Robinson Creek Bridge Replacement on Lambert Lane

Draft Initial Study / Proposed Mitigated Negative Declaration

Bridge No. 10C0146

Lead Agency:

County of Mendocino

Department of Transportation

340 Lake Mendocino Drive

Ukiah, California 95482

August 2021

Prepared By:

Mendocino County Department of Transportation

Lead Consultant: Quincy Engineering

Supporting Consultant: Gallaway Enterprises

This Page Intentionally Left Blank

Table of Contents

List of Figures

List of Tables

List of Appendices

List of Acronyms

AASHTO	American Association of State Highway Transportation Officials
MCAQMD or Air District	Mendocino County Air Pollution Control District
BMPs	Best Management Practices
BSA	Biological Survey Area
CAP	Climate Action Plan
Caltrans	California Department of Transportation
Cal Water	California Water Service Company
CBC	California Building Code
CC	Community Commercial
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFGC CFR	California Fish and Game Commission Code of Federal Regulations
County	Mendocino County
CNDDB	California Natural Diversity Database
CRHR	California Register of Historical Resources
CRWQCB	California Regional Water Quality Control Board
CVFPB	Central Valley Flood Protection Board
CWHR	California Wildlife Habitat Relationships
dBA	decibel
DTSC	Department of Toxic Substances Control
EIR	Environmental Impact Report
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
ft	Feet
GHG	Greenhouse gas
ISA	Initial Site Assessment
LID	Low Impact Development
LRA	Local Responsibility Area
LSA	Limited Soils Assessment
MDOT	Mendocino Department of Transportation
MBTA	Migratory Bird Treaty Act
MND	Mitigated Negative Declaration
MMRP	Mitigation Monitoring and Reporting Program
NAHC	Native American Heritage Commission
NEIC	Northeast Information Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination Permit
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NOx	Oxides of Nitrogen
OWOUS	Other Waters of the United States
PCE	Primary Constituent Elements
PGA	Peak Ground Acceleration
Phase I ESA	Phase I Environmental Site Assessment
PM	Parcel Map
$PM_{2.5}$	Fine Particulate Matter
PM_{10}	Respirable Particulate Matter
RC	Resource Constraint
REC	Recognized Environmental Condition
ROG	Reactive Organic Gases
RPW	Relatively Permanent Water
R3	Medium High Density Residential

SDC	Caltrans Seismic Design Criteria
SLIC	Spills, leaks, investigations and cleanup
SMP	Soils Management Plan
SNC	Sensitive Natural Community
sq ft	Square feet
SWPPP	Stormwater Pollution Prevention Plan
SRA	State Responsibility Area
TNW	Traditional Navigable Waters
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
VMT	Vehicle-miles-traveled

Draft Initial Study / Proposed Mitigated Negative Declaration
Environmental Coordination and Review

I. PROJECT DESCRIPTION

A. Project Title: Robinson Creek Bridge Replacement on Lambert Lane, County Road 123A, Boonville. Bridge No. 10C0146. BRLO-5910(099)

B. Project Sponsor/Lead Agency:
County of Mendocino
Department of Transportation
340 Lake Mendocino Drive
Ukiah, CA 95482, Willows, CA 95988

C. Property Owners:

029-140-46-00 Joan Burroughs 14140 HWY 128, Boonville, CA 95415	029-150-39-00 Michele Corlette & James Lutticken 18075 Lambert Lane E, Boonville, CA 95415	029-130-23 Tommy Cronquist 18111 Lambert Lane, Boonville, CA 95415	029-130-11 Steven & Beverly Daniels 18100 Lambert Lane, Boonville, CA 95415
029-130-13-00 Gary & Wanda Johnson 14120 HWY 128, Boonville, CA 95415	029-130-07-00 Mathew & Dixie McCarthy 18050 Lambert Lane, Boonville, CA 95415	029-130-10 Linda Newton 18141 Lambert Lane, Boonville, CA 95415	029-110-10 & 029- 130-03 Michael Reeves 18055 Lambert Lane, Boonville, CA 95415

D. County Contact: Howard Dashiell, Director of Transportation
(707) 463-4363
County of Mendocino Department of Transportation
340 Lake Mendocino Drive
Ukiah, CA 95482

E. Project Location: The Project is located in the Town of Boonville, California on the western side of State Route 128 in the Anderson Valley Region on Lambert Lane at the crossing of Robinson Creek. Boonville USGS Quadrangle, Section 2, Township 13N, Range 14W. Latitude 39.00853100000, Longitude -123.36801400000. (**Figure 1 – Project Location Map**).

F. Assessor's Parcel Number (APN): The project will be located within the existing public right-of-way and narrow portions of APNs 029-140-46-00, 029-150-39-00, 029-130-23, 029-130-11, 029-130-13-00, 029-130-07-00, 029-130-10 029-110-10 and 029-130-03.

G. Project Size: The project is approximately 3.6 acres in size which includes an off-site staging area.

H. General Plan Designation: Public Right-of-Way (ROW), Rural Community and Public Services.

I. Zoning: Public ROW, Rural Community (RC) and Public Facility (PF).

J. Environmental Setting: The project site is located on Lambert Lane in the southern area of Mendocino, California, within the United States Geological Survey (USGS) Boonville USGS Quadrangle, Section 2, Township 13N, Range 14W. The project site is located on Lambert Lane, west of State Route 128, in between Mountain View 510 Road and Husset Road. It is 1/4 mile north of the County Fairgrounds on State Route 128.

The Project site consists of the existing asphalt roadway, concrete bridge, gravel road shoulder, a mixed species tree canopy and annual grassland habitat. Robinson Creek runs through the

Project site. The overall topography of the site is relatively flat, with Robinson Creek being highly channelized. The surrounding land uses consist of residential homes and urban development, with a mix of landscape and native trees and patches of disturbed annual grassland. The proposed staging area at the fairground facility is composed of highly disturbed annual grassland which is regularly mowed.

The average annual precipitation is 37.88 inches and the average temperature is 58.55° F (WRCC 2019) in the region where the survey area is located. The survey area ranges in elevation from 382 to 405 feet above sea level and is sloped between 0-9 percent. Soils within the survey area are loams with a deep restrictive layer located more than 80 inches deep.

K. Project Description:

PROPOSED PROJECT

The proposed Project will replace the existing Robinson Creek Bridge on Lambert Lane, approximately 400 feet west of State Route (SR) 128 (Figure 2). The existing structure is 32 feet long and 26 feet wide reinforced concrete bridge with closed strutted abutments founded on spread footings on erodible alluvial material. This bridge has a history of scour issues and a scour hole that has undermined the integrity of the easterly bridge abutment. The existing bridge has been closed and a temporary bridge has been installed until it can be permanently replaced. There are deficiencies in the bridge width, superstructure and substructure conditions. The replacement bridge will have 9-foot lanes and 5-foot shoulders in each direction resulting in a wider structure which meets safety standards.

In addition to the bridge replacement, portions of the stream channel upstream and downstream of the bridge will be stabilized according to the Robinson Creek Channel Design for the Lambert Lane Bridge Replacement Project prepared by Michael Love & Associates, Inc. (MLA).

CONSTRUCTION METHODS AND ACCESS

The preferred construction method will be to build a replacement bridge on the existing alignment and provide a temporary detour. Based on Lambert Lane being the only public road access to approximately 30 parcels, it is necessary to keep at least one lane of traffic open during construction. During construction temporary detour bridge is proposed to be erected offset from the existing bridge to pass traffic around bridge construction operations within the Project site and avoid a road closure. This temporary bridge will either be a Bailey Bridge sourced from Mendocino County or a Contractor furnished temporary bridge structure.

A long span steel plate girder bridge will be constructed within the existing bridge alignment and can be fabricated in shorter lengths to facilitate transport and then assembled on-site. This bridge option will have a shorter construction time and will minimize impacts to the creek since it does not require falsework in the creek. Additionally, this long span bridge option provides the ability to improve the alignment of the creek to minimize future potential scour issues by increasing the channel opening and providing a softer and more gradual turn of the creek. Weathering steel will be utilized to minimize future maintenance efforts and costs. Significant changes to the vertical profile are not anticipated as the existing and replacement bridge option provide adequate hydraulic freeboard. The structure depth will be 4 feet 9 inches.

Deep foundation systems, drilled piles, will be required due to the presence of unconsolidated channel alluvium substrate. Pile type is Cast-In-Drilled-Hole (CIDH) piles. The foundation type for the retaining walls will be the same as for bridge abutments. It is anticipated that temporary shoring will be required during bridge construction.

Geomorphic Channel Conditions Within the Project Area and the Proposed Bridge Structure

Lambert Lane crosses Robinson Creek approximately 2,860 linear feet upstream of the confluence with Anderson Creek and 500 feet west of State Route SR128. The existing bridge crossing is at the inflection of a tight meander bend and the channel alignment has been constrained by the roadway embankment. The proposed replacement bridge has a free span of approximately 91 feet, while the existing bridge span is only 32 feet. The increased span is in-part intended to facilitate an improved channel alignment by decreasing the sharpness of the meander bend. A constraint to realigning the channel was the preservation of large established trees along the

right bank upstream and downstream of the crossing, including an 8-foot diameter heritage oak tree close to the existing right bank of the channel upstream of the bridge. The proposed alignment moves the approach channel further to the right (looking downstream) and has a sinuosity of 1.2 (valley length to channel length).

Stream Channel Restoration Geomorphic Characterization

It is proposed that portions of the embankment slopes will be protected from erosion with RSP and that willow plantings will also be included as part of bank protection and restoration. Channel grading will minimize abrupt hydraulic constrictions and areas of focused high velocities. The proposed riprap revetments upstream and downstream of the bridge crossing are to be vegetated with live willow cuttings following Caltrans "hybrid revetment" design. Further, this Project will include removing the rubble and reconfiguring the RSP that covers the creek bottom, restoring the channel to a more natural condition and restoring fish passage to sections of Robinson Creek above the failed retaining wall. Channel restoration designs for the site will satisfy current fish passage standards, as described in CDFG (2009) and NMFS (2001) guidelines (Appendix A: Robinson Creek Channel Design Report).

The proposed stream channel component of the replacement crossing was designed using the stream simulation approach outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFG, 2009) and by the USFS (2008). The stream simulation approach is a geomorphically-based approach that requires a channel-spanning crossing structure with adequate capacity to convey the 100-year flow. The channel grading should seamlessly connect with the upstream and downstream channel profiles and the streambed should be composed of native material that is as mobile as bed material within the adjacent channel reaches. The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing and channel bed.

The channel configuration and extent of grading was influenced by the goal of preserving trees. The first design consideration was to minimize the removal of larger oak and bay trees. Planting the RSP with willow stakes and site revegetation is intended to offset temporary loses, as willows grow quickly. Project designers considered reusing the larger trees in the channel for fish habitat and identified several locations where large woody debris (LWD) could be incorporated to offset temporal losses to steelhead habitat. Removed trees could be located along the inside bend in the upstream right bank between station 29+60 and 31+100, or downstream left bank around station 28+00. At the downstream end of the RSP, LWD could be utilized to provide flow deflection or bank protection for the bend immediately downstream of the project. Additional consideration for including LWD in the restored stream will be made in the final design.

Hybrid Revetment Design

Incorporating vegetation into the streambank revetment has the beneficial effects of improving stream ecology, increasing soil strength and providing flow resistance, although it can be unpredictable over the long term (Caltrans 2014). Established vegetation will provide cover, shade the channel and provide nutrients to the stream. As root systems establish, they can support the banks by providing resistance to scour and bind the soils and rock placed along the bank.

Caltrans has developed recommendations for the use of a "hybrid revetment" that incorporates vegetation into rock slope protection to provide the benefits of stream side vegetation while managing its uncertainties. The intent is to balance the engineering benefit of armoring a bank while promoting ecological processes. The hybrid RSP design consists of the standard RSP design as described above, with the addition of live willow staking that penetrates the rock layers and allows rooting into the native bank soils. Species most commonly used as live stakes are native willow and cottonwood trees. Plantings are placed either vertical or perpendicular to the slope face and must be long enough to extend through to the subbase and into moist soil. Placement of live stakes is done in conjunction with rock placement. To provide protection to the live stakes during rock placement, cuttings should be placed into perforated cardboard tubes that are embedded into the subgrade and extend through the layered RSP. Cardboard is preferred as it can degrade over time and not hinder the growth of the cuttings. Growing medium is placed within the cardboard tubes to provide direct soil contact. Additionally, voids within the placed riprap should be filled with salvaged soil to further promote root growth within the layered RSP.

For Robinson Creek, it is assumed cutting shall be made from native willow species. Stakes may need to be as long as 12 feet and should be placed vertically to maximize their rooting depth, with the butt of the live stake at or near summer groundwater levels. The willow plantings will start at bankfull, 2.3 feet above the finished channel bed, and extend up the RSP revetment. To ensure good establishment, the live stakes should be irrigated for a minimum of two seasons.

Based on the proposed channel grading, 19 trees will be removed. In addition to the plantings contained within the hybrid RSP revetment, native vegetation would be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants. In addition to the planting areas close to the channel, the Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks and function as a stormwater treatment facility.

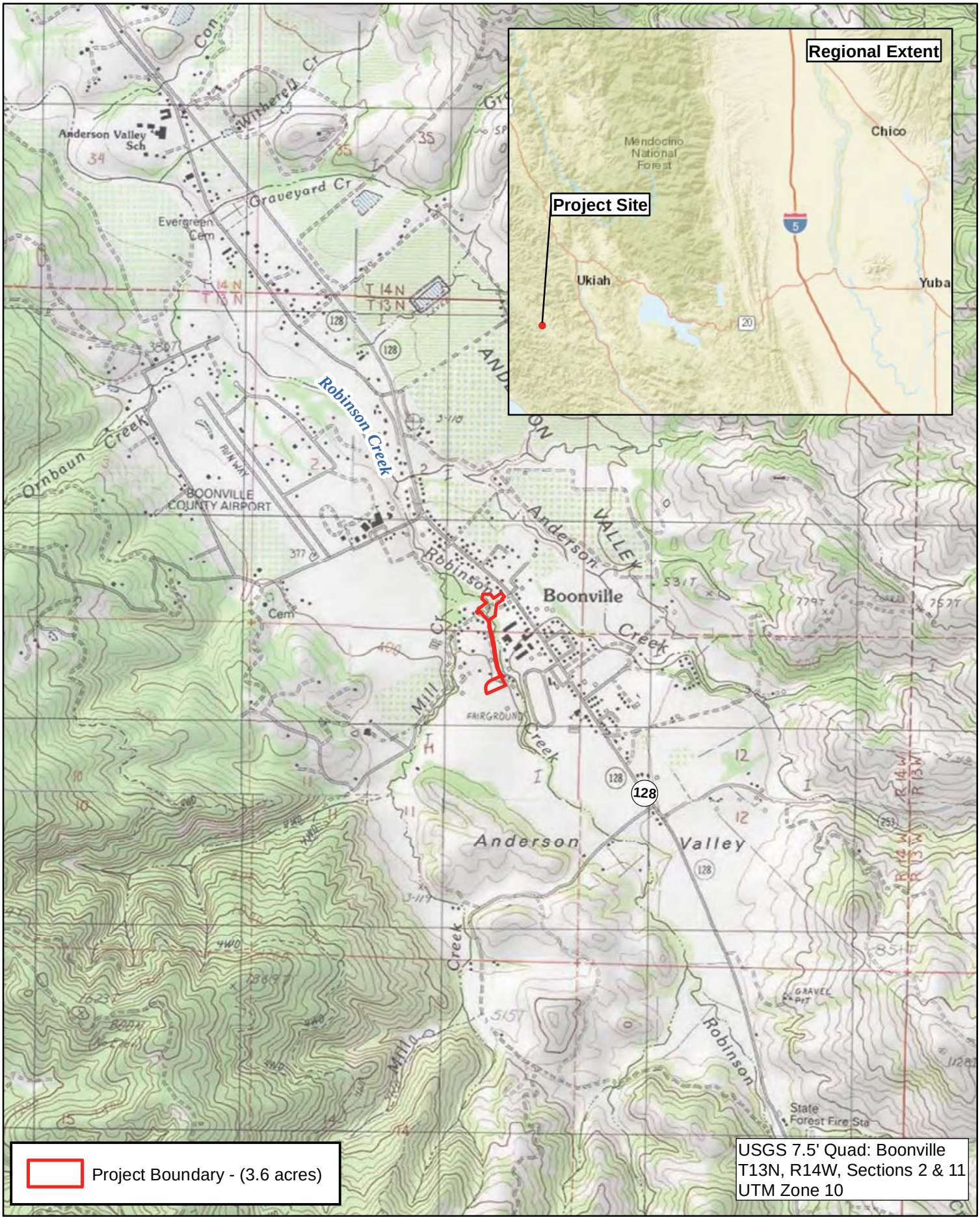
Channel incision, channel bank erosion, and channel widening associated with incision processes has caused severe bank erosion, resulting in loss of mature riparian vegetation throughout lower Robinson Creek. Though the riparian trees to be removed as a result of the Project are likely important components of NC steelhead critical habitat, current conditions have degraded the overall quality of the critical habitat. The Project proponent proposes to replant up to 355 trees, at a 18:1 ratio, in an effort to restore the creek and mitigate potential impacts to NC steelhead critical habitat. Robinson Creek and its associated riparian vegetation will be restored to a net benefit to NC steelhead and NC steelhead critical habitat. Where feasible LWD will be considered at specific locations within the Project to improve conditions for NC steelhead and offset temporary habitat loss.

The following are the preliminary estimates of trees to be replanted. Upon final design, a qualified landscape architect or botanist should be consulted to determine spacing and placement, species types, and any other factors appropriate to the site.

Planted RSP (3,010 sf):
Willow/cottonwood at 5 feet on center = 125 trees
Channel bank and low terrace (1,823 sf):
Native riparian and understory at 3 feet on center = 220 trees
Upper Terrace (725 sf):
Native upland trees, such as oaks = 5-10 trees

STAGING AREAS, RIGHTS OF WAY, AND UTILITIES
The Project staging areas will include portions of the closed roadway at each end of the bridge and the area just southeast of the bridge. If this area is unavailable or not sufficient in size, there is an alternative area off-site at the County Fairgrounds that can also serve as a staging area. Right-of-Way including slope easements, temporary construction easements, permanent maintenance easements, and permanent acquisitions will be required. There are existing overhead electrical and telephone utilities that will need to be relocated. Additionally, there is a storm water concrete pipe that outfalls into the creek that will need to be relocated. Coordination will begin early with PG&E.

CONSTRUCTION EQUIPMENT AND SCHEDULE
It is anticipated that excavators, dozers, cranes, pavers, dump trucks, concrete trucks, concrete pumps, and pile drilling equipment will be required. Construction is anticipated to begin in June 1, 2022 and run through October 31, 2022. In-stream work will occur between June 15th and October 15th when the creek is anticipated to be dry or not flowing.



1:24,000
0 1,000 2,000 Feet
NORTH
Data Sources: ESRI, USGS, Quincy Engineering

Robinson Creek Bridge Replacement Project
Project Vicinity Map
Figure 1

gallaway ENTERPRISES

GE: #15-130 Map Date: 01/31/19

This Page Intentionally Left Blank

L. Public Agency Approvals:

1. California Regional Water Quality Control Board – NPDES and §401 Water Quality Certification
2. California Department of Fish and Wildlife – Streambed Alternation Agreement §1602 and an Incidental Take Permit, as appropriate to satisfy California Endangered Species Act requirements
4. U.S. Army Corps of Engineers – Clean Water Act §404 Permit
5. U.S. Fish and Wildlife §7 Endangered Species Act Consultation

M. Regulatory Guidance

This document is an Initial Study, prepared pursuant to the California Environmental Quality Act (CEQA), for the proposed Lambert Lane over Robinson Creek Bridge Replacement Project. This Initial Study has been prepared in accordance with CEQA, Public Resources Code Sections 21000 et seq. and the CEQA Guidelines found in Chapter 14 of the California Code of Regulations (CCR).

An Initial Study is conducted by a lead agency to determine if a project may have a significant effect on the environment. In accordance with CEQA Guidelines Section 15064(a)(1), an environmental impact report (EIR) must be prepared if there is substantial evidence in light of the whole record that the proposed project under review may have a significant effect on the environment. A negative declaration may be prepared if the lead agency finds that there is no substantial evidence, in light of the whole record, that the project may have a significant effect on the environment. A negative declaration is a written statement describing the reasons why a proposed project will not have a significant effect on the environment and, therefore, why the proposed project will not require the preparation of an EIR (CEQA Guidelines Section 15371). Furthermore, CEQA Section 15070 indicates that a public agency shall prepare a proposed negative declaration or mitigated negative declaration for a project subject to CEQA when the initial study has identified significant effects, but:

> (1) Revisions in the project plans or proposals in accordance with the CEQA Guidelines Section 15070(b) made by or agreed to by the applicant before the proposed mitigated negative declaration and initial study is released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur, and
>
> (2) There is no substantial evidence, in light of the whole record before the agency, that the proposed project as revised may have a significant effect on the environment.

N. Native American Tribal Consultation: Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun?

☐ **Yes** ☒ **No**

O. Prepared By:

Howard Dashiell, Director of Transportation
(707) 463-4363
County of Mendocino Department of Transportation
340 Lake Mendocino Drive
Ukiah, CA 95482

Quincy Engineering
11017 Cobblerock Drive Suite 100
Rancho Cordova, CA 95670

Gallaway Enterprises
117 Meyers Street, Suite 120
Chico, CA 95928

This Page Intentionally Left Blank

NOTES:

1. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT THE COUNTY OFFICE.

LEGEND:

- DIRECTION OF TRAFFIC
- SURVEY CONTROL POINT
- (XXX) PAVEMENT DELINEATION DETAIL
- (XXX) DRAINAGE SYSTEM NUMBER
- (XX) DRAINAGE UNIT NUMBER
- DIRECTION OF DITCH FLOW
- LIMITS OF RSP
- OBJECT MARKER (TYPE P)
- REMOVE ROADSIDE SIGN
- ROADSIDE SIGN TO REMAIN
- RESET ROADSIDE SIGN
- (XX-XX) ROADSIDE SIGN (SHEET NUMBER-SIGN NUMBER)
- (XX) CURVE NUMBER

ABBREVIATIONS:

TCE TEMPORARY CONSTRUCTION EASEMENT

SURVEY CONTROL DATA

No.	NORTHING	EASTING	ELEV	LINE	STATION	OFFSET	DESCRIPTION
CP-3	2131936.47	6172790.35	390.11	"L"	4+21.22	15.12' Rt	-
CP-2	2132005.08	6172852.61	387.48	"L"	5+10.73	12.04' Lt	-
CP-91	2132029.41	6172892.58	386.78	"L"	5+57.44	14.74' Lt	-

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
01	Men	XX	XXXXXX	3	XX

REGISTERED CIVIL ENGINEER — XX/XX/XX DATE

65% SUBMITTAL

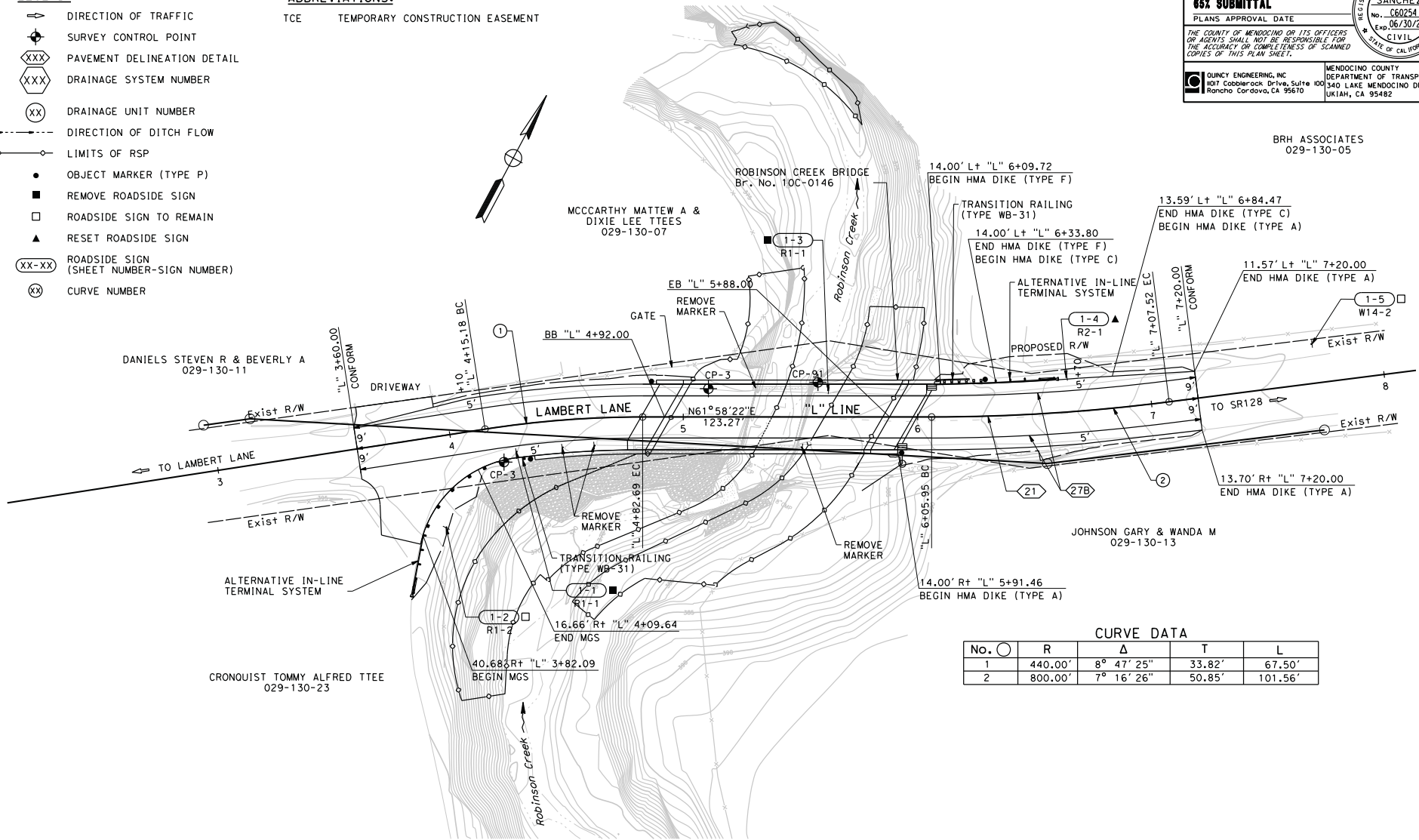
PLANS APPROVAL DATE

MICHAEL A. SANCHEZ No. C60254 Exp. 06/30/22 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE COUNTY OF MENDOCINO OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

QUINCY ENGINEERING, INC
11017 Cobblerock Drive, Suite 100
Rancho Cordova, CA 95670

MENDOCINO COUNTY
DEPARTMENT OF TRANSPORTATION
340 LAKE MENDOCINO DRIVE
UKIAH, CA 95482



CURVE DATA

No.	R	Δ	T	L
1	440.00'	8° 47' 25"	33.82'	67.50'
2	800.00'	7° 16' 26"	50.85'	101.56'

LAYOUT

SCALE: 1"=20'

L-1

MENDOCINO COUNTY - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR: JIM FOSTER

CALCULATED-DESIGNED BY: A. CASTILLO | CHECKED BY: M. ELLEDGE

REVISED BY | DATE REVISED

LAST REVISION 00-00-00
DATE PLOTTED => 4/27/2021
TIME PLOTTED => 2:08:41 PM

BORDER LAST REVISED 7/2/2010

USERNAME => Mike.Sanchez
DGN FILE => S:\Client\Mendocino\M10-700 Robinson Creek Bridge\500-Design\505 - CADD Files\MSANCHEZ\ea001.dgn

RELATIVE BORDER SCALE 0 1 2 3

UNIT 0000

PROJECT NUMBER & PHASE 00000000001

This Page Intentionally Left Blank

II. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below could be potentially affected by this project, but, due to the inclusion of specific mitigation measures, will result in impacts that are a "Less Than Significant with Mitigation Incorporated," as indicated by the environmental checklist on the following pages.

