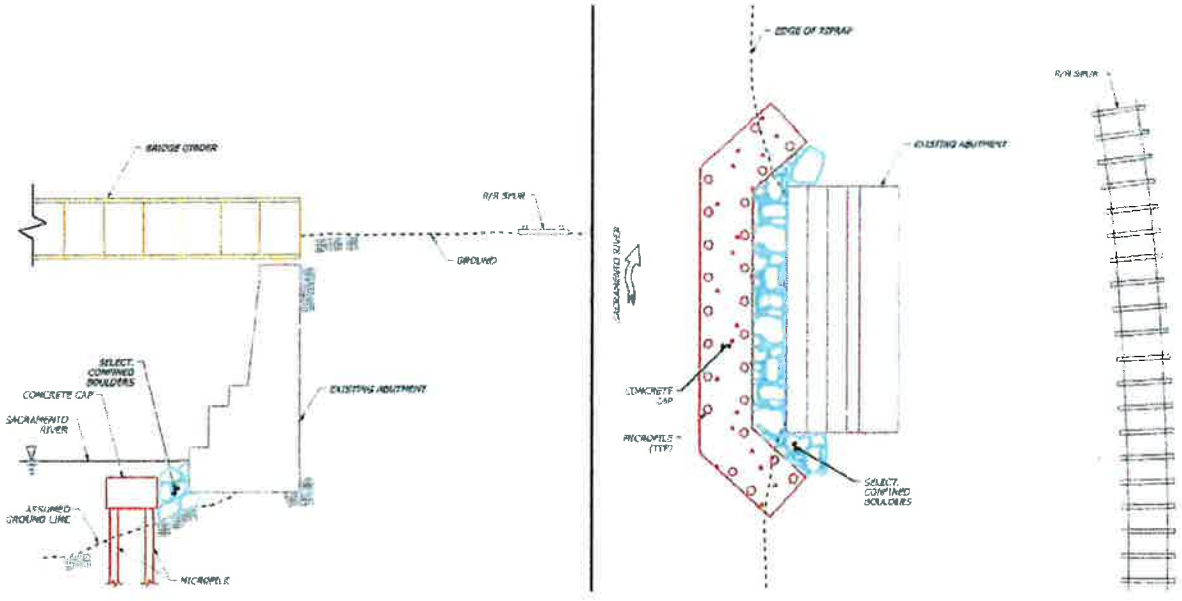


Option 2: Micropile Cutoff Wall

This solution addresses the scour problem by constructing a micropile cutoff wall in front of the existing abutment. This cutoff wall is a deep foundation system capable of retaining fill between itself and the existing abutment; scour only removes material along the front of the cutoff wall. The challenges with this system involve lateral load capacity. Micropiles do not offer substantial lateral load capacity and the existing mass gravity abutment will impart significant lateral soil pressures to the system. The number of micropiles required to provide the necessary lateral resistance could become excessive and result in substantially higher construction costs.

The estimated construction cost of this alternate is $1,757,000.

Option 2: Micropile Cutoff Wall	Unit	Quantity	Unit Price	Extension	Remarks
Mobilization	LPSM	All	$157,000.00	$157,000.00	12 Percent
Survey	LPSM	All	$5,000.00	$5,000.00	
Contractor Quality Control	LPSM	All	$37,000.00	$37,000.00	3 Percent
Contractor Testing	LPSM	All	$61,000.00	$61,000.00	5 Percent
Construction Schedule	LPSM	All	$10,000.00	$10,000.00	
Soil Erosion and Sediment Control	LPSM	All	$150,000.00	$150,000.00	Dewatering and Sediment Control
Removal of Structures and Obstructions	LPSM	All	$15,000.00	$15,000.00	
Riprap	CUYD	80	$400.00	$32,000.00	Both Abutments
Micropiles	LNFT	3,000	$250.00	$750,000.00	Both Abutments
Structural Concrete	CUYD	40	$1,000.00	$40,000.00	Both Abutments
Reinforcing Steel	LB	4,600	$1.50	$7,000.00	Both Abutments
Utility Modifications	LPSM	All	$100,000.00	$100,000.00	Waterline suspension
Rental Equipment and General Labor	LPSM	All	$30,000.00	$30,000.00	
Permanent Traffic Control	LPSM	All	$3,000.00	$3,000.00	
Temporary Traffic Control	LPSM	All	$25,000.00	$25,000.00	Detour Anticipated
UPRR Temporary Traffic Control	HOUR	520	$80.00	$42,000.00	Three Month Duration
			20% Contingency:	$293,000.00	
			Total	**$1,757,000.00**	

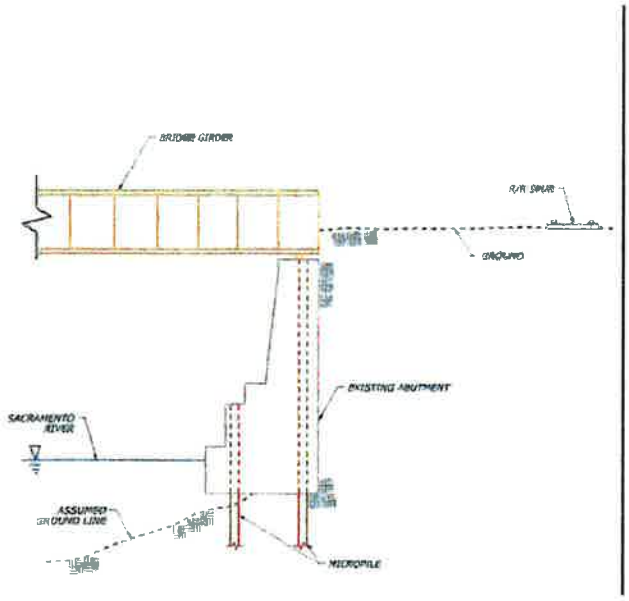


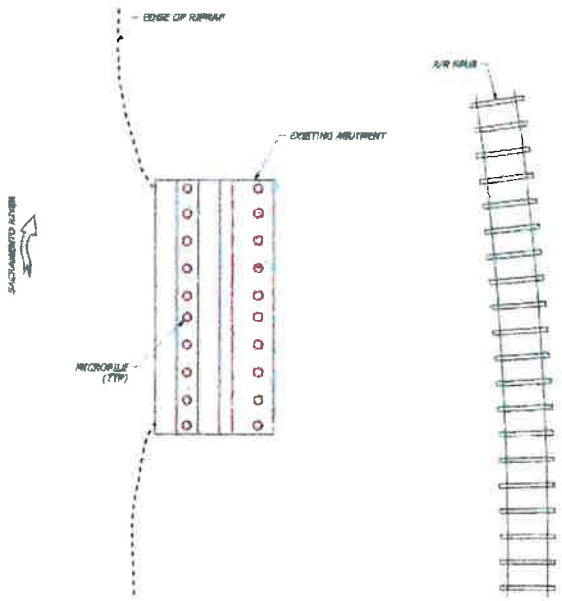
Option 3: Micropile Underpinning

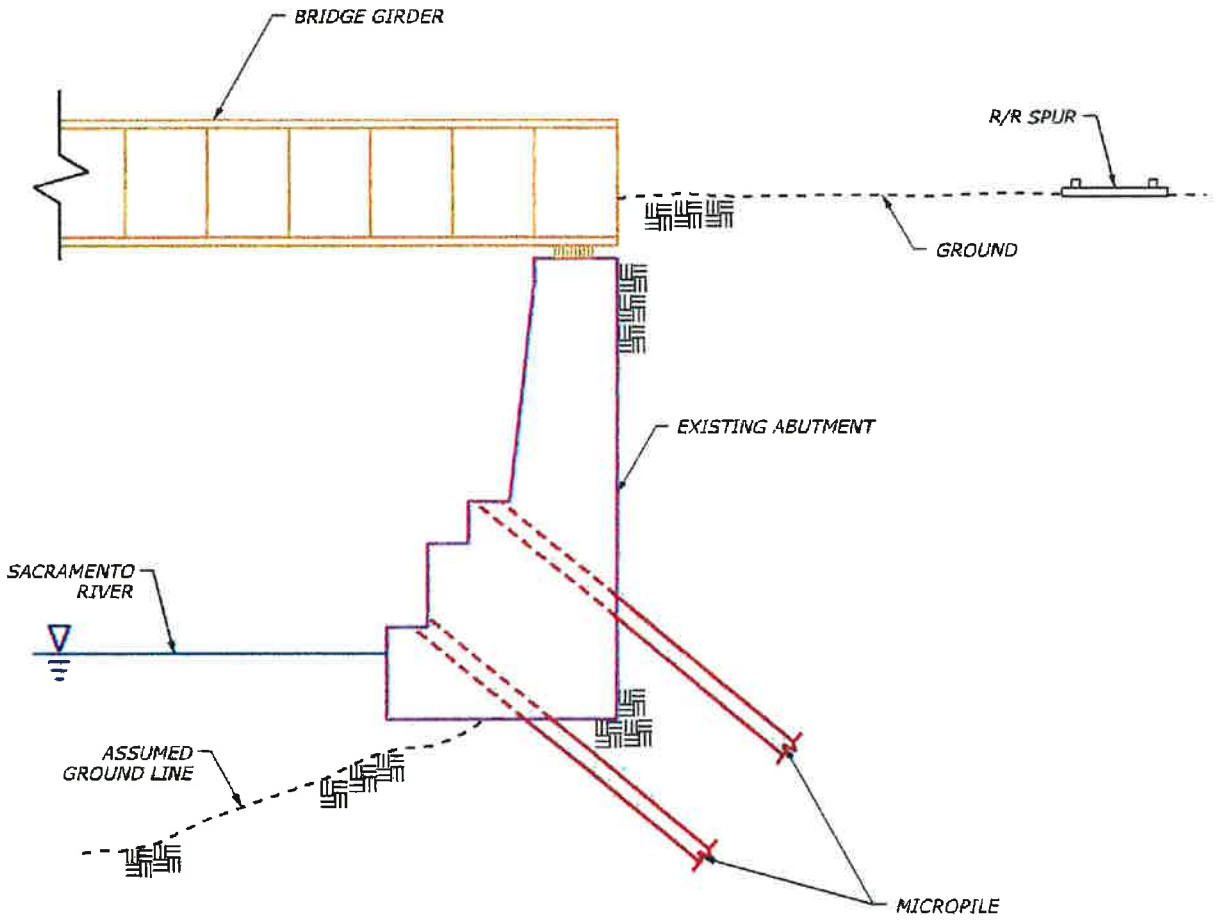
This solution addresses the scour problem by adding deep foundation elements beneath the existing abutment. These deep foundation elements support the abutment even if material below it is lost during future flood events. Just like the micropile cutoff wall, the primary challenge with this system involves lateral load capacity. Micropiles do not offer substantial lateral load capacity and the existing mass gravity abutment may develop moderate lateral forces during future scour events. The figures below and construction quantities assume vertical installation of the micropiles. Some of the micropiles could be installed at an angle (battered) to facilitate construction access and fine-tune system performance (see the following page for an alternative micropile configuration). Such an option would be evaluated in final design.

The estimated construction cost of this alternate is $1,064,000.

Option 3: Micropile Underpinning	Unit	Quantity	Unit Price	Extension	Remarks
Mobilization	LPSM	All	$95,000.00	$95,000.00	12 Percent
Survey	LPSM	All	$5,000.00	$5,000.00	
Contractor Quality Control	LPSM	All	$22,000.00	$22,000.00	3 Percent
Contractor Testing	LPSM	All	$37,000.00	$37,000.00	5 Percent
Construction Schedule	LPSM	All	$10,000.00	$10,000.00	
Soil Erosion and Sediment Control	LPSM	All	$150,000.00	$150,000.00	Dewatering and Sediment Control
Removal of Structures and Obstructions	LPSM	All	$15,000.00	$15,000.00	
Riprap	CUYD	130	$400.00	$52,000.00	Both Abutments
Micropiles	LNFT	1,200	$250.00	$300,000.00	Both Abutments
Utility Modifications	LPSM	All	$100,000.00	$100,000.00	Waterline suspension
Rental Equipment and General Labor	LPSM	All	$30,000.00	$30,000.00	
Permanent Traffic Control	LPSM	All	$3,000.00	$3,000.00	
Temporary Traffic Control	LPSM	All	$25,000.00	$25,000.00	Detour Anticipated
UPRR Temporary Traffic Control	HOUR	520	$80.00	$42,000.00	Three Month Duration
			20% Contingency:	$178,000.00	
			Total	**$1,064,000.00**	







As shown conceptually above, some of the micropiles could be installed at an angle (battered) to facilitate construction access and fine-tune system performance. Small micropile rigs are available that may fit under the existing bridge so that coring through bridge deck (proposed in the previous solution), will not be necessary.

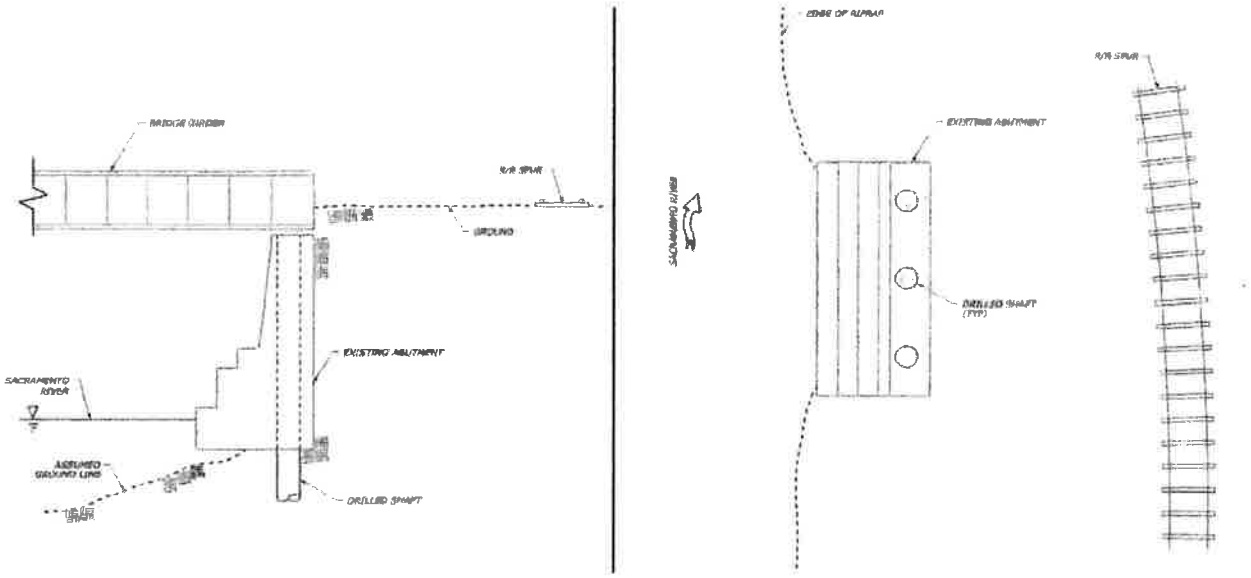
The costs for this system are likely to be less than the solution shown on the previous page, however, it is all dependant on what the site geotech investigation, and the bridge foundation structural elements cored, or non-destructively tested. For budgeting purposes, with the information known, both are statistically about the same price.

Option 4: Drilled Shaft Underpinning

This solution addresses the scour problem by adding deep foundation elements beneath the existing abutment. These deep foundation elements support the abutment even if material below it is lost during future flood events. Drilled shafts would be installed by drilling through the existing abutment from the roadway above. This would essentially core the existing abutment and place drilled shafts beneath the core holes. Challenges with this system include the need to core through the existing abutment, wet construction methods for the drilled shafts, and developing a lateral transfer mechanism between the drilled shafts and the smooth core holes in the abutment.

The estimated construction cost of this alternate is $782,000.

Option 4: Drilled Shaft Underpinning	Unit	Quantity	Unit Price	Extension	Remarks
Mobilization	LPSM	All	$71,000.00	$71,000.00	12 Percent
Survey	LPSM	All	$5,000.00	$5,000.00	
Contractor Quality Control	LPSM	All	$17,000.00	$17,000.00	3 Percent
Contractor Testing	LPSM	All	$28,000.00	$28,000.00	5 Percent
Construction Schedule	LPSM	All	$10,000.00	$10,000.00	
Soil Erosion and Sediment Control	LPSM	All	$150,000.00	$150,000.00	Dewatering and Sediment Control
Removal of Structures and Obstructions	LPSM	All	$15,000.00	$15,000.00	
Riprap	CUYD	130	$400.00	$52,000.00	Both Abutments
Structural Concrete	CUYD	40	$1,000.00	$40,000.00	Both Abutments
Reinforcing Steel	LB	5,000	$1.50	$8,000.00	Both Abutments
Drilled Shafts, 36-Inch	LNFT	90	$750.00	$68,000.00	Both Abutments
Utility Modifications	LPSM	All	$100,000.00	$100,000.00	Waterline suspension
Rental Equipment and General Labor	LPSM	All	$30,000.00	$30,000.00	
Permanent Traffic Control	LPSM	All	$3,000.00	$3,000.00	
Temporary Traffic Control	LPSM	All	$25,000.00	$25,000.00	Detour Anticipated
UPRR Temporary Traffic Control	HOUR	520	$80.00	$42,000.00	Three Month Duration
			20% Contingency:	$118,000.00	
			Total	**$782,000.00**	

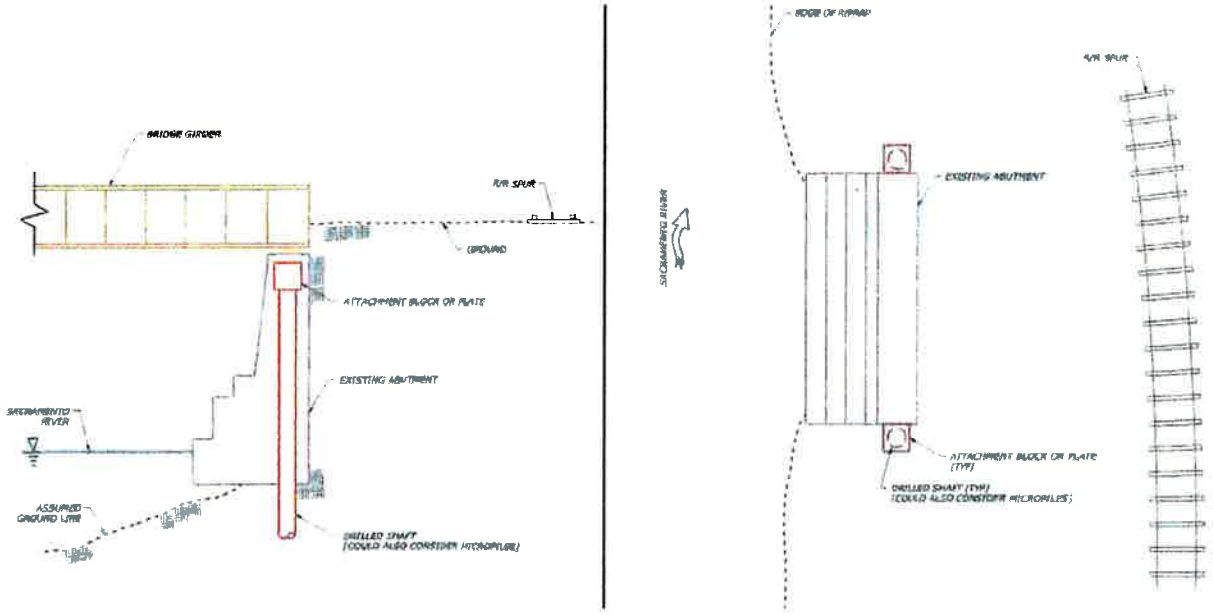


Option 5: Adjacent Deep Foundation

This solution addresses the scour problem by adding deep foundation elements to the existing abutment. These deep foundation elements support the abutment even if material below it is lost during future flood events. Unlike the underpinning solutions, this alternate installs deep foundation members on each side of the abutment. These deep foundation members are then connected to the sides of the abutment, allowing the necessary load transfer to occur. Challenges with this system include wet construction methods for the drilled shafts and suitable work zones beside each abutment. The illustration below shows connection of the drilled shafts at a relatively high location on the abutment. It is possible the connection point could be lowered to optimize behavior and construction. Such an element would be investigated in final design.

The estimated construction cost of this alternate is $745,000.

Option 5: Adjacent Deep Foundation	Unit	Quantity	Unit Price	Extension	Remarks
Mobilization	LPSM	All	$68,000.00	$68,000.00	12 Percent
Survey	LPSM	All	$5,000.00	$5,000.00	
Contractor Quality Control	LPSM	All	$16,000.00	$16,000.00	3 Percent
Contractor Testing	LPSM	All	$27,000.00	$27,000.00	5 Percent
Construction Schedule	LPSM	All	$10,000.00	$10,000.00	
Soil Erosion and Sediment Control	LPSM	All	$150,000.00	$150,000.00	Dewatering and Sediment Control
Removal of Structures and Obstructions	LPSM	All	$15,000.00	$15,000.00	
Riprap	CUYD	135	$400.00	$54,000.00	Both Abutments
Structural Concrete	CUYD	35	$1,000.00	$35,000.00	Both Abutments
Reinforcing Steel	LB	5,200	$1.50	$8,000.00	Both Abutments
Drilled Shafts, 36-Inch	LNFT	60	$750.00	$45,000.00	Both Abutments
Utility Modifications	LPSM	All	$100,000.00	$100,000.00	Waterline suspension
Rental Equipment and General Labor	LPSM	All	$30,000.00	$30,000.00	
Permanent Traffic Control	LPSM	All	$3,000.00	$3,000.00	
Temporary Traffic Control	LPSM	All	$25,000.00	$25,000.00	Detour Anticipated
UPRR Temporary Traffic Control	HOUR	520	$80.00	$42,000.00	Three Month Duration
			20% Contingency:	$112,000.00	
			Total	**$745,000.00**	

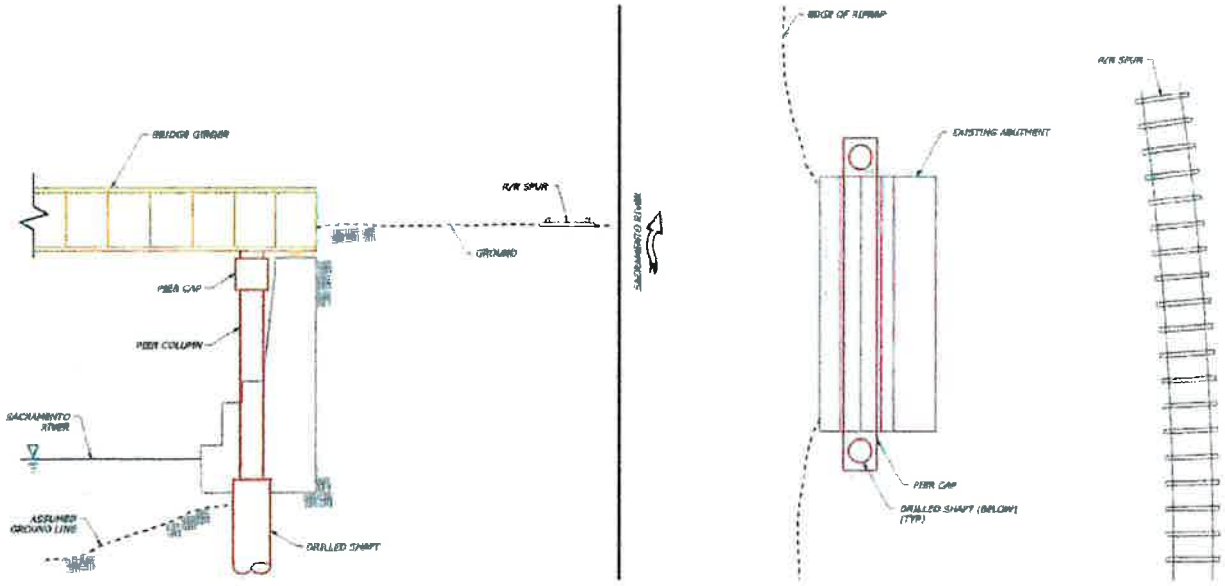


Option 6: Straddle Bent

This solution addresses the scour problem by constructing a new support with deep foundations at the end of the bridge. The bent itself consists of a reinforced concrete pier cap and columns. The columns are supported by drilled shafts. Modifications to the superstructure are required to move the support points from the existing abutment to the new bent location. Challenges with this system include wet construction methods for the drilled shafts and the construction of substantial members beneath the existing bridge. Also, the straddle bent does nothing to support the existing west abutment. While it would prevent bridge collapse, it does not prevent abutment collapse and loss of the approach roadway.