☐ Aesthetics	☒ Greenhouse Gas Emissions	☐ Public Services
☐ Agriculture and Forestry Resources	☒ Hazards/Hazardous Materials	☐ Recreation
☒ Air Quality	☒ Hydrology/Water Quality	☐ Transportation
☒ Biological Resources	☐ Land Use and Planning	☒ Tribal Cultural Resources
☒ Cultural Resources	☐ Mineral Resources	☒ Utilities and Service Systems
☐ Energy	☒ Noise	☐ Wildfire
☒ Geology/Soils	☐ Population/Housing	☒ Mandatory Findings of Significance

III. DIRECTOR DETERMINATION

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a potentially significant impact or have a potentially significant impact unless mitigated, but at least one effect has been adequately analyzed in an earlier document pursuant to applicable legal standards, and has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT (EIR) is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, there WILL NOT be a significant effect in this case because all potentially significant effects have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards and have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION including revisions or mitigation measures that are imposed upon the proposed project. No further study is required.

Signature — Date: 8/24/21

Howard Dashiell, Director of Transportation County of Mendocino Department of Transportation

Printed Name

IV. EVALUATION OF ENVIRONMENTAL IMPACTS

- Responses to the following questions and related discussion indicate if the proposed project will have or potentially have a significant adverse impact on the environment.

- A brief explanation is required for all answers except "No Impact" answers that are adequately supported by referenced information sources. A "No Impact' answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g. the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors or general standards.

- All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

- Once it has been determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there is at least one "Potentially Significant Impact" entry when the determination is made an EIR is required.

- Negative Declaration: "Less than Significant with Mitigation Incorporated" applies when the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The initial study will describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section 4, "Earlier Analysis," may be cross-referenced).

- Earlier analyses may be used where, pursuant to tiering, a program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration [Section 15063(c)(3)(D)].

- Initial studies may incorporate references to information sources for potential impacts (e.g. the general plan or zoning ordinances, etc.). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated. A source list attached, and other sources used or individuals contacted are cited in the discussion.

- The explanation of each issue should identify:
  a. The significance criteria or threshold, if any, used to evaluate each question; and
  b. The mitigation measure identified, if any, to reduce the impact to less than significant.

A. Aesthetics Except as provide in Public Resources Code Section 21099, would the project or its related activities:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Have a substantial adverse effect on a scenic vista?				X
2. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				X
3. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?				X
4. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				X

DISCUSSION:

A.1. No Impact. The Mendocino County General Plan does not designate any scenic vistas in the vicinity of the Project site (Mendocino County 2009). In addition, implementation of the Project would not result in comparably different views from the existing condition. No impact would occur.

A.2. No Impact. There are no officially designated state scenic highways in Mendocino County (Caltrans 2018b). State Route 1 and State Route 20 in Mendocino County are listed as "eligible" for designation as scenic highways; however, these highways are not located within the area of the Project site. No impact would occur.

A.3. No Impact. The project is not located in an urbanized area. Construction could result in short-term effects on the visual character and quality of the Project area typical of construction activities. For example, construction activities would result in temporary ground disturbance, landscape alterations, construction staging areas and the presence of construction vehicles that would be visible. Exposed and disturbed areas of the creek bank and construction area would be re-seeded and mulched, and new vegetation would be replanted. Therefore, because construction related affects would be temporary and typical of construction activities, the temporary impact on visual character and quality would be less than significant.

A.4. No Impact. Project construction would not include nighttime work. Therefore, construction activities would not result in a source of substantial light that would adversely affect nighttime views in the area. In addition, considering the nature of construction activities, equipment, and materials, there would be very little, if any, glare resulting from the Project. These instances of glare would be momentary and passing, depending on sky conditions, and the impact on daytime views in the area would be less than significant. Following construction, the Project would not include new sources of daytime glare or change nighttime lighting and illumination levels in the area. No lighting is proposed, and centerline and fog line striping would not produce glare in amounts that would adversely affect day or nighttime views. No impact would occur.

MITIGATION: None required.

B. Agriculture and Forest Resources: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
2. Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
3. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code Section 4526, or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				X
4. Result in the loss of forest land or conversion of forest land to non-forest use?				X
5. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?				X

DISCUSSION:

The project is located in a rural area of County jurisdiction. There are no lands designated as Prime farmland in the project area as defined by the Farmland Mapping and Monitoring Program (FMMP). Similarly there are no parcels within the project area that have Williamson Act contracts. See Appendix A Farmlands Study for the Robinson Creek Bridge Replacement on Lambert Lane Project.

B.1. No Impact. According to mapping compiled by the California Department of Conservation (CDC), Division of Land Resource Protection, and the *Farmlands Study for the Robinson Creek Bridge Replacement on Lambert Lane Project* memo the Project site is located in an area mapped as "Grazing Land" and "Urban and Built-Up Land" (CDC 2016). The Project site is not located on land mapped as prime farmland, unique farmland, or farmland of statewide or local importance. No impact would occur.

B.2 - B.-4. No Impact.. According to the Mendocino County Zoning Ordinance, the lands surrounding the Project area are zoned Rural Community (RC) and Public Facility (PF). The RC district is described

as being intended to maintain and enhance existing rural communities where a mixture of residential, commercial, and limited industrial uses are desired. The PF district is described as being intended to maintain land for public purposes or for specified public utility purposes. The proposed project in light of these land uses would not conflict with existing zoning. The Project would be consistent with zoning designations and would not cause a change in land use patterns, as the Project would consist of an in-kind replacement of an existing public structure involving negligible or no expansion of use. Neither construction nor operation of the Project would conflict with zoning regulations for agricultural use, forest land, result in the loss of forest land, or result in the conversion of forest land to non-forest use. Additionally, the Project site is not located on land enrolled in Williamson Act contracts (CDC 2017). No impact would occur.

B.5 No Impact: The Project would consist of an in-kind replacement of an existing public structure involving negligible or no expansion of use. The Project would not cause, or is intended to cause, a change in land use patterns which would convert farmlands or forestlands. The Project would have no impact on conversion of farmland or forest land to non-agricultural or non-forest use.

MITIGATION: None required.

C. Air Quality Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Conflict with or obstruct implementation of the applicable air quality plan?		X		
2. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?		X		
3. Expose sensitive receptors to substantial pollutant concentrations?		X		
4. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?			X	

DISCUSSION:

The Project site is located within the Inland Rural Mendocino County sub-basin of the North Coast Air Basin, which is within the jurisdiction of the Mendocino County Air Quality Management District (MCAQMD). The Inland Rural Mendocino County sub-basin, like the rest of Mendocino County, is designated as a nonattainment area for the State particulate matter (PM_{10}) standard (ARB 2017). The sub-basin is in attainment for all other State standards and for all Federal criteria air pollutants (ARB 2017, U.S. EPA 2018). According to the MCAQMD's Particulate Matter Attainment Plan (MCAQMD 2005), the primary man-made sources of PM_{10} pollution in the North Coast Air Basin are wood combustion (woodstoves, fireplaces and outdoor burning), fugitive dust, and automobile traffic. Some of the automobile emissions are the result of "pass-though" traffic on US Highway 101 because of its nature as the major transportation corridor in this part of the State.

CEQA Thresholds

On June 3, 2010, the MCAQMD Air Pollution Control Officer issued new CEQA guidance which requested that Planning agencies and consultants use the Bay Area Air Quality Management District (BAAQMD) CEQA Thresholds adopted on May 28th, 2010, to evaluate air quality impacts, with clarifications provided in 2013 (MCAQMD 2010, MCAQMD 2013). The BAAQMD thresholds have subsequently been updated, with the last major revision completed in May 2017.

The BAAQMD CEQA Thresholds were subsequently invalidated by a trial court because the BAAQMD itself did not do a CEQA evaluation of the Thresholds before their adoption. The Court, however, did not rule on or question the adequacy of the BAAQMD Air Quality CEQA Guidelines, including the impact assessment methodologies, or the evidentiary basis supporting the Thresholds, which are included in the Guidelines.

Therefore, the following air quality analysis utilizes in part the impact assessment methodologies presented in the BAAQMD Air Quality CEQA Guidelines.

C.1. Less Than Significant With Mitigation Incorporated. The California Clean Air Act of 1988 requires that any air district that does not meet the PM10 standard make continuing progress to attain the standard at the earliest practicable date. In response to this requirement, the MCAQMD adopted a Particulate Matter Attainment Plan in 2005 (MCAQMD 2005), which includes a description of local air quality, the sources of local PM emissions, and recommended control measures to reduce future PM levels. Control measures recommended in the Attainment Plan include measures related to woodstoves, campgrounds, unpaved roads, construction and grading activities, new residential development, and open burning emissions.

Construction activities associated with the Project would include site preparation (e.g., demolition, clearing/grubbing), grading, excavation, bridge construction, and asphalt paving. The types of air

pollutants generated by these activities are typically nitrogen oxides and particulate matter, such as dust and exhaust. Because construction activities could temporarily increase levels of PM_{10} in a region designated as nonattainment for PM_{10}, the impact is considered significant.

Mitigation Measure AQ-1: Dust Control Measures
In accordance with Rule 1-430(b) of the Mendocino County Air Quality Management District Regulations, the County of Mendocino and its Contractor shall implement the following airborne dust control measures during construction activities:

- All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions.
- All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 miles per hour.
- Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed.
- Asphalt, oil, water, or suitable chemicals shall be applied on materials stockpiles and other surfaces that can give rise to airborne dusts.
- All earthmoving activities shall cease when sustained winds exceed 15 miles per hour.
- The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours.
- The operator shall keep a daily log of activities to control fugitive dust.

With implementation of Mitigation Measure AQ-1, construction activities would not conflict with or obstruct implementation of the 2005 Particulate Matter Attainment Plan. The impact following mitigation would be less than significant

C.2. Less Than Significant With Mitigation Incorporated. The Project site is located in an area that is in attainment for all criteria air pollutants, except for PM10. By its nature, air pollution is largely a cumulative impact, in that individual projects are rarely sufficient in size to result in nonattainment of ambient air quality standards. Instead, a project's individual emissions may contribute to cumulative adverse air quality impacts.

The BAAQMD's CEQA guidelines and thresholds, which the MCAQMD uses as CEQA guidance, includes screening criteria to provide lead agencies with a conservative indication of whether a Project could result in potentially significant air quality impacts. According to the guidelines, if a project's characteristics (i.e., square footage, acreage, number of dwelling units) are less than associated screening criteria, then the lead agency does not need to perform a detailed air quality assessment of the Project's air pollutant emissions and a less-than-significant impact would occur (BAAQMD 2017).

For construction activities, several different screening criterions are recommended by the BAAQMD relative to air pollutant emissions (i.e., reactive organic gases [ROG], NO_X, $PM_{2.5}$, and PM_{10}). For example, detailed air quality assessments are not required for construction of projects such as single family residential developments comprised of less than 114 dwelling units, City parks that are less than 67 acres in size, and construction of office and commercial buildings that are less than 277,000 square feet (BAAQMD 2017).

The MCAQMD CEQA thresholds do not include specific screening criteria for bridge replacement and roadway improvement projects. However, when one compares the screening criteria established for the types of projects described above, it is reasonable to assume that the areal extent of construction activities associated with the bridge replacement project would be substantially less and does not warrant a detailed air quality assessment. The Project, for example, would be conducted during one construction season (i.e., approximately four months) and the total construction disturbance area is estimated to be 0.5 acre (i.e., 21,780 square feet) – well below the screening criteria. Therefore, given the temporary nature of the Project's construction phase and the scale of the Project it is not anticipated that construction activities would result in a cumulatively considerable net increase of PM_{10}. The short-term impact would be less than significant. Additionally, dust control measures required by Mitigation Measure AQ-1 would further minimize fugitive dust and emissions during construction.

Following construction, the Project would not result in a new stationary source of emissions and the roadway widening would not increase the vehicle capacity of Lambert Lane (i.e., no additional travel lanes along either side of the new bridge are proposed). Therefore, the Project would not result in any

new mobile pollutant emissions and would not result in a cumulatively considerable increase in PM_{10} emissions. No long-term impact would occur.

C.3. Less Than Significant With Mitigation Incorporated. The project will generate short-term construction related emissions associated with equipment used for construction activities. These emissions would contain ozone precursors, PM_{10} and $PM_{2.5}$. Additional particulate matter emissions in the form of fugitive dust could be generated during ground disturbing activities for vegetation removal and placement of abutments and rock slope protection.

There are two residences in the vicinity to the project area. Both residential dwellings exists over 1,000 ft. from the project site. Project activities consist of removal of the current structure and replacement with a new bridge structure as well as roadway approach work. There are no schools, hospitals, or other sensitive receptors in the area and no substantial pollutant concentrations are anticipated to occur. Temporary construction activities would result in particulate emissions in an area designated as non-attainment.

The proposed project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard. Each of the above impacts are temporary, local, and construction related.

Existing structures that will be impacted by project demolition are constructed of materials having the potential to contain asbestos. Concrete bridge components piers, footings, abutments, deck and concrete pipes storm drain could potentially contain asbestos. Asbestos containing material (ACM), as defined in the California Code of Regulations, Title 8, Section 1529 of the Construction Safety Orders, can be present in construction materials such as bridge joint seals, bearing pads, shims, deck drains or other less obvious materials such as pipe conduits for utilities. Federal regulations require a Certified Asbestos Consultant make definitive conclusions regarding the presence of ACM. Under the federal asbestos National Emissions Standards for Hazardous Air Pollutants regulations (NESHAP, 40 CFR Part 61, Subpart M), a Certified Asbestos Consultant (CAC) must make definitive conclusions regarding the presence of asbestos containing materials (ACM). The requirement for a Certified Asbestos Consultant to address the potential presence of asbestos containing materials is included in Mitigation Measure Haz-1 (Section I Hazards and Hazardous Materials). A Preliminary Foundation Report prepared for the Project included the review of geologic units underlying the project site. Ultramafic rocks, including serpentinite are not mapped by the California Division of Mines and Geology for the project site.

The incorporation of Mitigation Measure AQ-1 and HAZ-1 would reduce impacts associated with PM10 to and asbestos containing material to a less than significant level.

C.4. Less Than Significant Impact Construction activities could result in short-term odors, such as diesel exhaust from construction equipment. Such odors would be temporary, occurring only during the construction period, and would disperse rapidly. Therefore, construction would not create objectionable odors affecting a substantial number of people. Following construction, there would be no features included in the Project that would, by their nature or design, result in a new source of odors. No impact would occur.

MITIGATION REQUIRED: Mitigation Measures AQ-1: Dust Control Measures and HAZ-1: Hazardous Material Screening.

D. Biological Resources Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species as listed and mapped in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?		X		
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?		X		
3. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X	
5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X	
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?			X	

DISCUSSION:

A Natural Environment Study (NES) was prepared by Gallaway Enterprises in December 2020 (Appendix C). The purpose of the NES is to document the current endangered, threatened, sensitive and rare species, and their critical habitats that occur in the biological survey area (BSA) of the project. The BSA includes the project site, staging and access areas, as well as upstream and downstream portions of Robinson Creek so that indirect effects on special status species could be identified. Primary references consulted include species lists and information gathered using the United States Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC), California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB), the California Native Plant Society's (CNPS) list of rare and endangered plants, National Marine Fisheries Service (NMFS) species list and literature review. A Draft Delineation of Jurisdictional Waters of the United States was also prepared for the project is in September 2020 by Gallaway Enterprises (Appendix D). The surveys involved an examination of botanical resources, soils, hydrological features, and determination of wetland characteristics based on the United States Army Corps of Engineers (USACE) Wetlands Delineation Manual (Environmental Laboratory 1987) and other current regulations, manuals and interpretations of jurisdiction currently in effect.

The project site contains the habitat types of valley foothill riparian, riverine, annual grassland, urban

and barren. The riverine habitat is associated with Robinson Creek which traverses the project site. Annual grassland exists in a disturbed state as small patches of openings amongst tree canopy within the area round the bridge and is the dominant habitat type in the proposed offsite staging area. Barren habitats are comprised of the existing roadway, and gravel road shoulders. Urban habitats within the project site consist of residential home sites and associated landscaping.

Robinson Creek is NMFS designated a critical habitat for Central California Coastal Coho salmon Environmentally Significant unit (ESU) and Northern California steelhead Distinct Population Segment (DPS). There are no CDFW designated natural communities of species concern within or adjacent to the BSA.

Special-Status Plant Species
A protocol-level botanical survey was conducted on June 29, 2018 for a total of 13 of the special-status plant species identified on the USFWS, CNPS, and CNDDB lists which have a blooming period that overlapped with the survey date. No special-status plant species were observed during the protocol-level survey. Further, a habitat assessment was conducted within the BSA on June 29, 2018 for all remaining special-status plant species identified on the CNPS and CNDDB lists. Due to the lack of vernal, marsh or seep wetland habitat and volcanic, rocky or serpentine soils, none of these special-status plant species were determined to have potential to occur within the BSA. As such, the Project is not expected to have any effect on special-status plant species. Refer the Natural Environment Study (Appendix C) for details of botanical surveys and results.

Special-Status Animal Species
Eight special status animal species were found to have potential to be present in the Project area. Northern California steelhead, Central California Coastal Coho salmon, Navarro roach, California red-legged frog, foothill yellow-legged frog, western pond turtle, migratory birds and raptors and pallid bat have the potential to occur within the Project site.

D.1. Less Than Significant with Mitigation Incorporated. Special-status species are plant and wildlife species that are legally protected under the Federal Endangered Species Act (FESA), California Endangered Species Act (CESA) or other State regulations, and/or species that are considered sufficiently rare by the scientific community to warrant conservation concern. There are eight special-status animal species that have a moderate to high potential to be present in the Project area. Project impacts to special-status species are presented below.

Northern California Steelhead
The NC steelhead DPS is considered threatened under the federal ESA. They rely on streams, rivers, estuaries and marine habitat during their lifecycle. Because young steelhead spend a significant portion of their lives in rivers and streams, they are particularly susceptible to human induced changes to water quality and habitat threats. Steelhead spawn in streams and rivers, steelhead rear in freshwater for 1 to 4 years before migrating downstream through estuaries to the open ocean. Steelhead spend 1 to 5 years at sea before returning to natal streams or rivers. Steelhead do not always die after spawning, but will again migrate through estuaries to the ocean.

Survey Results
The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for steelhead when water is present during winter and spring months. Additionally, Robinson Creek has been designated as critical habitat for NC steelhead DPS (Figure 8: NC Steelhead and CCC Coho Salmon Critical Habitat). During the June site visit, Robinson Creek was dry with the exception of a few small shallow pools. Although there is no spawning habitat present, the BSA does offer suitable steelhead migration/emigration and non-natal rearing habitat during the late fall through late spring months (i.e. November 1 – May 31) when water levels are high and water temperatures are cool. When winter flows are adequate, the BSA provides suitable migration/emigration habitat for juvenile and adult steelhead. During the summer months (i.e. June 1 – October 31), the intermittent hydrology, still water, and warm temperatures make Robinson Creek within the BSA unsuitable habitat for any lifestage of salmonid including steelhead. Typically Robinson Creek is dry from June 15 – October 15. Therefore, if the BSA contains water between June 1 and October 31 then there is a potential for non-natal juveniles to be present. There is potential for NC steelhead to become stranded within the BSA in isolated pools like the ones observed during the site visit.

Northern California Steelhead Project Impacts

Project impacts include the potential for construction activities to occur in designated NC steelhead habitat. It should be noted that the Project will restore access to 0.25 acres of critical habitat within the BSA and the proposed stream restoration will have a beneficial effect on critical habitat. If water is present within the BSA, fish relocation will be conducted by a qualified biologist prior to the start of construction activities in the streambed. A clear water diversion shall be installed if needed. Therefore, the Project may impact NC steelhead DPS through potential relocation and Mitigation Measure BIO-1 is required. Implementation of this mitigation measure will result in impacts that are less than significant with mitigation incorporated.

Mitigation Measure BIO-1: Avoid Impacts to Special-Status Fish Species

- Construction within Robinson Creek will be limited to June 15 through October 15, or as permitted by regulatory agencies.
- If flowing water is present within the BSA between June 15 and October 15 then a clear water diversion using an appropriately sized culvert and sandbags will be installed. A qualified biologist shall monitor the construction site during placement and removal of stream diversions to ensure that any harm or loss of salmonids is minimized and documented.
- If water is present within the Project site between June 15 and October 15, then a qualified biologist will perform fish relocation prior to the start of construction activities.
    - The qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid habitat relationships; and biological monitoring shall perform fish relocation. Fish relocation will be performed in a manner which minimizes all potential risks to NC steelhead.
    - Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act.
- Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat.
- Removal of the existing rubble and reconfiguring of the RSP that covers the creek bottom and restoring the channel to a more natural condition to promote fish passage. This will involve removing a current barrier to steelhead at the existing failed retaining wall, thereby restoring access to habitat for steelhead upstream of the bridge.

Northern California Steelhead and Central California Coast Coho Salmond Critical Habitat

Survey Results

Robinson Creek within the BSA is designated as critical habitat for NC steelhead and CCC Coho salmon ESU. When water is present in Robinson Creek, the following Primary Constituent Elements (PCEs) are present within the BSA:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
- Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Project Impacts

Critical habitat for salmonids will be affected by the proposed action through stream restoration activities and the placement of RSP within the creek with live willow staking that penetrates the rock layers and allows rooting into the native bank soils. Proposed hybrid RSP revetment within the portions of Robinson Creek currently accessible to salmonids will result in approximately 93.1 linear feet (0.01 acres) of permanent impacts and temporary impacts of 201.6 linear feet (0.14 acres) to the stream. This is considered a potentially significant impact that requires mitigation. Therefore, the Project may impact

salmonid habitat during construction activities and Mitigation Measure BIO-2 is required. Implementation of this mitigation measure will result in impacts that are less than significant with mitigation incorporated.

Mitigation Measure BIO-2: Salmonid Habitat Restoration and Enhancement
The following measures, when implemented, will avoid and minimize impact to this species:

- All work within Robinson Creek will occur between June 15 and October 15 when PCEs are not present within the BSA. If water is present within the BSA then fish relocation will be conducted by a qualified biologist prior to the start of construction.
- The existing rubble from the failed retaining wall and RSP, will be removed from the creek channel and the channel will be restored to a more natural condition to promote fish passage.
- In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants.
- The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks and function as a stormwater treatment facility.
- Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat.
- A landscape architect or botanist shall be retained to develop a plan to harvest cutting stock, design a planting plan, replant and monitor for success the replanting of approximately 125 willow/cottonwood trees. 220 native riparian trees and 5-1- native upland trees to restore the riparian habitat and associated essential fish habitat. The plan shall be implemented and monitored for success.

Navarro Roach
Navarro roach are capable of adapting to varying habitats from coastal streams to mountain foothill streams. They are predominately found in small warm streams but are capable of thriving in larger colder streams with diverse conditions. They may actually occupy several different habitat types within a single drainage. Extreme tolerance includes temperatures ranging from 30-35ºC and dissolved oxygen levels as low as 1-2 ppm. In-stream location may vary depending on geography and predators. When Navarro roach share water with Sacramento pikeminnows, roach will stick to the stream margins, whereas in the absence of these piscivorous fish roach may venture into deeper pools. Navarro roach are omnivorous and diet may depend on stream size and food availability. In smaller rivers, roach feed mostly on filamentous algae, supplementing their diet with crustaceans and insects. In larger rivers these fish may focus on a diet of aquatic insects year round. The growth and development of Navarro roach is largely seasonally dependent. Most growth occurs during the summer months and roach may grow 20-40 mm in a year. Most fish of this species reach sexual maturity at age 2-3 and rarely live beyond three years total. Spawning occurs in March through early July, and timing is temperature dependent. Navarro roach breed in gravel beds or riffles where groups of females lay eggs on and into the substrate. One or two males follow each female closely to fertilize the groups of eggs. Each female may produce 250-2,000 eggs per year depending on body size. The eggs hatch in 2-3 days, but the larvae remain in the protection of the gravel substrate before emerging to swim.

Survey Results
The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for Navarro roach when there is flowing water present during the winter and spring months. During the June site visit, Robinson Creek was dry with the exception of a few small shallow, isolated pools. There is potential for Navarro roach to become stranded within the isolated pools such as those observed during the site visit.

Project Impacts
Construction activities will occur in Robinson Creek. Channel restoration activities will result in a net increase in both enhanced fish habitat and improved fish passage throughout the BSA. Due to the potential for impacts to Navarro roach, mitigation is required. To ensure impacts to Navarro roach from the proposed Project are avoided, Mitigation Measure BIO-3 is required to ensure a less than significant impact with mitigation incorporated.

Mitigation Measure BIO-3: Navarro Roach Avoidance

- Construction in Robinson Creek will be limited to June 15 through October 15, or as permitted by regulatory agencies

- If flowing water is present within the BSA between June 15 and October 15 then a clear water diversion using an appropriately sized culvert and sandbags will be installed. A qualified biologist shall monitor the construction site during placement and removal of stream diversions to ensure that any harm or loss of aquatic life is minimized and documented.
- If water is present within the Project site between June 15 and October 15, then a qualified biologist will perform fish relocation prior to the start of construction activities.
    - The qualified biologist with expertise in the areas of fisheries biology, including handling, collecting, and relocating fish; fish habitat relationships; and biological monitoring shall perform fish relocation. Fish relocation will be performed in a manner which minimizes all potential risks to Navarro roach.
    - Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act.
- Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat.
- The existing rubble from the failed retaining wall and RSP will be removed from the creek channel and the channel will be restored to a more natural condition to promote fish passage.
- In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants.
- The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks and function as a stormwater treatment facility.

California Red-Legged Frog

California Red-Legged Frog (CRLF) (Rana draytonii) is federally threatened and is a species of special concern in California. The CRLF is the largest native frog in California, with adults obtaining a length of 3 to 5 inches. Adult CRLF have prominent dorsolateral folds, dark spots, a bright red dorsum, and a well-defined stripe running along the upper lip. This species is primarily aquatic and most active during the night occupying perennial water sources such as streams, springs, lakes, marshes, natural and manmade ponds, and ephemeral drainages. During the breeding season, which typically runs from November through April, males call to females from the margins of ponds and slow streams (Jennings et al. 1992). Mating most commonly occurs in February or March, but can vary depending on seasonal climatic patterns. The female lays a jellylike mass of 2,000 to 5,000 reddish brown eggs in the water attached to emergent vegetation, twigs, or other structure. The resulting tadpoles, which likely feed on algae, typically require about 3 weeks to hatch, and another 11 to 20 weeks to metamorphose into juvenile frogs. Metamorphosis, therefore, typically occurs from July to September, although some tadpoles have been observed to delay metamorphosis until the following March or April. Adults are predominantly nocturnal, while juveniles can be active at any time of day.

Survey Results

There were no life stages of California red-legged frog observed during the site visit and no suitable breeding habitat was present within the BSA. There are no known occurrences of CRLF within 5 miles of the BSA. Also, during the June site visit, Robinson Creek was dry with the exception of a few small shallow pools. As such, Robinson Creek does not contain the necessary hydrologic regime required by CRLF for year-round occupancy.

Project Impacts

Due to the intermittent nature of Robinson Creek, there is no suitable breeding habitat for CRLF within the BSA. As such, the Project will have no impacts on CRLF and no avoidance, minimization or mitigation measures are required.

Foothill Yellow-Legged Frog

The foothill yellow legged frog northwest / north coast clade (FYLF, Rana boylii) is listed as a SSC. It is a gray to olive colored frog with occasional mottling or spots, and lacks a dorsolateral fold common in California Red-Legged Frog or eye strip common in Northern Pacific tree frogs (Pseudacris regilla). The FYLF range includes the coast ranges of Oregon south to Los Angeles County, in northern California west of the Cascade crest, and along the west side of the Sierra Nevada range as far south as Kern County. The FYLF has been found in a variety of habitats. Those habitats that have been found most suitable

based on the majority of occurrences include a running perennial water source such as rocky rivers and step rocky tributaries. They have also been found in ephemeral streams, intermittent streams, and perennial ponds. Boulders and large cobble play an important role in the FYLF habitat and life history. FYLFs utilize boulders and large cobble in streams for areas of refuge from predators, basking, depositing eggs and cover during periods of inactivity such as over wintering or cold weather. Breeding season begins at the end of the spring flood season, which can be between March and May depending on local conditions. Breeding and egg laying occur in streams with running water and do not occur in ponds or lakes which are common for most ranids (true frogs). Current threats facing FYLF are primarily due to invasive and exotic predators such as the bullfrog (Rana catesbeiana) and centrarchid fish. Other threats include degradation of habitat, hydroelectric development, urban development, agriculture, and timber harvests (Zeiner, D.C. et al. 1990).

Survey Results

The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for FYLF and there is a known CNDDB occurrence of FYLF approximately 0.5 miles downstream of the BSA (Occurrence # 467) within Anderson Creek near its confluence with Rancheria Creek. This occurrence was last observed in 2004 at the SR 128 bridge over Anderson Creek. However, during the June site visit, Robinson Creek was dry with the exception of a few small shallow, isolated pools. As such, Robinson Creek only contains suitable habitat for FYLF when there is flowing water present in the creek in the winter and spring months.

Project Impacts

Construction activities will occur in Robinson Creek, and have the potential to impact FYLF if present. This is considered a potentially significant impact that requires mitigation. To ensure impacts to FYLF are avoided, Mitigation Measure BIO-4 is required. Implementation of this mitigation measure will result in impacts that are less than significant with mitigation incorporated.

Mitigation Measure BIO-4: Foothill Yellow Legged Frog

The following measures when implemented will minimize impacts to this species:

- Construction within Robinson Creek will be limited to June 15 through October 15, during periods of low flows.
- A qualified biologist shall conduct a preconstruction survey to determine presence of FYLF immediately prior to the start of in-channel work. If found, FYLF will be relocated to suitable habitat outside of the BSA, by a qualified biologist.
- Contractor shall not use plastic monofilament netting which can entrap the FYLF.
- The existing rubble from the failed retaining wall and RSP will be removed from the creek channel and the channel will be restored to a more natural condition.
- In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants.
- The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks and function as a stormwater treatment facility.

Western Pond Turtle

The western pond turtle is a SSC in California. Western pond turtles are drab darkish colored turtles with a yellowish to cream colored head. They range from the Washington Puget Sound to the California Sacramento Valley. Suitable aquatic habitats include slow moving to stagnant water, such as back waters and ponded areas of rivers and creeks, semi-permanent to permanent ponds and irrigation ditches. Preferred habitats include features such as hydrophytic vegetation, for foraging and cover, and basking areas to regulate body temperature. In early spring through early summer, female turtles begin to move over land in search for nesting sites. Eggs are laid on the banks of slow moving streams. The female digs a hole approximately four inches deep and lays up to eleven eggs. Afterwards the eggs are covered with sediment and are left to incubate under the warm soils. Eggs are typically laid between March and August. Current threats facing the western pond turtle include loss of suitable aquatic habitats due to rapid changes in water regimes and removal of hydrophytic vegetation.

Survey Results
The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for western pond turtles. However, during the June site visit, Robinson Creek was dry with the exception of a few small shallow pools. As such, Robinson Creek only contains suitable habitat for western pond turtles when there is flowing water present in the creek in the winter and spring months. Given the steep banks and abundance of cobble substrate there is no potential for western pond turtle nests to occur within the BSA.

Project Impacts
The Project has potential to impact western pond turtles through activities that may disturb aquatic habitat. This is considered a potentially significant impact that requires mitigation. To ensure impacts to western pond turtle are avoided, Mitigation Measure BIO-5 is required. Implementation of this mitigation measure will result in impacts that are less than significant with mitigation incorporated.

Mitigation Measure BIO-5: Western Pond Turtle
The following are avoidance and minimization measures required in order to avoid and minimize potential impacts to western pond turtles.

- A qualified biologist shall conduct a preconstruction survey to determine presence of western pond turtle immediately prior to the start of in-channel work. If found, western pond turtles will be relocated to suitable habitat outside of the BSA by a qualified biologist.
- If a western pond turtle is observed within the Project site, then personnel shall stop work within a 50-foot radius of the sighting and notify the biologist or resident engineer (RE). Work shall not resume within the 50-foot radius buffer until the western pond turtle has left the Project site on its own volition or has been relocated by the qualified biologist.

Migratory Birds and Raptors
Nesting birds are protected under the MBTA (16 USC 703) and the CFGC (3503). The MBTA (16 USC §703) prohibits the killing of migratory birds or the destruction of their occupied nests and eggs except in accordance with regulations prescribed by the USFWS. The bird species covered by the MBTA includes nearly all of those that breed in North America, excluding introduced (i.e. exotic) species (50 Code of Federal Regulations §10.13). Activities that involve the removal of vegetation including trees, shrubs, grasses, and forbs or ground disturbance has the potential to affect bird species protected by the MBTA.

The CFGC (§3503.5) states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes (hawks, eagles, and falcons) or Strigiformes (all owls except barn owls) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Take includes the disturbance of an active nest resulting in the abandonment or loss of young. The CFGC
(§3503) also states that "it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto."

Survey Results
No active nests of any migratory bird or raptor species were observed during the biologist's field visit, however, the BSA contains vegetation and habitat that have the potential to support nesting migratory birds and raptors. Construction is proposed to occur outside of the avian nesting season, thus minimizing impacts to all avian bird species. A pre- construction survey is recommended if construction is delayed into the avian breeding season (February 1 – August 31) to determine potential locations of active avian species nests within or in close proximity of the BSA.

Project Impacts
Construction and vegetation clearing activities have the potential to impact nesting and migratory birds if present. This is considered a potentially significant impact that requires mitigation. To ensure impacts to nesting and migratory birds are avoided, Mitigation Measure BIO-6 is required. With the implementation of avoidance and minimization measures specified above there will be no impacts to avian species of special concern or avian species protected under the MBTA and CFGC.

Mitigation Measure BIO-6: Migratory Birds and Raptors
To avoid impacts to avian species of special concern or avian species protected under the MBTA and the CFGC, the following avoidance and minimization measures are recommended.

The following are avoidance and minimization measures for California avian species of special concern and species protected under the MBTA and the CFGC.

- Any vegetation removal and/or ground disturbance activities should take place during the avian non-breeding season (September 1 – January 31).
- If construction is to begin within the avian breeding season (February 1 – August 31) then a migratory bird and raptor survey shall be conducted within the BSA by a qualified biologist. A qualified biologist shall:
  - Conduct a protocol level survey for all birds protected by the MBTA and CFGC within seven (7) days prior to construction activities, and map all nests located within 200 feet of construction areas;
  - Develop buffer zones around active nests as recommended by a qualified biologist. Construction activity shall be prohibited within the buffer zones until the young have fledged or the nest fails. Nests shall be monitored at least once per week and a report submitted to the County monthly.
- If construction activities stop for more than ten (10) days then another migratory bird and raptor survey shall be conducted within seven (7) days prior to the continuation of construction activities.
- All staging and construction activity will be limited to designated areas within the BSA and designated routes for construction equipment shall be established in order to limit disturbance to the surrounding area.

Pallid Bats

Pallid bats are designated as a CDFW SSC. Pallid bats roost alone, in small groups (2 to 20 bats), or gregariously (100s of individuals). Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees (e.g., basal hollows of coast redwoods and giant sequoias, bole cavities of oaks, exfoliating Ponderosa pine and valley oak bark, deciduous trees in riparian areas, and fruit trees in orchards), and various human structures such as bridges (especially wooden and concrete girder designs), barns, porches, bat boxes, and human-occupied as well as vacant buildings. Roosts generally have unobstructed entrances/exits, and are high above the ground, warm, and inaccessible to terrestrial predators. However, this species has also been found roosting on or near the ground under burlap sacks, stone piles, rags, and baseboards. Lewis 1996 found that pallid bats have low roost fidelity and both pregnant and lactating pallid bats changed roosts an average of once every 1.4 days throughout the summer. Overwintering roosts have relatively cool, stable temperatures and are located in protected structures beneath the forest canopy or on the ground, out of direct sunlight. In other parts of the species' range, males and females have been found hibernating alone or in small groups, wedged deeply into narrow fissures in mines, caves, and buildings. At low latitudes, outdoor winter activity has been reported at temperatures between –5 and 10 °C.

Survey Results

During the field survey there was no evidence of bats roosting within the bridge structure. However, the mature oak trees surrounding the creek within the BSA have suitable habitat elements (e.g. cavities, peeling bark) that may provide suitable day roost habitat for pallid bats.

Project Impacts

Construction timing within the creek is proposed from June 15 to October 15 which falls within the bat maternity season (April-August).

Mitigation Measure BIO-7: Pallid Bat Avoidance

If trees containing suitable bat habitat (i.e. sloughing bark, cavities, or crevices) are removed between March 15 and August 31, a qualified biologist will conduct a preconstruction survey for roosting bats within seven days prior to tree removal. The survey will focus on suitable habitat to determine the absence or presence of roosting bats and type of roost within the tree. If the pre-construction survey determines that bats are not using the trees onsite as day roosts, then tree removal can proceed as planned.

If the tree is being utilized as a day roost and the qualified biologist determines that it is a maternity roost, then removal of the tree will be postponed until consultation with CDFW occurs. If the roost is not a maternity roost or if tree removal occurs during the winter months (i.e. October 16 – February 14), then the following phased removal of the occupied tree will be implemented:

- Day 1: All unoccupied roosting habitat (e.g. crevices, sloughing bark, cavities) should be removed or altered to make it less desirable for roosting. All portions of the tree that do not contain suitable habitat can be removed while avoiding occupied habitat.
- Day 2: All remaining portion of the tree including suitable roosting habitat can be removed.

A qualified biologist shall be onsite during tree removal activities if bats are detected.

D.2. Less Than Significant with Mitigation Incorporated. No Sensitive Natural Communities (SNC) as identified by the California Department of Fish and Wildlife has been mapped within the BSA. Critical Habitat for northern California (NC) steelhead Distinct Population Segment (DPS) and Central California Coast (CCC) Coho salmonid Evolutionary Significant Unit (ESU) as designated by NMFS exists within the project site. The riparian trees to be removed as a result of the Project are likely important components of NC steelhead DPS and CCC Coho salmon ESU critical habitat, however current conditions have degraded the overall quality of the critical habitat. The removal of riparian vegetation and its effects on steelhead and salmonid critical habitat is considered a potentially significant impact that requires mitigation. Mitigation Measure BIO-2 requires replanting of approximately 355 trees, at a 18:1 ratio, in an effort to restore the creek and mitigate potential impacts to Essential Fish Habitat (EFH) critical habitat. Robinson Creek and its associated riparian vegetation will be restored to a net benefit to NC steelhead and the critical habitat present.

In addition to the impacts on EFH and riparian vegetation, the removal, trimming and/or project work near oak trees could result in a potentially significant impact to oak trees and oak woodlands. Mitigation Measure BIO-8 would reduce impacts to a less than significant level by implementing tree protection measures and requiring habitat replacement for oak woodlands

Mitigation Measure BIO-8: Tree Protection and Replacement Plan
In accordance with the Mendocino County General Plan Policies RM-1, RM-27 and RM-28, Mendocino County shall preserve and protect trees in and adjacent to the Project area to the extent feasible. Prior to construction, an arborist certified by the International Society of Arboriculture shall conduct site surveys of the construction area and provide recommendations to ensure protection of trees and tree roots during construction activities such as the removal of the existing bridge abutments, the placement of new bridge abutments, re-contouring of the Mill Creek stream banks, and roadway widening.
Tree protection measures could include minimizing grading as much as possible; protecting trees and roots with exclusion fencing; limiting access to areas with protected trees; limiting tree trimming to the minimum necessary for construction clearance and site and equipment access; and conforming to standard tree trimming practices designed to protect trees such as the International Society of Arboriculture Pruning Standards.
Per the Mendocino County General Plan Policy RM-28, if oak woodland habitat is lost due to tree removal, replacement of lost oak woodlands or preservation of oak woodlands shall be provided at a 2:1 ratio. The arborist shall assist Mendocino County in determining the acreage of oak woodland lost, determining if on-site restoration is feasible, and locating an off-site location for mitigation if required. If replacement trees are required, the County shall implement a five-year maintenance and monitoring program in which the County shall inspect the mitigation planting area for the purpose of adapting maintenance techniques if necessary. Survival surveys shall be conducted biannually for five years. The County shall use the following sliding scale performance standard for evaluation of the restoration's success:

- First year – 95%
- Second year – 90%
- Third year – 85%
- Fourth year – 80%
- Fifth year – 75%

Trees shall be considered alive and healthy if they display noticeable growth and the presence of new shoots.

Aquatic Resources
Robinson Creek, an intermittent stream, is the only aquatic resource within the project site. The Project site contains 0.43 acres of Waters of the U.S. The project will result in approximately 0.28 acres of temporary impacts and 0.06 acres of permanent impacts to jurisdictional waters of the U.S. Restoration activities including removing the failed retaining wall and associated RSP from the creek, streambank

stabilization through hybrid RSP revetment, vegetation created point bars and habitat enhancement as detailed in Mitigation Measure BIO-1 and BIO-2 will contribute to mitigating for impacts to the aquatic resources. Regardless of habitat enhancement and restoration activities there will be impacts to waters of the U.S. and waters of the State. Mitigation Measure BIO-9 would reduce impacts to less than significant levels through coordination with regulatory and resource agencies.

Mitigation Measure BIO-9: Compensate for Impacts to Waters
Mendocino Department of Transportation (MDOT) shall avoid impacts to waters to the extent feasible. If fill cannot be avoided MDOT shall compensate for impacts to creeks and other waters, by creation, restoration, or preservation of waters so that there is no net loss (1:1 ratio or as required by resource agencies). Required permits from the U.S. Army Corps of Engineers, the Regional Water Quality Control Board, and the California Department of Fish and Wildlife shall be received prior to the start of any on-site construction activity. MDOT shall ensure any and all additional measures outlined in the permits are implemented.

With the implementation of the replanting plan contained in Mitigation Measure BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, and BIO-8 there will be a less than significant impact with mitigation incorporated.

D.3. No Impact. Robinson Creek, an intermittent stream, is the only aquatic resource within the project site. A field assessment was conducted to delineate waters of the United States within the Project area. No wetlands were found at or adjacent to the Project site. Impacts to Robinson Creek are addressed through Mitigation Measure BIO-9 mentioned above. There will be no impacts to state or federally protected wetlands as a result of the proposed project.

D.4.- D.6. Less Than Significant Impact. The proposed project consists of the widening and replacement of existing transportation facilities. The extents and scope of the improvements to the roadway, bridge, and associated infrastructure will not be significantly different than what currently exists. The project will not result in the fragmentation of an existing wildlife habitat nor conflict with any local policies or ordinances protecting biological resources. The project's impact would be less than significant.

MITIGATION: Mitigation Measures BIO-1: Avoid Impacts to Special-status Fish Species, BIO-2: Salmonid Habitat Restoration and Enhancement, BIO-3: Navarro Roach Avoidance, BIO-4: Foothill Yellow Legged Frog, BIO-5: Western Pond Turtle, BIO-6: Migratory Birds and Raptors, BIO-7: Pallid Bat Avoidance, BIO-8: Tree Protection and Replacement Plan, and BIO-9: Compensate for Impacts to Waters.

E. Cultural Resources Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?		X		
2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?			X	
3. Disturb any human remains, including those interred outside of dedicated cemeteries?		X		

DISCUSSION:

A site specific Archaeological Survey Report (ASR) (Alta, 2020b) an Extended Phase I (XPI) (Alta, 2020c) and an Archaeological Evaluation Report (AER) Phase II (Alta, 2020c) (Appendix E) were performed for the Project to identify potential archaeological and historical resources within the Area of Potential Effects (APE). The findings of the ASR were based on the following research, consultations and analysis:

- A records search and historic map research at the Northwest Information Center (NWIC) of the
- California Historic Resources Inventory System at Sonoma State University, Rohnert Park;
- Contact with the Native American Heritage Commission, Native American groups and individuals;
- Mendocino County Historical Society information solicitation;
- A field survey of the Project APE; and
- Geoarchaeological analysis.

The findings of the ASR, XPI and AER were used as the basis for the analysis of potential impacts to historical and archaeological resources below.

E.1. – E.2. Less Than Significant with Mitigation Incorporated. One previous study, part of a Caltrans historic bridge inventory update of concrete arch bridges determined that the current bridge does not meet the criteria for listing in the National Register. Field studies and investigations undertaken as part of the ASR, XPI and AER identified three sites with archaeological (2 sites) and historic-era (1 site) deposits within the Project site. The results of the ASR and AER determined that there are no historic–era structures eligible for inclusion to the National Register of Historic Places (NRHP) or California Register of Historic Resources (CRHR) within the Area of Direct Impact (ADI) of the Project. However, since testing was confined to the project ADI, the sites cannot be formally evaluated. Therefore, these sites will be considered eligible for the purposes of the project only, per Stipulation VIIC.4 of the Caltrans Section 106 PA. Untested portions of each site outside of the ADI should be protected as Environmentally Sensitive Areas (ESAs).

Mitigation Measure CR-1: Environmentally Sensitive Area Action Plan

An Environmentally Sensitive Areas (ESAs) Action Plan has been developed, which presents specific methods and procedures for protecting the portions of archaeological sites outside the ADI portion of the APE. Untested areas, outside of the ADI shall be protected as ESAs as a standard condition (per Caltrans Section 106 PS Attachment 5). A combination of exclusionary fencing, flagging, signing, or monitoring to protect properties from direct physical damage by project related activities shall be implemented prior to and during construction.

Mitigation Measure CR-2: Identify and Avoid or Minimize Impacts to Unknown Cultural Resources
Mendocino County shall retain a qualified archaeologist to be present during initial ground disturbing activities to ensure that there are no prehistoric archaeological resources present within the vertical APE. These activities would include excavation of the existing concrete abutments, headwalls, and associated footings from the creek.

If archaeological materials are encountered during construction activities, construction crews shall stop all work within 100 feet of the discovery until a qualified archaeologist can assess the discovery and provide recommendations. Such treatment and resolution could include modifying the Project to allow the materials to be left in place, or undertaking data recovery of the materials in accordance with standard archaeological methods. The preferred treatment of the resource is protection and preservation.

Resources could include buried historic features, such as artifact-filled privies, wells, and refuse pits, and artifact deposits, along with concentrations of adobe, stone, or concrete walls or foundations, and concentrations of ceramic, glass, or metal materials. Native American archaeological materials could include obsidian and chert flaked stone tools (such as projectile points and knives), midden (darken soil created culturally from use and containing heat-affected rock, artifacts, animal bones, or shellfish remains), and/or groundstone implements (such as mortars and pestles). Project personnel shall not collect cultural materials.