The estimated construction cost of this alternate is $969,000.

Option 6: Straddle Bent	Unit	Quantity	Unit Price	Extension	Remarks
Mobilization	LPSM	All	$89,000.00	$89,000.00	12 Percent
Survey	LPSM	All	$5,000.00	$5,000.00	
Contractor Quality Control	LPSM	All	$21,000.00	$21,000.00	3 Percent
Contractor Testing	LPSM	All	$35,000.00	$35,000.00	5 Percent
Construction Schedule	LPSM	All	$10,000.00	$10,000.00	
Shoring and Bracing	LPSM	All	$100,000.00	$100,000.00	
Soil Erosion and Sediment Control	LPSM	All	$150,000.00	$150,000.00	Dewatering and Sediment Control
Removal of Structures and Obstructions	LPSM	All	$15,000.00	$15,000.00	
Riprap	CUYD	135	$400.00	$54,000.00	Both Abutments
Structural Concrete	CUYD	70	$1,000.00	$70,000.00	Both Abutments
Reinforcing Steel	LB	11,200	$1.50	$17,000.00	Both Abutments
Drilled Shafts, 48-Inch	LNFT	60	$1,000.00	$60,000.00	Both Abutments
Utility Modifications	LPSM	All	$100,000.00	$100,000.00	Waterline suspension
Rental Equipment and General Labor	LPSM	All	$30,000.00	$30,000.00	
Permanent Traffic Control	LPSM	All	$3,000.00	$3,000.00	
Temporary Traffic Control	LPSM	All	$25,000.00	$25,000.00	Detour Anticipated
UPRR Temporary Traffic Control	HOUR	520	$80.00	$42,000.00	Three Month Duration
			20% Contingency:	$143,000.00	
			Total	**$969,000.00**	

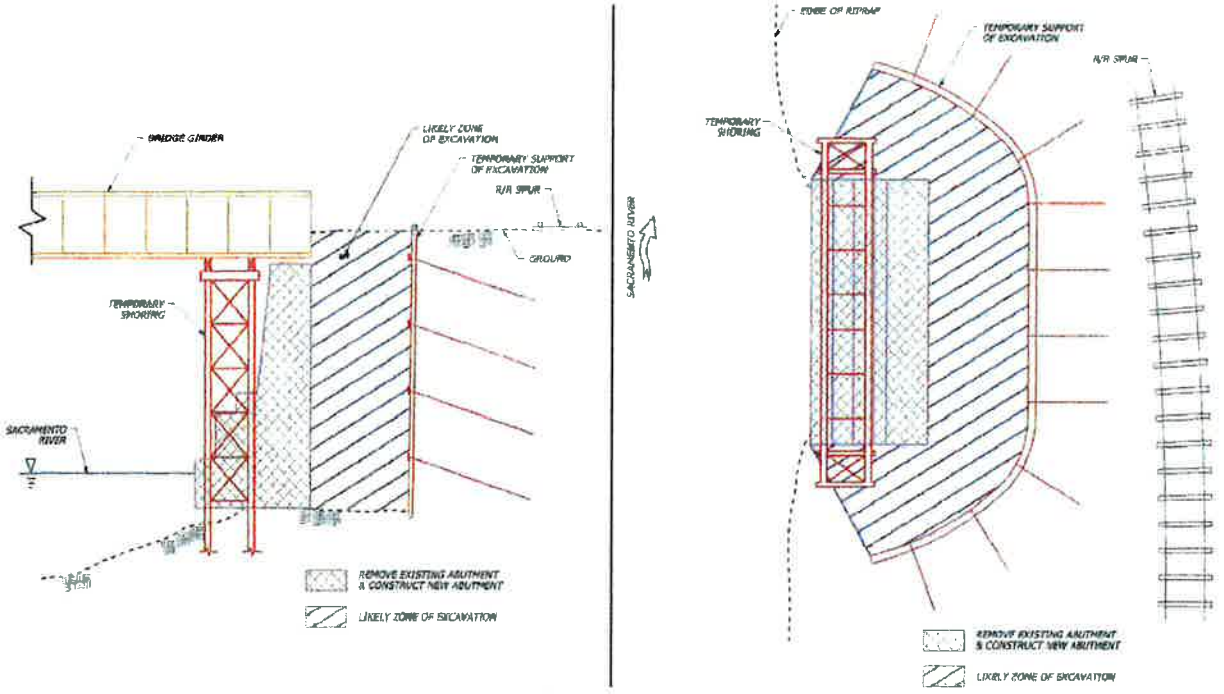


Option 7: Abutment Replacement

This retrofit would replace the existing abutments with new abutments. New abutments would most likely be supported on deep foundation elements. To accomplish this work, the superstructure will require either complete removal or temporary support. Complete removal can be accomplished as explained above. Support in place would require falsework and shoring.

The estimated construction cost of this alternate is $1,350,000.

Option 7: Abutment Replacement	Unit	Quantity	Unit Price	Extension	Remarks
Mobilization	LPSM	All	$124,000.00	$124,000.00	12 Percent
Survey	LPSM	All	$10,000.00	$10,000.00	
Contractor Quality Control	LPSM	All	$29,000.00	$29,000.00	3 Percent
Contractor Testing	LPSM	All	$48,000.00	$48,000.00	5 Percent
Construction Schedule	LPSM	All	$15,000.00	$15,000.00	
Structure Excavation and Backfill	CY	550	$65.00	$36,000.00	
Shoring and Bracing	LPSM	All	$200,000.00	$200,000.00	
Soil Erosion and Sediment Control	LPSM	All	$150,000.00	$150,000.00	Dewatering and Sediment Control
Removal of Structures and Obstructions	LPSM	All	$15,000.00	$15,000.00	
Riprap	CUYD	130	$400.00	$52,000.00	Both Abutments
Structural Concrete	CUYD	226	$1,000.00	$226,000.00	Both Abutments
Reinforcing Steel	LB	24,300	$1.50	$37,000.00	Both Abutments
Utility Modifications	LPSM	All	$100,000.00	$100,000.00	Waterline suspension
Rental Equipment and General Labor	LPSM	All	$40,000.00	$40,000.00	
Permanent Traffic Control	LPSM	All	$3,000.00	$3,000.00	
Temporary Traffic Control	LPSM	All	$25,000.00	$25,000.00	Detour Anticipated
UPRR Temporary Traffic Control	HOUR	520	$80.00	$42,000.00	Three Month Duration
			20% Contingency:	$198,000.00	
			Total	**$1,350,000.00**	



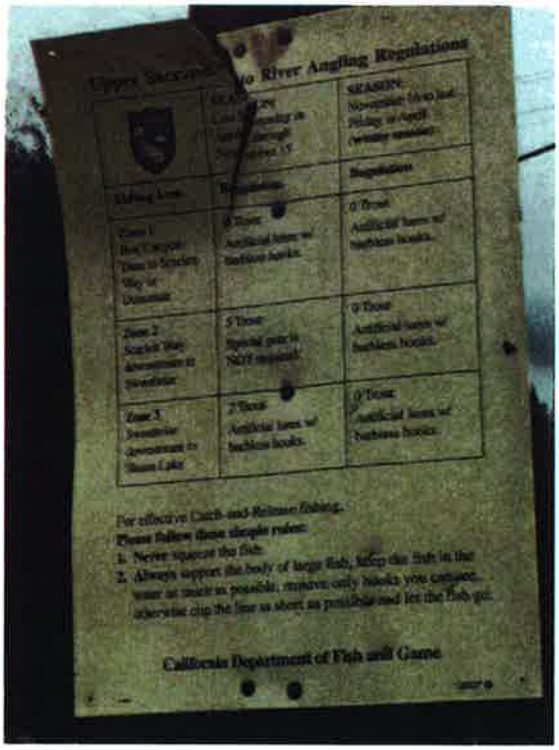
Alternative Approach: Increase Channel Capacity by Lengthening Bridge

The team attempted to find a solution to the following criteria: If additional channel capacity is required, can the bridge be lengthened to meet these goals?

This alternative was initiated for discussion purposes, but as noted in the drainage section, the consequences of widening the structure are significant, and would not likely achieve the objectives of keeping all of the river flow within a channel prism under the bridge. The existing site has too many opportunities for the higher flows of the Sacramento River to overtop the eastern banks. Therefore, this alternative will not be pursued any further. It is being included in this report only to show that it was considered.

ENVIRONMENTAL EVALUATION OF ALTERNATIVES

The existing bridge crosses the Upper Sacramento River which is a water of the U.S. and is under the jurisdiction of the U.S. Army Corps of Engineers (USACE). Dredging of or placement of fill material in the river would require a Section 404 permit from the USACE San Francisco District. In addition, a 401 Water Quality Certification from the Central Valley Regional Water Quality Control Board is anticipated. Because of the dams located downstream of the river, the river may not be considered navigable under the Rivers and Harbors Act of 1899 and/or the General Bridge Act of 1946; however, if it is, a Section 10 permit from the USACE and/or a Section 9 (bridge) permit from the U.S. Coast Guard would be required. Caltrans noted the Upper Sacramento River flows into Shasta Lake, which is a drinking water source. The river is also popular for recreational trout fishing and is a blue ribbon trout stream.



For these reasons, water quality is expected to be a concern and additional protection measures may be warranted, particularly if materials such as lead-based paint are encountered. In addition, discussions with the City indicated there is no low-flow period for the river, which eliminates the potential for a dry work area without water diversion(s) and/or pumping; therefore, in-water work timing restrictions are expected to be required.

The existing bridge was constructed in 1915 and reconstructed in 1956. A review of Caltrans' Category 5 bridge list identified that the bridge (noted as Bridge #02C0076) appears to have been determined not eligible for listing on the National Register of Historic Places (NRHP). This will be confirmed during the Class I file search as part of the cultural resources inventory. Small tower structures alongside the bridge carry utilities across the river. These appear to have been constructed in the early 1900s and it needs to be determined if they have been previously evaluated for listing on the NRHP. It is anticipated that these tower structures would not be eligible for listing.

As Caltrans may be a partner agency for the project, and their requirements may need to be followed, the following Preliminary Environmental Survey is provided as a first step to move the environmental compliance process forward. It should be noted the following requirements and proposed actions are based on what is typically performed for environmental clearances following a design project managed in accordance with Central Federal Lands procedures.

Description	Response	Comment
SUMMARY		
Type of NEPA document anticipated	**CE**	**It is anticipated that the project would qualify for a CE (e.g., 23 CFR 771.117(c)(23)). The lead agency will be FHWA.**
CEQA required (CA Projects)?	**Yes**	It is anticipated an Initial Study will be required. The preparer of the study needs to be determined.
NPS - Environmental Screening Form (ESF) required?	**No**	
Potential use of programmatic agreements?	**Unknown**	It is assumed at this time that Caltrans will not be a partner on the project and this will be processed similar to the Trinity County HBP Bridges projects. However, if Caltrans is a partner, some programmatic agreements may be available for use on the project.
Public involvement required?	**Yes/No**	**No public involvement is required for the CE. However, an Initial Study for CEQA requires public review/comment.**
AIR QUALITY		
Non-attainment or maintenance area?	**No**	**The Northeast Plateau Air Basin, which the project is within, is in non-attainment for PM_{10} under State air quality regulations; however, Siskiyou County is in attainment. Under federal regulations, the project is located in an area either unclassified or in attainment for criteria pollutants.**
Exempt from conformity requirements?	**Yes**	The project would not increase capacity and would be considered a safety project. In addition, the project is within attainment or unclassified area and conformity requirements do not apply (Caltrans 8/16/13).
If conformity applies, is the project included in the STIP or regional TIP?	**Yes/No**	**N/A**

Description	Response	Comment
Adding or removing lanes, signalization, and/or alignment changes?	**No**	
State or local air quality studies required?	**No**	No air quality modeling is requiring, but it is anticipated CalEEEmod would be required to estimate emissions related to construction.
BIOLOGICAL RESOURCES		
Local knowledge of federal T&E or candidate species in the area?	**Unknown**	According to iPaC, there are 15 species that could occur in the area: • California red-legged frog (Threatened) • Oregon spotted frog (Threatened) • Northern spotted owl (Threatened) • Yellow-billed cuckoo (Threatened) • Conservancy fairy shrimp (Endangered) • Vernal pool fairy shrimp (Threatened) • Vernal pool tadpole shrimp (Endangered) • Delta smelt (Threatened) • Longfin smelt (Candidate) • Gentner's fritillary (Endangered) • Hoover's spurge (Threatened) • Slender orcutt grass (Threatened) • Valley elderberry longhorn beetle (threatened) • Fisher (Proposed Threatened) • Gray wolf (endangered)
Potential for suitable habitat of any listed species in/near the project area?	**Yes/No**	Based on CNDDB, the project site is outside the range for California red-legged frog, Oregon spotted frog, and yellow-billed cuckoo. In addition, impoundments downstream on the Sacramento River prevent delta smelt and longfin smelt from the potential of inhabiting the project area. Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, Hoover's spurge, and slender orcutt grass are dependent on vernal pools, but there are no depressional areas that would indicate the potential presence of a vernal pool within the project area. Given the urban setting of the project area, the site does not contain suitable habitat for gray wolf or fisher, although transient species could occur along the river given that dense forests surround Dunsmuir. Similarly, the urban nature of the project area and lack of mature, old growth along the river does not provide the ideal nesting/roosting habitat for northern spotted owl. The valley elderberry longhorn beetle inhabits riparian areas containing elderberry. During the site visit, plants were

Description	Response	Comment
		dormant; however, based on a review of site photos, it does not appear elderberry occurs within or adjacent to the bridge site. This can be confirmed during the wetland delineation. Gentner's fritillary prefers chaparral and grassland habitats on the edge of woodlands, but can occur in a range of habitat types. The species also has some tolerance to human disturbance, and is known to occur in roadside ditches and residential areas. The project site does contain moist, open riparian habitat, preferred elevational range, and soil type where the species could occur, although it is not ideal habitat. However, the project site is not within an area of known populations.
Designated critical habitat in the project area?	No	
Local knowledge of state protected species in the area?	**Unknown**	Based on a review of the CNDDB, the following state species of special concern have recorded occurrences within or near Dunsmuir: • American peregrine falcon • Oregon fireweed • Western mastiff bat • Osprey A 9-quad review, per standard process, should be completed once the project is initiated and prior to any field work.
Adjacent to BLM or USFS land?	No	
BLM or USFS sensitive species the FLMA is concerned about?	**No**	
Migratory bird nest observed in the project area?	No	None were observed during the February 2015 site visit.
Wildlife or aquatic organism passage issues?	**Yes**	The Upper Sacramento River is considered a blue ribbon trout stream and trout fishing is an important recreational activity and economic driver in the area. Fish passage will be important and in-water work timing restrictions are anticipated.
Located within 100 miles of the coast?	Yes	The bridge is approximately 95 miles from the coast as the crow flies, but movement of anadromous fish has been blocked by dams downstream on the Sacramento River.
Known noxious weed occurrences or concerns regarding noxious weeds?	**Unknown**	The site visit in 2015 occurred in early February when plants were dormant.
Biological resource surveys required?	Yes	A general habitat assessment is recommended to be completed at the same time as a wetland, other waters, and riparian area delineation.

Description	Response	Comment
Is a BA/BE required?	**Yes**	It is recommended that a biological resources technical memorandum or joint BA/BE be completed that addresses existing conditions, federal species, and state species. If concurrence from USFWS is required (i.e., due to a may affect, not likely to adversely affect finding), a letter summary of the findings could be prepared to facilitate informal consultation.
CULTURAL RESOURCES		
New ground disturbance outside the existing roadway prism?	**Yes**	If the bridge is replaced, the existing bridge lengthened, or new abutments or foundations constructed, work outside the existing prism is anticipated.
Previously surveyed for cultural resources?	**Unknown**	The extent of previous surveys is unknown. The bridge itself has been previously inventoried.
Evaluated for eligibility for the National Register of Historic Places (NRHP)?	**Yes/No**	The bridge has been previously inventoried by Caltrans and determined not eligible for listing. It is unknown if the suspension towers that carry two utility lines across the river have been previously inventoried. These may have been included in the bridge inventory and evaluation.
Properties (buildings, bridges, trails, etc.) thought to be older than 50 years?	**Yes**	**The bridge was built in 1915 and reconstructed in 1956; however, it has previously been determined not eligible for listing on the NRHP. Based on the riveting on the utility suspension tower adjacent to the bridge, the tower may have been constructed at the same time as the original bridge. The age of the second tower is unknown but may also be more than 50 years of age.**
Apparent / unique / suspect structures of possible historical interest?	**Yes**	See above regarding utility suspension towers.
Tribes who will have an interest in the project?	**Unknown**	**Based on being located within Siskiyou County, tribes with a historical interest in the area include the Karuk Tribe, Klamath Tribes, Pit River Tribe, Quartz Valley Indian Community of the Quartz Valley Reservation, and Confederated Tribes of Siletz Indians. However, a list of interested tribes will be obtained through consultation with the Native American Heritage Commission.**
Traditional Cultural Properties (TCPs) in the area?	**Unknown**	A sacred lands file search request will be submitted to the Native American Heritage Commission.
Cultural resource surveys required?	**Yes**	**If the proposed alternative extends beyond the existing prism, a Class III pedestrian survey will be required. A historic assessment of the utility towers will be required.**
ENERGY		
Affect energy use as a result of changes to traffic patterns or volumes, or involve speed zone changes?	**No**	**The project would maintain traffic patterns and would not increase capacity. Speeds would remain the same. One concept may lengthen the bridge, but it would not be substantial and would not add vehicle miles travelled.**

Description	Response	Comment
GEOLOGY		
Do discussions with Geotechnical staff indicate any concerns?	Unknown	
Is drilling / exploration anticipated?	Yes	Drilling to determine bridge foundations is required.
HAZARDOUS MATERIAL		
Hazardous sites in the project area?	Yes	Based on a review of EnviroStor, the North Dunsmuir Railyard, located just north of the project, is an active cleanup site. The site has been contained but is an open action. A derailment along the rail line, noted near the west approach of the bridge, has also been recorded but the case is closed. Other leaking underground storage tanks were identified during the data search, but the cases were closed as well. An Initial Site Assessment with an EDR is recommended.
Known or possible hazardous waste on the project ()?	Yes	Given the age of the bridge, the paint on the bridge may contain lead paint and the concrete abutments could contain asbestos. Recommend requiring contractor testing prior to removal/demolition. In addition, the western approach of the roadway abuts the railroad line.
Structure with potential to contain hazardous material be altered or demolished?	Yes	Given the age of the bridge, the paint on the bridge may contain lead paint and the concrete abutments could contain asbestos. Recommend requiring contractor testing prior to removal/demolition. Proper disposal will be required if hazardous materials are identified.
LAND USE / PLANNING		
Require land use actions from FLMA or local jurisdictions?	Unknown	Actions may be required from the Town of Dunsmuir if right of way or easements are required to facilitate construction, but no substantial concerns related to conflicts with current land uses or zoning ordinances is anticipated.
Concerns regarding consistency with federal, state, or local land use policies or plans?	No	
Coastal Zone Management Act apply?	No	
Result in the conversion of prime farmland, unique farmland, or land of statewide or local importance as defined by Farmland Protection Policy Act?	No	The project is located within city limits and, therefore, the Farmland Protection Policy Act does not apply.
Any other specially designated or protected lands that may be affected?	No	

Description	Response	Comment
NOISE		
Will there be any shift in horizontal or vertical alignment?	Unknown	No shift in the horizontal alignment is anticipated. Minor adjustments to the vertical alignment may be required if the bridge is lengthened and to allow for adequate freeboard, but these adjustments are not anticipated to rise to the level of a substantial alteration.
Does project increase the number of through travel lanes?	No	
Roadway located on a new alignment?	No	
Removal of topographical features which currently shield receptors?	No	
Are there buildings/ activity areas within 200 feet of proposed right of way line:	Yes	Based on a review of aerial maps, there are five residential structures and one commercial structure (Eagles building) within 200 feet of the bridge.
SECTION 4(f)		
Parks, wildlife refuges, historic properties, recreational areas, campgrounds, trails, etc. that may be impacted?	Unknown	No parks or other recreational areas would be impacted. A determination on the eligibility of the two utility structures will be required. Based on initial conversations with historians, these are not anticipated to be eligible for listing and, therefore, are not expected to constitute a Section 4(f) resource. However, this determination will be made following field evaluation.
SECTION 6(f)		
Land & Water Conservation Funds used to acquire parks, or to make improvements, etc.?	No	
SOCIOECONOMICS		
Building displacements or relocations?	No	None are anticipated
Right of way be required for the project?	Unknown	
Divide or disrupt an established community, or affect neighborhood character or stability?	No	

Description	Response	Comment
Affect minority, elderly, handicapped, low income, transit-dependent, or other specific interest group?	Unknown	The project is located within an area containing low-income populations. It is unknown if right of way will be required. However, the project is not anticipated to result in disproportionate adverse effects to EJ communities based on the nature of the project, which is a small bridge replacement or rehabilitation project to maintain traffic patterns and access for residences.
VISUAL		
Designated state or federal scenic route?	No	
Major cuts/fills associated with this project?	No	Deep foundation work is likely to be required, but no major cuts/fills that would result in long-term visual impacts are expected at this time.
Bridges or large retaining walls anticipated?	Yes	The project is a bridge replacement or rehab
Affect waterways designated as National Wild and Scenic Rivers?	No	
WATERWAYS / WATER QUALITY		
Within FEMA 100-year floodplain?	Yes	The project is located within Zone AE
Within FEMA regulated floodway?	Yes	The project is within the regulatory floodway of the Sacramento River
Water quality impaired stream (303(d) listed) impacted?	No	
Outstanding Resource Waters affected?	No	
Active well impacted?	No	None were observed or identified during the field visit with the Town of Dunsmuir and Caltrans.
Navigable waterway(s) within the project area?	Unknown	Based on dams downstream on the Sacramento River, the Upper Sacramento River is not believed to fall under the Rivers and Harbors Act or the General Bridge Act of 1946; however, this needs to be confirmed with the USACE and U.S. Coast Guard.
Irrigation ditches impacted?	No	
State or National Wild and Scenic River?	No	
WETLANDS AND WATERS OF THE U.S.		
Intermittent streams, ephemeral drainages, or perennial rivers/streams?	Yes	The bridge crosses the Upper Sacramento River.
Wetlands mapped on the Nationals Wetlands Inventory (NWI)?	No	
Blue line features from the National Hydrographic Datum (NHD)?	Yes	The bridge crosses the Upper Sacramento River

Description	Response	Comment
Riparian or wetland vegetation evident from visual inspection?	Yes	There is a small riparian fringe along the river. At the time of the field visit, plants were dormant; however, no obvious wetlands were observed. If wetlands exist, they may be narrow linear features along the river edge.
Delineation of waters of the U.S. including wetlands and other special aquatic sites need to be completed for the project area?	**Yes**	**The project will be conducting work within a jurisdictional water and a Section 404 permit is anticipated. At a minimum, impacts to the perennial river are anticipated.**
WILDERNESS		
Occur in or near designated wilderness?	**No**	
GENERAL SCHEDULE/CONSTRUCTABILITY CONCERNS		
Potential Major Impacts to Cost or Schedule	**No**	**Mitigation measures to protect the blue ribbon fishing and various bird and fish species will require that the river be diverted around each abutment work zone and adequately protected. This is a typical requirement for working in this river, but does add to the cost and construction duration of the project.** **No major impacts outside of the typical expectations described above are expected at this time. However, an Initial Study for CEQA purposes could take 6-9 months for completion.**
Constructability Concerns	No	Diversion and dewatering structures are common requirements for working on these types of structures. They are known requirements, and are typically addressed such that they are no constructability obstacles.