E.3. Less Than Significant with Mitigation Incorporated. While no known burial sites have been identified within the APE, the APE is sensitive for prehistoric and/or contact period archaeological resources below or near the surface. Therefore, the potential impact to archaeological resources, including human remains is considered significant, given the potential for unanticipated discoveries to occur during ground-disturbing activities.

Mitigation Measure CR-3: Procedures for Encountering Human Remains
If human remains are encountered as a result of construction activities, any work in the vicinity shall stop and the Mendocino County Coroner shall be contacted immediately. In addition, a qualified archaeologist shall be contacted immediately to evaluate the discovery, if a monitor is not already present. If the human remains are Native American in origin, then the Coroner shall notify the Native American Heritage Commission within 24 hours of this identification, pursuant to Public Resources Code 5097.98. California Health and Safety Code Section 7050.5 states that it is a misdemeanor to knowingly disturb a human grave.

Mitigation Measure CR-1 would provide for measure to avoid and minimize potential impacts to resources outside of the ADI but within the APE. Mitigation Measure CR-2 would reduce the impact to archaeological resources that may be encountered during construction by protecting, preserving, or recovering any significant resources. Mitigation Measure CR-3 would reduce the impact from discovery of human remains by providing standard procedures in the event that human remains are encountered and requiring adherence to Public Resources Code Section 5097.98 requiring Native American Tribal notification. The impact to potentially unknown archaeological resources or human remains following mitigation would be less than significant.

MITIGATION: Mitigation Measure CR-1: Environmentally Sensitive Area Action Plan, CR-2: Identify and Avoid or Minimize Impacts to Unknown Cultural Resources, and CR-3: Procedures for Encountering Human Remains.

F. Energy Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?				X
2. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?				X

DISCUSSION:

F.1. No Impact. Construction of the Project would involve grading, excavation, and use of heavy machinery. Construction would require the use of fuels, primarily gas, diesel, and motor oil. The precise amount of construction-related energy consumption that would occur is uncertain. However, construction would not require a large amount of fuel or energy usage because of the moderate number of construction vehicles and equipment, worker trips, and truck trips that would be required for a project of this scale. Construction equipment would remain staged in the Project area once mobilized. . Excessive idling and other inefficient site operations would be prohibited. Equipment idling times would be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes or less (as required by the California airborne toxics control measure (Title 13, Section 2485 of the CCR). Therefore, construction would not result in the use of large amounts of fuel and energy in a wasteful manner, and the impact would be less than significant.

Following construction, no additional energy would be required in order for bridge operation to occur. Therefore, the Project would not result in wasteful, inefficient or unnecessary consumption of energy resources. No operational impact would result.

F.2. No Impact. In 2003, the California Energy Commission (CEC), the California Power Authority (CPA), and the California Public Utilities Commission (CPUC) jointly adopted an Energy Action Plan (EAP) that listed goals for California's energy future and set forth a commitment to achieve these goals through specific actions (CEC 2003). In 2005, the CPUC and the CEC jointly prepared the EAP II to identify the further actions necessary to meet California's future energy needs. Additionally, the CEC prepared the State Alternative Fuels Plan in partnership with the California Air Resources Board and in consultation with the other state, federal, and local agencies. The alternative fuels plan presents strategies and actions California must take to increase the use of alternative non-petroleum fuels in a manner that minimizes costs to California and maximizes the economic benefits of in-state production (CEC 2005).

Locally, the Mendocino County General Plan includes policies to promote energy conservation in the County (Policy RM-52, RM-54, and RM-57) and to increase use of renewable energy resources (Policies RM-53, RM—55, RM-56, and RM-58). Construction and operation of the Project would not conflict with or obstruct implementation of either the EAP, EAP II, the State Alternative Fuels Plan or local County general plan goals. Project construction would not require a large amount of fuel or energy usage because of the limited extent and nature of the proposed improvements and the minimal number of construction vehicles and equipment, worker trips, and truck trips that would be required for a project of this small scale. Project operation would not require additional energy use beyond existing conditions. No conflicts with a state or local plan for renewable energy or energy efficiency have been identified. Therefore, no impact would result.

MITIGATION: None required.

G. Geology / Soils Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:			X	
a. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
b. Strong seismic ground shaking?			X	
c. Seismic-related ground failure, including liquefaction?			X	
d. Landslides?			X	
2. Result in substantial soil erosion or the loss of topsoil?			X	
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
4. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?			X	
5. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X
6. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?		X		

DISCUSSION:

G.1(a)-(d). Less Than Significant Impact. The Project site is not underlain by a known earthquake fault and is not located within or adjacent to an Alquist-Priolo Earthquake Fault Zone (Blackburn Consulting 2012). Therefore, no impact from rupture of a known fault would occur. The closest active faults are the San Andreas Fault Zone, North Coast Section (14.8 Miles away) and the Maacama Fault Zone, North Section (13.4 Miles away). Like most of California, the site can be expected to be subjected to seismic ground shaking at some future time. However, active faults are quite distant from the project site and ground shaking due to a seismic event is expected to have a lower intensity at the project site. As the project appears to be located such that the probability of significant ground shaking is low, and because the project does not propose the addition of significant structures that would be at risk to seismic activity, potential geologic impacts would be less than significant. Under existing regulations, all

future structures will incorporate AASHTO, SDC, and MTD standards into the design and construction that are designed to minimize potential impacts associated with strong ground-shaking during an earthquake. Therefore, geologic impacts on people or structures related to seismic ground shaking would be less than significant.

Liquefaction is a phenomenon where loose saturated, granular soils lose their inherent shear strength due to excess water pressure that builds up during repeated movement from seismic activity. Factors that contribute to the potential for liquefaction include a low relative density of granular materials, a shallow groundwater table, and a long duration and high acceleration of seismic shaking. Liquefaction usually results in horizontal and vertical movements from lateral spreading of liquefied materials and post-earthquake settlement of liquefied materials. Liquefaction potential is greatest where the groundwater level is shallow, and submerged loose, fine sands occur within a depth of approximately 50 feet or less. It is expected that at least some portion of the unconsolidated alluvium underlying the site will be susceptible to liquefaction. Under existing regulations, all future structures will incorporate AASHTO, SDC, and MTD standards into the design and construction that are designed to minimize potential impacts associated with liquefaction during an earthquake. Therefore, geologic impacts on people or structures related to liquefaction would be less than significant.

The potential for seismic slope instability in the form of landslides or mudslides at the site is considered to be generally low, with the possible exception of local bank instability. The potential for seismically induced slides on engineered fill slopes, constructed at typical gradients of 1.5H:1V or flatter, is considered low. Under existing regulations, all future structures will incorporate AASHTO, SDC, and MTD standards into the design and construction that are designed to minimize potential impacts associated with landslides. Therefore, impacts on people or structures related to landslides would be less than significant.

G.2. Less Than Significant Impact. Construction activities could result in a small localized loss of top soil. However, such losses of top soil would be negligible. Consequently, no substantial loss of topsoil due to erosion or grading is anticipated and the impact would be less than significant. Construction impacts to water quality associated with soil erosion are further addressed in the Hydrology and Water Quality section of this document. During construction the project would be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) in compliance with the Construction General Permit. Specific erosion control and surface water protection methods would be implemented within the project site, such as straw wattles and silt fencing, covering materials and dumpsters, storing fuel and other potentially hazardous materials away from the watercourse, and the use of erosion control seeding. These control measures are standard in the construction industry and are commonly utilized to minimize soil erosion and water quality degradation. The project will have a less than significant impact on loss of top soil.

G.3. No Impact. During a seismic event, ground shaking can cause densification of granular soil above the water table that can result in settlement of the ground surface. Seismic settlement may occur within the loose alluvium above the creek bed, but is not expected below as the ground becomes saturated from the water table. Under existing regulations, all future structures will incorporate AASHTO, SDC, and MTD standards into the design and construction that are designed to minimize potential impacts associated with strong ground-shaking during an earthquake. Therefore, geologic impacts on people or structures related to unstable soils would be less than significant.

G.4. Less than Significant. The soil present within the project site consists primarily of alluvial deposits which consists of silt and clay. The site is not located on expansive soil and would not create substantial risks to life or property. Bridge design and all construction will comply with AASHTO, SDC, and MTD requirements. The project will have a less than significant impact in regards to expansive soils.

G.5. No Impact. No septic tanks, sewer or alternative wastewater disposal systems are proposed for the Project. The project will result in **no impact** relative to policies governing sewer service control.

G.6. Less Than Significant with Mitigation Incorporated. The project is not anticipated to cause a substantial adverse change in the significance, directly or indirectly destroy a unique paleontological resource or site, geological feature, or unique geological feature. Due to the developed character of the site, the potential to encounter surface-level paleontological resources is considered low. However, there is the potential for accidental discovery of paleontological resources. In the event that resources are

inadvertently discovered, implementation of Mitigation Measure GEO-1. would reduce impacts to a less than-significant level with mitigation.

Mitigation Measure GEO-1: Evaluation and Treatment of Paleontological Resources
If paleontological resources (e.g., vertebrate bones, teeth, or abundant and well-preserved invertebrates or plants) are encountered during construction, Mendocino County shall ensure work in the immediate vicinity shall be diverted away from the find until a professional paleontologist assesses and salvages the find, if necessary.

MITIGATION: Mitigation Measure GEO-1: Evaluation and Treatment of Paleontological Resources.

H. Greenhouse Gas Emissions Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Generate greenhouse gas (GHG) emissions, either directly or indirectly, that may have a significant impact on the environment?		X		
2. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	

DISCUSSION:

H.1 Less than Significant With Mitigation Incorporated. There is currently no applicable federal, State, or local threshold pertaining to construction-related greenhouse gas (GHG) emissions and the MCAQMD CEQA Guidelines [used by the Mendocino County Air Quality Management District] do not include screening criteria or significance thresholds for construction. Therefore, this analysis uses a qualitative approach in accordance with Section 15064.4(a)(2) of the CEQA Guidelines.

During construction, GHG emissions would be generated from construction equipment. However, construction would last for only eight months and would be less intensive than traditional land use development that requires a larger fleet of earthmoving equipment or soil off hauling and/or delivery and similar such equipment. Project emissions during construction would not be a considerable contribution to the cumulative GHG impact, given that construction would be temporary (i.e., eight months), and the size and nature of construction is not considered to result in significant air quality impacts (see Section C, Air Quality). Examples of sources for construction related GHGs are equipment fossil fuel combustion, material transportation, and purchased electricity. This is considered a less than significant impact with mitigation incorporated.

Following construction, the Project would not result in a new source of GHG emissions, would not increase the vehicle capacity of Lambert Lane, and would not induce population growth in the area. Therefore, no long term impact to GHG emissions would occur. It is anticipated that bridge replacement activities would generate short-term temporary GHG emissions associated with construction equipment.

See Mitigation Measure AQ-1 discussed in Section C, Air Quality, minimize and reduce temporary emissions associated with the construction activities.

H.2 Less than Significant The County of Mendocino has adopted several GHG emission reduction policies and action items as part of the 2009 General Plan (County of Mendocino 2009). General Plan Action Item DE-65.2 directs the County to work cooperatively with industrial facilities to identify greenhouse gas impacts from their operations and develop a long-term plan for reducing emissions. Because the Project is not a type of industrial development, Action Item DE-65.2 would not apply to the Project. Mendocino County General Plan Policy RM-43 and Action Items RM-43.1 through RM-43.3 direct the County to create an inventory of existing and historical GHG emissions, to create a GHG reduction plan, and to reduce the County's GHG footprint. As of the date this analysis was completed, the County had not completed such an inventory and had not developed a GHG reduction plan (County of Mendocino 2013).

The Project would therefore not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. Additionally, as described above in Impact H.1, the Due to the temporary nature of impacts resulting from construction activities on a relatively small bridge replacement project, the project will not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. This is considered a less than significant impact.

MITIGATION: Mitigation Measure AQ-1: Dust Control Measures.

I. Hazards and Hazardous Materials Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	
2. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		X		
3. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?			X	
4. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?			X	
5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?			X	
6. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?			X	
7. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?				X

DISCUSSION:

An Initial Site Assessment (ISA) was developed by Crawford & Associates, Inc. for the proposed project to identify recognized soil or groundwater contamination and hazardous material issues that may affect the planned project improvements. (Appendix F).

Based on the records reviewed and the site reconnaissance

- The project site was not identified in the database records reviewed.
- The database records search did not identify any facilities in the vicinity that have potentially impacted the project site.
- Site reconnaissance, historical topographic maps, and historical aerial photographs indicate historical land use adjacent to the project site is unlikely to have contaminated the project site and the potential to encounter Recognized Environmental Conditions (RECs) is low.

I.1. Less Than Significant Impact. The project will not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. Hazardous materials

will be used during construction activities (e.g., equipment maintenance, fuel, solvents, roadway resurfacing and re-striping materials). However, all hazardous material use would be required to comply with all applicable local, state, and federal standards associated with the handling and storage of hazardous materials. Use of hazardous materials in accordance with applicable standards ensures that any exposure of the public to hazard materials would result in a less than significant impact.

I.2. Less Than Significant With Mitigation Incorporated. The ISA developed by Crawford & Associates identified four Recognized Environmental Conditions (REC) within the project boundary: asbestos containing material (ACM), lead-based paint and chemically treated wood and thermoplastic traffic stripping. Due to the presence or potential presence of these hazardous materials there is the potential that during demolition of the existing structure, the hazardous materials could be released into the environment and cause a potentially significant impact. In order to reduce the potential impact to a less than significant level, Mitigation Measure HAZ-1 is required.

Mitigation Measure HAZ-1: Hazard Material Screening
Prior to site disturbance and demolition of the existing bridge, testing for asbestos containing material (ACM), lead-based paint and chemically treated wood and thermoplastic traffic stripping shall be conducted and appropriate methods of handling and disposal shall be implemented per the conditions of the ISA.

I.3. Less Than Significant. The proposed project does not involve any emission or handling of any hazardous materials, substances, or waste within one-quarter mile of an existing school. No existing or proposed school facilities are located within one-quarter mile radius of the project site. As stated previously, the use and handling of hazardous materials during construction activities would occur in accordance with applicable federal, state, and local laws including CalOSHA requirements. This is considered a less than significant impact.

I.4. Less Than Significant. The project is not included on a list of sites containing hazardous materials, and would not result in a significant hazard to the public or to the environment. The project site is not included on the Cortese list compiled pursuant to Government Code Section 65962.5. The nearest sites containing hazardous materials are located approximately 400 feet east of the project area at 4125 Highway 128. This topic is considered a less than significant impact.

I.5. Less Than Significant. The project site is located in the Boonville Airport land use planning area compatibility zone C. Typical aircraft operations involve single and twin-engine planes with average daily use of 18 flights (Mendocino, 1996). The Project site is outside of the 55 CNEL noise contour identified for the airport, which is not considered a significant value.; therefore, there will be less than significant impact.

I.6. Less Than Significant. The County of Mendocino's 2016 Emergency Operations Plan includes and identifies emergency planning, organization, policies, procedures, and response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies (Mendocino County 2016).

Currently there is a temporary bridge installed to allow for vehicular and pedestrian access across Robinson Creek. The proposed project will neither hinder the implementation, nor physically interfere with, emergency response or evacuation plans. The proposed project is considered to have a less than significant impact.

I.7. No Impact. According to maps prepared by the California Department of Forestry and Fire Protection (CAL FIRE), the Project area and immediately adjacent lands are designated as being within a "Moderate" fire hazard severity zone (CAL FIRE 2007a and 2007b). The Project site is not located within a "high" or "very high" fire hazard zone. Therefore, the potential for construction activities to expose people or structures to a significant risk of loss, injury or death involving wildland fires is considered less than significant.

MITIGATION: Mitigation Measure HAZ-1: Hazard Material Screening.

J. Hydrology / Water Quality Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?		X		
2. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?			X	
3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:			X	
a. result in substantial erosion or siltation on- or off-site;			X	
b. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;			X	
c. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or			X	
d. impede or redirect flood flows?			X	
4. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?			X	
5. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?			X	

DISCUSSION:

J.1. Less Than Significant With Mitigation Incorporated. The project is located within the Mendocino Coast Hydrologic Unit, Navarro River Hydrologic Area and an undefined Hydrologic Sub-Area (DWR, 2021). The Navarro River Hydrologic Area is listed on the 2010 Clean Water Act Section 303(d) list of water quality limited segments for sedimentation/siltation, temperature, and aluminum (U.S. EPA 2011).

Construction activities within and adjacent to Robinson Creek would temporarily disturb local soils and could result in erosion if not properly controlled and repaired. Construction could also be a source of chemical contamination from use of alkaline construction materials (e.g., concrete, mortar, hydrated lime) and hazardous or toxic materials, such as fuels. Construction activities would be implemented in accordance with Caltrans 2018 Standard Specifications Water Quality Control Section 13-4.03E(9), however the potential still exists for construction-related activities to result in turbidity levels or chemical

contamination that may violate water quality standards and degrade water quality. The impact is, therefore, considered significant.

Construction activities would require removal of some riparian vegetation. As described in the Project Description, following construction, disturbed areas will be re-vegetated with fast-growing native plants, including locally-sourced willow cuttings, along with commercial hydraulic mulching materials. Project revegetation, along with implementation of Mitigation Measure BIO-8: Tree Protection and Replacement Plan, would reduce the Project's impact on temperature in the Round Valley Hydrologic Sub-Area to a less-than-significant level.

Mitigation Measure HWQ-1: Minimize Impacts to Robinson Creek During Construction
MDOT or its contractor(s) shall prepare an Erosion and Sediment Control Plan prior to construction and implement it during construction to minimize impacts to Robinson Creek during Project construction. The Erosion and Sediment Control Plan shall include sufficient measures to address the overall construction of the Project and, at a minimum, construction contractors should undertake the following measures, as applicable, to minimize any adverse effects on water quality:

- The amount of construction-related disturbance within the Robinson Creek channel and creek banks shall be limited to the extent practicable.
- Where the creek channel is contoured to accommodate the new bridge, modifications to the existing stream banks shall provide a smooth transition into and out of the modified stream section.
- Other disturbed stream banks shall be returned to pre-existing contours and natural conditions upon completion of work.
- Construction equipment shall be cleaned and inspected prior to use. Servicing of vehicles shall be conducted a minimum of 100 feet from Mill Creek, at designated staging areas to avoid contamination through accidental drips and spills.
- The Project shall comply with the Caltrans Construction Site BMP Manual section NS-13: Material and Equipment Use Over Water.
- Dust, erosion, sedimentation control, and dewatering activities shall follow the 2018 Caltrans Standard Specifications.
- On-site stockpiles shall be isolated with silt fence, filter fabric, and/or straw bales/fiber rolls. Silt fence and/or fiber rolls shall be placed at bridge abutments, new abutment excavation areas, and any other locations when work could result in loose sediment that could enter active stream. The silt fence/fiber rolls shall be maintained and kept in place for the duration of the Project. Any sediment or debris captured by the fence/rolls shall be removed before the fence/rolls are pulled. As necessary additional erosion, sediment, and material stockpile BMPs shall be employed between work areas and adjacent waterway. No fill or runoff shall be allowed to enter the active waterway.
- The construction zone shall be kept free from litter by providing suitable disposal containers for trash and all construction-generated material wastes. These containers shall be emptied at regular intervals and the contents properly disposed. The containers shall have covers that can be completely closed and secured.
- Hazardous materials shall be stored in an area protected from rainfall and stormwater run-on to prevent the offsite discharge of leaks or spills.
- Portable sanitary facilities shall be located a minimum of 50 feet from the creek and maintained regularly to prevent the discharges of pollutants.

Mitigation Measure HWQ-2: Storm Water Control Measures during Construction
MDOT shall obtain coverage under State Water Resources Control Board Order No. 2009-0009- DWQ, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities, as amended by 2010-0014-DWQ and 2012-0006- DWQ. MDOT and/or its contractor shall submit permit registration documents (notice of intent, risk assessment, site maps, Storm Water Pollution Prevention Plan (SWPPP), annual fee, and certifications) to the State Water Resources Control Board. The SWPPP shall address pollutant sources, non-storm water discharges, best management practices, and other requirements specified in the above-mentioned Order. The SWPPP shall also include dust control practices to prevent wind erosion, sediment tracking, dust generation by construction equipment, management of concrete slurry, asphalt, pavement cutting, and other street and road activities to avoid discharge to storm drains from such work. The SWPP shall be prepared in accordance with Caltrans SWPPP and Water Pollution Control Program Preparation Manual (Caltrans

2016).A Qualified Storm Water Pollution Prevention Plan Practitioner shall oversee implementation of the Plan, including visual inspections, sampling and analysis, and ensuring overall compliance.

Mitigation Measure BIO-8: Tree Protection and Replacement Plan
See discussion in IV.D for a description of this measure.

J.2. No Impact. During construction, temporary dewatering could be required if groundwater accumulates in an excavation area. Dewatering would occur via low flow diversion, diverting all water to the middle of the channel to allow work along the banks to be done in dry areas. The water would still be allowed to infiltrate either upstream or downstream from the diversion. No substantial lowering of the local groundwater table would occur from such temporary dewatering; therefore, the impact from construction dewatering is considered less than significant.

Following construction, there would be no features included in the Project that would, by their nature or design, utilize groundwater supplies or interfere with groundwater recharge. No impact would occur.

J.3 (a). Less Than Significant Impact. See Impact J.1 above for an evaluation of the Project's construction-related impacts on erosion and siltation.

As described in the Project Description, portions of the embankment slopes will be protected from erosion with RSP and that willow plantings will also be included as part of bank protection and restoration. The proposed riprap revetments upstream and downstream of the bridge crossing and downstream by the Boonville Hotel are to be vegetated with live willow cuttings following Caltrans "hybrid revetment" design. Further, this Project will include removing the rubble and reconfiguring the RSP that covers the creek bottom, restoring the channel to a more natural condition and restoring fish passage to sections of Robinson Creek above the failed retaining wall. Channel restoration designs for the site will satisfy current fish passage standards, as described in California Department of Fish and Game (CDFG) (2009) and NMFS (2001) guidelines. Large woody debris (LWD) will be placed along the inside bend in the upstream right bank. Removed trees to be used as LWD will be a minimum of 15 feet long and have a 16-inch diameter at breast height (DBH). A plan sheet showing the location of LWD placement in the restored stream will be included in the final design.

Incorporating vegetation into the streambank revetment has the beneficial effects of improving stream ecology, increasing soil strength and providing flow resistance, although it can be unpredictable over the long term (Caltrans 2014). Established vegetation will provide cover, shade the channel and provide nutrients to the stream. As root systems establish, they can support the banks by providing resistance to scour and bind the soils and rock placed along the bank. Therefore, following construction, the Project's long-term impact on erosion or siltation on- or off-site would be less than significant.

J.3 (b). Less Than Significant Impact. Following construction, drainage patterns would be substantially the same as existing conditions. The RSP and streambank revetment would not interfere with normal channel flows. The Project would not result in new storm drain facilities and only negligible increases in impervious surfaces would occur from the widened roadway approaches. Therefore, the Project would not result in localized increases in the rate or amount of surface runoff that would result in flooding on- or off-site. The impact would be less than significant.

J.3 (c). Less Than Significant Impact. See Impact J.3 b above for an evaluation of the Project's potential impacts due to localized increases in runoff.

Following construction, there would be no features included in the Project that would, by their nature or design, provide substantial sources of polluted runoff. RSP streambank revetment would be placed to armor and protect the channel banks from potential erosion, and exposed and disturbed areas of the creek bank and construction area would be re-vegetated with fast-growing native plants. The impact would be less than significant.

J.3 (d). Less Than Significant Impact. The bridge would be elevated above the 100-year flood elevation. A Channel Design Report developed by Michael Love and Associates (MLA, 2019) and a Draft Location Hydraulic Study Report developed by Wreco (Wreco, 2016) analyzed potential changes in hydrological conditions based on project activities at the site. The two analyses utilized the Hydraulic Engineering Center River Analysis System (HEC-RAS) to estimate the hydraulic conveyance capacity under project conditions. The studies concluded the addition of the proposed bridge would have an

insignificant impact on the water surface elevations at the project site and would improve channel hydraulics. Since the bridge will be designed to be elevated above the 100 year flood elevation and the capacity of the creek channel will be enhanced there will be a less than significant impact.

J.4. Less Than Significant Impact. The Project site is located within FEMA FIRM for Mendocino County, California and Incorporated Areas, Map Number 06045C1663F. According to this FIRM, the Project site is located in the Special Flood Hazard Area (SFHA) Zone A, which represents areas subject to flooding by the 100-year flood event determined by approximate methods where base flood elevations are not shown. The project site is not located in an area that is prone to seiche or tsunami. Risks associated with inundation and the release of pollutants by flood, seiche or tsunami, would not occur beyond existing conditions. This is considered a less than significant impact.