A. PERMITS

Description	Response	Comment
Section 404 / 401 Permit		
Discharge of dredge or fill into a water of the U.S.	**Yes**	**It is anticipated that the project would fall within a Nationwide Permit. NWP 3, 14, and 23 have not been certified by the Regional Water Quality Control Board; therefore, a water quality certification will be required.**
Discharge of fill into a perennial river/stream, intermittent stream, or ephemeral drainage?	Yes	It is anticipated that bridge work will require fill in the river.
Discharge of fill into a pond or lake?	**No**	
Discharge of fill into a special aquatic site?	Unknown	Fringe wetlands may occur. No other special aquatic sites are anticipated to be identified within the project area.

Water diversion needed?	**Unknown**	This will be explored further prior to submittal of the final feasibility study. However, it is anticipated that dry work areas will be required to facilitate both bridge rehab or bridge replacement alternatives.
Channelization, channel realignment, or channel armoring required?	**No**	
Qualify for a Nationwide Permit (NWP)?	**Yes**	Based on the scope of the work and the site conditions, it is anticipated the project will qualify for a NWP.
Comply with NWP general conditions?	**Yes**	It is assumed the project will comply with the general conditions.
Comply with NWP regional conditions?	**Yes**	It is assumed the project will comply with the regional conditions.
Cause the loss of less than 1/2 acre of non-tidal waters of the U.S. or 1/3 acre of tidal waters of the U.S.?	**Yes**	Based on the existing bridge size and site conditions, it is assumed the project will result in less than 0.5 acre of impact to non-tidal waters.
Does the project require compensatory mitigation?	**Unknown**	
Would the project cause the loss of less than 1/10 acre of wetlands?	**Unknown**	This will be determined following a delineation.
Does the project require a LOP or IP for authorization?	**No**	
Any Corps-approved mitigation bank or in-lieu fee programs that service the project area?	**No**	
NPDES Permit		
Amount of acreage disturbed?	**<1 ac**	Unless construction staging would be cleared by CFLHD, it is anticipated that the project would disturb less than one acre.
Subject to any state, county or local sediment/erosion management plan (MS4)?	**No**	
Subject to a state or basin sediment/erosion management plan?	**Yes**	The project is within the Central Valley Regional Water Quality Control Board's Water Quality Control Plan for the Sacramento River and San Joaquin River Basins.
Cooperator willing to assume responsibility for the NPDES Permit upon completion of construction?	**Unknown**	
Post-construction BMP requirements?	**No**	Even if the bridge is lengthened, it is not anticipated that it would be enough impervious surface to require post-construction BMPs. This is usually required if > 5,000 square feet is added.
Other Permits / Authorizations		
FLMA special use permit	**No**	
Staging area permit?	**Unknown**	No staging locations have been discussed or identified at this time.
Disposal/waste area permits?	**No**	

Material source permit?	No	
Asphalt or concrete batch plant permit?	No	
Utility line or buried pipe permit?	No	
Dewatering permit?	Yes	Dewatering is anticipated in order to facilitate construction. The contractor must obtain a dewatering permit from the Central Valley Regional Water Quality Control Board.
Water rights or appropriation approval?	No	
Local, County or State air quality permit	No	
County road access or encroachment permits?	No	
State highway access or encroachment permit?	No	
Stream alteration permit?	No	CFLHD is exempt from CFGC 1602
Other	No	

Description	Response	Comment
Potential Major Impacts to Cost or Schedule	No	No major impacts to the cost or schedule of the project are anticipated. The 404/401 permitting process may take six months or more.
Constructability Concerns	No	

Subsequent Environmental Recommendations:

The environmental summary provided above is the result of an initial field review, and a preliminary literature search to address the scoping elements of this report. The next phase of the design, when the impacts are better defined, and when the construction requirements are better known, will result in the detailed environmental investigation. The next steps will include the following:

Recommended Surveys and Reports:

- Cultural resource survey (Class III pedestrian survey and architectural inventory) and report
- Wetland, other waters of the U.S., and riparian area delineation and report
- Biological Resources Technical Memorandum or joint Biological Assessment/Biological Evaluation (federally-listed, state-listed, and state species of special concern)
- Initial Site Assessment

Anticipated Permits/Authorizations:

- Clean Water Act Section 404 Permit—U.S. Army Corps of Engineers, San Francisco District
- Clean Water Act Section 401 Water Quality Certification—Central Valley Regional Water Quality Control Board
- Construction Dewatering Permit—Central Valley Regional Water Quality Control Board

UTILITIES. There are a number of utilities directly on and adjacent to the bridge crossing. Based on visual inspection and discussions with city personnel these include:

- Steel gas line mounted to the exterior face of the downstream girder. The City believes this line is abandoned. (Any bridge work will likely need to remove this from the structure).

- Four-inch (est.) diameter steel water line, located approximately 2 feet downstream of the bridge (shown in the picture to the right). The waterline has its own "suspension bridge" support system to cross the river. The bridge has one foundation adjacent to Abutment 1 (west abutment, which is not directly in conflict with much of the proposed improvements, and the other foundation is adjacent to the pier that is in front of Abutment 2 (see second picture to the right). This foundation and structure will need to be removed to provide for enhanced bridge capacity and improved channel hydraulics.

In the picture to the right, the shows the tower support structure for this waterline to the right (downstream) of the old bridge pier.

- Twelve-inch (est.) diameter sewer line, located approximately 40 feet downstream of the bridge. This utility also has its own "suspension bridge" support structure to cross the river.

In the picture above, the right side embankment protrudes into the channel approximately 5- to 8-ft. These protrusions causes back eddies upstream and vortices at the western abutment face. Removal of this downstream protruding slope may have upstream benefits at the abutment, but it may also have been placed to protect the downstream utility crossing foundation, the triangular structure immediately downstream of the bridge shown in the picture below. With no as-builts and no plans for the placement of this riprap (or this structure), the intended purpose is not known. More site analysis is required before this material can be modified. If the utility crossing is not dependent on this protruding protection, it will be removed.

- A variety of overhead electric lines on both the east and west ends of the bridge.

Contact information for the utilities follows:

Communications:
Dennis Harman
VERIZON
PO Box 1218
115 Bremer Street
Weaverville, CA 96093-1218

Power:
Jason Thomas
Pacific, Gas, and Electric
Redding Land Rights Services
3600 Meadow View Drive
Redding, CA 96002

Water and Sewage
Department of Public Works
City of Dunsmuir
5915 Dunsmuir Avenue
Dunsmuir, California 96025
530-235-4822

Natural Gas
Pacific Gas and Electric
20806 Black Ranch Road
Burney, CA 96013
530-335-5640

Union Pacific Railroad
Union Pacific Railroad Company
5750 Sacramento Avenue
Dunsmuir, CA 96025 - View Map
Phone: (530) 235-0300

SUMMARY:

The Butterfly Avenue Bridge is an existing single span steel girder bridge that crosses the Sacramento River on Bush Street. The original structure, constructed in 1915, was a three span facility approximately 80 feet in length. The original abutments were modified and the bridge was widened and converted to a single span (approximately 80 feet in length) in 1956.

The Butterfly Avenue Bridge spans over the upper Sacramento River which runs through the City of Dunsmuir. The River is considered a blue ribbon trout stream. The City has a private stocking permit from the Department of Fish and Game and fly fishing is a major component of the Town's strong recreational economy. The City of Dunsmuir's official motto is: *"Home of the best water on earth".*

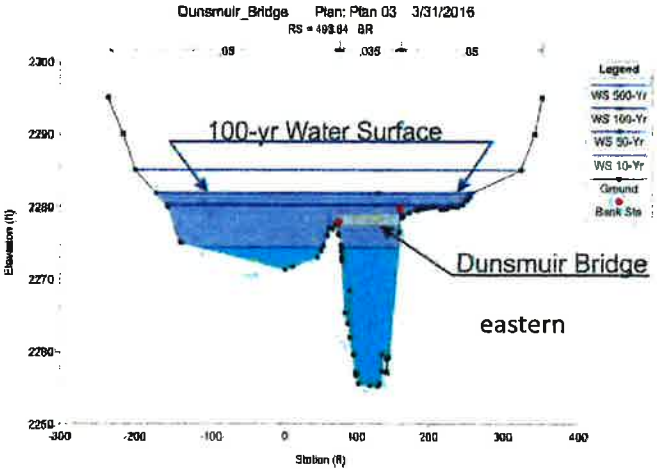
The superstructure consists of two steel through girders, which support steel floor beams and a reinforced concrete deck. Reinforced concrete gravity abutments make up the substructure. Based on review of the August 22, 2013 Bridge Inspection Report, the structure:

- **Is Fracture Critical** (only supported by two beams... should one fail, the bridge fails). This is routinely a concern to many agencies, as new structures will likely have greater redundancy designed into it.
- Is Not Structurally Deficient, and Not Functionally Obsolete
- **Is Scour Critical** with Unstable Abutments
- Has a Sufficiency Rating of 67.9

During the scoping meetings with the City of Dunsmuir and Caltrans, a feasibility study was desired to evaluate the bridge and making repair/replacement recommendations. The study was focused on:

- Evaluating the bridge's ability to pass the 100-year flood event
- Evaluating if repairs could be made to address the scour and foundation concerns
- Evaluating the environmental issues of making repairs or replacement of the structure

From a hydraulics perspective, the existing bridge is inundated during the 100-year event. While there is an existing pier under the bridge that can be removed, and modifications could be made to the scour counter-measures to enhance the hydraulic capacity of the span over the Sacramento River, the topography of the floodplain is such that during larger events, the banks of the river will exceed those of the primary river channel well upstream of the bridge and flood the approach.



No level of improvements could be implemented to pass the 100 year flows without overtopping. Similarly, construction of a new bridge within the existing footprint would also fail to pass the 100 year flow without overtopping. It must therefore be designed to withstand the overtopping (two other crossings, Bridge Street and South 1st Street, are fully functional and provide redundant access to all of the residences east of the river).

From a structural perspective, the existing bridge, while scour critical, has other issues that require maintenance/repairs. From the latest bridge inspection reports, this existing structure assessment addressed:

DECK AND ROADWAY

- There are dirt and debris at both abutments open joint.
- There are 0.016 - 0.03 inch wide pattern cracks spaced at 2 - 6 inches apart throughout the deck. (see photo 4)
- There are 1-inch diameter popouts throughout the deck surface. (see photo 4)
- There are three 1-foot long diagonal soffit cracks with heavy efflorescence near the Abutment 2 right exterior stringer.
- There are hairline transverse and longitudinal cracks spaced at 6 – to 9-foot apart throughout the soffit.

SUPERSTRUCTURE

- There are intermittent spots of rust and freckled rust throughout the girders and floor beams.
- A hands-on visual inspection was performed on: (i) the steel girders in Span 1, and (ii) the steel floor beams in Span 1. No fractures or cracks were found.

SUBSTRUCTURE

- There is moderate corrosion and minor pitting in the bearings but still functions as intended.
- There is no full bearing in the bottom left corner of the Abutment 2 wall. There is also an exposed vertical bar in this location. It appears that it has been grouted to prevent from further erosion.
- The left side of Abutment 1 is undermined about 20 foot long x 1.5 foot high and extends back under the footing at least 3 feet .

SCOUR

The structure's scour potential has been assessed in accordance with the Federal Highway Administration Technical Advisory T5140.23, "Evaluating Scour at Bridges". The National Bridge Inventory Item 113 Code, "Vulnerability to Scour", has been changed to 2. The Hydraulic Report stated that: "*Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by an engineering evaluation of the observed scour condition report by the bridge inspector. Immediate action is required to provide scour countermeasures.*"

WATERWAY

There have been no significant changes in the channel elevation/profile since the previous cross section was taken.

With respect to retrofitting the existing bridge to address the scour protection and voids under the foundation, the study team developed seven retrofit alternatives, along with the concept of replacing the entire bridge. The costs summarized below were based on repairing the failing westerly abutment, and then applied equally to both abutments to prevent future erosion/scour issues on the easterly abutment. The construction costs below include all of the general bridge costs, including anticipated utility work, but do not include design or construction administration costs.

Alternative/Option	Estimated Construction Cost	Evaluation
New Bridge Alternative	$1,800,000.00	New bridge addressing not only all of the scour and foundation issues, but with the new structure, addressing all other structural deficiencies with the existing structure. **This solution should be considered further.**
Option 1: Grout and Revetment	$647,000.00	This solution provides traditional scour mitigation, but does not provide the desired foundation improvements/protection offered by other solutions below. Results in reduced channel capacity and significant grouting in the channel. **This solution is not desired.**
Option 2: Micropile Cutoff Wall	$1,757,000.00	Micropiles do not offer substantial lateral load capacity and the existing mass gravity abutment will impart significant lateral soil pressures to the system. The number of micropiles required to provide the necessary lateral resistance could become excessive and results in higher construction costs. **This solution is not desired.**
Option 3: Micropile Underpinning	$1,064,000.00	Provides the greatest potential to best found the abutments on sound materials that will be identified with the Phase II geotech investigation. **This solution should be considered further.**
Option 4: Drilled Shaft Underpinning	$782,000.00	This solution, while possible, has greater risks than Option 5 by drilling through the tallest section of the abutment with a drilled shaft with a diameter that is approximately one half to two thirds the thickness of the assumed abutment section. Option 5 provides similar benefits with lower risks. **This solution is not desired.**
Option 5: Adjacent Deep Foundation	$745,000.00	The majority of the work is outside of the water, and adjacent to the existing bridge. Easiest construction, reduced risks compared to other alternatives. Pending strength of existing foundation, ability to properly tie to it, and found on solid materials. **This solution should be considered further.**

Alternative/Option	Estimated Construction Cost	Evaluation
Option 6: Straddle Bent	$969,000.00	Challenges with this system include wet construction methods for the drilled shafts and the construction of substantial members beneath the existing bridge. Also, the straddle bent does nothing to support the existing west abutment. While it would prevent bridge collapse, it does not prevent abutment collapse and loss of the approach roadway. **This solution is not desired.**
Option 7: Abutment Replacement	$1,350,000.00	To accomplish this work, the superstructure will require either complete removal or temporary support. Other solutions are more cost effective with similar benefits. **This solution is not desired.**

Options 3 and 5 have the greatest potential to address both scour and foundation support benefits, and are the most feasible retrofit solutions being considered at this time. For any retrofit solution, the next phase of evaluation will require a full geotechnical investigation of both abutments to support the various design efforts, as well as nondestructive testing techniques to determine the existing foundation dimensions, possible steel and integral feature conflicts, as well as determining the presence of micro and macro cracking (and its depth of influence), in addition to delamination, and voiding. Most importantly, this method will detect and document abnormalities providing a comprehensive evaluation of the existing abutments.

From an environmental perspective, the Butterfly Avenue Bridge spans over the upper Sacramento River which is considered a blue ribbon trout stream that attracts fishermen from all over the world. Wild rainbow trout abound in the river. Environmental stakeholders will require the full complement of studies and permits to protect this resource, thus the timing for completing the design and environmental clearance need to account for the anticipated field studies, coordination, and review periods. Construction estimates need to make provisions for anticipated mitigation measures, especially those that involve work within the banks of the river.

From a constructability perspective, one advantage associated with the repairs or replacement at this site is that there is another bridge crossing the Sacramento River located nearly ½ mile downstream at Scherrer Avenue. In discussions with the Town, it will be possible to close the Dunsmuir crossing during construction and detour traffic through the Scherrer structure.

From a cost and value perspective, we are evaluating repairs to a bridge previously reconstructed in 1956 to have a 50-year design life. While the bridge has many challenges (the greatest risk being that the current bridge is fracture critical – supported by two steel members where failure of either member would result in a collapse of the entire bridge), those that are most critical and form the basis for this evaluation are the scour mitigation and foundation stabilization requirements. The costs to construct these improvements are between $745,000 and $1,064,000. While contingencies have been added that will likely cover the other

minor repairs identified in the latest bridge inspection report, we are spending nearly one million dollars to extend the life of a 60-year old bridge. These foundation repairs will likely address scour and foundation issues for many years to come, but the life of the other bridge elements are difficult to project. The inspection report addresses issues with cracking in the decks, intermittent spots of rust and freckled rust throughout the girders and floor beams, and moderate corrosion and minor pitting in the abutment bearings. While there are no observations of cracks in the steel members at this time, the fatigue experienced over the past 60 years may start to appear as cracks in the steel in future inspections. As such, there is some degree of risk assumed in repairing only these know deficiencies.

RECOMMENDATION:

Phase 1 included performing preliminary structural evaluations, geotechnical assessments, topographic surveys, analysis of the bridge hydraulics, and an overview of the environmental requirements for the potential improvement options to address the extensive scour that has occurred at the west abutment foundation of the Dunsmuir Butterfly Bridge. After considering several improvement options, two retrofit repair solutions are proposed for further evaluation (Option 3: Micropile Underpinning , and Option 5: Adjacent Deep Foundation) To complete the designs of these options, more detailed geotechnical surveys are required of the site, as well as nondestructive testing techniques are required on the bridge abutment foundations to determine the existing foundation dimensions, possible steel and integral feature conflicts.

The cost to repair the structure is estimated to be as high as $1,064,000. While it may be reduced during the subsequent detailed design, for programming purposes, at least $1,100,000 should be set aside for the repairs, not including design or construction administration.

The cost anticipated to replace the entire bridge is estimated to be $1,800,000.

The costs associated with the design, environmental clearance, and permitting for either repairing or replacing the structures will be similar.

While retrofitting the existing bridge is less costly in the near term, ***the study team recommends moving forward with replacing the existing bridge with a new bridge built to current standards***, thereby providing a solid and dependable bridge crossing for at least the next 75-years. This recommendation is founded on the following:

- The existing 60-year old structure is starting to show signs of distress.
- The crossing can be closed during construction, providing desired room and access to remove the old abutments, and properly found and construct the new ones.
- The new crossing will have improved hydraulics, providing the largest possible opening for the existing crossing site.
- The environmental impacts associated with removing the old abutments, and installing the new abutments is less invasive than the work required to retrofit the existing foundations, with much of the work being performed within the river footprint.

Therefore, the recommended solution for this site is a new single-span structure. The specifics of the bridge type and selection have yet to be determined. A formal evaluation, pending acceptance of this replacement recommendation, needs to be conducted to address the optimum solution for this crossing.

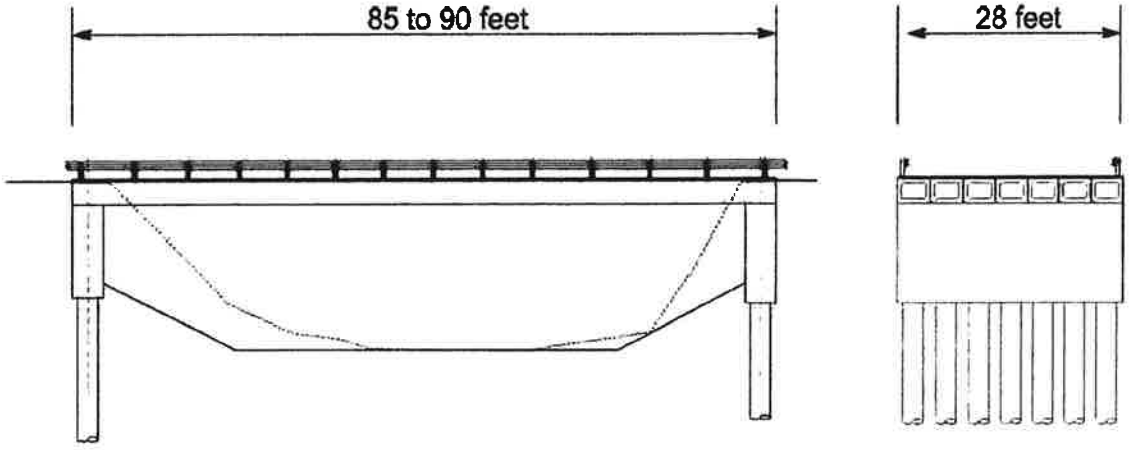
With the desire of having the thinnest bridge section that can minimize impacts when large flood events eventually inundate this structure, initial concepts suggest either a precast box girder, or precast voided slab bridge deck. As there are utilities that need to go through the structure, the precast box girder would provide many benefits to this location.

To address all of the issues and concerns addressed with this site, the bridge solution would include:

Bridge Span: 85- to 90-ft, as the site is constrained by the railroad to the west, and the existing street to the east. As noted in the evaluation, there is no way to extend the bridge to span the entire floodplain of the design storm. As any solution will have an inundated eastern abutment, the eastern bridge terminus should not extend beyond the existing eastern terminus limits, as not to make the vertical profile to match Butterfly Avenue any more severe. The western terminus is constrained by the existing railroad facilities. With the existing structure 83-ft, the new structure is assumed to be approximately 85- to 90-feet long.

New Vertical Abutments: The existing gravity abutments were stepped while blending with the banks of the River channel. The bridge design should maximize the available opening under the bridge as to allow the largest possible River cross section possible. The grade of the bridge is fixed by the adjacent railroad profile, and therefore will remain with the same roadway profile.

No Scour Countermeasures: Making the abutments vertical to the bottom of the River channel, being founded on bedrock with drilled shafts supporting the abutments, the bridges can be designed without any scour countermeasures, again, opening up the cross section under the bridge to maximize the bridge opening.



Elevation View **Section View**

Appendix A:
Bridge Inspection Reports

California Department of Transportation
Division of Maintenance

Structure Maintenance and Investigations

BRIDGE
INSPECTION
RECORDS
INFORMATION
SYSTEM

The requested documents have been generated by BIRIS.

These documents are the property of the California Department of Transportation and should be handled in accordance with Deputy Directive 55 and the State Administrative Manual.

Records for "Confidential" bridges may only be released outside the Department of Transportation upon execution of a confidentiality agreement.

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 02C0076
Facility Carried: BUTTERFLY AVE
Location : JUST E SACRAMENTO AVE
City : DUNSMUIR
Inspection Date : 08/22/2013
Inspection Type
Routine [X] FC Underwater Special Other

Bridge Inspection Report

STRUCTURE NAME: SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened: 1956
Length (m) : 25.3
Skew (degrees): 0
No. of Joints : 2
No. of Hinges : 0

Structure Description: Built-up welded steel through girder (2) with RC deck and steel floor beams on RC gravity abutments. 1.2 m sidewalk on upstream side.

Span Configuration : 1 @ 24.4 m

SAFE LOAD CAPACITY AND RATINGS

Design Live Load: M-13.5 OR H-15
Inventory Rating: 21.9 metric tons Calculation Method: ALLOWABLE STRESS
Operating Rating: 33.3 metric tons Calculation Method: ALLOWABLE STRESS
Permit Rating : XXXXX
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: 0.5 m cu, 6.7 m, 0.5 m cu
Total Width: 7.7 m Net Width: 6.7 m No. of Lanes: 2 Speed: 15 mph
Min. Vertical Clearance: Unimpaired
Rail Code: 0000

Rail Type	Location	Length (ft)	Rail Modifications
Misc. Steel	Right/Left	164	

DESCRIPTION UNDER STRUCTURE

Channel Description: Rocks

INSPECTION COMMENTARY

SCOPE AND ACCESS

The river was flowing swiftly about 3 ft deep under the span at the time of this investigation. Abutment 2 was above water level and Abutment 1 had less than 3 ft water. A complete inspection of the visible elements was performed.

REVISIONS

ELI Element 335, Misc Bridge Bridge Railing: has been modified to ELI Element 330, Metal Bridge Railing to more accurately reflect actual bridge rail component.

ELI Element 358, Deck Cracking: has been added to the ELEMENT INSPECTION RATINGS Table and placed in Condition State 3.

ELI Element 359, Soffit of Concrete Decks and Slabs: has been added to the ELEMENT INSPECTION RATINGS Table and placed in Condition State 2.

INSPECTION COMMENTARY

DECK AND ROADWAY

There are dirt and debris at both abutments open joint.

There are 0.016 - 0.03 inch wide pattern cracks spaced at 2 - 6 inches apart throughout the deck. (see photo 4)

There is 1 in diameter popouts throughout the deck surface. (see photo 4)

There are three 1 ft long diagonal soffit cracks with heavy efflorescence near the Abutment 2 right exterior stringer.

There are hairline transverse and longitudinal cracks spaced at 6 - 9 ft apart throughout the soffit.

SUPERSTRUCTURE

There are intermittent spots of rust and freckled rust throughout the girders and floor beams.

A fracture critical inspection was performed on 10/11/2011 by Mark Desrosiers from the Office of Specialty Investigations and Bridge Management. The investigation was conducted in accordance with the Fracture Critical Member Inspection Plan, dated 10/24/2007.

A hands-on visual inspection was performed on: (i) the steel girders in Span 1, and (ii) the steel floor beams in Span 1. No fractures or cracks were found.

SUBSTRUCTURE

There is moderate corrosion and minor pitting in the bearings but still functions as intended.

There is no full bearing in the bottom left corner of the Abutment 2 wall. There is also an exposed vertical bar in this location. It appears that it has been grouted to prevent from further erosion. (see photo 5)

The left side of Abutment 1 is undermined about 20 ft long x 1.5 ft high and extends back under the footing at least 3 ft .

The structure's scour potential has been assessed in accordance with the Federal Highway Administration Technical Advisory T5140.23, "Evaluating Scour at Bridges". The National Bridge Inventory Item 113 Code, "Vulnerability to Scour", has been changed to 2. The Hydraulic Report dated 08/22/2001 stated that: "Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by an engineering evaluation of the observed scour condition report by the bridge inspector. Immediate action is required to provide scour countermeasures."

A Scour Plan Of Action dated 03/13/2007 is on file for this structure.

SAFE LOAD CAPACITY

The load rating for this structure is being reviewed by SMI Ratings Branch under Work Request #3731. An updated Load Rating Summary will be archived when this review is complete. The current rating is based on a hand calculation dated October 18, 2007 and

INSPECTION COMMENTARY

May 14, 1981.

WATERWAY

A channel cross section was taken during this inspection. The cross section was compared to the previous cross section taken on 10/06/2005. There have been no significant changes in the channel elevation/profile since the previous cross section was taken.

STEEL INVESTIGATIONS

This structure qualifies for an in-depth Steel investigation because it possesses the following fracture critical or fatigue prone details :

Floor Beams: FC Members,
Plate Girder: FC Members

Fracture Critical: Yes Inspection Freq.: 24 Next Inspection: 10/11/2013

ELEMENT INSPECTION RATINGS

Elem No.	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
12	Concrete Deck - Bare	2	185	sq.m.	185	0	0	0	0
107	Painted Steel Open Girder/Beam	2	51	m.	0	51	0	0	0
152	Painted Steel Floor Beam	2	63	m.	0	63	0	0	0
215	Reinforced Conc Abutment	2	15	m.	15	0	0	0	0
304	Open Expansion Joint	2	15	m.	15	0	0	0	0
311	Moveable Bearing (roller, sliding, etc.)	2	2	ea.	0	2	0	0	0
313	Fixed Bearing	2	2	ea.	0	2	0	0	0
330	Metal Bridge Railing - coated or uncoated	2	50	m.	50	0	0	0	0
358	Deck Cracking	2	1	ea.	0	0	1	0	0
359	Soffit of Concrete Deck or Slab	2	1	ea.	0	1	0	0	0
361	Scour	2	1	ea.	0	1	0		

WORK RECOMMENDATIONS

RecDate: 08/22/2013
Action : Sub-Misc.
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Provide full bearing at the bottom corner of the Abutment 2 left.

RecDate: 08/22/2013
Action : Deck-Methacrylate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Treat bridge deck with methacrylate.

RecDate: 10/15/1997
Action : Bridge-Misc
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:
Clean bearing seats at Abutments 1 and 2

WORK RECOMMENDATIONS

RecDate: 10/15/1997	EstCost:		Clean expansion joints that remain
Action : Bridge-Misc	StrTarget:	2 YEARS	impacted with dirt debris.
Work By: LOCAL AGENCY	DistTarget:		
Status : PROPOSED	EA:		

RecDate: 10/15/1997	EstCost:		Repair undermining at Abutment 1.
Action : Sub-Scour Mitigate	StrTarget:	2 YEARS	Provide scour countermeasures.
Work By: LOCAL AGENCY	DistTarget:		
Status : PROPOSED	EA:		

CHANNEL X-SECTION

Side : Upstream — X-Section Date: 08/22/2013

Measured From : Top of left steel rail

Location	Horiz(m)	Vert(m)	Comments
A1	0.00	3.30	Face of Abutment 1
	1.60	5.20	
	4.20	6.50	
EOW	4.50	7.70	Edge of Water
	12.60	8.10	Thalweg
EOW	18.00	7.70	Edge of Water
	21.40	6.00	
A2	25.00	3.20	Face of Abutment 2

Team Leader : George A. Navarrete

Report Author : George A. Navarrete

Inspected By : GA.Navarrete/Z.Zhang

10/4/2013

George A. Navarrete (Registered Civil Engineer) (Date)

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1)	STATE NAME- CALIFORNIA	069
(8)	STRUCTURE NUMBER	02C0076
(5)	INVENTORY ROUTE(ON/UNDER) - ON	150000000
(2)	HIGHWAY AGENCY DISTRICT	02
(3)	COUNTY CODE 093 (4) PLACE CODE	20242
(6)	FEATURE INTERSECTED-	SACRAMENTO RIVER
(7)	FACILITY CARRIED-	BUTTERFLY AVE
(9)	LOCATION-	JUST E SACRAMENTO AVE
(11)	MILEPOINT/KILOMETERPOINT	0
(12)	BASE HIGHWAY NETWORK- NOT ON NET	0
(13)	LRS INVENTORY ROUTE & SUBROUTE	
(16)	LATITUDE	41 DEG 12 MIN 31 SEC
(17)	LONGITUDE	122 DEG 16 MIN 17 SEC
(98)	BORDER BRIDGE STATE CODE % SHARE	%
(99)	BORDER BRIDGE STRUCTURE NUMBER	

******** STRUCTURE TYPE AND MATERIAL *********

(43)	STRUCTURE TYPE MAIN:MATERIAL-	STEEL
	TYPE- GIRDER & FLOORBEAM SYSTEM CODE	303
(44)	STRUCTURE TYPE APPR:MATERIAL-	OTHER/NA
	TYPE- OTHER/NA CODE	000
(45)	NUMBER OF SPANS IN MAIN UNIT	1
(46)	NUMBER OF APPROACH SPANS	0
(107)	DECK STRUCTURE TYPE- CIP CONCRETE CODE	1
(108)	WEARING SURFACE / PROTECTIVE SYSTEM:	
A)	TYPE OF WEARING SURFACE- NONE CODE	0
B)	TYPE OF MEMBRANE- NONE CODE	0
C)	TYPE OF DECK PROTECTION- NONE CODE	0

********** AGE AND SERVICE **********

(27)	YEAR BUILT	1915
(106)	YEAR RECONSTRUCTED	1956
(42)	TYPE OF SERVICE: ON- HIGHWAY	1
	UNDER- WATERWAY	5
(28)	LANES:ON STRUCTURE 02 UNDER STRUCTURE	00
(29)	AVERAGE DAILY TRAFFIC	320
(30)	YEAR OF ADT 2011 (109) TRUCK ADT	5 %
(19)	BYPASS, DETOUR LENGTH	3 KM

********** GEOMETRIC DATA **********

(48)	LENGTH OF MAXIMUM SPAN	24.4 M
(49)	STRUCTURE LENGTH	25.3 M
(50)	CURB OR SIDEWALK: LEFT 0.5 M	RIGHT 0.5 M
(51)	BRIDGE ROADWAY WIDTH CURB TO CURB	6.7 M
(52)	DECK WIDTH OUT TO OUT	7.7 M
(32)	APPROACH ROADWAY WIDTH (W/SHOULDERS)	7.3 M
(33)	BRIDGE MEDIAN- NO MEDIAN	0
(34)	SKEW 0 DEG (35) STRUCTURE FLARED	NO
(10)	INVENTORY ROUTE MIN VERT CLEAR	99.99 M
(47)	INVENTORY ROUTE TOTAL HORIZ CLEAR	6.7 M
(53)	MIN VERT CLEAR OVER BRIDGE RDWY	99.99 M
(54)	MIN VERT UNDERCLEAR REF- NOT H/RR	0.00 M
(55)	MIN LAT UNDERCLEAR RT REF- NOT H/RR	0.0 M
(56)	MIN LAT UNDERCLEAR LT	0.0 M

********** NAVIGATION DATA **********

(38)	NAVIGATION CONTROL- NO CONTROL CODE	0
(111)	PIER PROTECTION- CODE	
(39)	NAVIGATION VERTICAL CLEARANCE	0.0 M
(116)	VERT-LIFT BRIDGE NAV MIN VERT CLEAR	M
(40)	NAVIGATION HORIZONTAL CLEARANCE	0.0 M

****

	SUFFICIENCY RATING =	67.9
	STATUS	
	HEALTH INDEX	83.3
	PAINT CONDITION INDEX =	75.0

********** CLASSIFICATION ********** CODE

(112)	NBIS BRIDGE LENGTH- YES	Y
(104)	HIGHWAY SYSTEM- NOT ON NHS	0
(26)	FUNCTIONAL CLASS- MINOR COLLECTOR RURAL	08
(100)	DEFENSE HIGHWAY- NOT STRAHNET	0
(101)	PARALLEL STRUCTURE- NONE EXISTS	N
(102)	DIRECTION OF TRAFFIC- 2 WAY	2
(103)	TEMPORARY STRUCTURE-	
(105)	FED.LANDS HWY- NOT APPLICABLE	0
(110)	DESIGNATED NATIONAL NETWORK - NOT ON NET	0
(20)	TOLL- ON FREE ROAD	3
(21)	MAINTAIN- CITY OR MUNICIPAL HIGHWAY AGENCY	04
(22)	OWNER- CITY OR MUNICIPAL HIGHWAY AGENCY	04
(37)	HISTORICAL SIGNIFICANCE- NOT ELIGIBLE	5

********** CONDITION ********** CODE

(58)	DECK	5
(59)	SUPERSTRUCTURE	6
(60)	SUBSTRUCTURE	6
(61)	CHANNEL & CHANNEL PROTECTION	6
(62)	CULVERTS	N

********* LOAD RATING AND POSTING ********* CODE

(31)	DESIGN LOAD- M-13.5 OR H-15	2
(63)	OPERATING RATING METHOD- ALLOWABLE STRESS	2
(64)	OPERATING RATING-	33.3
(65)	INVENTORY RATING METHOD- ALLOWABLE STRESS	2
(66)	INVENTORY RATING-	21.9
(70)	BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS	5
(41)	STRUCTURE OPEN, POSTED OR CLOSED-	A
	DESCRIPTION- OPEN, NO RESTRICTION	

********** APPRAISAL ********** CODE

(67)	STRUCTURAL EVALUATION	6
(68)	DECK GEOMETRY	4
(69)	UNDERCLEARANCES, VERTICAL & HORIZONTAL	N
(71)	WATER ADEQUACY	7
(72)	APPROACH ROADWAY ALIGNMENT	7
(36)	TRAFFIC SAFETY FEATURES	0000
(113)	SCOUR CRITICAL BRIDGES	2

********** PROPOSED IMPROVEMENTS **********

(75)	TYPE OF WORK-	CODE
(76)	LENGTH OF STRUCTURE IMPROVEMENT	M
(94)	BRIDGE IMPROVEMENT COST	
(95)	ROADWAY IMPROVEMENT COST	
(96)	TOTAL PROJECT COST	
(97)	YEAR OF IMPROVEMENT COST ESTIMATE	
(114)	FUTURE ADT	214
(115)	YEAR OF FUTURE ADT	2029

********** INSPECTIONS **********

(90)	INSPECTION DATE 08/13 (91) FREQUENCY	24 MO
(92)	CRITICAL FEATURE INSPECTION:	(93) CFI DATE
A)	FRACTURE CRIT DETAIL- YES 24 MO	A) 10/11
B)	UNDERWATER INSP- NO MO	B)
C)	OTHER SPECIAL INSP- NO MO	C)

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 02C0076
Facility Carried: BUTTERFLY AVE
Location : JUST E SACRAMENTO AVE
City : DUNSMUIR
Inspection Date : 10/11/2011
Inspection Type
Routine FC Underwater Special Other
X

Bridge Inspection Report

STRUCTURE NAME: SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened: 1956
Length (m) : 25.3
Skew (degrees): 0
No. of Joints : 2
No. of Hinges : 0

Structure Description: Built-up welded steel through girder (2) with RC deck and steel floor beams on RC gravity abutments. 1.2 m sidewalk on upstream side

Span Configuration : 1 @ 24.4 m

LOAD CAPACITY AND RATINGS

Design Live Load: M-13.5 OR H-15
Inventory Rating: 21.9 metric tonnes Calculation Method: ALLOWABLE STRESS
Operating Rating: 33.3 metric tonnes Calculation Method: ALLOWABLE STRESS
Permit Rating : XXXXX
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: 0.5 m cu, 6.7 m, 0.5 m cu
Total Width: 7.7 m Net Width: 6.7 m No. of Lanes: 2
Rail Description: Through girder Rail Code : 0000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Rocks

INSPECTION COMMENTARY

FRACTURE CRITICAL INVESTIGATION

A fracture critical inspection was performed on 10/11/2011 by Mark Desrosiers from the Office of Specialty Investigations and Bridge Management. The structure was accessed with the UBIT operated by Gerald Young. Lane closures and traffic control were provided by the City of Dunsmuir. The investigation was conducted in accordance with the Fracture Critical Member Inspection Plan, dated 10/24/2007.

A hands-on visual inspection was performed on: (i) the steel girders in Span 1, and (ii) the steel floor beams in Span 1. No fractures or cracks were found.

STEEL INVESTIGATIONS

This structure qualifies for an in-depth Steel investigation because it possesses the following fracture critical or fatigue prone details :

Floor Beams: FC Members,
Plate Girder: FC Members

Fracture Critical: Yes Inspection Freq.: 24 Next Inspection: 10/11/2013

Inspected By : MA.Desrosiers

Vassil Simeonov

Vassil K. Simeonov (Registered Structural Engineer)

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 02C0076
Facility Carried: BUTTERFLY AVE
Location : JUST E SACRAMENTO AVE
City : DUNSMUIR
Inspection Date : 08/31/2011

Inspection Type
Routine FC Underwater Special Other
X

Bridge Inspection Report

STRUCTURE NAME: SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened: 1956
Length (m) : 25.3
Skew (degrees): 0
No. of Joints : 2
No. of Hinges : 0

Structure Description: Built-up welded steel through girder (2) with RC deck and steel floor beams on RC gravity abutments. 1.2 m sidewalk on upstream side

Span Configuration :1 @ 24.4 m

LOAD CAPACITY AND RATINGS

Design Live Load: M-13.5 OR H-15
Inventory Rating: 21.9 metric tonnes Calculation Method: ALLOWABLE STRESS
Operating Rating: 33.3 metric tonnes Calculation Method: ALLOWABLE STRESS
Permit Rating : XXXXX
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: 0.5 m cu, 6.7 m, 0.5 m cu
Total Width: 7.7 m Net Width: 6.7 m No. of Lanes: 2
Rail Description: Through girder Rail Code : 0000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Rocks

INSPECTION COMMENTARY

INSPECTION ACCESS

The water was measured at 1.0 meter deep flowing at high velocity during this investigation. Both of the abutments were not in contact with water. A complete inspection of this structure was performed.

CONDITION OF STRUCTURE

APPROACH

No notable defects were observed.

DECK AND RAIL

There are hairline pattern and short longitudinal deck cracks throughout. There are also popouts (25 mm in diameter) throughout the deck surface (Photo 1).

SUPERSTRUCTURE

There are hairline transverse and longitudinal soffit cracks spaced at 2 to 3 meters apart throughout.

INSPECTION COMMENTARY

SUBSTRUCTURE

The bearings have dirt and moss accumulating on them.

PAINT CONDITION

There are intermittent spots of rust throughout the girders and floor beams. The bearings have dirt and moss accumulating on them which is contributing to the decline of their paint system. This condition is worse at Abutment 2.

SAFE LOAD CAPACITY

A request for new load ratings calculations was submitted to the Ratings and Analysis Branch on 02/22/2010. The previous rating dated 05/14/1981 used the Allowable Stress method to calculate the capacity of the bridge. The existing Inventory and Operating ratings are 21.9 and 33.3 metric tonne, respectively. However, current standards require the bridge capacity to be calculated using the Load Factor method. Upon completion of the new rating calculations, the new Inventory and Operating Ratings will be updated and revisions will be made in the next bridge inspection report to document the new rating.

SCOUR

There is undermining along the left side of Abutment 1 (about 6 meters long). It extends back under the footing at least one meter (Photo 2).

The structure's scour potential has been assessed in accordance with the Federal Highway Administration Technical Advisory T5140.23, "Evaluating Scour at Bridges". The National Bridge Inventory Item 113 Code, "Vulnerability to Scour", has been changed to 2. The Hydraulic Report dated 08/22/2001 stated that: "Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by an engineering evaluation of the observed scour condition report by the bridge inspector. Immediate action is required to provide scour countermeasures."

FRACTURE CRITICAL INVESTIGATION

A fracture critical inspection was performed on 09/02/2009 by Shujun Wang from the Office of Specialty Investigations and Bridge Management. The structure was accessed with a UBIT operated by Robert Rexin. Lane closures and traffic control were provided by the Siskiyou County Siskiyou crew. The investigation was conducted in accordance with the Fracture Critical Member Inspection Plan, dated 10/24/2007. A hands-on visual inspection was performed on: (i) the tension stress areas of the left and right steel girders, and (ii) the tension stress areas of the floor beams. No fractures or cracks were found.

ELEMENT INSPECTION RATINGS

Elem No.	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
12	Concrete Deck - Bare	2	185	sq.m.	185	0	0	0	0
107	Painted Steel Open Girder/Beam	2	51	m.	0	51	0	0	0

Elem No.	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
152	Painted Steel Floor Beam	2	63	m.	0	63	0	0	0
215	Reinforced Conc Abutment	2	15	m.	15	0	0	0	0
304	Open Expansion Joint	2	15	m.	15	0	0	0	0
311	Moveable Bearing (roller, sliding, etc.)	2	2	ea.	0	2	0	0	0
313	Fixed Bearing	2	2	ea.	0	2	0	0	0
335	Other Bridge Railing	2	50	m.	50	0	0	0	0
361	Scour	2	1	ea.	0	1	0		

WORK RECOMMENDATIONS

RecDate: 10/15/1997
Action : Bridge-Misc
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget:
DistTarget:
EA:

Clean expansion joints that remain impacted with dirt debris.

RecDate: 10/15/1997
Action : Sub-Scour Mitigate
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget:
DistTarget:
EA:

Repair undermining at Abutment 1. Provide scour countermeasures.

RecDate: 10/15/1997
Action : Bridge-Misc
Work By: LOCAL AGENCY
Status : PROPOSED
EstCost:
StrTarget:
DistTarget:
EA:

Clean bearing seats at Abutments 1 and 2

Inspected By : M.Nguyen/T.Le

Mike Nguyen (Registered Civil Engineer)

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **02C0076**
(5) INVENTORY ROUTE(ON/UNDER)- ON 150000000
(2) HIGHWAY AGENCY DISTRICT 02
(3) COUNTY CODE 093 (4) PLACE CODE 20242
(6) FEATURE INTERSECTED- SACRAMENTO RIVER
(7) FACILITY CARRIED- BUTTERFLY AVE
(9) LOCATION- JUST E SACRAMENTO AVE
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 41 DEG 12 MIN 31 SEC
(17) LONGITUDE 122 DEG 16 MIN 17 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- STEEL
TYPE- GIRDER & FLOORBEAM SYSTEM CODE 303
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 1
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- NONE CODE 0
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1915
(106) YEAR RECONSTRUCTED 1956
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 320
(30) YEAR OF ADT 2011 (109) TRUCK ADT 5 %
(19) BYPASS, DETOUR LENGTH 3 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 24.4 M
(49) STRUCTURE LENGTH 25.3 M
(50) CURB OR SIDEWALK: LEFT 0.5 M RIGHT 0.5 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 6.7 M
(52) DECK WIDTH OUT TO OUT 7.7 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 7.3 M
(33) BRIDGE MEDIAN- NO MEDIAN 0
(34) SKEW 0 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 6.7 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NO CONTROL CODE 0
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 70.4
STATUS
HEALTH INDEX 82.6
PAINT CONDITION INDEX = 75.0

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- MINOR COLLECTOR RURAL 08
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(22) OWNER- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 7
(59) SUPERSTRUCTURE 6
(60) SUBSTRUCTURE 6
(61) CHANNEL & CHANNEL PROTECTION 6
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- M-13.5 OR H-15 2
(63) OPERATING RATING METHOD- ALLOWABLE STRESS 2
(64) OPERATING RATING- 33.3
(65) INVENTORY RATING METHOD- ALLOWABLE STRESS 2
(66) INVENTORY RATING- 21.9
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 6
(68) DECK GEOMETRY 4
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 7
(72) APPROACH ROADWAY ALIGNMENT 7
(36) TRAFFIC SAFETY FEATURES 0000
(113) SCOUR CRITICAL BRIDGES 2

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 214
(115) YEAR OF FUTURE ADT 2029

********** INSPECTIONS **********

(90) INSPECTION DATE 08/11 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- YES 24 MO A) 09/09
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 02C0076
Facility Carried: BUTTERFLY AVE
Location : JUST E SACRAMENTO AVE
City : DUNSMUIR
Inspection Date : 09/08/2009

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened: 1956
Length (m) : 25.3
Skew (degrees): 0
No. of Joints : 2
No. of Hinges : 0

Structure Description: Built-up welded steel through girder (2) with RC deck and steel floor beams on RC gravity abutments. 1.2 m sidewalk on upstream side

Span Configuration : 1 @ 24.4 m

LOAD CAPACITY AND RATINGS

Design Live Load: M-13.5 OR H-15
Inventory Rating: 21.9 metric tonnes Calculation Method: ALLOWABLE STRESS
Operating Rating: 33.3 metric tonnes Calculation Method: ALLOWABLE STRESS
Permit Rating : XXXXX
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: 0.5 m cu, 6.7 m, 0.5 m cu
Total Width: 7.7 m Net Width: 6.7 m No. of Lanes: 2
Rail Description: Through girder Rail Code : 0000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Rocks

CONDITION TEXT

CONDITION OF STRUCTURE

The following conditions existed prior to this investigation and have been updated with this report:

There are hairline pattern and short longitudinal deck cracks throughout. There are also popouts (25 mm in diameter) throughout the deck surface.