J.5. Less than Significant Impact. The North Coast Regional Water Quality Control Board Basin Plan establishes thresholds for key water resource protection objectives for both surface waters and groundwater. Although the Project would replace the existing bridge over Robinson Creek and install RSP and streambank revetment along the banks, it is not anticipated that the Project would alter water quality parameters established in the Basin Plan. Erosion control BMPs would be required to be implemented during construction to prevent erosion and to protect overall water quality. The Project would not utilize groundwater beyond minimal construction dewatering (if required). No conflicts with an existing or foreseeable sustainable groundwater management plan have been identified. No impact would result. The impact to water quality will be less than significant.

MITIGATION: Mitigation Measures HWQ-1: Minimize Impacts to Robinson Creek During Construction, HWQ-2: Storm Water Control Measures during Construction, and Mitigation Measure BIO-8: Tree Protection and Replacement Plan.

K. Land Use and Planning Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Physically divide an established community?			X	
2. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?				X

DISCUSSION:

K.1. Less Than Significant. The project will not physically divide an established community. There is a temporary bridge provided to allow circulation around the project site. This disruption will be temporary during construction activities Therefore; the project is anticipated to have a **l**ess than significant impact.

K.2. No Impact. The project is identified in the Mendocino County Regional Transportation Plan. There will be no conflicts with land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect. The Project would not cause a change in land use patterns and would be required to comply with the County's floodplain requirements in Chapter 20.120 of the County of Mendocino Municipal Code. Therefore, the potential for conflict with land use plans, policies, and regulations would be considered no impact.

MITIGATION: None required.

L. Mineral Resources Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
2. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X

DISCUSSION:

L.1.-2. No Impact. The Mendocino County General Plan identifies aggregate resources, primarily sand and gravel, as the predominant minerals found in the County. According to the General Plan, three sources of aggregate materials are present in Mendocino County: quarries, instream gravel, and terrace gravel deposits (Mendocino County 2009). According to aggregate availability mapping compiled by the California Geological Survey, several aggregate mines are located in northern Mendocino County, indicating the presence of aggregate production areas (CDC 2012b). The State of California Geological Survey has not studied mineral resource zones in Mendocino County and no locally-important mineral resource recovery area is identified in the Mendocino County General Plan. Because the Project would consist of the improvement of a public road facility, no impact on potential aggregate resources would occur

MITIGATION: None required.

M. Noise Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			X	
2. Generation of excessive groundborne vibration or groundborne noise levels?			X	
3. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X

DISCUSSION:

The project is located in a rural area, approximately 0.10 miles from SR128 and the Town of Boonville. Given the rural nature of the site there are few sensitive receptors in the Project vicinity. The nearest sensitive receptors are the single family residences surrounding the Project site and the Anderson Valley Jr-S High School 0.5 miles to the north. Existing noise generators in the area include the Boonville Airport, which is adjacent to the Anderson Valley Junior -Senior High School. The project does not include pile driving as a component of construction techniques and instead proposed to utilize Cast in Drill Hole (CIDH) piles.

M.1.-2. Less Than Significant Impact

Mendocino County Noise Ordinance

The Mendocino County Zoning Code provides Exterior Noise Use Standards in Title 20, Division I, Appendix C, which are summarized in Table 2 below. These standards would be applicable to operation of the Project.

Mendocino County General Plan Noise Policies and Action Items

The following goals and policies established in the Mendocino County General Plan are applicable to operation of the Project.

Policy DE-98: The County will protect residential areas and other noise-sensitive uses from excessive noise by doing the following:

> 3) Requiring that County decisions which would cause or allow an increase in noise created by stationary or mobile sources (such as development of noise-generating land uses or the construction of new or wider roadways) be informed by a noise analysis and accompanied by noise reduction measures to keep noise at acceptable levels.

Policy DE-99: To implement Policy DE-98, the following shall apply:

> 4) The County shall ensure that roadway projects include mitigation measures to maintain at least "tentatively compatible" noise levels as shown in Policy DE-101. Mitigation for roadway noise may be deferred where "tentatively compatible" noise guidelines would be exceeded on vacant lands, but shall be installed as part of the roadway project where the noise would affect existing homes. Deferred mitigation shall be the responsibility of the project which places residential units on vacant lands.

Table 1 Exterior Noise Limit Standards (Not to be Exceeded More than 30 minutes in any hour)

Receiving Land Use Category [1, 2]	**Time Period**	**Noise Level Standards (dBA) [3, 4]**	
		Rural/Suburban Urban/Highways5	**Rural/Suburban Urban/Highways[5]**
One and two-family residential	10:00 pm – 7:00 am 7:00 am – 10:00 pm	50 40	60 50
Multi-family Public Spaces	10:00 pm – 7:00 am 7:00 am – 7:00 pm	45 55	50 60
Limited Commercial Some Multifamily	10:00 pm – 7:00 am 7:00 am – 10:00 pm	55 60	
Commercial	7:00 am – 10:00 pm 10:00 pm – 7:00 am	65 60	
Light Industrial	Any Time	70	
Heavy Industrial	Any Time	75	
Adjustments to Noise Level Standard			
L_{50}	30 min per hour	Standard	
L_{25}	15 min per hour	Standard + 5dB	
L_0	Maximum permissible level	Standard + 20dB	
Character	Tone, whine, screech, hum, or impulsive hammering, riveting or music or speech	Standard + 5dB	
Ambient Level	Existing ambient L_{50}, L_{25}	Standard + 5dB	
	Existing ambient L_0	Existing maximum	

Notes:
1. County staff shall recommend which receiving land use category applies to a particular project, based on the mix of uses and community noise levels. Industrial noise limits intended to be applied at the boundary of industrial zones, rather than within industrial areas.
2. The "rural/suburban" standard should be applied adjacent to noise sensitive uses such as hospitals or convalescence homes.
3. When an acoustical study demonstrates that ambient levels exceed the noise standard, then the ambient levels become the standard.
4. Higher noise levels may be permitted for temporary, short-term or intermittent activities when no sensitive or residential uses will be affected.
5. "Highways" apply to roads and highways where average daily traffic (ADT) exceeds ten thousand (10,000).

Mendocino County General Plan Noise Policies and Action Items
The following goals and policies established in the Mendocino County General Plan are applicable to operation of the Project.

Policy DE-101: The following are noise compatibility guidelines for use in determining the general compatibility of planned land uses:

Table 2 Noise Compatibility Guidelines (Expressed as a 24-Hour Day-Night Average or Ldn)

Land Use	**Completely Compatible**	**Tentatively Compatible**	**Normally Compatible**	**Completely Compatible**
Residential	Less than 55 dBA	*55-60 dBA*	*55-60 dBA*	Greater than 75 dBA
Commercial	Less than 65 dBA	*65-75 dBA*	*75-80 dBA*	Greater than 80 dBA
Industrial	Less than 75 dBA	*70-80 dBA*	*80-85 dBA*	Greater than 85 dBA

- These guidelines apply to land designated by this General Plan for these uses. Residential, retail, or public parks which have been developed on land designated for other uses shall be subject to the exterior noise guidelines for the land on which they are located.
- Non-residential uses located on residentially designated land shall be subject to the exterior noise guidelines for residential lands.
- All uses on Commercial lands, including non-commercial uses, shall be subject to the standards for Commercial land.

Policy DE-105: A 5 decibel (dB) increase in CNEL or Ldn noise levels shall be normally considered to be a significant increase in noise.

Caltrans Construction Noise Standards
Section 14-8.02 (Noise Control) of the Caltrans Standard Specifications is relevant to Project construction. The specification states:

- Equip an internal combustion engine with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.
- Do not exceed 86 dBA at 50 feet from the job site activities from 9 p.m. to 6 a.m.

Project Impacts

Construction
General Plan policies are generally considered to apply to long-term operational land uses and not to construction activities. Additionally, the County has not established quantified construction noise limits or allowable construction hours. For these reasons, these regulations are not applicable to Project construction. However, the Project is still in compliance with Policy DE-98 because a noise analysis has been prepared for the Project.

A noise Analysis was prepared by Bollard Acoustical Consultants, Inc. in September, 2020 (Bollard Acoustical Consultants, 2020). An evaluation of ambient noise levels at the project site was conducted, the results of which are shown in the table below.

Table 3 Summary of Ambient Noise Level Measurement Results – September 16-17, 2020

Location	Date	Average Measured Daytime Noise Levels, dB			
		L_{eq}	L_{50}	L_{90}	L_{max}
East of Bride on Lambert Lane	9/16/2020	52	48	44	70
	9/172020	54	49	45	73

Testing locations are shown in the Construction Noise Memo, see Appendix G

Evaluation of Construction Noise Generation
The Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) was utilized to model the various project equipment noise levels at the nearest noise-sensitive locations.

Table 4 Summary of Predicted Construction Equipment Noise Levels

Construction Sequence Number	Predicted Maximum Noise Levels at Receiver Locations, L_{max} (dBA)								
	1	2	3	4	5	6	7	8	9
1. Clearing / grubbing	78	72	69	63	68	70	73	75	77
2. Existing bridge demolition	78	72	69	63	68	70	73	75	77
3. Grading and stream improvements	78	72	69	63	68	70	73	75	77
4. Downstream RSP placement	78	72	69	63	68	70	73	75	77
5. Installation of CIDH abutment piles	77	77	71	67	73	75	76	75	81
6. Construction of superstructure	77	77	71	67	73	75	76	75	81
7. RSP placement around new bridge	77	72	69	63	68	70	72	75	77

8. Final site stabilization and tree planting	77	70	68	61	66	69	72	75	76

Receiver locations are shown in the Construction Noise Memo, see Attachment G

Caltrans standards state that construction must not exceed 86 dBA at 50 feet during nighttime hours of 9:00 pm to 6:00 am. Because the Project description specifies that construction would be restricted to daytime hours, the Caltrans nighttime construction noise thresholds would not apply. It is not known if the Project construction equipment would be in compliance with Caltrans internal combustion specifications. If non-compliant construction equipment were used, this would be a significant impact. Implementation of Mitigation Measure NOI-1 would reduce impacts to less-than-significant levels by requiring the use of Caltrans-compliant equipment. Mitigation Measure NOI-1 would further reduce potential noise impacts by requiring implementation of other noise-reduction measures, such as further restricting construction hours, limiting unnecessary noisy idling, and requiring distribution of a noise-generating construction schedule to nearby sensitive receptors.

The project proposes construction activities from sunrise to sunset (Monday through Saturday), and does not propose work during the hours of 9:00 p.m. to 6:00 a.m. As a result, noise levels associated with project construction equipment would not exceed 86 dB Lmax at 50 feet during the hours of 9:00 p.m. to 6:00 a.m. However, should the operation of internal combustion engines without appropriate mufflers occur on the job site, the project would not be in compliance with the Caltrans specification. Therefore, it is recommended that all project-related internal combustion engines are equipped with the appropriate mufflers as recommended by the manufacturer. Provided that all construction activities within the project area occur from sunrise to sunset (as proposed), and that project equipment is equipped with appropriate mufflers, the project would satisfy the applicable Caltrans standard specifications.

The Table 4 data indicate that conservative estimates of project construction noise would be elevated when compared with measured daytime maximum noise levels in the immediate project vicinity. Because project construction activities would result in short-term periods of elevated ambient noise levels in the immediate project vicinity, and because engineering techniques may not be practical in addressing noise attenuation for some equipment types, Mitigation Measure NOI-1 shall be incorporated into project construction operations in order to reduce the potential for adverse reaction at nearby residential receivers to a less than significant level.

Mitigation Measure NOI-1: Reduce Construction Noise

- Project construction activities should occur during daytime hours only (as proposed).
- All noise-producing equipment and vehicles using internal combustion engines shall be equipped with manufacturers-recommended mufflers (pursuant to Section 14- 8.02 of Caltrans standard specifications).
- Nearby residences shall be notified of construction schedules so that arrangements can be made (if desired) to limit their exposure to short-term increases in ambient noise levels.

Operation
The Project does not include new development that would result in increased traffic. The bridge replacement and not intended to increase the vehicle capacity of Lambert Lane. Therefore, changes in existing traffic-generated noise are not anticipated and operation of the Project would not result in increased noise levels that could conflict with the County noise ordinance or General Plan policies DE-99, DE-101, or DE-105. Impacts would be less than significant.

M.3. Less Than Significant. The project site is located in the Boonville Airport land use planning area compatibility zone C. Typical aircraft operations involve single and twin-engine planes with average daily use of 18 flights (Mendocino, 1996). The Project site is outside of the 55 CNEL noise contour identified for the airport, which is not considered a significant value. The project would not expose people residing to or working in the project area to excessive noise levels. This is considered a less than significant impact.

MITIGATION: Mitigation Measure NOI-1: Reduce Construction Noise.

N. Population and Housing Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
2. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?				X

DISCUSSION:

N.1.-N.2. No Impact. The Project would not induce substantial population growth in the area. The Project would replace a functionally obsolete bridge, slightly widen roadway approaches on either side of the bridge, and stabilize the creek bank beneath the bridge. The roadway widening is not intended to increase the vehicle capacity of Lambert Lane and no additional travel lanes are proposed along Hill Road. The Project would not induce population growth in the area. No impact would occur. The Project would not displace existing housing or people and would not require construction of replacement housing elsewhere. No impact would occur.

MITIGATION: None required.

O. Public Services Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Fire protection?			X	
Police protection?			X	
Schools?				X
Parks?				X
Other public facilities?				X

DISCUSSION:

O.1.-5. Less Than Significant Impact. The proposed project would not construct buildings, businesses or other facilities that would result in an increased population in the area. Temporary delays to traffic may occur during construction activities due to the use of the temporary bridge crossing. There would be no long- term demands on public services such as fire protection, police protection, schools, or parks generated by this project. No changes in fire protection or police protection are proposed as part of this project. Therefore, the proposed project is not anticipated to impact public services.

The proposed project would not cause any permanent closures to the roadway, nor block access to private property. The construction is expected to occur from June 15 – October 15 and take one construction season weather and conditions permitting. Temporary road delays and closures during construction may affect traffic patterns near the construction site and potentially affect fire and police response times for multiple apparatus events; however, any such impacts would be minor and not significantly affect long-term service ratios, response times, or other performance objectives for public services. Project proponents would notify local emergency service providers of construction activities and would ensure coordination with local providers to establish alternative routes and appropriate signage. No changes in fire protection or police protection services are proposed as part of this project. The proposed project would not add to the area's population or increase demands on police or fire services. The effects of the Project would not cause significant environmental impacts as it relates to police and fire service. Therefore, relative to the provision of police and fire service, the proposed project would generate a less than significant impact.

MITIGATION: None required.

P. Recreation	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
2. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

DISCUSSION:

P.1.-2. No Impact. The project does not propose dwelling units, businesses or other structures that might increase the area's human population. The project site does not include existing recreational facilities. Similarly, the proposed project would not construct recreational facilities.

The proposed project would not generate additional demands on parks and recreational facilities. The proposed project does not include the development of recreational facilities or other structures that would necessitate the development or modification of any recreational facilities. Relative to recreation, the proposed project would result in no impact.

MITIGATION: None required.

Q. Transportation Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?				X
2. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?				X
3. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
4. Result in inadequate emergency access?			X	

DISCUSSION:

Q.1. No Impact. The proposed project is a bridge replacement that would result in the replacement of a two-lane bridge with a 31'-6" clear width bridge, consisting of two-9' lanes and two-5' shoulders. The project will not conflict with an applicable plan, ordinance or policy regarding the effectiveness of the performance of the circulation system. The proposed project would not generate additional traffic, as it would not construct facilities or land uses that would generate additional vehicular traffic such as a retail center or residential subdivision. No impact is anticipated.

Q.2. No Impact. The project is not expected to result in additional vehicular trips, or to impact levels of service and trip distributions within the project area. The proposed project will not conflict with an applicable congestion management program and will not affect travel demand measures. Roadway safety conditions are expected to improve upon project completion, as the project will include a new wider bridge and provide safer, wider transitions to the bridge structure. CEQA Guidelines Section 15064.3(b)(1).) (2) states:

> "Transportation projects that reduce, or have no impact on, vehicle miles traveled should be presumed to cause a less than significant transportation impact."

In accordance with CEQA Guidelines Section 15064.3, subdivision (b), the Project would cause a less than significant transportation impact. As such, the Project would not conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b), and would result in no impact.

Q.3. No Impact. The Project would replace an existing structurally deficient and closed bridge with a new bridge. Therefore, the Project would have a beneficial effect on transportation by eliminating risks from an existing structurally deficient structure. The horizontal alignment of the new bridge would match that of the existing bridge, which is approximately perpendicular to the normal stream alignment of Robinson Creek. The new bridge would allow for wider travel lanes and improved shoulder widths. The bridge would not introduce design features that would increase hazards, such as sharp curves. No impact would occur.

Q.4. Less Than Significant. Currently there is a temporary bridge installed to allow for vehicular and pedestrian access across Robinson Creek. The proposed project would not cause any permanent closures to the roadway, nor block access to private property. The construction is expected to occur from June 1 – October 30 and take one construction season weather and conditions permitting. Temporary road delays during construction may affect traffic patterns near the construction site and potentially affect fire and police response times for multiple apparatus events; however, any such impacts would be minor and not significantly affect long-term service ratios, response times, or other performance objectives for public services. Project proponents would notify local emergency service providers of construction activities and would ensure coordination with local providers to establish alternative routes and appropriate signage. The proposed improvements, which would bring the existing facilities in the project site up to current design standards, would provide safer passage for emergency vehicles. Therefore, relative to emergency access, impacts would be less than significant.

MITIGATION: None required.

R. Tribal Cultural Resources	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or		X		
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.		X		

DISCUSSION:

The CEQA Guidelines define tribal cultural resources as: (1) a site, feature, place, cultural landscape, sacred place, or object with cultural value to a California Native American Tribe that is listed or eligible for listing on the California Register of Historical Resources, or on a local register of historical resources as defined in Public Resources Code Section 5020.1(k); or (2) a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant according to the historical register criteria in Public Resources Code Section 5024.1(c), and considering the significance of the resource to a California Native American tribe.

The project is not anticipated to cause a substantial adverse change in the significance of a tribal cultural resource. The project site is in an area considered to be low to moderate archaeological sensitivity. In regards to AB52 compliance, no Tribes have filed letters with MDOT to be a consulting party for any project that MDOT conducts.

R.1.a. – 1.b. Less Than Significant with Mitigation Incorporated. A site specific Archaeological Survey Report (ASR), an Extended Phase I (XPI) and an Archaeological Evaluation Report (AER) Phase II were performed for the Project to identify potential archaeological and historical resources within the Area of Potential Effects (APE). The findings of the ASR were based on the following research, consultations and analysis:

- A records search and historic map research at the Northwest Information Center (NWIC) of the
- California Historic Resources Inventory System at Sonoma State University, Rohnert Park;
- Contact with the Native American Heritage Commission, Native American groups and individuals;
- Mendocino County Historical Society information solicitation;
- A field survey of the Project APE; and
- Geoarchaeological analysis.

One previous study, part of a Caltrans historic bridge inventory update of concrete arch bridges determined that the current bridge does not meet the criteria for listing in the National Register. Field

studies and investigations undertaken as part of the ASR, XPI and AER identified three sites with archaeological and historic-era deposits within the Project site. The results of the ASR and AER determined that there are no historic–era structures eligible for inclusion to the National Register of Historic Places (NRHP) or California Register of Historic Resources (CRHR) within the Area of Direct Impact (ADI) of the Project. These resources do not have cultural value to Native American tribes.

Although no eligible historic properties have been identified within the Project Area, the potential exists to encounter as-of-yet unknown historic or archaeological materials during project related construction activities. If such resources were to represent "tribal cultural resources" as defined by CEQA, any substantial change to or destruction of these resources would be a potentially significant impact. Implementation of Mitigation R.1 would reduce impacts to less than significant with mitigation incorporated.

Mitigation Measure TCR-1: Tribal Cultural Resources
If potential tribal cultural resources are uncovered, the County shall halt work, and workers shall avoid altering the materials and their context. Project personnel shall not collect cultural materials. MDOT shall notify California Native American tribes culturally affiliated with the Project area. MDOT, in coordination with Native American tribes, shall determine if the resource qualifies as a tribal cultural resource under CEQA. If it does, then all work must remain stopped in the immediate vicinity to allow evaluation of any materials. MDOT shall ensure that qualified resources are avoided or protected in place, in accordance with the requests of Native American tribes, to the extent feasible. Work may proceed on other parts of the project while mitigation for tribal cultural resources is being carried out.

Implementation of Mitigation Measure TCR-1 would reduce this impact to a less-than- significant level because a plan to address discovery of unanticipated buried tribal cultural resources and to preserve and/or record those resources consistent with appropriate laws and requirements would be implemented, and a tribal monitor would be present during ground disturbing activities.

MITIGATION: Mitigation Measures TCR-1: Tribal Cultural resources

S. Utilities and Service Systems Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?		X		
2. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?			X	
3. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?			X	
4. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?			X	
5. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?			X	

DISCUSSION:

S.1. Less Than Significant With Mitigation Incorporated. The proposed project would not require wastewater treatment, new electric power, natural gas or telecommunications facilities. The existing bridge contains a stormwater outfall pipe on the south side of an abutment that drains into Robinson Creek. This outfall will be replaced as part of the Project. The replacement bridge will be crowned at the centerline and utilize concrete barrier rail or curb to collect storm water and direct it off the bridge. Eventually, the bridge and roadway drainage and aforementioned culvert will empty into Robinson Creek. The project does require the rehabilitation of an existing drainage system, including surface and subsurface drainage infrastructure to capture and direct runoff from the Project site into Robinson Creek. Rock slope protection is proposed as part of this drainage infrastructure, and the placement of the RSP will likely be within the jurisdictional of the RWQCB, USACE and CDFW. Mitigation Measure BIO-9, as described in the Biological section of this document, requires the County to obtain final permits from the USACE, CVWQCB and CDFW prior to the construction of the project. With this mitigation measure, potential impacts to the environment as a result of the rehabilitation of drainage systems will be less than significant with mitigation incorporated.

S.2.-S.3. No Impact. The Project would require minimal water for dust suppression during the construction phase of the Project. No water would be required for the long-term operation of the Project. The proposed project does not require the ongoing use of water as there are no landscaping components involved. The proposed project will not involve the need for wastewater treatment or the expansion of wastewater treatment facilities. No impact is anticipated.

S.4.-S.5. Less Than Significant Impact. The project will not generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. During construction, a limited amount of construction waste would be generated. Waste would only be sent to permitted landfill facilities with adequate capacity to accept construction waste. The project would not create a long-term source of solid waste needing disposal. Disposal and recycling of materials generated by the construction of the new road and bridge will be

handled and disposed of in accordance with Federal, State, and local requirements. This impact would be less than significant.

MITIGATION: Mitigation Measure BIO-9 (Regulatory Permits)

T. Wildfire If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Substantially impair an adopted emergency response plan or emergency evacuation plan?				X
2. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?				X
3. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?				X
4. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?				X

DISCUSSION:

T.1. No Impact. The County of Mendocino's 2016 Emergency Operations Plan includes and identifies emergency planning, organization, policies, procedures, and response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies (Mendocino County 2016). Lambert Lane is not considered an evacuation route in the County's Emergency Operation Plan. A temporary bridge will provide access to parcels and residences on Lambert Lane west of the project site during construction activities. Therefore the proposed Project will have no impacts on an adopted emergency response plan or emergency evacuation plan.

T.2. No Impact. Wildfire risk is dependent upon existing environmental conditions, including but not limited to the amount of vegetation present, topography, and climate. The Project site is located within a rural area surrounded by oak woodland and riparian vegetation. Climate in the area is generally warm and temperate, with the winters being rainier than the summers. The proposed Project involves the replacement of a functionally obsolete bridge with a new bridge structure and does not include housing or other structures that would house occupants at the site, therefore the project would result in no impact.

T.3. No Impact. The proposed Project would replace the existing Lambert Lane Bridge. No new infrastructure would be installed that would require additional maintenance beyond what is currently utilized. Once the bridge is installed there is not anticipated to be any temporary or ongoing impacts to the environment above the existing conditions. Therefore, no impact would occur.

T.4. No Impact. The proposed replacement bridge would be raised above the 100-year flood plain and RSP would be placed around the abutments to protect against erosion. Additionally, following construction, drainage patterns would be substantially the same as existing conditions. The RSP to be placed on the channel banks would not interfere with normal channel flows and the project would ultimately enhance channel flows. The Project would result in only negligible increases in impervious surfaces from the widened roadway approaches. Therefore, the Project would not result in localized increases in the rate or amount of surface runoff that would result in flooding downslope or downstream.

A component of the project involves addressing an existing wing-wall and slope failure. Through adherence to AASHTO, SDC, MTD standards and engineering review, the design and construction of the bridge and associated structures will be designed to minimize potential impacts associated with soil or slope instability. This is considered a less than significant impact.

MITIGATION: None Required.

U. MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?		X		
2. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			X	
3. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?		X		

DISCUSSION:

U.1 Less Than Significant with Mitigation Incorporated. With implementation of the mitigation measures presented herein, the Project does not have the potential to degrade the quality of the environment, including fish or wildlife species or their habitat, plant or animal communities, important examples of the major periods of California history or prehistory.

U.2 Less Than Significant Impact. Cumulative impacts are defined as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts” (CEQA Guidelines Section 15355). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. This IS/Proposed MND utilizes the “plan” approach, per CEQA Guidelines Section 15130(d), to determine if the Project makes a considerable contribution to a significant cumulative impact.

As discussed in Section XI., Land Use and Planning, the Project would not conflict any applicable land use plans, policies, or regulations which govern the Project area. The Project’s impact would not add appreciably to any existing or foreseeable future significant cumulative impact, such as visual quality, traffic impacts, or noise. Incremental impacts, if any, would be negligible and undetectable. As reported throughout this analysis, any applicable cumulative impacts to which this Project would contribute would be mitigated to a less-than-significant level.

U.3 Less Than Significant with Mitigation Incorporated. Based on the preceding environmental analysis and adherence to applicable local, state and federal regulations, as noted in this document, the proposed project would not result in potentially significant cumulative, direct or indirect adverse effects on human beings.

V. MITIGATION MONITORING AND REPORTING PROGRAM

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Air Quality					
Mitigation Measure AQ-1: Dust Control Measures In accordance with Rule 1-430(b) of the Mendocino County Air Quality Management District Regulations, the County of Mendocino and its Contractor shall implement the following airborne dust control measures during construction activities: • All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions. • All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 miles per hour. • Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed. • Asphalt, oil, water, or suitable chemicals shall be applied on materials stockpiles and other surfaces that can give rise to airborne dusts. • All earthmoving activities shall cease when sustained winds exceed 15 miles per hour. • The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours. • The operator shall keep a daily log of activities to control fugitive dust.	Incorporate into specifications Contractor to implement measures during construction	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Biological Resources					
Mitigation Measure BIO-1: Avoid Impacts to Special-Status Fish Species • Construction within Robinson Creek will be limited to June 15 through October 15, or as permitted by regulatory agencies. • If flowing water is present within the BSA between June 15 and October 15 then a clear water diversion using an appropriately sized culvert and sandbags will be installed. A qualified biologist shall monitor the construction site during placement and removal of stream diversions to ensure that any harm or loss of salmonids is minimized and documented. • If water is present within the Project site between June 15 and October 15, then a qualified biologist will perform fish relocation prior to the start of construction activities. • The qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid habitat relationships; and biological monitoring shall perform fish relocation. Fish relocation will be performed in a manner which minimizes all potential risks to NC steelhead. • Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act. • Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat. • Removal of the existing rubble and reconfiguring of the RSP that covers the creek bottom and restoring the channel to a more natural condition to promote fish passage. This will involve removing a current barrier to steelhead at the existing failed retaining wall, thereby restoring access to habitat for steelhead upstream of the bridge.	Incorporate into specifications Contractor to implement measures during construction	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Mitigation Measure BIO-2: Salmonid Habitat Restoration and Enhancement The following measures, when implemented, will avoid and minimize impact to this species: • All work within Robinson Creek will occur between June 15 and October 15 when PCEs are not present within the BSA. If water is present within the BSA then fish relocation will be conducted by a qualified biologist prior to the start of construction. • The existing rubble from the failed retaining wall and RSP will be removed from the creek channel and the channel will be restored to a more natural condition to promote fish passage. • In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants. • The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks and function as a stormwater treatment facility. • Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat. • A landscape architect or botanist shall be retained to develop a plan to harvest cutting stock, design a planting plan, replant and monitor for success the replanting of approximately 125 willow/cottonwood trees. 220 native riparian trees and 5-10 native upland trees to restore the riparian habitat and associated essential fish habitat. The plan shall be implemented and monitored for success.	Incorporate into specifications Contractor to implement measures during construction Monitor replanting to meet success criteria	Mendocino County Department of Transportation			

Mitigation Measure BIO-3: Navarro Roach Avoidance
• Construction in Robinson Creek will be limited to June 15 through October 15, or as permitted by regulatory agencies
• If flowing water is present within the BSA between June 15 and October 15 then a clear water diversion using an appropriately sized culvert and sandbags will be installed. A qualified biologist shall monitor the construction site during placement and removal of stream diversions to ensure that any harm or loss of aquatic life is minimized and documented.
• If water is present within the Project site between June 15 and October 15, then a qualified biologist will perform fish relocation prior to the start of construction activities.
  • The qualified biologist with expertise in the areas of fisheries biology, including handling, collecting, and relocating fish; fish habitat relationships; and biological monitoring shall perform fish relocation. Fish relocation will be performed in a manner which minimizes all potential risks to Navarro roach.
  • Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act.
• Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat.
• The existing rubble from the failed retaining wall and RSP will be removed from the creek channel and the channel will be restored to a more natural condition to promote fish passage.
• In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants.
• The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks and function as a stormwater treatment facility.
	Incorporate into specifications
	
	Contractor to implement measures during construction
	
	Monitor replanting to meet success criteria
		Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Mitigation Measure BIO-4: Foothill Yellow Legged Frog The following measures when implemented will minimize impacts to this species: • Construction within Robinson Creek will be limited to June 15 through October 15, during periods of low flows. • A qualified biologist shall conduct a preconstruction survey to determine presence of FYLF immediately prior to the start of in-channel work. If found, FYLF will be relocated to suitable habitat outside of the BSA, by a qualified biologist. • Contractor shall not use plastic monofilament netting which can entrap the FYLF. • The existing rubble from the failed retaining wall and RSP will be removed from the creek channel and the channel will be restored to a more natural condition. • In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants. • The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks and function as a stormwater treatment facility.	Incorporate into specifications Contractor to implement measures during construction Monitor replanting to meet success criteria Implement recommended protection measures as necessary	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Mitigation Measure BIO-5: Western Pond Turtle The following are avoidance and minimization measures required in order to avoid and minimize potential impacts to western pond turtles. • A qualified biologist shall conduct a preconstruction survey to determine presence of western pond turtle immediately prior to the start of in-channel work. If found, western pond turtles will be relocated to suitable habitat outside of the BSA by a qualified biologist. • If a western pond turtle is observed within the Project site, then personnel shall stop work within a 50-foot radius of the sighting and notify the biologist or resident engineer (RE). Work shall not resume within the 50-foot radius buffer until the western pond turtle has left the Project site on its own volition or has been relocated by the qualified biologist.	Incorporate into specifications Contractor to implement measures during construction Implement recommended protection measures as necessary	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes

Mitigation Measure BIO-6: Migratory Birds and Raptors
To avoid impacts to avian species of special concern or avian species protected under the MBTA and the CFGC, the following avoidance and minimization measures are recommended.
 	
The following are avoidance and minimization measures for California avian species of special concern and species protected under the MBTA and the CFGC.
 	
• Any vegetation removal and/or ground disturbance activities should take place during the avian non-breeding season (September 1 – January 31).
• If construction is to begin within the avian breeding season (February 1 – August 31) then a migratory bird and raptor survey shall be conducted within the BSA by a qualified biologist. A qualified biologist shall:
  • Conduct a protocol level survey for all birds protected by the MBTA and CFGC within seven (7) days prior to construction activities, and map all nests located within 200 feet of construction areas;
  • Develop buffer zones around active nests as recommended by a qualified biologist. Construction activity shall be prohibited within the buffer zones until the young have fledged or the nest fails. Nests shall be monitored at least once per week and a report submitted to the County monthly.
• If construction activities stop for more than ten (10) days then another migratory bird and raptor survey shall be conducted within seven (7) days prior to the continuation of construction activities.
• All staging and construction activity will be limited to designated areas within the BSA and designated routes for construction equipment shall be established in order to limit disturbance to the surrounding area.
	Incorporate into specifications
	
	Contractor to implement measures during construction
	
	Implement recommended protection measures as necessary
		Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Mitigation Measure BIO-7: Pallid Bat Avoidance If trees containing suitable bat habitat (i.e. sloughing bark, activities, or crevices) are removed between March 15 and August 31, a qualified biologist will conduct a preconstruction survey for roosting bats within seven days prior to tree removal. The survey will focus on suitable habitat to determine the absence or presence of roosting bats and type of roost within the tree. If the pre-construction survey determines that bats are not using the trees onsite as day roosts, then tree removal can proceed as planned. If the tree is being utilized as a day roost and the qualified biologist determines that it is a maternity roost, then removal of the tree will be postponed until consultation with CDFW occurs. If the roost is not a maternity roost or if tree removal occurs during the winter months (i.e. October 16 – February 14), then the following phased removal of the occupied tree will be implemented: • Day 1: All unoccupied roosting habitat (e.g. crevices, sloughing bark, cavities) should be removed or altered to make it less desirable for roosting. All portions of the tree that do not contain suitable habitat can be removed while avoiding occupied habitat. • Day 2: All remaining portion of the tree including suitable roosting habitat can be removed. A qualified biologist shall be onsite during tree removal activities if bats are detected.	Incorporate into specifications Contractor to implement measures during construction Implement recommended protection measures as necessary	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Mitigation Measure BIO-8: Tree Protection and Replacement Plan In accordance with the Mendocino County General Plan Policies RM-1, RM-27 and RM-28, Mendocino County shall preserve and protect trees in and adjacent to the Project area to the extent feasible. Prior to construction, an arborist certified by the International Society of Arboriculture shall conduct site surveys of the construction area and provide recommendations to ensure protection of trees and tree roots during construction activities such as the removal of the existing bridge abutments, the placement of new bridge abutments, re-contouring of the Mill Creek stream banks, and roadway widening. Tree protection measures could include minimizing grading as much as possible; protecting trees and roots with exclusion fencing; limiting access to areas with protected trees; limiting tree trimming to the minimum necessary for construction clearance and site and equipment access; and conforming to standard tree trimming practices designed to protect trees such as the International Society of Arboriculture Pruning Standards. Per the Mendocino County General Plan Policy RM-28, if oak woodland habitat is lost due to tree removal, replacement of lost oak woodlands or preservation of oak woodlands shall be provided at a 2:1 ratio. The arborist shall assist Mendocino County in determining the acreage of oak woodland lost, determining if on-site restoration is feasible, and locating an off-site location for mitigation if required. If replacement trees are required, the County shall implement a five-year maintenance and monitoring program in which the County shall inspect the mitigation planting area for the purpose of adapting maintenance techniques if necessary. Survival surveys shall be conducted biannually for five years. The County shall use the following sliding scale performance standard for evaluation of the restoration's success: • First year – 95% • Second year – 90% • Third year – 85% • Fourth year – 80% • Fifth year – 75% Trees shall be considered alive and healthy if they display noticeable growth and the presence of new shoots.	Incorporate into specifications Contractor to implement measures during construction	Mendocino County Department of Transportation			

Mitigation Measure BIO-9: Compensate for Impacts to Waters MDOT shall avoid impacts to waters to the extent feasible. If fill cannot be avoided MDOT shall compensate for impacts to creeks and other waters, by creation, restoration, or preservation of waters so that there is no net loss (1:1 ratio or as required by resource agencies). Required permits from the U.S. Army Corps of Engineers, the Regional Water Quality Control Board, and the California Department of Fish and Wildlife shall be received prior to that start of any on-site construction activity. MDOT shall ensure any and all additional measures outlined in the permits are implemented.	Incorporate protection and avoidance measures into specifications Acquire permits and fulfill compensatory mitigation requirements as defined by permits.	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Cultural Resources					
Mitigation Measure CR-1: Environmentally Sensitive Area Action Plan An Environmentally Sensitive Areas (ESAs) Action Plan has been developed, which presents specific methods and procedures for protecting the portions of archaeological sites outside the ADI portion of the APE. Untested areas, outside of the ADI shall be protected as ESAs as a standard condition (per Caltrans Section 106 PS Attachment 5). A combination of exclusionary fencing, flagging, signing, or monitoring to protect properties from direct physical damage by project related activities shall be implemented prior to and during construction.	Incorporate protection and avoidance measures into specifications Develop and implement ESA Action Plan throughout the life of construction activities.	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Mitigation Measure CR-2: Identify and Avoid or Minimize Impacts to Unknown Cultural Resources Mendocino County shall retain a qualified archaeologist to be present during initial ground disturbing activities to ensure that there are no prehistoric archaeological resources present within the vertical APE. These activities would include excavation of the existing concrete abutments, headwalls, and associated footings from the creek. If archaeological materials are encountered during construction activities, construction crews shall stop all work within 100 feet of the discovery until a qualified archaeologist can assess the discovery and provide recommendations. Such treatment and resolution could include modifying the Project to allow the materials to be left in place, or undertaking data recovery of the materials in accordance with standard archaeological methods. The preferred treatment of the resource is protection and preservation. Resources could include buried historic features, such as artifact-filled privies, wells, and refuse pits, and artifact deposits, along with concentrations of adobe, stone, or concrete walls or foundations, and concentrations of ceramic, glass, or metal materials. Native American archaeological materials could include obsidian and chert flaked stone tools (such as projectile points and knives), midden (darken soil created culturally from use and containing heat-affected rock, artifacts, animal bones, or shellfish remains), and/or groundstone implements (such as mortars and pestles). Project personnel shall not collect cultural materials.	Incorporate into final plans and specifications	Mendocino County Department of Transportation			

Mitigation Measure CR-3: Procedures for Encountering Human Remains If human remains are encountered as a result of construction activities, any work in the vicinity shall stop and the Mendocino County Coroner shall be contacted immediately. In addition, a qualified archaeologist shall be contacted immediately to evaluate the discovery, if a monitor is not already present. If the human remains are Native American in origin, then the Coroner shall notify the Native American Heritage Commission within 24 hours of this identification, pursuant to Public Resources Code 5097.98. California Health and Safety Code Section 7050.5 states that it is a misdemeanor to knowingly disturb a human grave.	Incorporate into final plans and specifications	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Geology / Soils					
Mitigation Measure GEO-1: Evaluation and Treatment of Paleontological Resources If paleontological resources (e.g., vertebrate bones, teeth, or abundant and well-preserved invertebrates or plants) are encountered during construction, Mendocino County shall ensure work in the immediate vicinity shall be diverted away from the find until a professional paleontologist assesses and salvages the find, if necessary.	Incorporate into final plans and specifications	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Hazards and Hazardous Materials					
MITIGATION HAZ-1: Hazard Material Screening Prior to site disturbance and demolition of the existing bridge, testing for asbestos containing material (ACM), lead-based paint and chemically treated wood and thermoplastic traffic stripping shall be conducted and appropriate methods of handling and disposal shall be implemented per the conditions of the ISA.	Conduct testing for hazardous materials identified in the ISA. Incorporate the results and recommendations into final plans and specifications	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Hydrology / Water Quality					
Mitigation Measure HWQ-1: Minimize Impacts to Robinson Creek During Construction MDOT or its contractor(s) shall prepare an Erosion and Sediment Control Plan prior to construction and implement it during construction to minimize impacts to Robinson Creek during Project construction. The Erosion and Sediment Control Plan shall include sufficient measures to address the overall construction of the Project and, at a minimum, construction contractors should undertake the following measures, as applicable, to minimize any adverse effects on water quality: • The amount of construction-related disturbance within the Robinson Creek channel and creek banks shall be limited to the extent practicable. • Where the creek channel is contoured to accommodate the new bridge, modifications to the existing stream banks shall provide a smooth transition into and out of the modified stream section. • Other disturbed stream banks shall be returned to pre-existing contours and natural conditions upon completion of work. • Construction equipment shall be cleaned and inspected prior to use. Servicing of vehicles shall be conducted a minimum of 100 feet from Mill Creek, at designated staging areas to avoid contamination through accidental drips and spills. • The Project shall comply with the Caltrans Construction Site BMP Manual section NS-13: Material and Equipment Use Over Water. • Dust, erosion, sedimentation control, and dewatering activities shall follow the 2018 Caltrans Standard Specifications.	Incorporate protection and avoidance measures into specifications Prepare Erosion and Sediment Control Plan Contractor to implement Erosion and Sediment Control Plan during construction	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
(HWQ-1 Continued) • On-site stockpiles shall be isolated with silt fence, filter fabric, and/or straw bales/fiber rolls. Silt fence and/or fiber rolls shall be placed at bridge abutments, new abutment excavation areas, and any other locations when work could result in loose sediment that could enter stream. The silt fence/fiber rolls shall be maintained and kept in place for the duration of the Project. Any sediment or debris captured by the fence/rolls shall be removed before the fence/rolls are pulled. As necessary additional erosion, sediment, and material stockpile BMPs shall be employed between work areas and adjacent waterway. No fill or runoff shall be allowed to enter the waterway. • The construction zone shall be kept free from litter by providing suitable disposal containers for trash and all construction-generated material wastes. These containers shall be emptied at regular intervals and the contents properly disposed. The containers shall have covers that can be completely closed and secured. • Hazardous materials shall be stored in an area protected from rainfall and stormwater run-on to prevent the offsite discharge of leaks or spills. • Portable sanitary facilities shall be located a minimum of 50 feet from the creek and maintained regularly to prevent the discharges of pollutants.	See previous page	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Mitigation Measure HWQ-2: Storm Water Control Measures During Construction MDOT shall obtain coverage under State Water Resources Control Board Order No. 2009-0009- DWQ, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities, as amended by 2010-0014-DWQ and 2012-0006- DWQ. MDOT and/or its contractor shall submit permit registration documents (notice of intent, risk assessment, site maps, Storm Water Pollution Prevention Plan (SWPPP), annual fee, and certifications) to the State Water Resources Control Board. The SWPPP shall address pollutant sources, non-storm water discharges, best management practices, and other requirements specified in the above-mentioned Order. The SWPPP shall also include dust control practices to prevent wind erosion, sediment tracking, dust generation by construction equipment, management of concrete slurry, asphalt, pavement cutting, and other street and road activities to avoid discharge to storm drains from such work. The SWP shall be prepared in accordance with Caltrans SWPPP and Water Pollution Control Program Preparation Manual (Caltrans 2016).A Qualified Storm Water Pollution Prevention Plan Practitioner shall oversee implementation of the Plan, including visual inspections, sampling and analysis, and ensuring overall compliance.	Prepare SWPPP and permit registration documents prior to construction. Contractor to provide Qualified Storm Water Pollution Prevention Plan Practitioner to oversee SWPPP implementation	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Noise					
Mitigation Measure NOI-1: Reduce Construction Noise • Project construction activities should occur during daytime hours only (as proposed). • All noise-producing equipment and vehicles using internal combustion engines shall be equipped with manufacturers-recommended mufflers (pursuant to Section 14- 8.02 of Caltrans standard specifications). • Nearby residences shall be notified of construction schedules so that arrangements can be made (if desired) to limit their exposure to short-term increases in ambient noise levels.	Incorporate requirements and construction best management practices into specifications Implement best management practices during construction Notify adjacent sensitive receptors	Mendocino County Department of Transportation			

Mitigation Measure	Timeframe for Implementation	Responsible Monitoring Agency	Verification of Compliance		
			Agency & Initials	Date	Notes
Tribal Cultural Resources					
Mitigation Measure TCR-1: Tribal Cultural Resources: If potential tribal cultural resources are uncovered, the County shall halt work, and workers shall avoid altering the materials and their context. Project personnel shall not collect cultural materials. MDOT shall notify California Native American tribes culturally affiliated with the Project area. MDOT, in coordination with Native American tribes, shall determine if the resource qualifies as a tribal cultural resource under CEQA. If it does, then all work must remain stopped in the immediate vicinity to allow evaluation of any materials. MDOT shall ensure that qualified resources are avoided or protected in place, in accordance with the requests of Native American tribes, to the extent feasible. Work may proceed on other parts of the project while mitigation for tribal cultural resources is being carried out.	Incorporate into specifications	Mendocino County Department of Transportation			

VI. REFERENCES

Alta Archaeological Consulting (Alta). 2020a. Archaeological Evaluation Report (Phase II) Lambert Lane (10c-0146) Over Robinson Creek Bridge Replacement Project, Boonville, Mendocino County, California

Alta Archaeological Consulting (Alta). 2020b Archaeological Survey Report Lambert Lane Bridge (10c-0146) Over Robinson Creek Replacement Project Boonville, Mendocino County, California

Alta Archaeological Consulting (Alta). 2020c. Extended Phase I (XPI) Report Lambert Lane Over Robinson Creek Bridge Number 10c-00146 Mendocino County, California

Bollard Acoustical Consultants, Inc. 2020. Construction Noise Memo Robinson Creek Bridge Replacement Project – Mendocino County, California.

California Air Resources Board. 2020c. Area Designations for State/Federal Ambient Air Quality Standards. https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations

California Department of Conservation (CDC). 2020. Mendocino County Williamson Act.

California Department of Conservation, Division of Land Resource Protection. Farmland Mapping and Monitoring Program. Mendocino County Important Farmland 2018 Online resource: https://www.conservation.ca.gov/dlrp/fmmp/Pages/Mendocino.aspx

California Department of Forestry and Fire Protection. 2020. Fire Hazard Severity Zones (Adopted in 2017). https://databasin.org/datasets/fbb8a20def844e168aeb7beb1a7e74bc.

California Department of Toxic Substances Control (DTSC). 2021. EnviroStor Online Database. Website: https://www.envirostor.dtsc.ca.gov/public/.

Crawford & Associates, Inc. 2016. Initial Site Assessment Robinson Creek Bridge Replacement on Lambert Lane Boonville, Mendocino County, California

Crawford & Associates, Inc. 2016. Preliminary Foundation Report Robinson Creek Bridge Replacement on Lambert Lane Boonville, Mendocino County, California

County of Mendocino. 1998. Title 20—Division II of The Mendocino County Code, Appendix C – Exterior Noise Limit Standards.

County of Mendocino. 2009. Mendocino County General Plan. August.

County of Mendocino. 2016. Emergency Operations Plan. September.

County of Mendocino Air Quality Management District. (MCAQMD). 2013. Advisory; District Interim CEQA Criteria and GHG Pollutants Thresholds. December.

County of Mendocino Airport Land Use Commission. 1996. Mendocino County Airport Comprehensive Land Use Plan. Adopted October 21, 1993, Revised June 6, 1996.

County of Mendocino - Mendocino County Air Pollution Control District. 2010. Regulations of the Air Pollution Control District of Mendocino County

FEMA. 2010. Flood Insurance Rate Maps. Map ID -06045C1663F https://msc.fema.gov/portal/search 2020.

Gallaway Enterprises. 2020. Natural Environment Study Robinson Creek Bridge Replacement on Lambert Lane

Gallaway Enterprises. 2020. Draft Delineation of Jurisdictional Waters of the United States Robinson Creek Bridge Replacement on Lambert Lane

Gallaway Enterprises. 2020. Farmlands Study for the Robinson Creek Bridge Replacement on Lambert Lane Project

Michael Love & Associates (MLA). 2019. Robinson Creek Channel Design Report for the Lambert Land Bridge Replacement Project.

North Coast Regional Water Quality Control Board (NCRWQCB). 2018. Water Quality Control Plan for the North Coast Region.

State of California Department of Water Resources Memorandum of Understanding Regarding the Use and Maintenance of the California Watershed Map by the California Interagency Watershed Mapping Committee (CIWMC, 1998 - 2000). http://cain.nbii.gov/calwater/. Accessed 1/18/2021.

State Water Resources Control Board. 2020. http://geotracker.swrcb.ca.gov.

U.S. EPA. 2011. Final California 2010 Integrated Report (303(d) List/305(b) Report). October 11. Updated May 24, 2012.

Wreco. 2018. Location Hydraulic Study Report, Robinson Creek Bridge Replacement on Lambert Lane

Wreco. 2018. Bridge Design Hydraulic Study Report, Robinson Creek Bridge Replacement on Lambert Lane

Appendix A:
Robinson Creek Channel Design Report

Robinson Creek Bridge Replacement on Lambert Lane,
Mendocino California

Robinson Creek Channel Design Report for the Lambert Lane Bridge Replacement Project

Federal-Aid Project No. BLO-5910(099)

Mendocino County Project No. B1302

Existing Bridge No. 10C0146

Prepared for:

Quincy Engineering
and
County of Mendocino Department of Public Works

Prepared by:

Michael Love & Associates
Hydrologic Solutions
PO Box 4477 • Arcata, CA 95518 • (707) 822-2411

March 2019

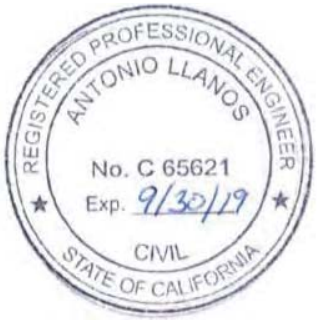
Robinson Creek Channel Design Report for the Lambert Lane Bridge Replacement Project

Prepared for:

County of Mendocino Department of Public Works

Quincy Engineering

Prepared by:



Antonio Llanos, P.E.
Project Engineer
License No. C65621
Michael Love & Associates, Inc.
llanos@h2odesigns.com • (707) 826-2411 x2

Michael Love P.E.
Principal Engineer
License No. C71681
Michael Love & Associates, Inc.
mlove@h2odesigns.com • (707) 826-2411 x1

March 2019

Cover Photo: Oak tree recently fallen into Robinson Creek upstream of Lambert Lane following bank erosion.