The bearings have dirt and moss accumulating on them.

There are hairline transverse and longitudinal soffit cracks.

PAINT CONDITION

There are intermittent spots of rust throughout the girders and floor beams. The bearings have dirt and moss accumulating on them which is contributing to the decline of their paint system. This condition is worse at Abutment 2.

FRACTURE CRITICAL INVESTIGATION

CONDITION TEXT

A fracture critical inspection of the structure was performed on 10/24/2007 by Paul Hartbower of the Office of Specialty Investigations and Bridge Management. The fracture critical members were accessed with the Under Bridge Inspection Truck (UBIT) operated by Robert Rexin. Lane closures and traffic control were provided by the City of Dunsmuir. The investigation was conducted according to the revised Fracture Critical Member Inspection Plan, dated 10/24/2007.

A visual inspection was performed on the tension stress areas of the two steel girders and the steel floor beams. No fractures or cracks were found.

SCOUR

The water was measured at 0.5 meter deep flowing at high velocity during this investigation. Both of the abutments were not in contact with water.

There is undermining along the left side of Abutment 1 (about 6 meters long). It extends back under the footing at least one meter.

SAFE LOAD CAPACITY

A request for new load ratings calculations was submitted to the Ratings and Analysis Branch on 02/22/2010. The previous rating dated 05/14/1981 used the Allowable Stress method to calculate the capacity of the bridge. The existing Inventory and Operating ratings are 21.9 and 33.3 metric tonne, respectively. However, current standards require the bridge capacity to be calculated using the Load Factor method. Upon completion of the new rating calculations, the new Inventory and Operating Ratings will be updated and an office report will be written at that time to document the new rating.

ELEMENT INSPECTION RATINGS

F#Elem	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
101 12	Concrete Deck - Bare	2	185	sq.m.	185	0	0	0	0
101 107	Painted Steel Open Girder/Beam	2	51	m.	0	51	0	0	0
101 152	Painted Steel Floor Beam	2	63	m.	0	63	0	0	0
101 215	Reinforced Conc Abutment	2	15	m.	15	0	0	0	0
101 304	Open Expansion Joint	2	15	m.	15	0	0	0	0
101 311	Moveable Bearing (roller, sliding, etc.)	2	2	ea.	0	2	0	0	0
101 313	Fixed Bearing	2	2	ea.	0	2	0	0	0
101 335	Other Bridge Railing	2	50	m.	50	0	0	0	0
101 361	Scour	2	1	ea.	0	1	0		

WORK RECOMMENDATIONS

RecDate: 10/15/1997
Action : Bridge-Misc
Work By: LOCAL AGENCY
Status : PROPOSED

EstCost:
StrTarget:
DistTarget:
EA:

Clean expansion joints that remain impacted with dirt debris.

WORK RECOMMENDATIONS

RecDate: 10/15/1997	EstCost:	Repair undermining at Abutment 1.
Action : Sub-Scour Mitigate	StrTarget:	
Work By: LOCAL AGENCY	DistTarget:	
Status : PROPOSED	EA:	

RecDate: 10/15/1997	EstCost:	Clean bearing seats at Abutments 1 and 2
Action : Bridge-Misc	StrTarget:	
Work By: LOCAL AGENCY	DistTarget:	
Status : PROPOSED	EA:	

Inspected By : M.Nguyen/WL.Peterson

Registered Civil Engineer

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER 02C0076
(5) INVENTORY ROUTE(ON/UNDER)- ON 150000000
(2) HIGHWAY AGENCY DISTRICT 02
(3) COUNTY CODE 093 (4) PLACE CODE 20242
(6) FEATURE INTERSECTED- SACRAMENTO RIVER
(7) FACILITY CARRIED- BUTTERFLY AVE
(9) LOCATION- JUST E SACRAMENTO AVE
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE 00
(16) LATITUDE 41 DEG 12 MIN 31 SEC
(17) LONGITUDE 122 DEG 16 MIN 17 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- STEEL
TYPE- GIRDER & FLOORBEAM SYSTEM CODE 303
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 1
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1915
(106) YEAR RECONSTRUCTED 1956
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 200
(30) YEAR OF ADT 1981 (109) TRUCK ADT 3 %
(19) BYPASS, DETOUR LENGTH 3 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 24.4 M
(49) STRUCTURE LENGTH 25.3 M
(50) CURB OR SIDEWALK: LEFT 0.5 M RIGHT 0.5 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 6.7 M
(52) DECK WIDTH OUT TO OUT 7.7 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 7.3 M
(33) BRIDGE MEDIAN- NO MEDIAN 0
(34) SKEW 0 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 6.7 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NO CONTROL CODE 0
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 74.9
STATUS
HEALTH INDEX 82.6
PAINT CONDITION INDEX = 75.0

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- MINOR COLLECTOR RURAL 08
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(22) OWNER- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 7
(59) SUPERSTRUCTURE 6
(60) SUBSTRUCTURE 6
(61) CHANNEL & CHANNEL PROTECTION 6
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- M-13.5 OR H-15 2
(63) OPERATING RATING METHOD- ALLOWABLE STRESS 2
(64) OPERATING RATING- 33.3
(65) INVENTORY RATING METHOD- ALLOWABLE STRESS 2
(66) INVENTORY RATING- 21.9
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 6
(68) DECK GEOMETRY 4
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 7
(72) APPROACH ROADWAY ALIGNMENT 7
(36) TRAFFIC SAFETY FEATURES 0000
(113) SCOUR CRITICAL BRIDGES 2

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 214
(115) YEAR OF FUTURE ADT 2029

********** INSPECTIONS **********

(90) INSPECTION DATE 09/09 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- YES 24 MO A) 09/09
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 02C0076
Facility Carried: BUTTERFLY AVE
Location : JUST E SACRAMENTO AVE
City : DUNSMUIR
Inspection Date : 07/24/2007

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened: 1956
Length (m) : 25.3

Skew (degrees): 0
No. of Joints : 2
No. of Hinges : 0

Structure Description: Built-up welded steel through girder (2) with RC deck and steel floor beams on RC gravity abutments. 1.2 m sidewalk on upstream side

Span Configuration : 1 @ 24.4 m

LOAD CAPACITY AND RATINGS

Design Live Load: M-13.5 OR H-15
Inventory Rating: 21.9 metric tons Calculation Method: LOAD FACTOR
Operating Rating: 33.3 metric tons Calculation Method: LOAD FACTOR
Permit Rating : XXXXX
Posting Load : Type 3 N/A Type 3S2 N/A Type 3-3 N/A

DESCRIPTION ON STRUCTURE

Deck X-Section: 0.5 m cu, 6.7 m, 0.5 m cu
Total Width: 7.7 m Net Width: 6.7 m No. of Lanes: 2
Rail Description: Through girder Rail Code : 0000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Rocks

CONDITION TEXT

REVISIONS

Inventory Rating - based on the calculations dated 10/18/07, the inventory rating value has been corrected from 16.3 metric tons to 21.9 metric tons.
Operating Rating - based on the calculations dated 10/18/07, the inventory rating value has been corrected from 20.8 metric tons to 33.3 metric tons.

CONDITION OF STRUCTURE

There are hairline pattern and short longitudinal deck cracks throughout. There are also popouts (25 mm in diameter) throughout the deck surface.

The open joints are impacted with dirt and debris.

The bearings have dirt and moss accumulating on them.

There are light transverse and longitudinal soffit cracks.

PAINT CONDITION

There are intermittent spots of rust throughout the girders and floor beams. The

CONDITION TEXT

bearings have dirt and moss accumulating on them which is contributing to the decline of their paint system. This condition is worse at Abutment 2.

FRACTURE CRITICAL INVESTIGATION

This bridge is Fracture Critical. The Fracture Critical Investigation Team is responsible for performing this investigation.

SCOUR

The water was measured at 0.5 meter deep flowing at high velocity during this investigation. Both of the abutments were not in contact with water.

There is undermining along the left side of Abutment 1 (about 6 meters long). It extends back under the footing at least one meter.

ELEMENT INSPECTION RATINGS

F#Elem	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
101 12	Concrete Deck - Bare	2	185	sq.m.	185	0	0	0	0
101 107	Painted Steel Open Girder/Beam	2	51	m.	0	51	0	0	0
101 152	Painted Steel Floor Beam	2	63	m.	0	63	0	0	0
101 215	Reinforced Conc Abutment	2	15	m.	15	0	0	0	0
101 304	Open Expansion Joint	2	15	m.	15	0	0	0	0
101 311	Moveable Bearing (roller, sliding, etc.)	2	2	ea.	0	2	0	0	0
101 313	Fixed Bearing	2	2	ea.	0	2	0	0	0
101 335	Other Bridge Railing	2	50	m.	50	0	0	0	0
101 361	Scour	2	1	ea.	0	1	0		

WORK RECOMMENDATIONS

RecDate: 10/15/1997 EstCost:
Action : Bridge-Misc StrTarget:
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Clean bearing seats at Abutments 1 and 2

RecDate: 10/15/1997 EstCost:
Action : Sub-Scour Mitiga StrTarget:
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Repair undermining at Abutment 1.

RecDate: 10/15/1997 EstCost:
Action : Bridge-Misc StrTarget:
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Clean expansion joints that remain impacted with dirt debris.

Inspected By : Michael Nguyen

Registered Civil Engineer

Printed on: Thursday 10/25/2007 01:42 PM

02C0076/AAAH/11544

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **02C0076**
(5) INVENTORY ROUTE(ON/UNDER)- ON 150000000
(2) HIGHWAY AGENCY DISTRICT 02
(3) COUNTY CODE 093 (4) PLACE CODE 20242
(6) FEATURE INTERSECTED- SACRAMENTO RIVER
(7) FACILITY CARRIED- BUTTERFLY AVE
(9) LOCATION- JUST E SACRAMENTO AVE
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 41 DEG 12 MIN 31 SEC
(17) LONGITUDE 122 DEG 16 MIN 17 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- STEEL
TYPE- GIRDER & FLOORBEAM SYSTEM CODE 303
(44) STRUCTURE TYPE APPR:MATERIAL-
TYPE- CODE
(45) NUMBER OF SPANS IN MAIN UNIT 1
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1915
(106) YEAR RECONSTRUCTED 1956
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 200
(30) YEAR OF ADT 1981 (109) TRUCK ADT 3 %
(19) BYPASS, DETOUR LENGTH 3 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 24.4 M
(49) STRUCTURE LENGTH 25.3 M
(50) CURB OR SIDEWALK: LEFT 0.5 M RIGHT 0.5 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 6.7 M
(52) DECK WIDTH OUT TO OUT 7.7 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 7.3 M
(33) BRIDGE MEDIAN- NO MEDIAN 0
(34) SKEW 0 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 6.7 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NO CONTROL CODE 0
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 74.9
STATUS
HEALTH INDEX 82.6
PAINT CONDITION INDEX = 75.0

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- MINOR COLLECTOR RURAL 08
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(22) OWNER- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 7
(59) SUPERSTRUCTURE 6
(60) SUBSTRUCTURE 6
(61) CHANNEL & CHANNEL PROTECTION 6
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- M-13.5 OR H-15 2
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 33.3
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 21.9
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED A
DESCRIPTION OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 6
(68) DECK GEOMETRY 4
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 7
(72) APPROACH ROADWAY ALIGNMENT 7
(36) TRAFFIC SAFETY FEATURES 0000
(113) SCOUR CRITICAL BRIDGES 2

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 205
(115) YEAR OF FUTURE ADT 2015

********** INSPECTIONS **********

(90) INSPECTION DATE 07/07 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- YES 24 MO A) 10/05
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 02C0076
Facility Carried: BUTTERFLY AVE
Location : JUST E SACRAMENTO AVE
City : DUNSMUIR
Inspection Date : 09/21/2005

Bridge Inspection Report

Inspection Type

Routine	FC	Underwater	Special	Other
X				

STRUCTURE NAME: SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened: 1956
Length (m) : 25.3
Skew (degrees): 0
No. of Joints : 2
No. of Hinges : 0

Structure Description: Built-up welded steel through girder (2) with RC deck and steel floor beams on RC gravity abutments. 1.2 m sidewalk on upstream side

Span Configuration : 1 @ 24.4 m

LOAD CAPACITY AND RATINGS

Design Live Load: M-13.5 OR H-15
Inventory Rating: 16.3 metric tons Calculation Method: LOAD FACTOR
Operating Rating: 20.8 metric tons Calculation Method: LOAD FACTOR
Permit Rating : XXXXX
Posting Load : Type 3 N/A Type 3S2 N/A Type 3-3 N/A

DESCRIPTION ON STRUCTURE

Deck X-Section: 0.5 m cu, 6.7 m, 0.5 m cu
Total Width: 7.7 m Net Width: 6.7 m No. of Lanes: 2
Rail Description: Through girder Rail Code : 0000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Rocks

CONDITION TEXT

CONDITION OF STRUCTURE

There are hairline pattern and short longitudinal deck cracks throughout. There are also popouts (25 mm in diameter) throughout the deck surface.

The open joints are impacted with dirt and debris.

There are light transverse and longitudinal soffit cracks.

The water was measured at 0.5 meter deep during this investigation.

PAINT CONDITION

There are intermittent spots of rust throughout the girders and floor beams. The bearings have dirt and moss accumulating on them which is contributing to the decline of their paint system. This condition is worse at Abutment 2.

SCOUR

There is undermining along the left side of Abutment 1. It extends back under the

CONDITION TEXT

footing at least one meter.

ELEMENT INSPECTION RATINGS

F#Elem	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01 12	Concrete Deck - Bare	2	185	sq.m.	185	0	0	0	0
01 107	Painted Steel Open Girder/Beam	2	51	m.	0	51	0	0	0
01 152	Painted Steel Floor Beam	2	63	m.	0	63	0	0	0
01 215	Reinforced Conc Abutment	2	15	m.	15	0	0	0	0
01 304	Open Expansion Joint	2	15	m.	15	0	0	0	0
01 311	Moveable Bearing (roller, sliding, etc.)	2	2	ea.	0	2	0	0	0
01 313	Fixed Bearing	2	2	ea.	0	2	0	0	0
01 361	Scour	2	1	ea.	1	0	0	0	0

WORK RECOMMENDATIONS

RecDate: 10/15/1997 EstCost:
Action : Undefined Work StrTarget:
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Clean bearing seats at Abutments 1 and 2

RecDate: 10/15/1997 EstCost:
Action : Undefined Work StrTarget:
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Repair undermining at Abutment 1

RecDate: 10/15/1997 EstCost:
Action : Undefined Work StrTarget:
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Clean expansion joints that remain impacted with dirt debris

Inspected By : Michael Nguyen

Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
MICHAEL VAN NGUYEN
No. C 057507
Exp. 12/31/05
CIVIL
STATE OF CALIFORNIA

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **02C0076**
(5) INVENTORY ROUTE(ON/UNDER)- ON 150000000
(2) HIGHWAY AGENCY DISTRICT 02
(3) COUNTY CODE 093 (4) PLACE CODE 20242
(6) FEATURE INTERSECTED- SACRAMENTO RIVER
(7) FACILITY CARRIED- BUTTERFLY AVE
(9) LOCATION- JUST E SACRAMENTO AVE
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 41 DEG 12 MIN 31 SEC
(17) LONGITUDE 122 DEG 16 MIN 17 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- STEEL
TYPE- GIRDER & FLOORBEAM SYSTEM CODE 303
(44) STRUCTURE TYPE APPR:MATERIAL-
TYPE- CODE
(45) NUMBER OF SPANS IN MAIN UNIT 1
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1915
(106) YEAR RECONSTRUCTED 1956
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 200
(30) YEAR OF ADT 1981 (109) TRUCK ADT 3 %
(19) BYPASS, DETOUR LENGTH 3 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 24.4 M
(49) STRUCTURE LENGTH 25.3 M
(50) CURB OR SIDEWALK: LEFT 0.5 M RIGHT 0.5 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 6.7 M
(52) DECK WIDTH OUT TO OUT 7.7 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 7.3 M
(33) BRIDGE MEDIAN- NO MEDIAN 0
(34) SKEW 0 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 6.7 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NO CONTROL CODE 0
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 63.9
STATUS
HEALTH INDEX 82.6
PAINT CONDITION INDEX = 75.0

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- MINOR COLLECTOR RURAL 08
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(22) OWNER- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 7
(59) SUPERSTRUCTURE 6
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 6
(62) CULVERTS N

********** LOAD RATING AND POSTING ********** CODE

(31) DESIGN LOAD- M-13.5 OR H-15 2
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 20.8
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 16.3
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 5
(68) DECK GEOMETRY 4
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 7
(72) APPROACH ROADWAY ALIGNMENT 7
(36) TRAFFIC SAFETY FEATURES 0000
(113) SCOUR CRITICAL BRIDGES 2

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 205
(115) YEAR OF FUTURE ADT 2015

********** INSPECTIONS **********

(90) INSPECTION DATE 09/05 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- YES 24 MO A) 10/99
B) UNDERWATER INSP- NO MO B)
C) OTHER SPECIAL INSP- NO MO C)

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 02C0076
Facility Carried: BUTTERFLY AVE
Location : JUST E SACRAMENTO AVE
City : DUNSMUIR
Inspection Date : 05/25/2004

Bridge Inspection Report

Inspection Type

Routine	Group A	Underwater	Special	Other
[X]	[ ]	[ ]	[ ]	[ ]

STRUCTURE NAME: SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened: 1956
Length (m) : 25.3

Skew (degrees): 0
No. of Joints : 2
No. of Hinges : 0

Structure Description: Built-up welded steel through girder (2) with RC deck and steel floor beams on RC gravity abutments. 1.2 m sidewalk on upstream side

Span Configuration : 1 @ 24.4 m

LOAD CAPACITY AND RATINGS

Design Live Load: M-13.5 OR H-15
Inventory Rating: 16.3 metric tons Calculation Method: LOAD FACTOR
Operating Rating: 20.8 metric tons Calculation Method: LOAD FACTOR
Permit Rating : XXXXX
Posting Load : Type 3 N/A Type 3S2 N/A Type 3-3 N/A

DESCRIPTION ON STRUCTURE

Deck X-Section: 0.5 m cu, 6.7 m, 0.5 m cu
Total Width: 7.7 m Net Width: 6.7 m No. of Lanes: 2
Rail Description: Through girder Rail Code : 0000
Min. Vertical Clearance: Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description: Rocks

CONDITION TEXT

REVISIONS

ELI codes 311 - Moveable Bearing and 313 - Fixed Bearing have been added to reflect the bearings under the girders. Both quantities have been placed in Condition State 2. See "Paint Condition" text.

ELI code 330 - Metal Bridge Railing has been deleted. Although the top portion of the steel girder extends above the deck and acts as a barrier, it should not be coded as one. This element is already listed as ELI code 107 - Painted Steel Open Girder/Beam.

CONDITION OF STRUCTURE

There are light pattern and short longitudinal deck cracks throughout. There are also popouts throughout the deck surface.

The open joints are impacted with dirt and debris.

There are light transverse and longitudinal soffit cracks.

This structure is in satisfactory condition.

PAINT CONDITION

There are intermittent spots of rust throughout the girders and floor beams. The bearings have dirt and moss accumulating on them which is contributing to the decline of their paint system. This condition is worse at Abutment 2.

CONDITION TEXT

UNDERWATER INVESTIGATION

A Type "A" underwater investigation was performed by probing from the embankments. See "Scour" text.

SCOUR

There is undermining along the left side of Abutment 1. It extends back under the footing at least one meter. Previous reports indicated the undermining to be 0.5 m.