Table of Contents

Appendices

1 INTRODUCTION

1.1 Purpose of Report

The purpose of this report is to summarize the channel design for a bridge replacement project on Lambert Lane at Robinson Creek, a tributary to Anderson Creek, in the unincorporated community of Boonville, Mendocino County, California. The bridge replacement designs are being developed by Quincy Engineering for the county and is intended to replace an obsolete and scour critical bridge.

1.2 Project Background

The County of Mendocino and the California Department of Transportation (Caltrans), are planning to replace Lambert Lane Bridge at Robinson Creek (Bridge No. 10C0146). Lambert Lane crosses Robinson Creek approximately 2,860 linear feet upstream of the confluence with Anderson Creek and 500 feet west of State Route SR128 (Figure 1). The contributing drainage area at the bridge crossing is approximately 4.0 square miles. The bridge has been labelled functionally obsolete and is scour critical. Originally built in 1954, the existing 32-foot long single span bridge is supported on concrete abutments founded on spread footings which were placed on the alluvial channel material. Caltrans has noted hydraulic undermining of the abutments since the year 2000. In February 2015 a retaining wall along the roadway embankment on the upstream side of the western bridge approach collapsed, falling across the stream channel. This created a flow obstruction that further increased scour of the bridge foundation. As an emergency measure the county placed riprap at the base of the roadway and later pumped concrete underneath the undermined footing and formed a concrete skirt in front of the exposed footing, as seen in Figure 2.

Previous work has been conducted by Quincy Engineering in partnership with County of Mendocino Department of Public Works, including a Bridge Design Hydraulic Study (2018) and Project Report (2018). These works provide the basis for design of the proposed bridge replacement. Michael Love & Associates, Inc. (MLA) has been contracted to develop the geomorphic design and stabilization measures for the stream channel within the bridge replacement project reach, which is described within this report.

1.3 Fisheries Habitat and Fish Passage

Robinson Creek is a tributary to Anderson Creek within the Navarro River watershed. Robinson Creek is designated as critical habitat for Northern California steelhead, which is federally listed as a threatened species. Streamflows within Robinson Creek are intermittent, with the channel drying by early summer. These conditions suggest that the habitat available in lower Robinson Creek is primarily suitable for spawning and over-winter rearing for steelhead.

A fish passage assessment of stream crossings was conducted by RTA (2001). Because the Lambert Lane bridge is a channel spanning crossing, it was considered to provide unimpeded fish passage and was not included in the assessment. However, under current conditions, the failed retaining wall and associated riprap creates a 3-foot water surface drop, which classifies the current conditions as a barrier to adult and juvenile steelhead based on California Department of Fish and Wildlife fish passage assessment guidelines (CDFG, 2002). Channel restoration designs for the site should satisfy current fish passage standards, as described in CDFG (2009) and NMFS (2001).

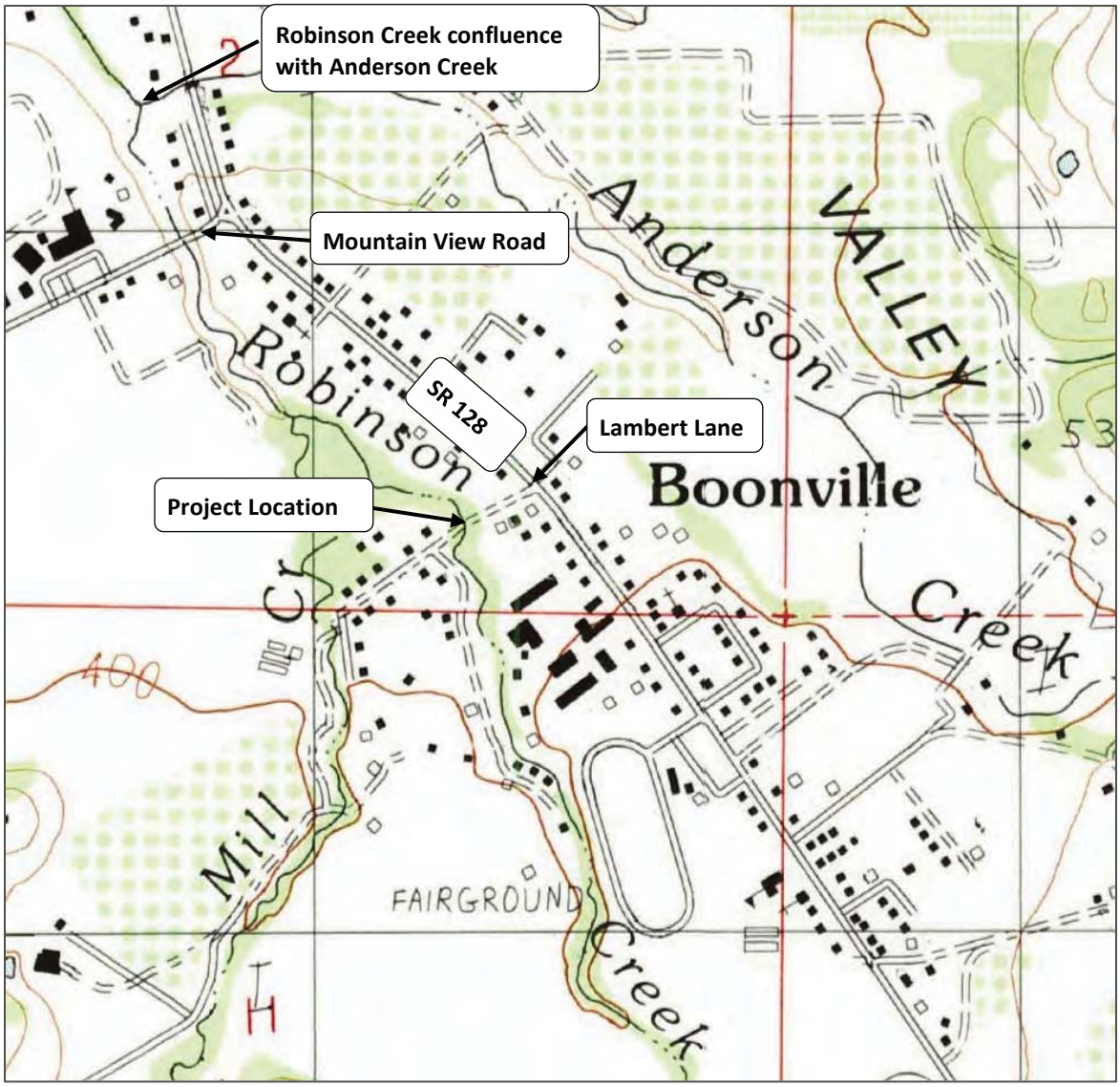


Figure 1. Project location for bridge replacement on Lambert Lane at Robinson Creek, Boonville, Mendocino County, California.

Figure 2. Current condition of the channel at the Lambert Lane Bridge, with (a) riprap placed along roadway embankment at location of collapsed retaining wall and (b) a new concrete skirt along the undermined footing.

1.4 Previous Studies of Geomorphic Channel Conditions

Changing geomorphic conditions within Robinson Creek and downstream Anderson Creek have been noted for decades. Channel incision (lowering of the channel bed) and channel bank erosion along Robinson Creek was noted as a significant source of sediment production within the 1998 Navarro River Watershed Restoration Plan. Incision has caused scour and undermining of bridge foundations, leading to the replacement of the Highway 128 crossing of Anderson Creek immediately upstream of the confluence of Robinson Creek and replacement of the Mountain View Road bridge crossing over Robinson Creek, downstream of Lambert Lane. Also, channel widening associated with incision processes has caused severe bank erosion threatening adjoining structures and resulting in loss of mature riparian vegetation throughout lower Robinson Creek,

The Mendocino County Resource Conservation District (RCD) and the Mendocino County Water Agency conducted studies of channel conditions to characterize the ongoing channel adjustments in Robinson Creek, focusing on the reach from the confluence with Anderson Creek to the Mendocino County Fair Grounds upstream of Lambert Lane. This included conducting profile surveys of the channel thalweg and surveys of channel cross sections in 2005 to document the channel morphology. Florsheim (2006) prepared a baseline assessment of bio-geomorphic conditions within lower Robison Creek for the RCD, and identified channel incision as the dominant process causing the observed channel instabilities. Follow-up monitoring surveys of the lower Robinson Creek channel thalweg were conducted in 2008, which found the channel showed signs of aggradation near the confluence with Anderson Creek, but also showed signs of incision within a reach between Mountain View Road and Lambert Lane bridge crossings (Florsheim, 2008). These findings were further described in a 2013 peer-reviewed publication (Florsheim et al., 2013). The RCD provided the original data from the 2005 and 2008 county surveys to MLA to compare to current channel conditions at the Lambert Lane bridge replacement project.

1.5 Channel Restoration Design Approach

Development of the channel restoration design for the bridge replacement project involved:

- Reviewing previous geomorphic studies and data for Robinson Creek,
- Characterizing existing geomorphic processes related to previously noted channel incision and widening that may influence the project channel reach
- Identifying the design channel profile and estimate the potential range in variability of the channel bed elevation resulting from future incision or aggradation processes
- Identifying appropriate channel dimension based on a characterization of a stream reference reach
- Identifying appropriate bank treatments based on hydraulic forces acting on the streambanks within the project reach

Channel design followed stream simulation methodology from USFS (2008) and bank stabilization measures from Caltrans design documents, as referenced within this report. The channel design is intended to provide geomorphically stable channel geometry while protecting the roadway embankment and vulnerable streambanks with hybrid RSP revetments where required due to risk of scour and lateral channel migration.

2 STREAM CHANNEL GEOMORPHIC CHARACTERIZATION

The proposed stream channel component of the replacement crossing was designed using the stream simulation approach outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFG, 2009) and by the USFS (2008). The stream simulation approach is a geomorphically-based approach that requires a channel-spanning crossing structure with adequate capacity to convey the 100-year flow. The channel grading should seamlessly connect with the upstream and downstream channel profiles and the streambed should be composed of native material that is as mobile as bed material within the adjacent channel reaches. The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing and channel bed.

2.1 Field Activities

2.1.1 Lower Robinson Creek Reconnaissance and Observations

On September 12, 2018 staff from MLA walked Robinson Creek stream channel from the confluence with Anderson Creek to the bridge crossing at the Mendocino County Fair Grounds. In general, the channel appeared to be relatively stable vertically, with no obvious knickpoints. The channel morphology is characterized as gravel/cobble bedded pool and riffle with fairly shallow residual pool depths. Primary features forcing the channel morphology and pool scour appear to be channel constrictions, flow obstructions and wood recruitment from bank failures.

From upstream to downstream the channel widens, and the terraces that form the valley floor get higher above the channel bed, with heights ranging from 15 to 25 feet increasing in the downstream direction. Active bank erosion sites are located at numerous locations throughout lower Robinson Creek. Indicators suggest that the channel incision process noted by Florsheim (2006 and 2008) has slowed or stopped and the channel is actively widening due to the oversteepened banks created by incision. Several locations were recently treated for bank erosion, which involved use of both large rock and vegetation treatments (live willow stakes).

2.1.2 Geomorphic Site Surveys

On September 12 and 13, 2018 staff from MLA conducted a geomorphic survey of the stream channel extending 500 feet downstream and 1,182 feet upstream of Lambert Lane using a Trimble S7 robotic total station. The survey datum was State Plane Zone 2 in the horizontal and NAVD88 in the vertical based on survey control established by SHN for the project. At the time of the survey the channel was dry.

The geomorphic survey consisted of a longitudinal profile of the channel thalweg extending a total distance of 1,682 feet. The profile includes breaks in slope, such as riffle crests and pool bottoms. In addition to the thalweg, the margins of the actively scoured channel bed were surveyed. In potential reference reaches, persistent inset benches above the bankfull channel bed were also surveyed. Downstream of Lambert Lane the bases of several streamside heritage bay trees were also surveyed as indicators of historical incision.

A series of five channel cross sections were surveyed upstream and four downstream of Lambert Lane for use in developing reference reach channel geometry and to extend the project hydraulic model further upstream and downstream beyond the topographic survey limits provided by SHN. Cross sections noted geomorphic features, including active channel margins, bankfull indicators, and tops of inset benches.

Pebble counts were conducted at three locations upstream of Lambert Lane to characterize the bedload gradation that will be delivered to the project reach. A potential reference reach was identified and field sketches were prepared. An annotated map of the assessed channel reach is provided in Figure 3 showing the location of the reference reach, surveyed cross sections (XS) and pebble counts (PC), along with noted locations of active bank erosion and bank armoring. Additional geomorphic field data is provided in Appendix B.

2.2 Comparison of 2005, 2008, 2016, and 2018 Channel Profiles

The RCD provided the original spreadsheets containing the 2005 and 2008 channel thalweg survey conducted by the county. The county's profiles begin at station 0+00 at the confluence with Anderson Creek. The elevation data, which was in vertical datum NAVD29 was converted to NAVD88 by adding 2.971 feet to the surveyed elevations. The MLA 2018 thalweg was then overlaid onto the previous surveys along with the 2016 project survey by SHN, as shown in Figure 4.

Comparison of the profiles found them to be relatively consistent through time. As noted by Florsheim (2008), some channel aggradation was observed between 2005 and 2008 in the lower 300 feet of Robinson Creek and at the confluence with Anderson Creek, suggesting that incision originating from downstream has ceased. Also, comparing the 2005 to 2008 profiles shows some lowering of the channel bed between stations 16+00 and 21+00. This reach is located at the confluence of Mill Creek, and has recently experienced extreme channel bank erosion and widening, causing the channel bed to lose confinement. This appears to be the cause of the localized lowering of the stream profile within this reach, and does not appear to be due to headward migrating incision.

The overall slope of the channel is relatively constant from the Mountain View Road bridge crossing to the bridge at the County Fair Grounds, averaging approximately 1.19%. Plotting the overall profile highlights a 500-foot section of locally aggraded channel upstream of Lambert Lane extending from station 30+00 to 35+00. Field inspection of this reach suggests the aggradation is caused in whole or in part by backwater affects created by sharp channel bends associated with the Lambert Lane bridge approach. Between 2008 and 2016 additional sediment aggradation has occurred closer to the bridge crossing as a result of a flow obstruction created by the collapsed retaining wall and associated riprap.

2.3 Local Scour and Aggradation downstream of Lambert Lane

Under the bridge, the right (looking downstream) footing has experienced significant local scour caused in part by flow plunging over the failed retaining wall being directed into the footing. In 2018 the scour depth along the right footing had increased to 5 feet, partially undermining the recent interim repair.

Immediately downstream of the bridge there is a tight left bend in the channel. The bank along the outside of the bend located on the property of the Boonville Hotel is oversteepened and actively eroding (Figure 5). The resulting bank failures have toppled numerous mature trees into the channel, creating a large wood jam near station 28+00. This bank failure started in 2012 with the loss of a heritage oak tree (personal communication, Linda MacElwee, RCD), but became more extensive during the winter of 2017. Between the 2016 and 2018 surveys, the height of the channel bed upstream of the large wood jam aggraded approximately 1.6 feet.

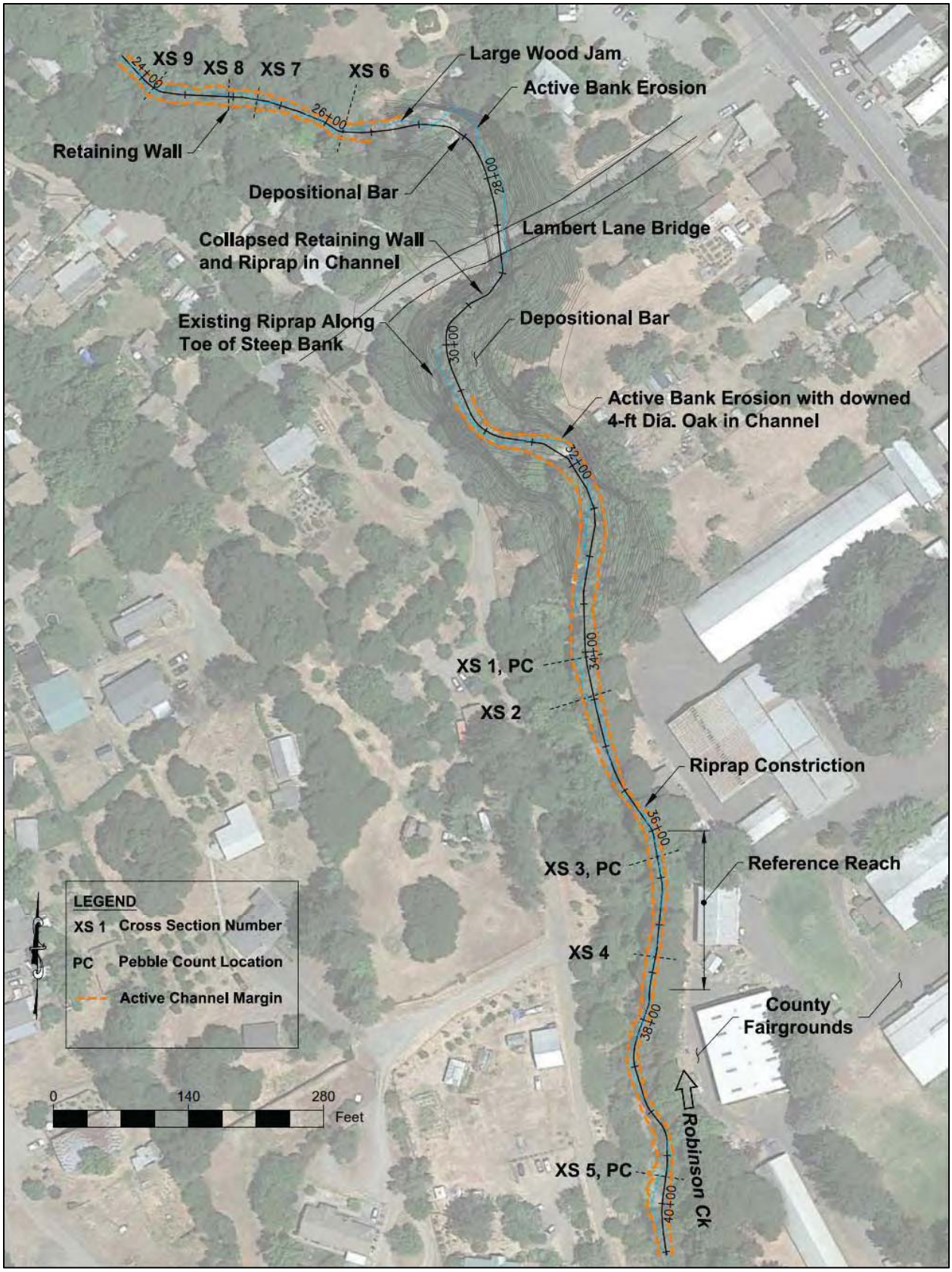


Figure 3. Robinson Creek plan view extents of the geomorphic survey of the channel.

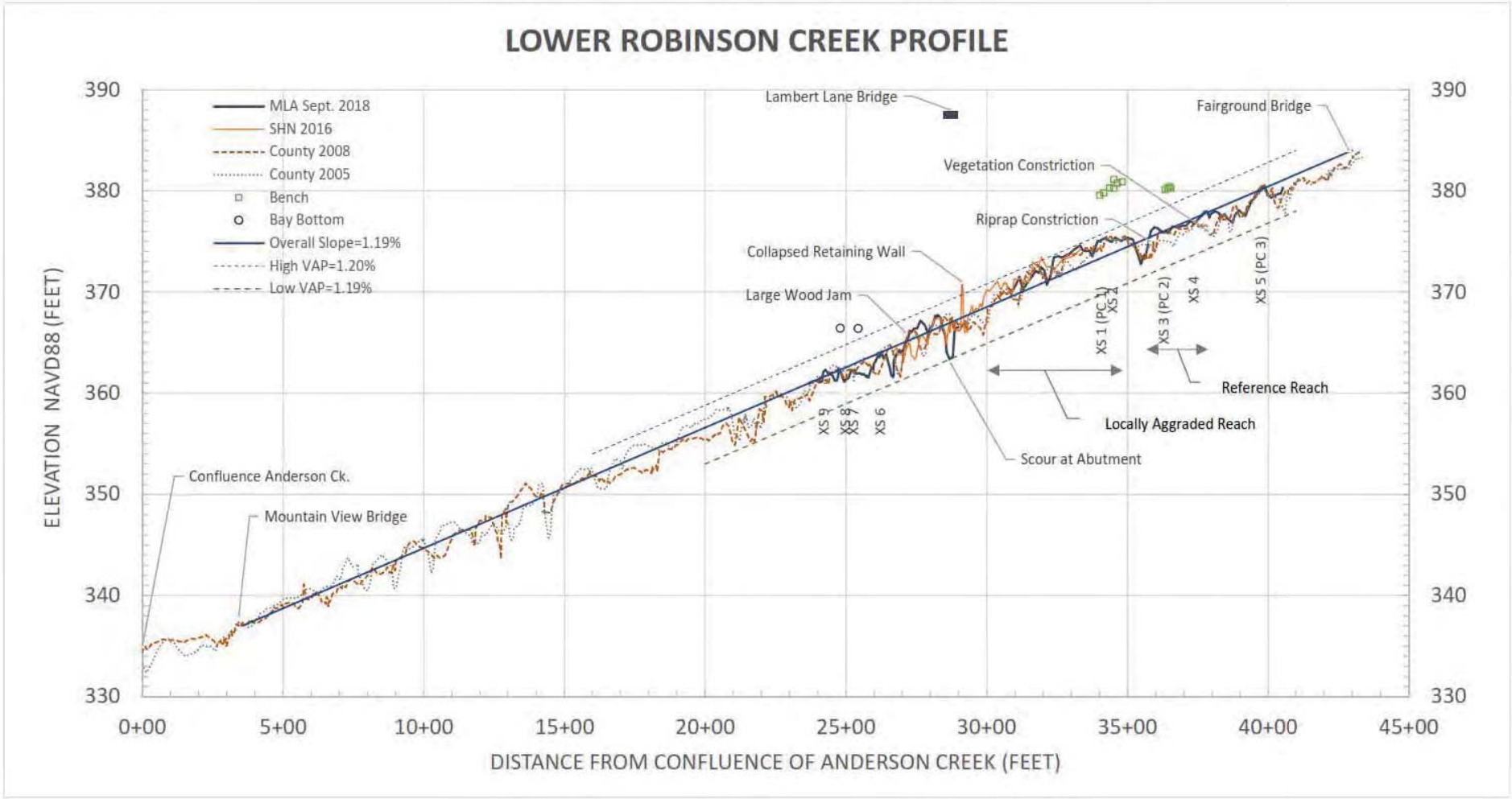


Figure 4. Channel thalweg profile showing the MLA survey (2018), SHN survey (2016), and County surveys from 2008 and 2005. Estimated overall channel profile and high and low vertical adjustment potential (VAP) profiles through the project reach are also shown.

Figure 5. Looking downstream at the active bank failure and local sediment aggradation upstream of large wood jam, 150 feet downstream of the Lambert Lane bridge (near station 27+50).

2.4 Stream Sinuosity

The channel has moderate sinuosity from upstream of Mountain View Road to approximately station 27+00. Beginning at station 27+00 to approximately 33+00 the channel sinuosity increases substantially, with the Lambert Lane crossing located within the most sinuous section of this reach (Figure 3). The Lambert Lane bridge crossing is located on an s-curve within the channel. The bridge is at the beginning of a tight meander towards the left. Downstream this meander continues bending left, causing the extensive bank failure and resulting large wood jam previously described.

Upstream of the Lambert Lane bridge the partially failed retaining walls and road embankment is on the outside of a right bend within the channel. On the inside of the bend there is a depositional bar that appears to have formed relatively recently (since construction of the bridge), likely in-part due to backwater affects from the abrupt turn in the channel as it approaches the bridge. The bar appears to have sharpened the radius of the channel bend and pushed the channel thalweg up against the retaining wall along the road embankment and against the nearly vertical bank upstream of the retaining wall, where riprap has been placed.

Farther upstream there is another meander bend near station 32+00. The bank along the outside of the bend is oversteepened and actively eroding, and caused a 4-foot diameter oak tree to topple into the channel. Upstream of this bend the channel is relatively straight, with low sinuosity.

2.5 Discussion of Geomorphic Conditions

The lower reach of Robinson Creek does not appear to be incising since the 2005 survey, and has transitioned to the widening stage of channel development, as described by Schumm et al. (1984). This is expressed by the frequent bank failure and in-channel deposition. Localized aggradation was observed upstream of the crossing, caused by the sharp bend and obstructed flow at the bridge and

from a large wood jam downstream of the bridge that resulted from bank failure at the bend immediately downstream of the crossing.