ELEMENT INSPECTION RATINGS

F #	Elem No.	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01	12	Concrete Deck - Bare	2	185	sq.m.	185	0	0	0	0
01	107	Painted Steel Open Girder/Beam	2	51	m.	0	51	0	0	0
01	152	Painted Steel Floor Beam	2	63	m.	0	63	0	0	0
01	215	Reinforced Conc Abutment	2	15	m.	15	0	0	0	0
01	304	Open Expansion Joint	2	15	m.	15	0	0	0	0
01	311	Moveable Bearing (roller, sliding, etc.)	2	2	ea.	0	2	0	0	0
01	313	Fixed Bearing	2	2	ea.	0	2	0	0	0
01	361	Scour	2	1	ea.	1	0	0	0	0

WORK RECOMMENDATIONS

RecDate: 10/15/1997 EstCost:
Action : StrTarget: 2 YEARS
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Clean bearing seats at Abutments 1 and 2

RecDate: 10/15/1997 EstCost:
Action : StrTarget: 2 YEARS
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Repair undermining at Abutment 1

RecDate: 10/15/1997 EstCost:
Action : StrTarget: 2 YEARS
Work By: LOCAL AGENCY DistTarget:
Status : PROPOSED EA:

Clean expansion joints that remain impacted with dirt debris

Inspected By : Mary L. Warrick

Mary L. Warrick
Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
MARY L. WARRICK
No. 53751
Exp. 06/30/2007
CIVIL
STATE OF CALIFORNIA

CC: CIneichen, Hydraulics

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **02C0076**
(5) INVENTORY ROUTE(ON/UNDER)- ON 150000000
(2) HIGHWAY AGENCY DISTRICT 02
(3) COUNTY CODE 093 (4) PLACE CODE 20242
(6) FEATURE INTERSECTED- SACRAMENTO RIVER
(7) FACILITY CARRIED- BUTTERFLY AVE
(9) LOCATION- JUST E SACRAMENTO AVE
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 41 DEG 12 MIN 31 SEC
(17) LONGITUDE 122 DEG 16 MIN 17 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- STEEL
TYPE- GIRDER & FLOORBEAM SYSTEM CODE 303
(44) STRUCTURE TYPE APPR:MATERIAL-
TYPE- CODE
(45) NUMBER OF SPANS IN MAIN UNIT 1
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- CONCRETE CODE 1
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1915
(106) YEAR RECONSTRUCTED 1956
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 200
(30) YEAR OF ADT 1981 (109) TRUCK ADT 3 %
(19) BYPASS, DETOUR LENGTH 3 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 24.4 M
(49) STRUCTURE LENGTH 25.3 M
(50) CURB OR SIDEWALK: LEFT 0.5 M RIGHT 0.5 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 6.7 M
(52) DECK WIDTH OUT TO OUT 7.7 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 7.3 M
(33) BRIDGE MEDIAN- NO MEDIAN 0
(34) SKEW 0 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 6.7 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NO CONTROL CODE 0
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

****

SUFFICIENCY RATING = 63.9
STATUS
HEALTH INDEX = 82.6
PAINT CONDITION INDEX = 75.0

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- MINOR COLLECTOR RURAL 08
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(22) OWNER- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 7
(59) SUPERSTRUCTURE 6
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 6
(62) CULVERTS N

******** LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- M-13.5 OR H-15 2
(63) OPERATING RATING METHOD- LOAD FACTOR 1
(64) OPERATING RATING- 20.8
(65) INVENTORY RATING METHOD- LOAD FACTOR 1
(66) INVENTORY RATING- 16.3
(70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5
(41) STRUCTURE OPEN, POSTED OR CLOSED- A
DESCRIPTION- OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 5
(68) DECK GEOMETRY 4
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 7
(72) APPROACH ROADWAY ALIGNMENT 7
(36) TRAFFIC SAFETY FEATURES 0000
(113) SCOUR CRITICAL BRIDGES 2

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 205
(115) YEAR OF FUTURE ADT 2015

********** INSPECTIONS **********

(90) INSPECTION DATE 05/04(91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- YES 48 MO A) 10/99
B) UNDERWATER INSP- NO -1 MO B)
C) OTHER SPECIAL INSP- NO -1 MO C)

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : **02C0076**
Facility Carried: **BUTTERFLY AVE**
Location : **BUSH ST BTW SACTO&GILLIS**
City : **DUNSMUIR**
Inspection Date : **22-AUG-01**
Inspection Type

Routine	Group A	Underwater	Special	Other
[ ]	[ ]	[ ]	[ ]	[X]

Bridge Inspection Report

Name : SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened : 1965
Length (m) : 25.9

Skew (degrees): 0
No. of Joints : 0
No. of Hinges :

Description of Structure : Built up welded steel through girder (2) with PC deck and steel floor beams on RC gravity abutments. 1.22 m sidewalk on upstream side.

Span Configuration : 1 @ 24.38 m

LOAD CAPACITY AND RATINGS

Design Live Load : M 13.5 OR H - 15
Inventory Rating : 16.2 metric tons — Calculation Method : LOAD FACTOR
Operating Rating : 20.8 metric tons — Calculation Method : LOAD FACTOR
Permit Rating : XXXXX
Posting Load : Type 3 N/A english tons — Type 3S2 N/A english tons — Type 3-3 N/A english tons

DESCRIPTION ON STRUCTURE

Bridge width . 7.31 m
Total Width : 6.9 m — Net Width : 6.70 m — No. of Lanes : 2
Rail Description : Through girder. — Rail Code : 0000
Min. Vertical Clearance : Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description : Large rocks.

HISTORY

There has been a history of footing undermining at Abutment 1 dating back to the 04/29/81 inspection report.

The 09/14/87 report indicated that the undermining had been repaired, but the 06/29/91 report noted that the footing repair was becoming undermined.

The most recent report, 10/04/99, indicated that the footing was still undermined.

There were no reports of scour or undermining at Abutment 2.

The structure has been given an Element Level Inspection 361 Code, Scour Smart flag, Condition State of 1: "Scour exists at the bridge site but is of little concern to the structural integrity of the bridge."

REVISIONS

The National Bridge Inventory Item 113 Code has been revised from 5 to 2.

SCOUR

This report adderesses hydraulic issues only. The structure's scour potential has been assessed in accordance with the Federal Highway Administration Technical Advisory T5140.23, "Evaluating Scour at Bridges". The National Bridge Inventory Item 113 Code, "Vulnerability to Scour", has been changed to 2. 'Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by an engineering evaluation of the observed scour condition report by the bridge inspector. Immediate action is required to provide scour countermeasures."

This report was generated based on an office investigation of historical bridge reports, as built plans and other available information. A channel cross-section was not taken at the time of this report.

Printed on : 22-AUG-2001 03:30.54 PM

Bridge No.: 02C0076 Location: BUSH ST BTW SACTO&GILLIS Inspection Date: 22-AUG-01

Using engineering judgement based on the history of undermining of the Abutment 1 footing and on a lack of adequate information indicating the footing is founded on scour resistant bedrock, the structure is considered scour critical.

RECOMMENDATIONS

The local agency shall provide appropriate scour countermeasures to mitigate current problems.

Inspected By : Tony Nedwick

Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
ANTHONY NEDWICK
No. C60368
Exp
CIVIL
STATE OF CALIFORNIA

CC : County of Siskiyou
SJaques, Hydraulics
JSagar, ABME

Printed on : 22-AUG-2001 03:30:54 PM

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Caltrans

Bridge Number : 02C0076
Facility Carried: BUTTERFLY AVE
Location : BUSH ST BTW SACTO&GILLIS
City : DUNSMUIR
Inspection Date : 21-AUG-01
Inspection Type

Routine	Group A	Underwater	Special	Other
[X]	[ ]	[ ]	[ ]	[ ]

Bridge Inspection Report

Name : SACRAMENTO RIVER

CONSTRUCTION INFORMATION

Year Built : 1915
Year Widened : 1956
Length (m) : 25.3

Skew (degrees): 0
No. of Joints : 0
No. of Hinges :

Description of Structure : Built-up welded steel through girder (2) with RC deck and steel floor beams on RC gravity abutments. 1.2 m sidewalk on upstream side

Span Configuration : 24.4 m

LOAD CAPACITY AND RATINGS

Design Live Load : M 13.5 OR H - 15
Inventory Rating : 16.3 metric tons Calculation Method : LOAD FACTOR
Operating Rating : 30.8 metric tons Calculation Method : LOAD FACTOR
Permit Rating : XXXXX
Posting Load : Type 3 N/A english tons Type 3S2 N/A english tons Type 3-3 N/A english tons

DESCRIPTION ON STRUCTURE

Bridge width : 0.3 m cu - 6.7 m 0.3 m cu
Total Width : 7.3 m Net Width : 6.70 m No. of Lanes : 2
Rail Description : Through girder Rail Code : 0000
Min. Vertical Clearance : Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description : Rocks

HISTORY

Abutments were built in 1915. The former steel truss span was replaced by this superstructure (02C0076) in 1956. The old truss was re erected over Cottonwood Creek (02C0068) on Road 9K006 by Siskiyou County

CONDITION OF STRUCTURE

The deck has random light cracks throughout.

The deck joints are impacted with dirt debris.

Debris has accumulated around the bearing areas on the abutments.

PAINT CONDITION

The paint system has areas of spot rust.

SCOUR

There is some undermining at Abutment 1. The undermining is approximately the same as noted in the previous investigation, 3.5 m long and extending 0.5 m back under the footing.

ELEMENT LEVEL INSPECTION RATINGS

Elem No.	Element Description	Env	Total Units Quantity	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01 12	Concrete Deck Bare	2	185 sq.m.	185	0	0	0	0
01 107	Painted Steel Open Girder/Beam	2	51 m.	0	51	0	0	0
01 152	Painted Steel Floor Beam	2	63 m.	0	63	0	0	0

Printed on : 24-SEP 2001 02:08:31 PM

Bridge No.: 02C0076 Location: BUSH ST BTW SACTO&GILLIS Inspection Date: 21-AUG-01

F#	Elem No.	Element Description	Env	Total Units Quantity	Qty in each Condition State St. 1	St. 2	St. 3	St. 4	St. 5
01	215	Reinforced Conc Abutment	2	15 m.	15	0	0	0	0
01	304	Open Expansion Joint	2	15 m.	15	0	0		
01	330	Metal Bridge Railing - Uncoated	2	25 m.	25	0	0	0	0
01	361	Scour	2	1 ea.	1	0	0		

WORK RECOMMENDATIONS

Clean expansion joints that remain impacted with dirt debris

Item#	Rec. Date	Work By	Work Id.	Prog. Method	Cost
1	15 OCT-1997	City Agency	40076X97288X		

Repair undermining at Abutment 1

Item#	Rec. Date	Work By	Work Id.	Prog. Method	Cost
2	15-OCT-1997	City Agency	40076X97768X		

Clean bearing seats at Abutments 1 and 2

Item#	Rec. Date	Work By	Work Id.	Prog. Method	Cost
3	15-OCT 1997	City Agency	40076X97288X		

Inspected By : Jim Sagar

J. Sagar

Registered Civil Engineer

CC : SJaques, Hydraulics

Printed on : 24-SEP-2001 02:08:31 PM

Bridge No.: 02C0076 Location: BUSH ST BTW SACTO&GILLIS Inspection Date: 21-AUG-01

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME - CALIFORNIA 06 9
(8) STRUCTURE NUMBER 02C0076
(5) INVENTORY ROUTE(ON/UNDER) - ON 1 50 000000
(2) HIGHWAY AGENCY DISTRICT 02
(3) COUNTY CODE 09J (4) PLACE CODE 20342
(6) FEATURE INTERSECTED - SACRAMENTO RIVER
(7) FACILITY CARRIED - BUTTERFLY AVE
(9) LOCATION - BUSH ST BTW SACTO&GILLIS
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 41 DEG 12 MIN 31 SEC
(17) LONGITUDE 122 DEG 16 MIN 17 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

********** STRUCTURE TYPE AND MATERIAL **********

(43) STRUCTURE TYPE MAIN: MATERIAL STEEL
TYPE - GIRDER & FLOORBEAM SYSTEM CODE 3 03
(44) STRUCTURE TYPE APPR: MATERIAL - OTHER
TYPE - OTHER CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 1
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM.
A) TYPE OF WEARING SURFACE CONCRETE CODE 1
B) TYPE OF MEMBRANE - NONE CODE 0
C) TYPE OF DECK PROTECTION NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1915
(106) YEAR RECONSTRUCTED 1956
(42) TYPE OF SERVICE: ON - HIGHWAY 1
UNDER WATERWAY 5
(28) LANES: ON STRUCTURE 02 UNDER STRUCTURE
(29) AVERAGE DAILY TRAFFIC 200
(30) YEAR OF ADT 1998 (109) TRUCK ADT 3 %
(19) BYPASS, DETOUR LENGTH 3 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 24.4 M
(49) STRUCTURE LENGTH 25.3 M
(50) CURB OR SIDEWALK: LEFT .1 M RIGHT .1 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 6.7 M
(52) DECK WIDTH OUT TO OUT 7.3 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 7.3 M
(33) BRIDGE MEDIAN NO MEDIAN 0
(34) SKEW 0 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 6.7 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF - NOT H/RR 0 M
(55) MIN LAT UNDERCLEAR RT REF - NOT H/RR 0 M
(56) MIN LAT UNDERCLEAR LT 0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL NO CONTROL CODE 0
(111) PIER PROTECTION - CODE
(39) NAVIGATION VERTICAL CLEARANCE 0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0

****

SUFFICIENCY RATING = 63.2
STATUS =
HEALTH INDEX = 83.6

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH - YES Y
(104) HIGHWAY SYSTEM - NOT ON NHS 0
(26) FUNCTIONAL CLASS MINOR COLLECTOR RURAL 08
(100) DEFENSE HIGHWAY - NOT STRAHNET 0
(101) PARALLEL STRUCTURE - NONE EXISTS N
(102) DIRECTION OF TRAFFIC - 2 WAY 2
(103) TEMPORARY STRUCTURE -
(105) FEDERAL LANDS HIGHWAY -
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL - ON FREE ROAD 3
(21) MAINTAIN CITY OR MUNICIPAL HIGHWAY AGENCY 4
(22) OWNER - CITY OR MUNICIPAL HIGHWAY AGENCY 4
(37) HISTORICAL SIGNIFICANCE - NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 7
(59) SUPERSTRUCTURE 6
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 6
(62) CULVERTS N

********** LOAD RATING AND POSTING ********** CODE

(31) DESIGN LOAD - M 13.5 OR H 15 2
(63) OPERATING RATING METHOD - LOAD FACTOR 1
(64) OPERATING RATING - 20.8
(65) INVENTORY RATING METHOD - LOAD FACTOR 1
(66) INVENTORY RATING - 16.2
(70) BRIDGE POSTING Equal to or above legal loads 5
(41) STRUCTURE OPEN, POSTED OR CLOSED - A
DESCRIPTION OPEN, NO RESTRICTION

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 5
(68) DECK GEOMETRY 4
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 7
(72) APPROACH ROADWAY ALIGNMENT 8
(36) TRAFFIC SAFETY FEATURES 0000
(113) SCOUR CRITICAL BRIDGES 2

********** PROPOSED IMPROVEMENTS **********

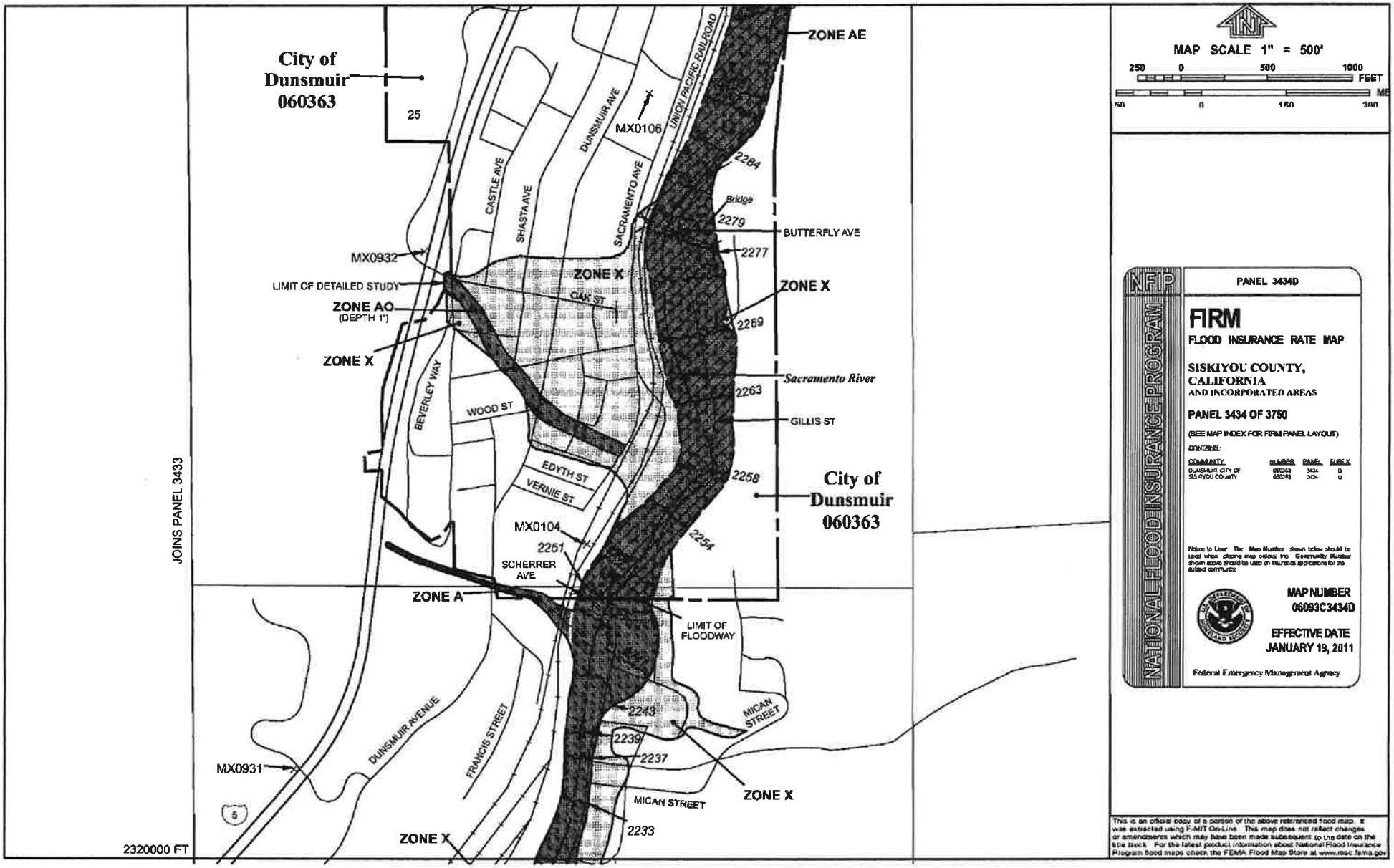
(75) TYPE OF WORK - CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT M
(94) BRIDGE IMPROVEMENT COST
(95) ROADWAY IMPROVEMENT COST
(96) TOTAL PROJECT COST
(97) YEAR OF IMPROVEMENT COST ESTIMATE
(114) FUTURE ADT 205
(115) YEAR OF FUTURE ADT 2015

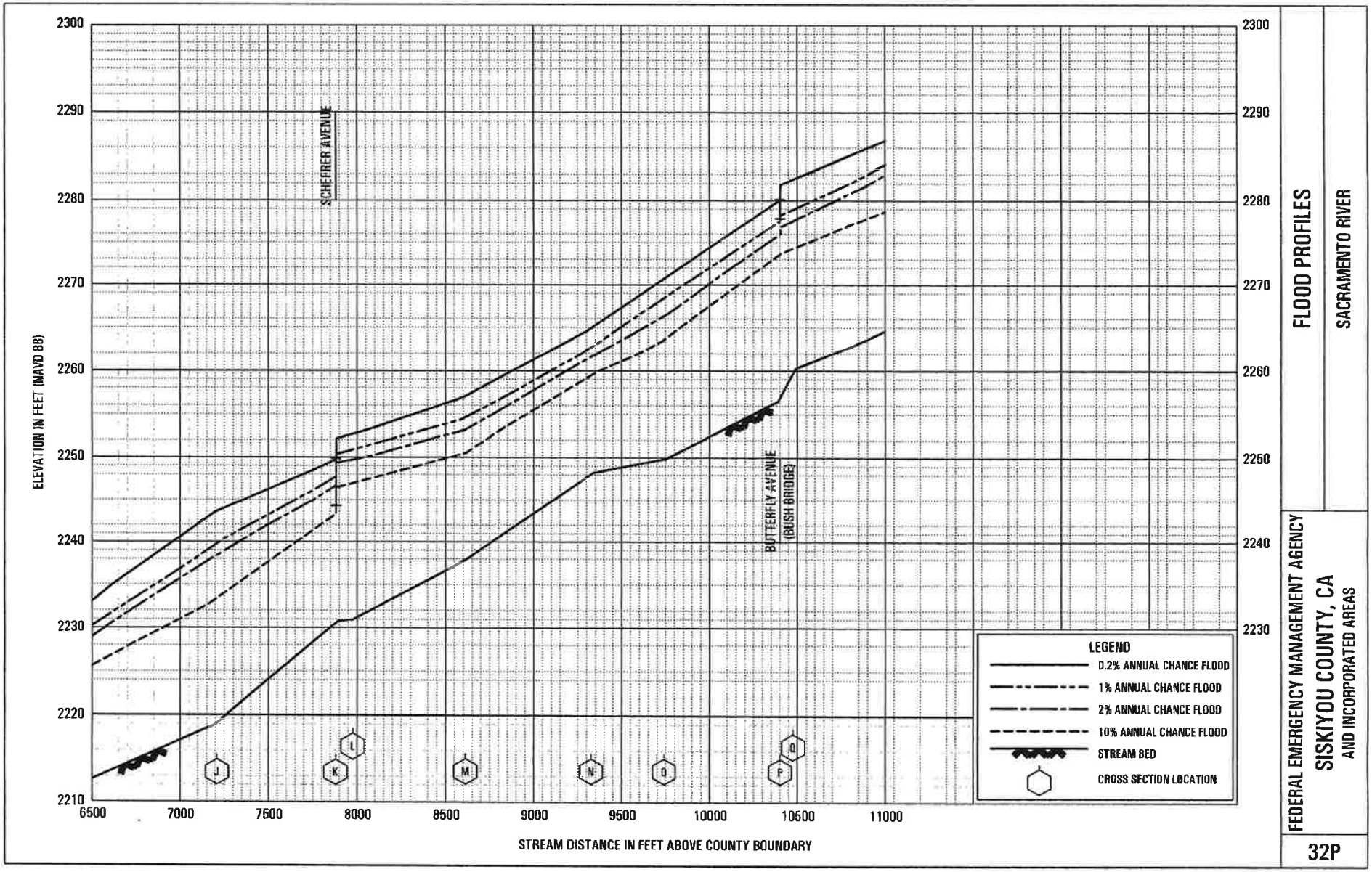
********** INSPECTIONS **********

(90) INSPECTION DATE 08/01 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL - YES 24 MO A) 10/99
B) UNDERWATER INSP - NO 1 MO B)
C) OTHER SPECIAL INSP NO 1 MO C)

Printed on : 24-SEP-2001 02:08:31 PM

Appendix B:
Flood Insurance Rate Maps
(FIRM Maps)


City of Dunsmuir 060363
25
MX0106
ZONE AE
UNION PACIFIC RAILROAD
DUNSMUIR AVE
SACRAMENTO AVE
CASTLE AVE
SHASTA AVE
2284
Bridge
2279
BUTTERFLY AVE
2277
MX0932
ZONE X
LIMIT OF DETAILED STUDY
OAK ST
ZONE AO
(DEPTH 1')
ZONE X
2269
ZONE X
BEVERLEY WAY
WOOD ST
Sacramento River
2263
GILLIS ST
EDYTH ST
VERNIE ST
2258
City of Dunsmuir 060363
MX0104
2251
2254
SCHERRER AVE
ZONE A
LIMIT OF FLOODWAY
JOINS PANEL 3433
2320000 FT
DUNSMUIR AVENUE
FRANCIS STREET
MICAN STREET
2243
2239
2237
MX0931
MICAN STREET
ZONE X
2233
ZONE X
MAP SCALE 1" = 500'
250 0 500 1000
FEET
PANEL 3434D
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SISKIYOU COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 3434 OF 3750
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
DUNSMUIR, CITY OF 060363 3434 D
SISKIYOU COUNTY 060349 3434 D
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
06093C3434D
EFFECTIVE DATE
JANUARY 19, 2011
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



FLOOD PROFILES

SACRAMENTO RIVER

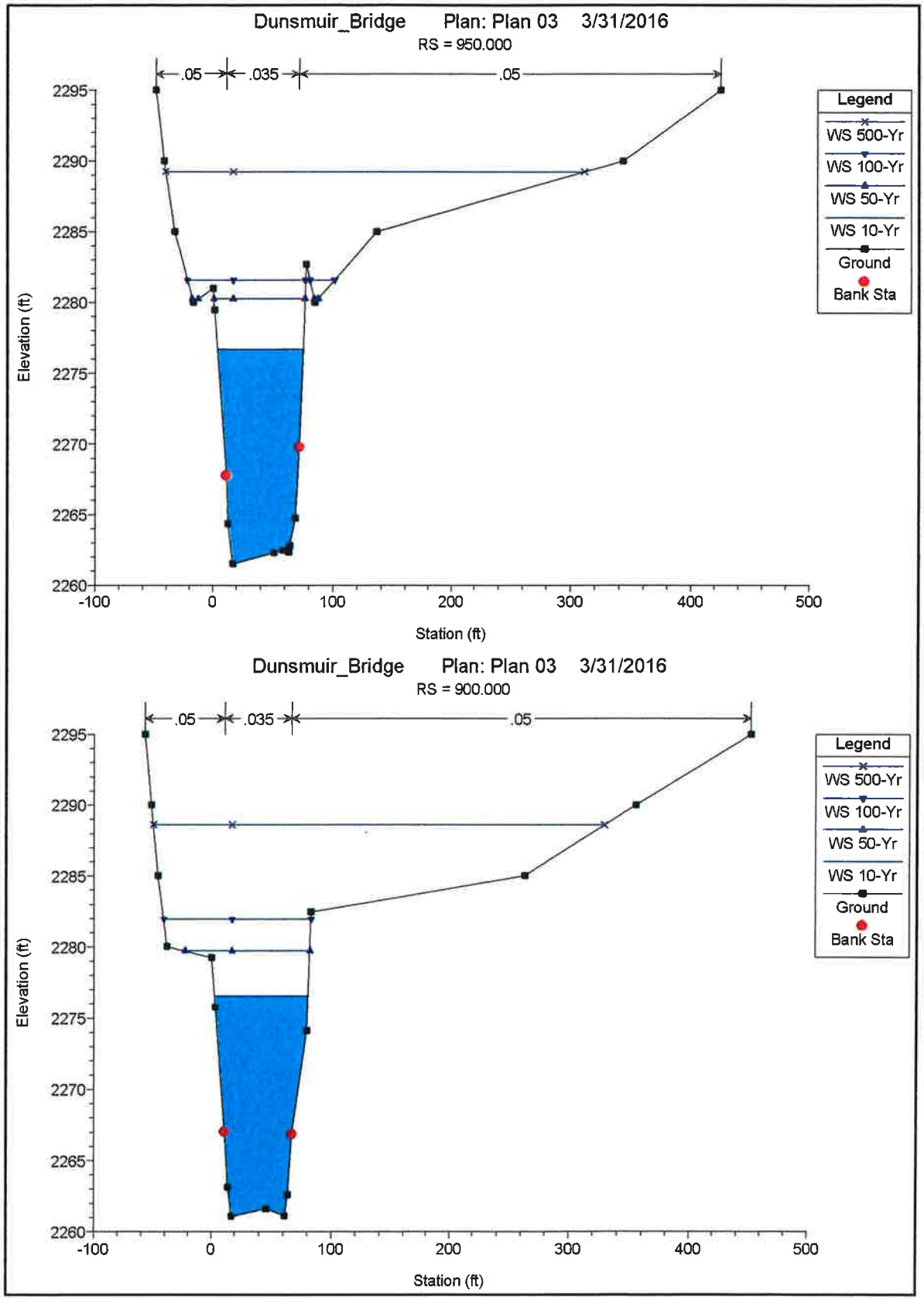
FEDERAL EMERGENCY MANAGEMENT AGENCY

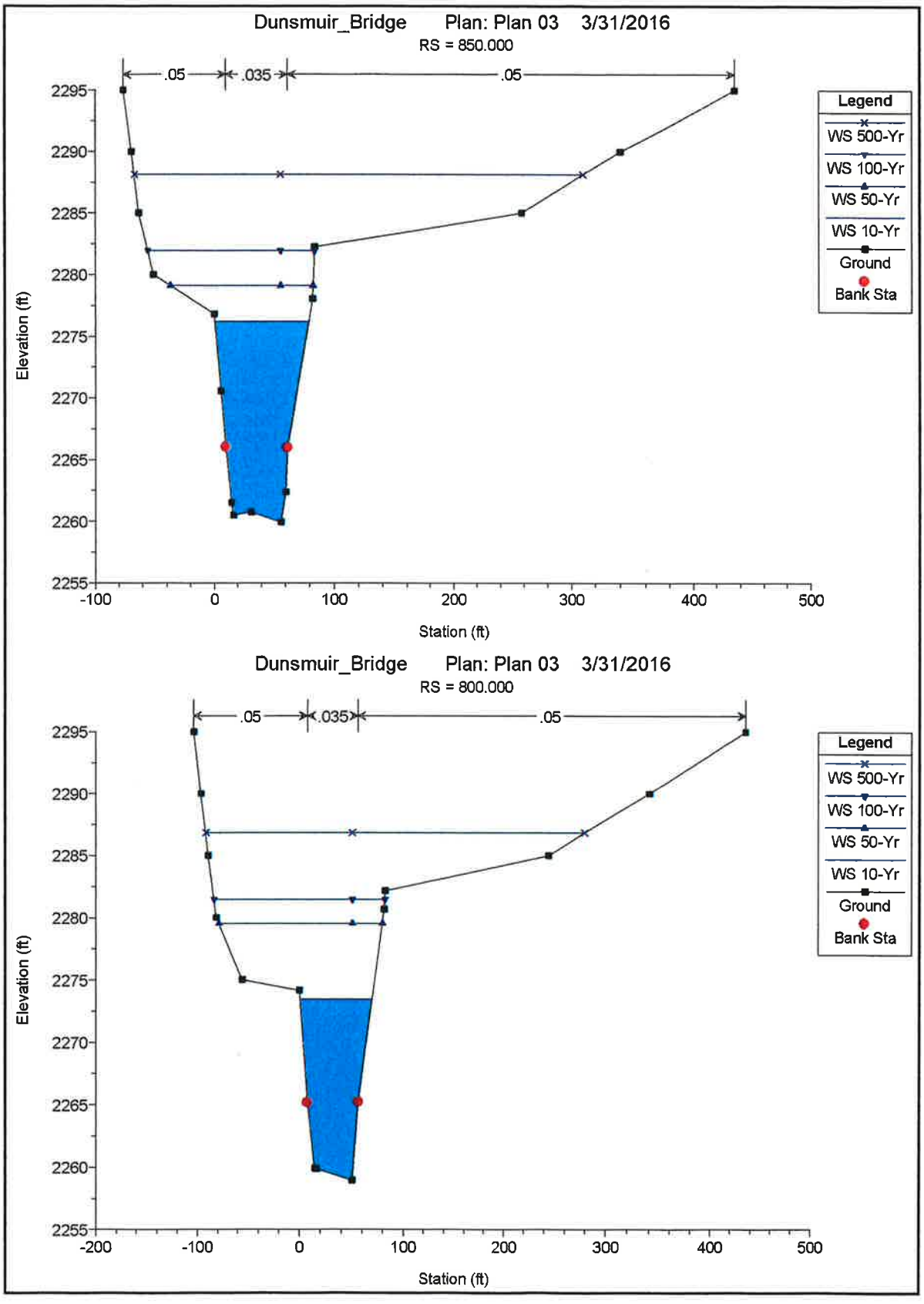
SISKIYOU COUNTY, CA

AND INCORPORATED AREAS

32P

Appendix C:
Hydraulic Cross Sections


Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 950.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 900.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Legend
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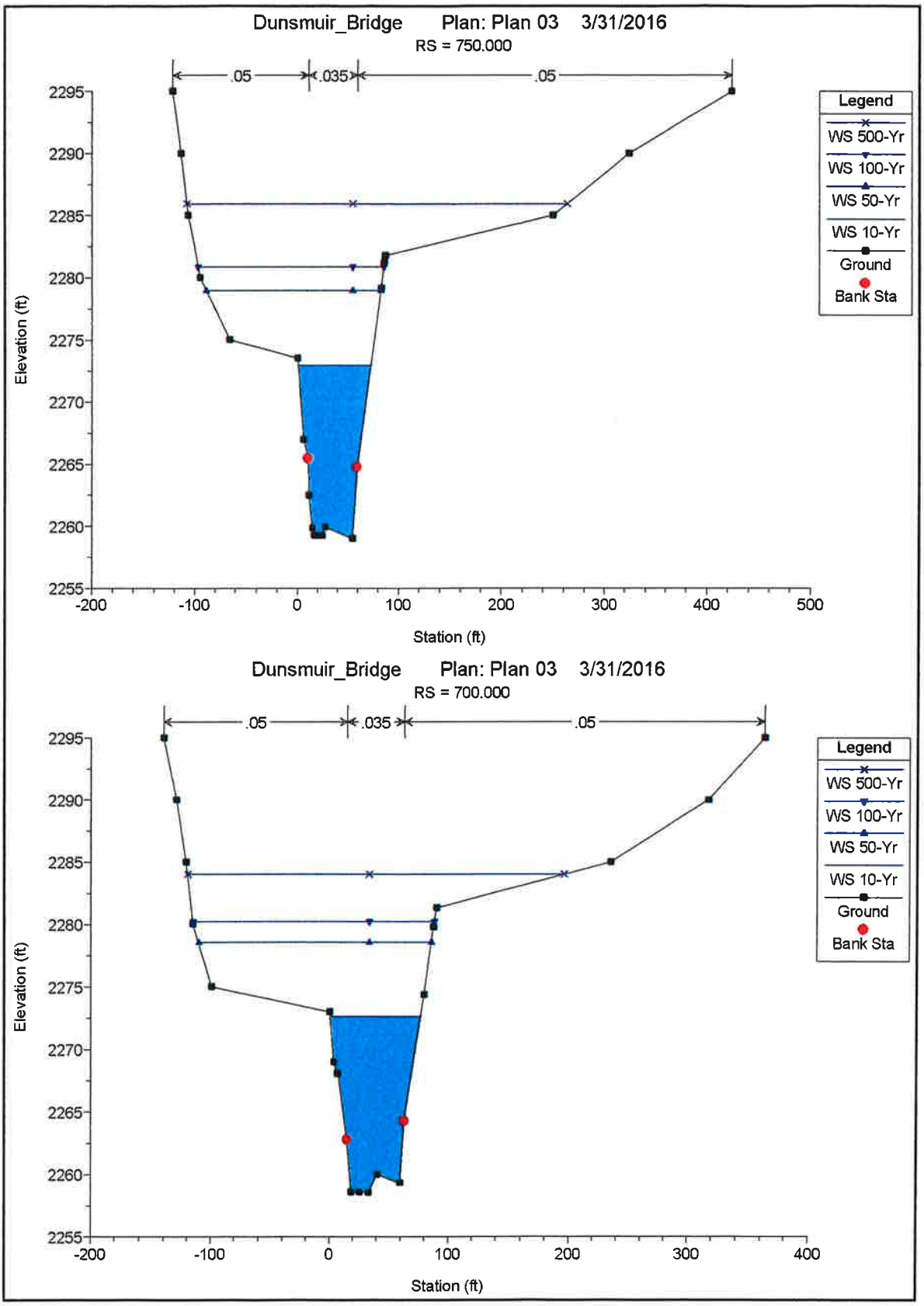
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 800.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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Legend
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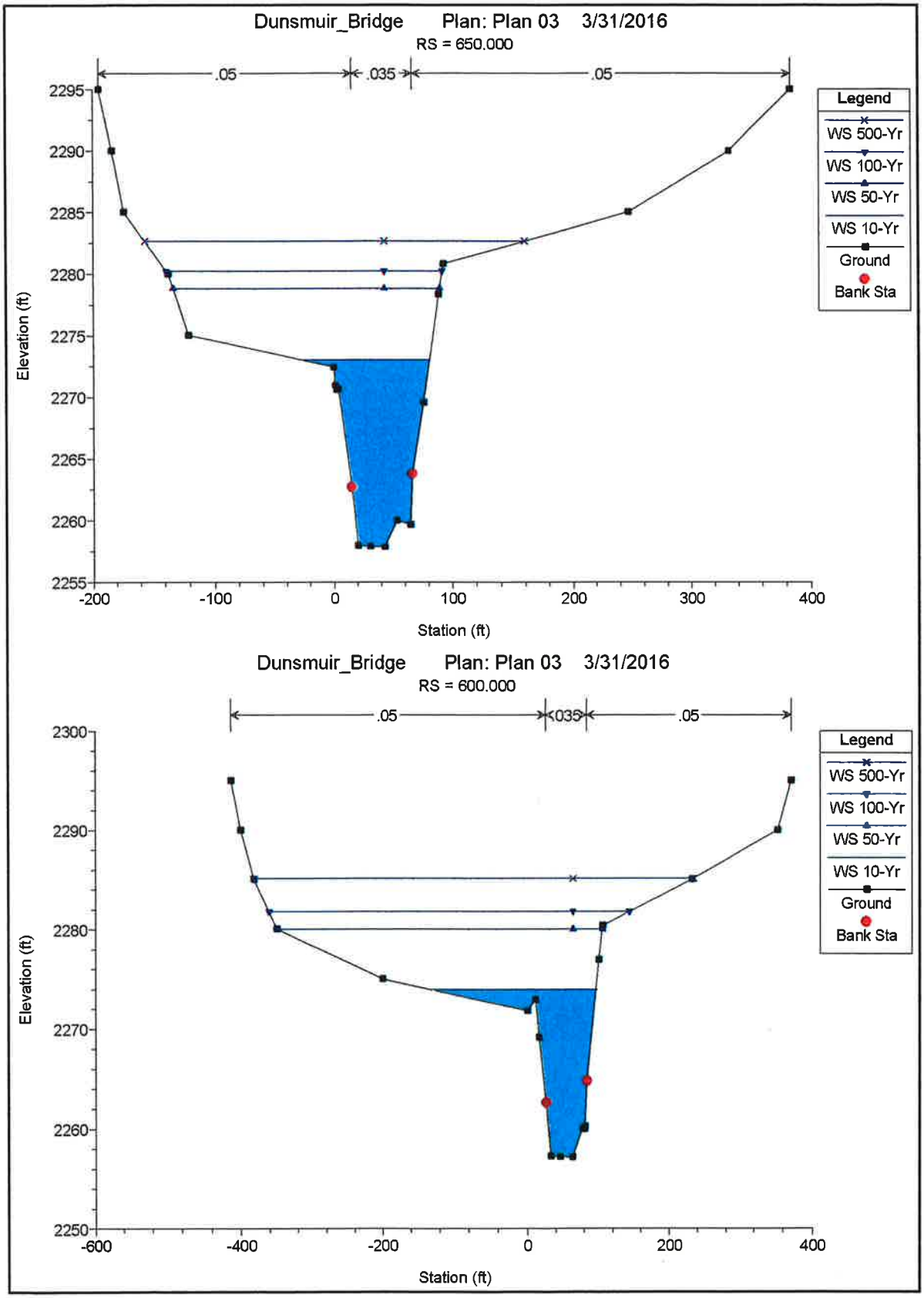
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 700.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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RS = 650.000
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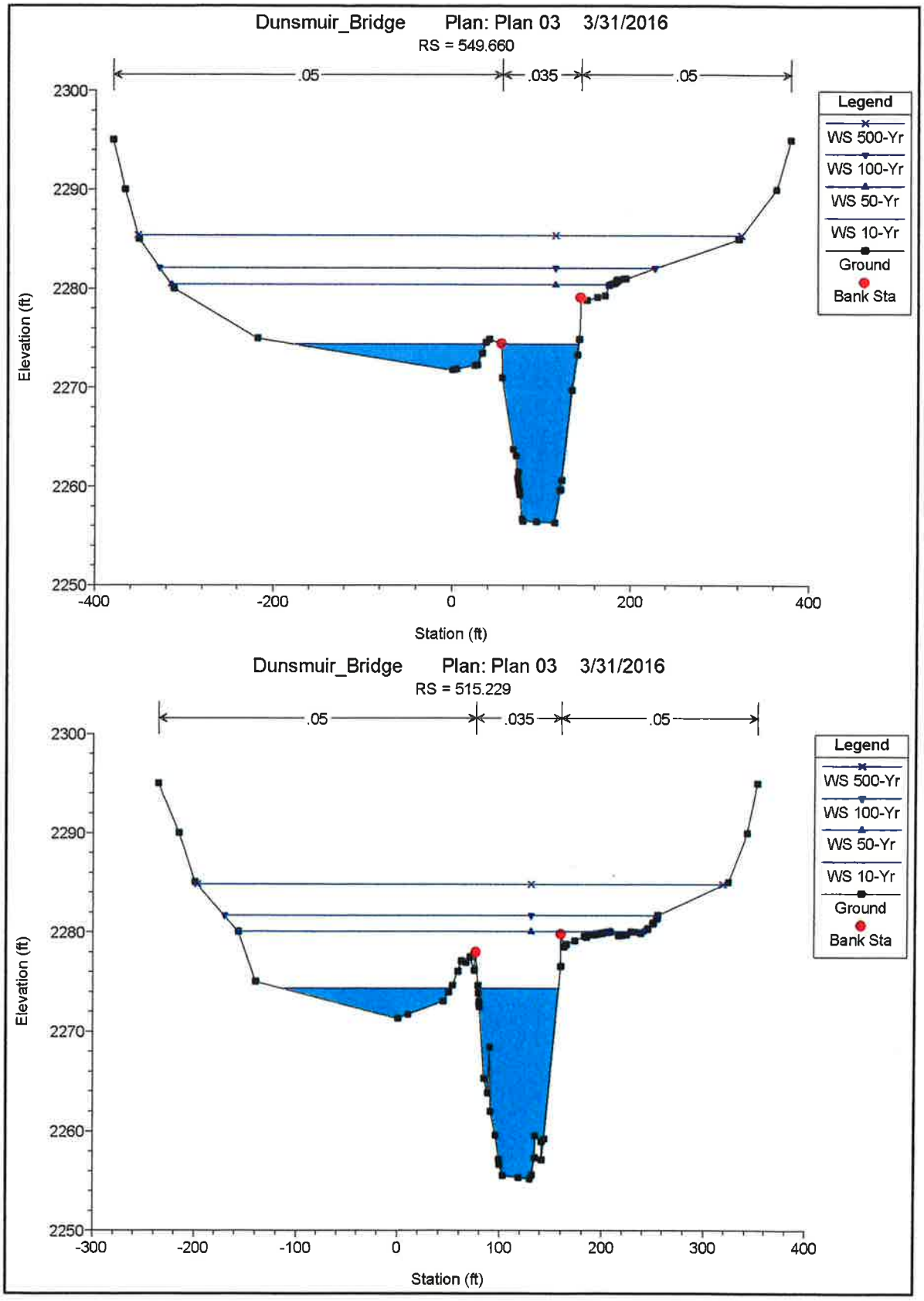
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 600.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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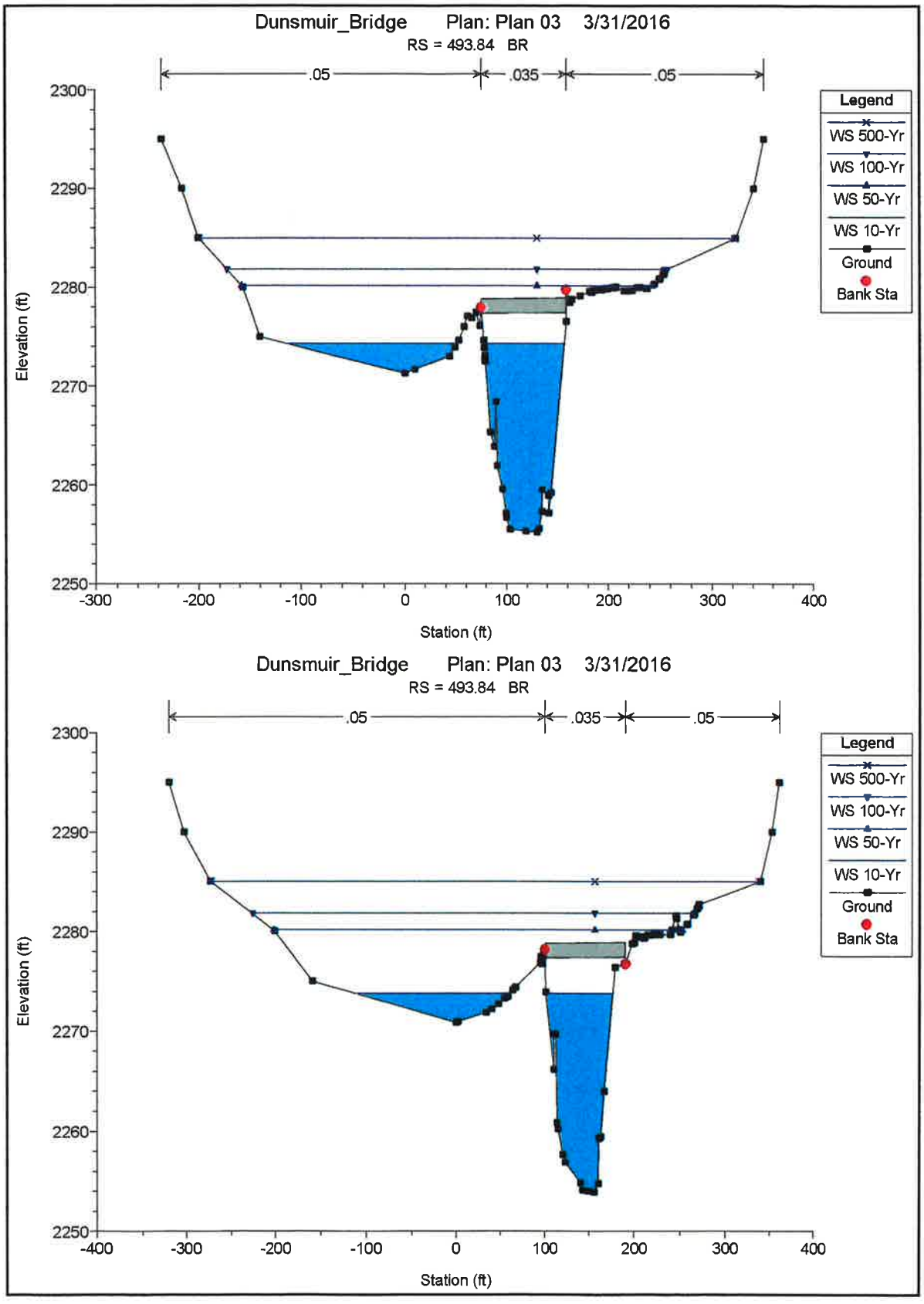
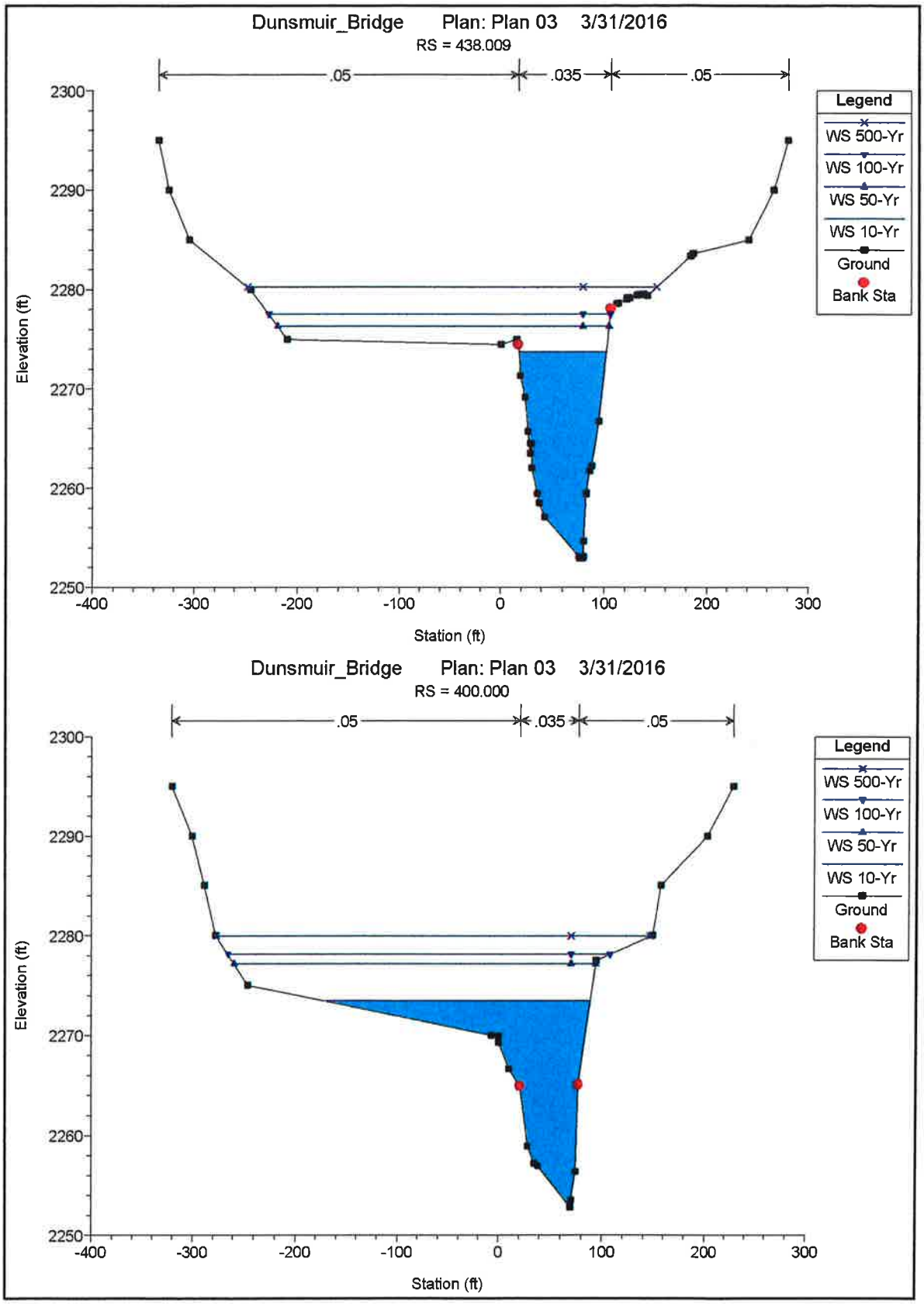
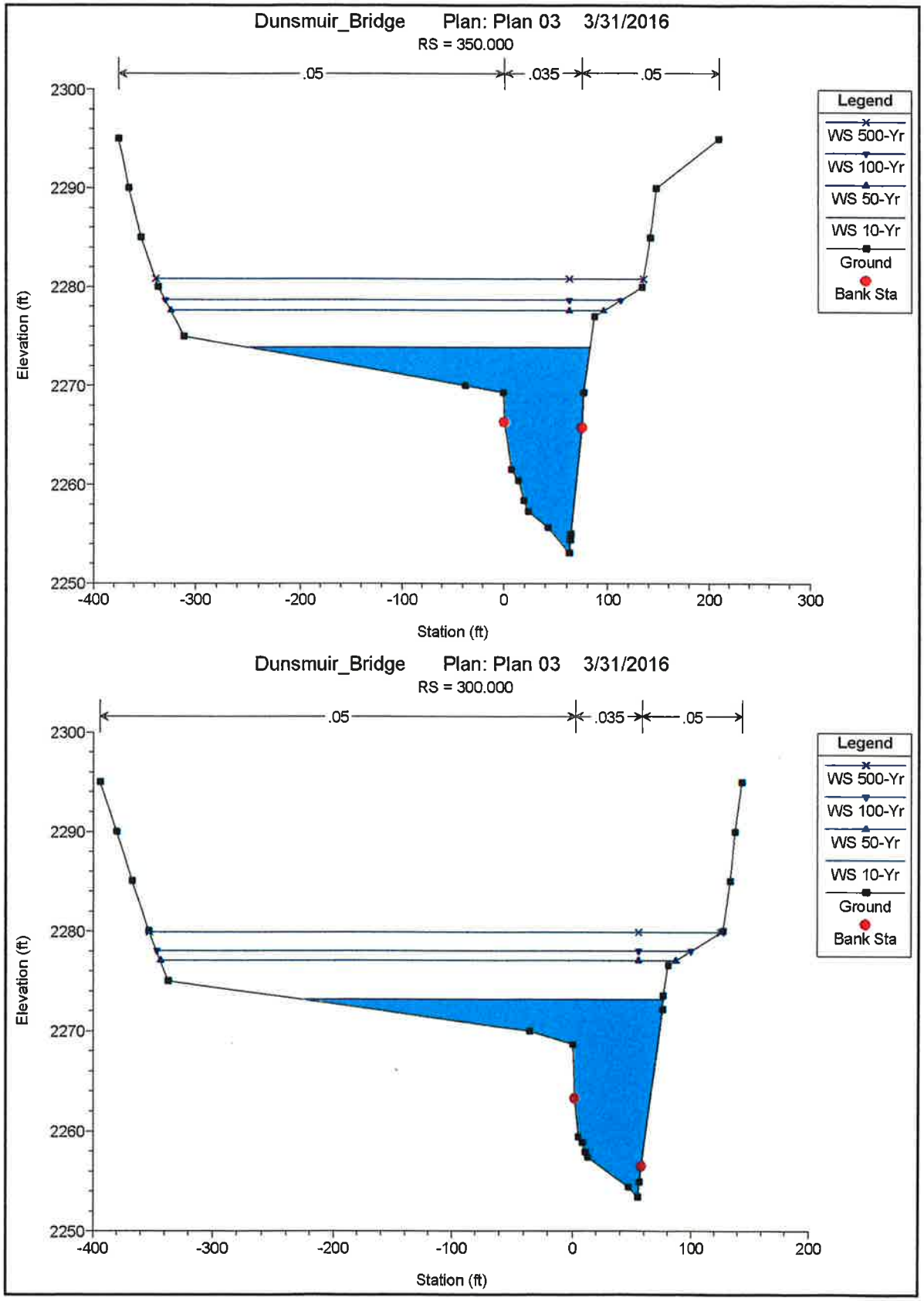
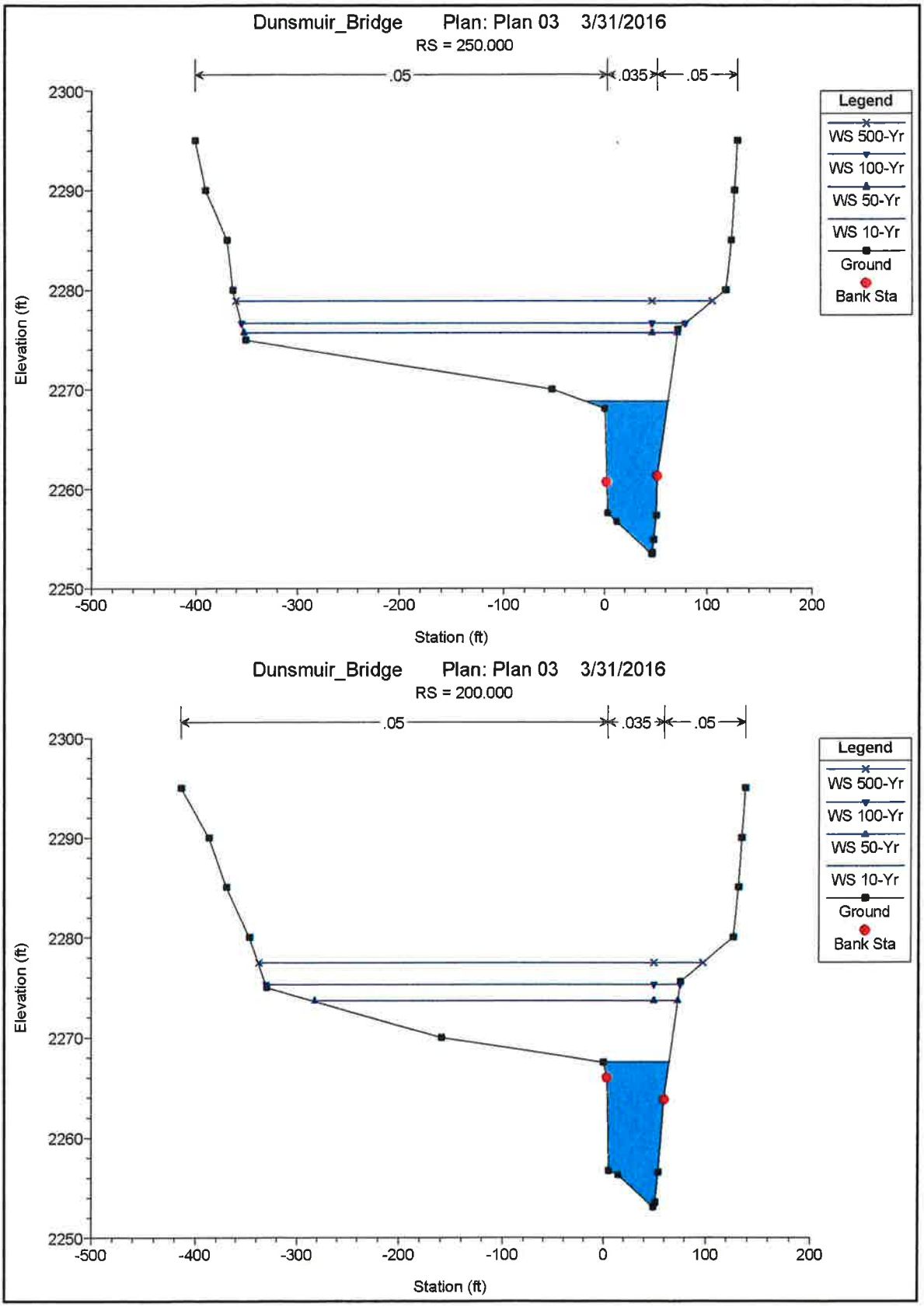
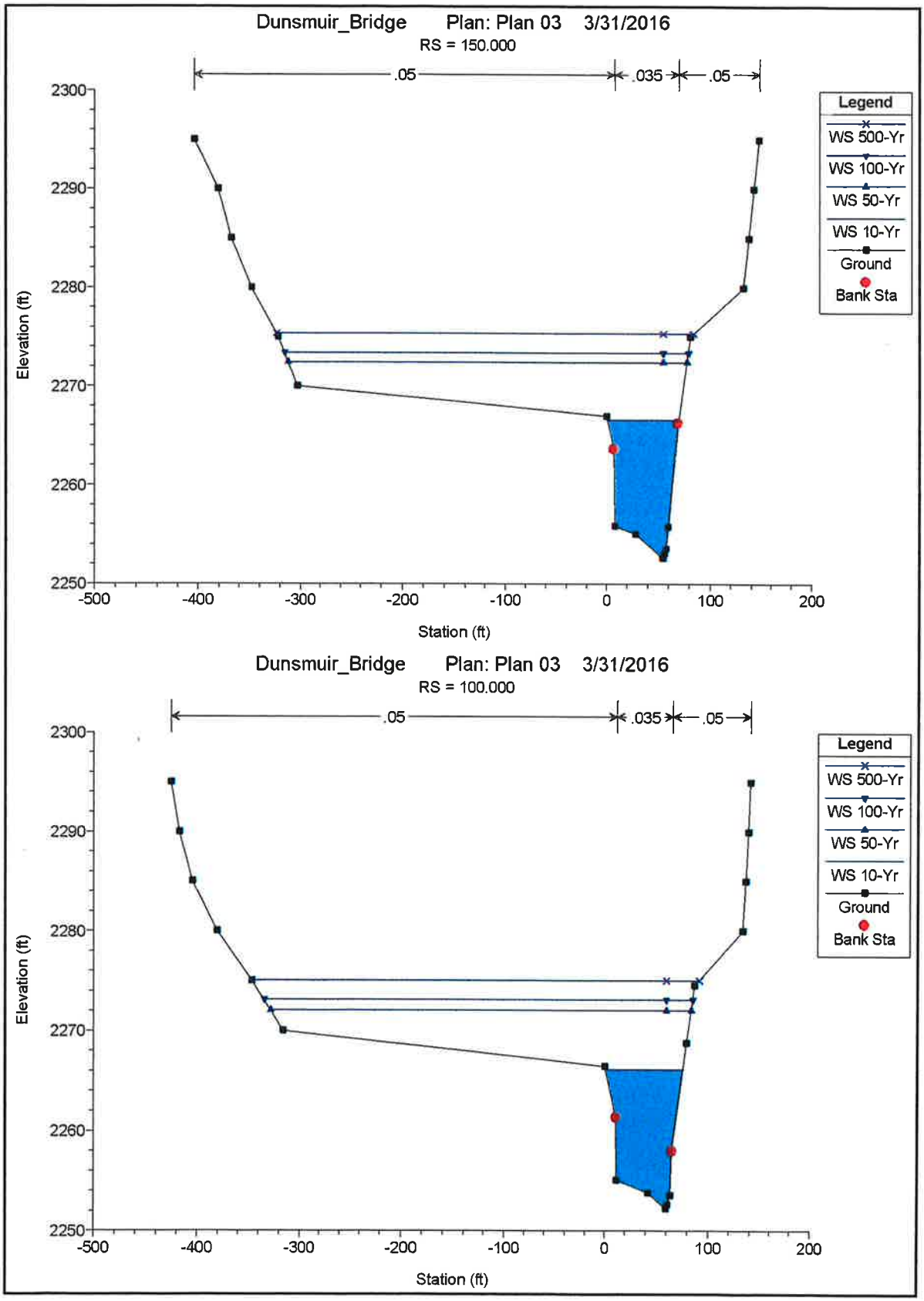
.035
.05
2300
2290
2280
2270
2260
2250
Elevation (ft)
-400
-200
0
200
400
Station (ft)
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 515.229
.05
.035
.05
2300
2290
2280
2270
2260
2250
Elevation (ft)
-300
-200
-100
0
100
200
300
400
Station (ft)
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta

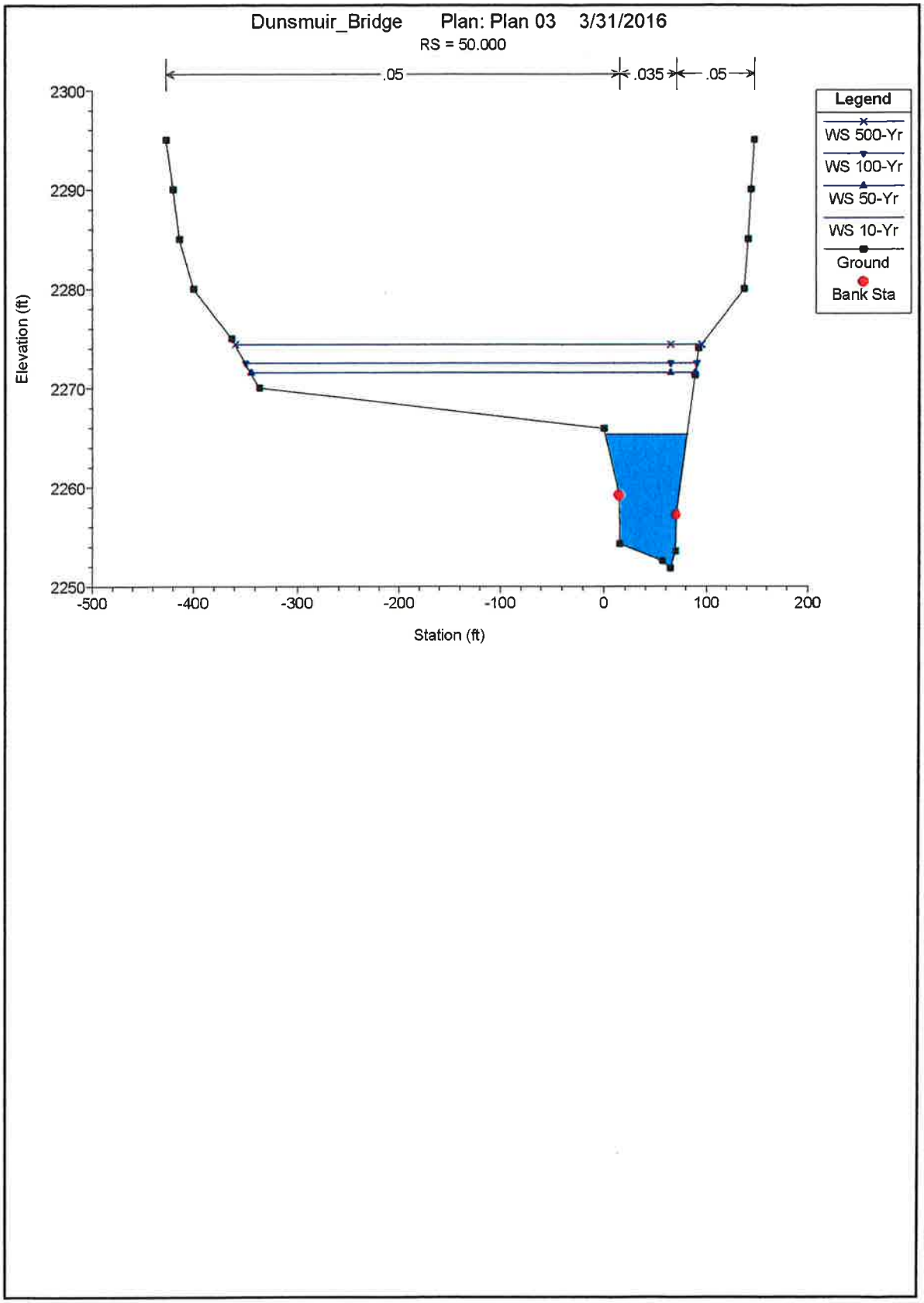

Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 493.84 BR
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2300
2290
2280
2270
2260
2250
-300
-200
-100
0
100
200
300
400
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 493.84 BR
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2300
2290
2280
2270
2260
2250
-400
-300
-200
-100
0
100
200
300
400

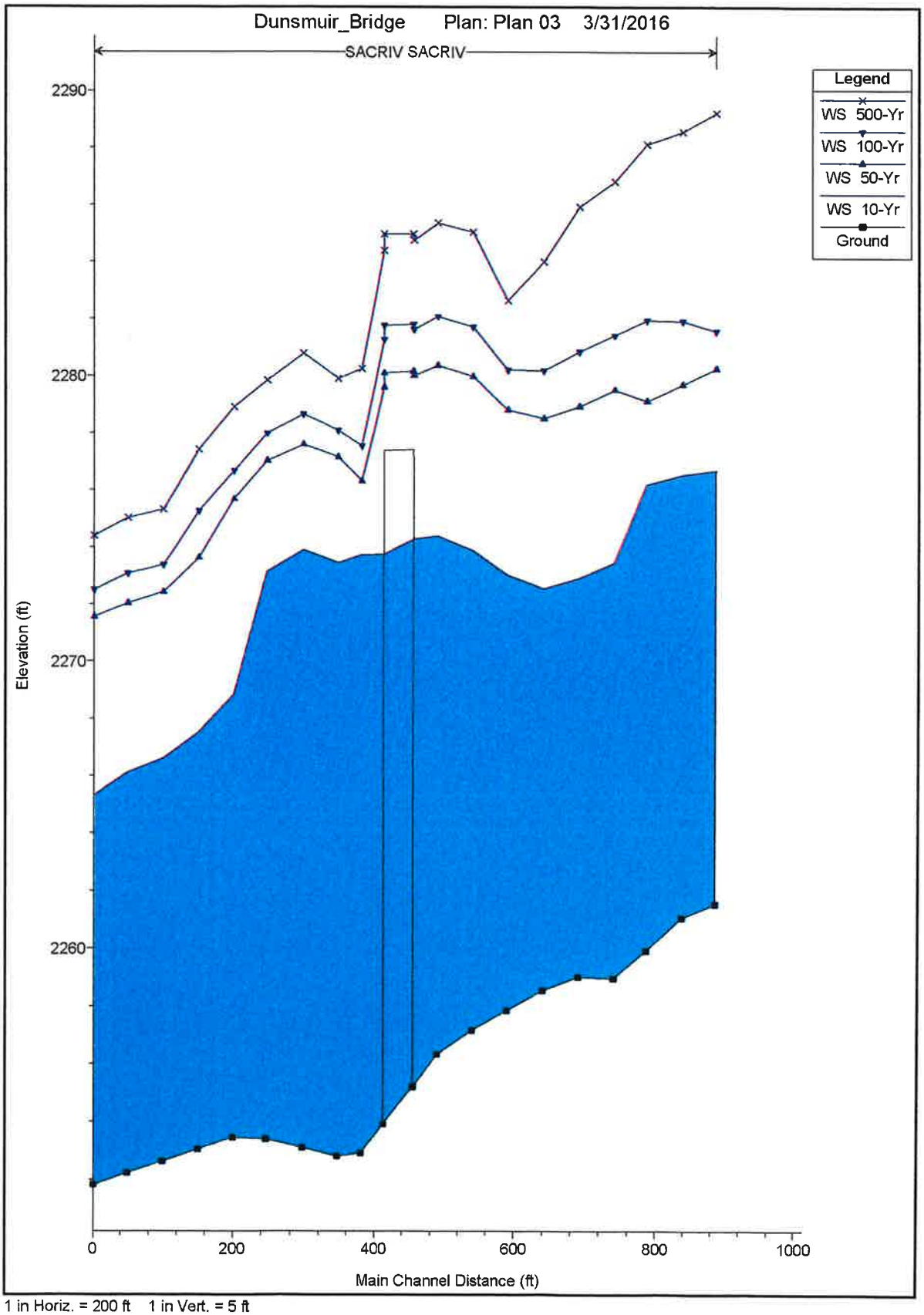

Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 438.009
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 400.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 350.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 300.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 250.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2300
2290
2280
2270
2260
2250
-500
-400
-300
-200
-100
0
100
200
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 200.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2300
2290
2280
2270
2260
2250
-500
-400
-300
-200
-100
0
100
200


Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 150.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
2300
2290
2280
2270
2260
2250
-500
-400
-300
-200
-100
0
100
200
Station (ft)
Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 100.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
2300
2290
2280
2270
2260
2250
-500
-400
-300
-200
-100
0
100
200
Station (ft)


Dunsmuir_Bridge Plan: Plan 03 3/31/2016
RS = 50.000
.05
.035
.05
Legend
WS 500-Yr
WS 100-Yr
WS 50-Yr
WS 10-Yr
Ground
Bank Sta
Elevation (ft)
2300
2290
2280
2270
2260
2250
-500
-400
-300
-200
-100
0
100
200
Station (ft)



1 in Horiz. = 200 ft 1 in Vert. = 5 ft