Pools were generally shallow, however deeper pools observed in the profile were usually forced by constrictions from riprap placement and flow obstructions from wood jams resulting from bank failure. The dominant bed material can be characterized as very coarse gravel with a large percentage of cobble. The bed material has minimal embeddedness, suggesting it is frequently mobilized.

2.6 Overall Slope and Channel Vertical Adjustment Potential (VAP)

Developing stream crossing and bank revetment designs requires consideration of the degree that the channel bed may aggrade or degrade (incise). This is accomplished through geomorphic interpretation of the channel thalweg profile, documented historical channel adjustments, and field observations of channel features, including depth of pools, location of riffle crests, height of banks, longevity of wood controls, and potential for increases or decreases in coarse sediment loads. Through this process, low and high "vertical adjustment potential" (VAP) profiles are plotted following methods outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFW, 2009) and in USFS (2008).

The outcome of the channel VAP evaluation is the low and high VAP profiles and the current stable channel profile through the project reach. These VAP profiles define the estimated bounds of vertical channel adjustment that may occur in the project reach over the next several decades. The channel VAP profiles are based on both quantitative and qualitative evaluations with uncertainty inherent in their nature, which should be considered when developing engineering designs. The VAP profiles do not consider local scour, which is accounted for using other methods, but rather are based on reach scale aggradation or degradation potential.

2.6.1 Estimated Low Vertical Adjustment Potential (VAP) Profile

The low VAP profile is typically used as part of the overall scour analysis for setting the bottom of bridge footings and bank revetments. The estimated low VAP profile is shown on Figure 5 and Figure 6. This was estimated based on the interpretation that the channel incision process has slowed or stopped, with no substantial vertical adjustment between 2005 and 2018. Additionally, the channel bed of Anderson Creek at the confluence with Robinson Creek appears to be stable or aggrading. Therefore, the lowest points along the channel profile between station 20+00 and 43+00 were used to estimate the low VAP profile. The resulting profile has a slope equal to the overall slope of 1.19%, but is offset approximately 4 feet lower in elevation.

2.6.2 Estimated High Vertical Adjustment Potential (VAP) Profile

The high VAP profile is typically used to evaluate hydraulic conditions if the channel aggrades. This is applied when setting the top elevation for bank revetments and setting the soffit elevations for road-stream crossings. For the project reach, the high VAP profile was based in part on the likelihood that upstream locally aggraded sediments, as seen in Figure 5, will be released in response to a new larger bridge crossing and less abrupt channel bends. This sediment release could temporarily aggrade the channel within the project reach. Additionally, long-term aggradation could occur due to ongoing bank erosion and widening, leading to an overall increase in sediment supply. Therefore, the high VAP profile was set based on the current elevation of the aggraded channel reach, placing it approximately 2 feet higher than the overall channel profile as shown in Figure 6. The result is an estimated 6-foot range in potential channel bed elevations within the project reach during the next several decades.

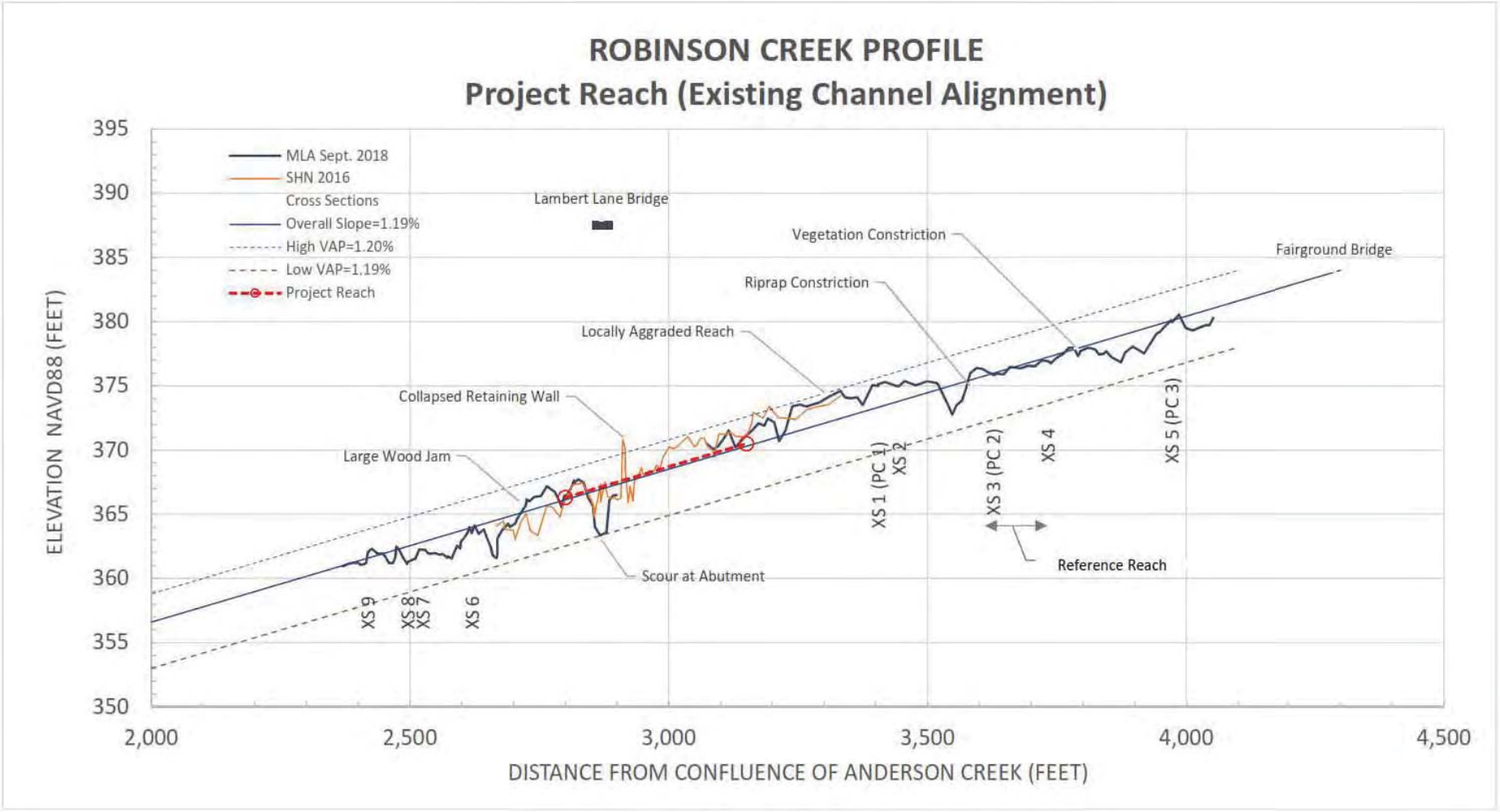


Figure 6: Robinson Creek channel thalweg profile upstream and downstream of the existing bridge crossing at Lambert Lane. Also plotted are the overall channel slope based on the entire lower Robinson Creek profile, the current project extents, and the low and high vertical adjustment potential (VAP) profiles for the project.

2.7 Hydrology

The contributing watershed area at the Lambert Lane crossing is approximately 4.0 square miles and is characterized by second growth forests in the steeper headwaters that drain into the agricultural land of Anderson Valley. The estimated mean annual precipitation for the watershed is 44.2 inches per year (USGS, 2018). A summary of basin statistics is provided in Appendix C.

The Draft Bridge Design Hydraulic Study Report by WRECO (2018) included estimates of the 50-year and 100-year return period flows calculated using two methods: the USGS North Coast regression equations (Gotvald et al. 2012) and the USACE rainfall-runoff model, HEC-HMS. WRECO (2018) selected the HEC-HMS 50- and 100-year flows of 1,340 and 1,750 cubic feet per second (cfs) for design of the Robinson Creek Bridge Replacement Project.

The USGS regression equations provide estimates of peak flows for return periods as low as the 2-year flow. Frequently occurring peak flows with return periods of 1.2 to 2.5 years are often the "channel forming flows" that convey the most sediment through time (Wollman & Miller, 1960; Leopold, 2005). There is also often a break in slope and change in vegetation within the channel cross section associated with the stream stage at the channel forming flow, which is referred to as "bankfull". Therefore, to evaluate the channel hydraulic geometry, peak flows with these return periods were estimated by extrapolating the flows from the USGS regression using a log-linear regression. The estimated peak flows for the various return periods are provided in Table 1.

2.8 Representative Channel Geometry

Nine channel cross sections were surveyed as part of the geomorphic assessment and used to measure active channel width, bankfull width, and bankfull depth. In addition to these sections, the survey captured the left and right margins of the active channel bed and heights of inset benches above the thalweg. Averages of active channel width, bankfull width, and bankfull depth were computed and are provide Table 2. The typical bankfull depth and width was 2.3 feet and 25 feet, respectively. These values were used to determine the appropriate dimensions for the channel within the project reach.

2.9 Reference Reach Selection and Characterization

The reference reach is a selected section of channel that serves as a template for design of the project channel. The reference reach should have a similar drainage area and slope as the project reach and appear geomorphically stable. Ideally, it would also have a similar planform sinuosity as the project reach. Three reaches were surveyed and assessed for use as a reference reach for channel design. The reach containing cross sections (XS) 3 and 4 was selected, although it is relatively straight compared to the project reach (Figure 3). This reference reach is upstream of the aggraded sediment from the bridge crossing and has a slope that is close to the overall channel slope of 1.19% at the project site (Figure 4 and Figure 6). Cross sections, a pebble count of the bed material was conducted and site sketch prepared for the reference reach.

Table 1: Estimated peak flows for various return periods in Robinson Creek at Lambert Lane. Extrapolated values are indicated with (*).

Return Period of Peak Flow	Peak Flows Robinson Creek at Lambert Lane	
	North Coast Regional Regression Equations	HEC-HMS (from WRECO, 2018)
1.01-Year	77 cfs*	
1.2-Year	126 cfs*	
1.5-Year	187 cfs*	
2-Year	264 cfs	
5-Year	517 cfs	
10-Year	700 cfs	
25-Year	943 cfs	
50-Year	1,130 cfs	1,340 cfs
100-Year	1,320 cfs	1,750 cfs

Table 2: Measured channel dimensions upstream and downstream of the Lambert Lane crossing. The selected Reference Reach is indicated with (*).

Upstream of Lambert Lane				
Cross Section Location		**Active Channel Width (ft)**	**Bankfull Width (ft)**	**Bankfull Depth (ft)**
XS 1	STA 34+05	26.2	29.9	2.2
XS 2	STA 34+45	19.5	25	2.7 / 2.3
XS 3*	STA 36+27	15.4	21.4	2.4
XS 4*	STA 37+33	13.3	24.8	2.2
XS 5	STA 39+72	24.8	31.7	2.1
	Average:	**19.8**	**26.6**	**2.3**
Downstream of Lambert Lane				
Cross Section Location		**Active Channel Width (ft)**	**Bankfull Width (ft)**	**Bankfull Depth (ft)**
XS 9	STA 24+20	17	23.7	1.8 / 2.1
XS 8	STA 24+95	18.1	19.6	
XS 7	STA25+25	19.7	25	2.3
XS 6	STA 26+20	19.6	28.8	2.6
	Average:	**18.6**	**24.3**	**2.2**

2.9.1 Description

The reference reach has an average actively scoured bottom width of 14.4 feet and average bankfull width and depth of 23.1 feet and 2.3 feet, respectively. The reach has an inset floodplain bench running along its entire left side of the channel (looking downstream), as seen in Figure 7. This bench is consistently about 3.8 feet above the channel thalweg. There is also a discontinuous floodplain bench on the right side of the channel that is slightly lower in height. Cross section 3 is on the outside of a left bend in the reference reach. The thalweg is against the right bank, on the outside of the bend, and there is a gentle upward sloping point bar within the actively scoured channel (Figure 8).

The floodplain benches do not appear to be formed through deposition from overbank flows in the stream. Instead, they may be remnants of the historical channel bed prior to an incision event, as suggested by Florsheim (2006). As such, their inundation may not coincide to frequently occurring flows.

Figure 7. Looking upstream at selected reference reach, with typical channel cross section and location of inset floodplain bench noted.

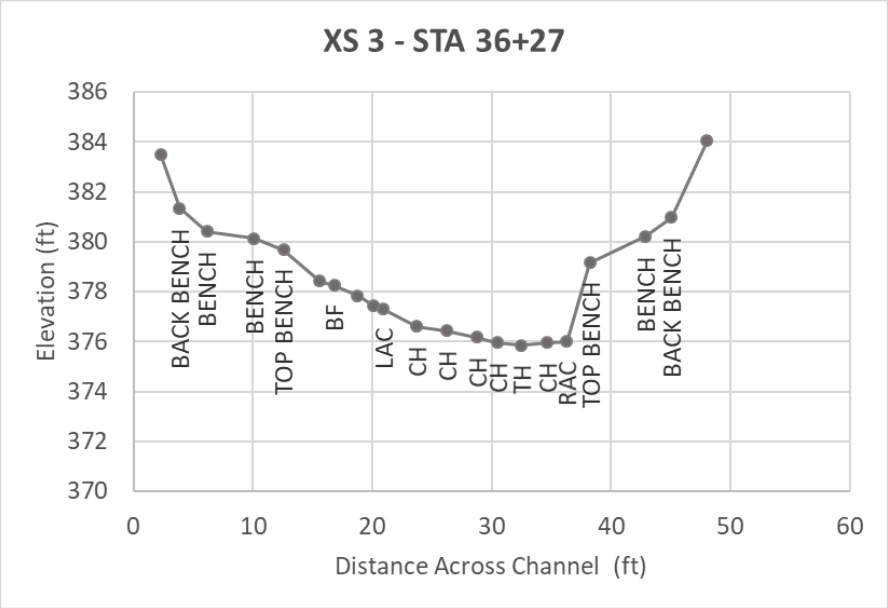


Figure 8. Reference reach cross sections, looking downstream, with typical bench geometry. Where LAC and RAC are left and right sides of active channel, BF is bankfull, and TH is thalweg.

2.9.2 Streambed Material

Pebble counts of the surface streambed material were conducted at three locations upstream of the Lambert Lane crossing to characterize the sediment size (Figure 9). Pebble count (PC) 1 was the furthest downstream and well within the influence of the existing bridge and failed retaining wall. It had substantially finer material than the other two pebble counts. PC-2 was within the reference reach. The median particle size within this reach was very coarse gravel (64 mm) and the D84 was medium cobble (128 mm).

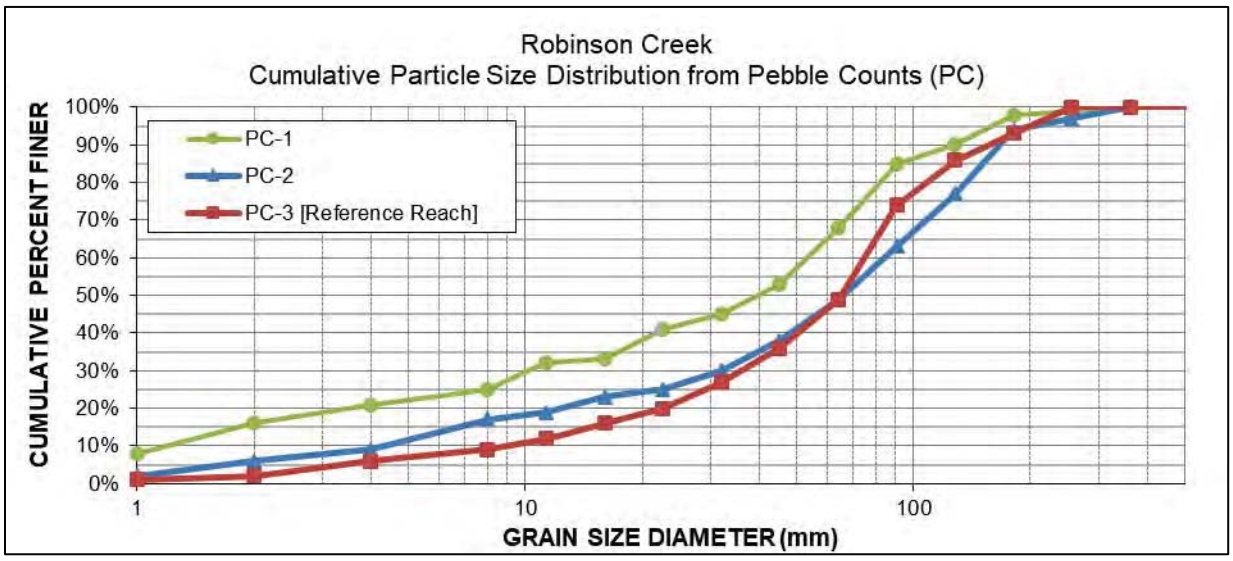


Figure 9. Gradation of streambed material from pebble counts in Robinson Creek upstream of Lambert Lane. PC-1 is closest to the bridge crossing.

2.9.3 Bankfull Capacity and Shear Stress in Reference Reach

The nine cross sections surveyed as part of the geomorphic assessment were added to the existing conditions HEC-RAS steady-state 1-D model (Appendix D) that was prepared by WRECO (2018). This model was then used to evaluate channel flow conveyance relative to geomorphic features within the reference reach, including bankfull flow. Model roughness coefficients for existing conditions matched the WRECO model, which is discussed in Section 4.1.1.

Water levels for cross section 3 within the reference reach are shown in Figure 10. Results indicate that the field indicators for bankfull correspond approximately with the 1.2-year flow. The right bench elevation becomes inundated at the 2-year return flow while the left bench inundates between a 2-year and 5-year flow. The infrequency of flows inundating the benches supports that they are likely due to recent incision within the reach. As previously noted, field evidence suggests the benches are remnants of the historical channel bed prior to an incision event.

Water velocity and channel shear stress for flows with 1- to 5-year return periods is shown in Figure 11. At 1.2-year bankfull flow of 126 cfs the cross-sectional average channel velocity is 3.9 ft/s and shear stress is 0.76 lb/ft^2. Bankfull flow is typically associated with initiation of bedload movement. Using a dimensionless Shields parameter of 0.052 for very coarse gravel (Julien, 1998), the median particle size, the estimated critical shear stress to initiate movement ranges between 0.54 and 1.12 lb/ft^2. This falls within the model-estimated shear stress at the 1.2-year flow, supporting the observed bankfull estimate.

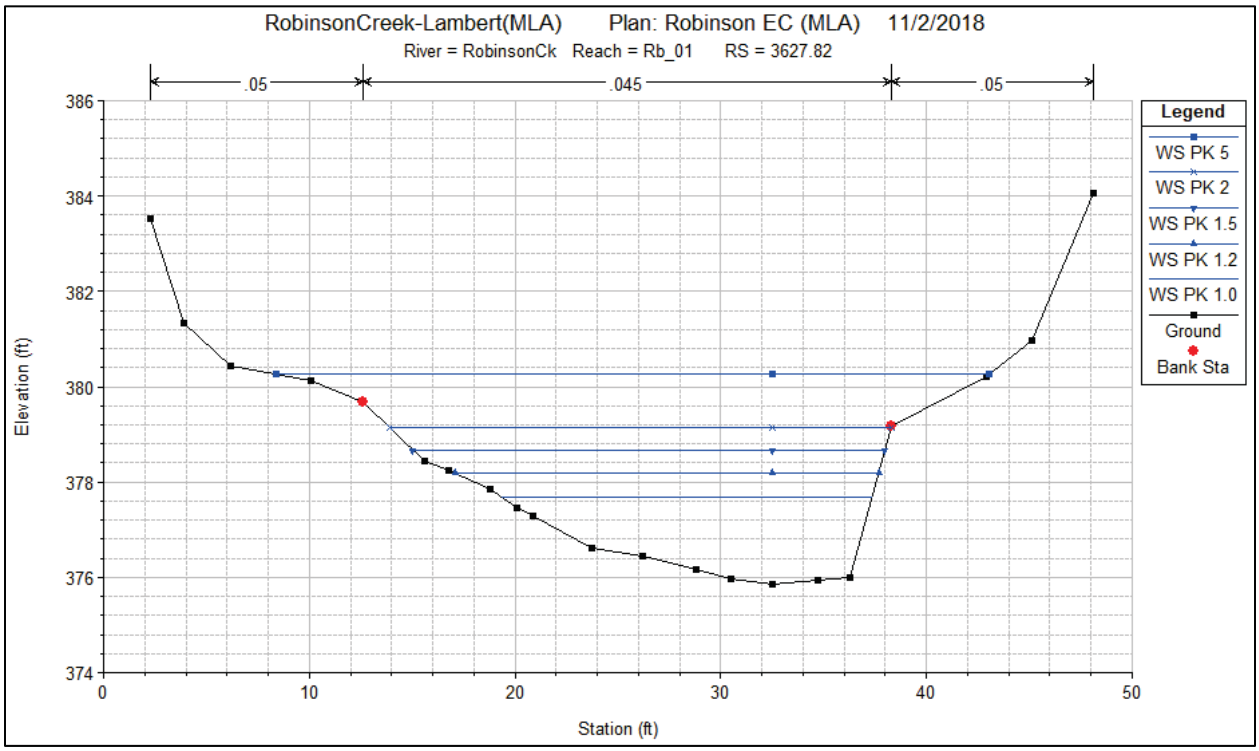


Figure 10. Existing condition HEC-RAS model results for the cross section XS3 in the selected reference reach. The bankfull field indicators correspond to the 1.2-year return flow and the benches inundate between a 2-year and 5 -year flow.

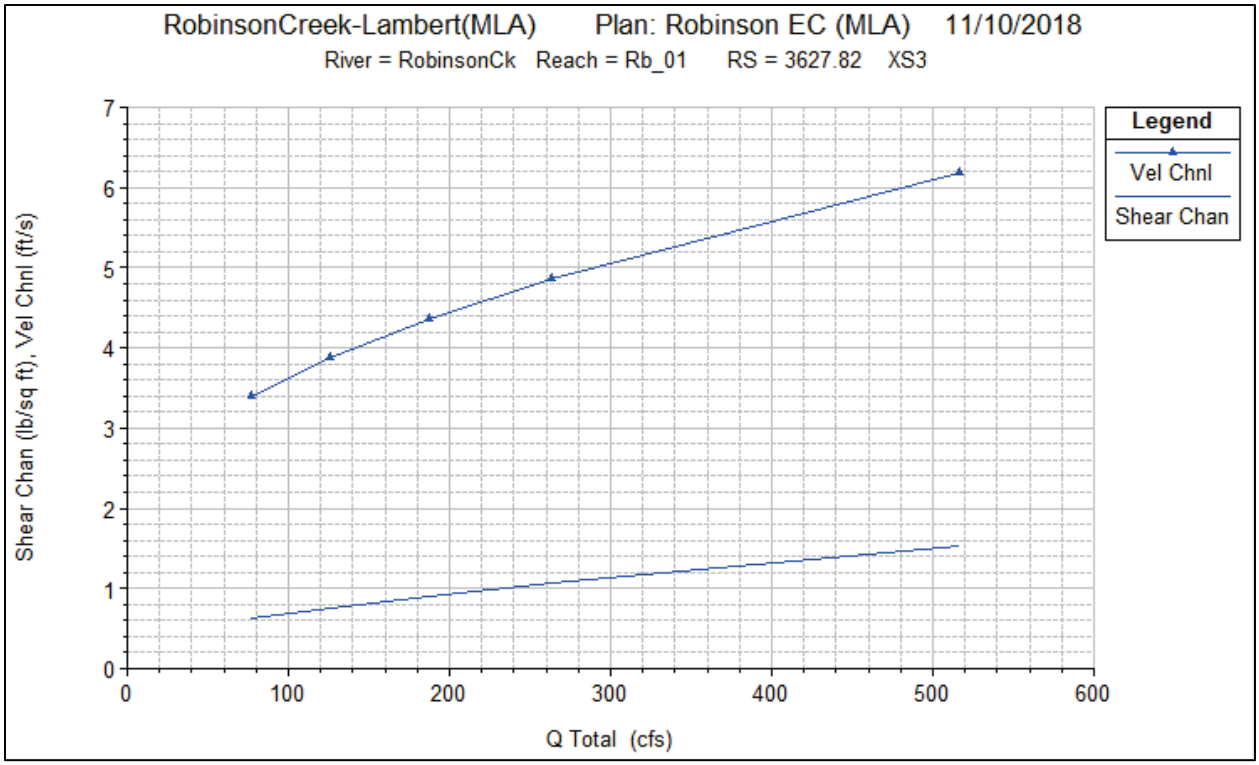


Figure 11. Water velocities and channel shear stress for cross section XS3 between the 1.01-year flow (77 cfs) and 5-year flow (517 cfs).

3 DESIGN CHANNEL LAYOUT AND GRADING

The channel design involved developing the appropriate channel profile and dimensions and then determining the appropriate bank protection measures and revegetation approach. Drawings for the channel restoration plan are provided in Appendix A.

3.1 Design Planform

The existing bridge crossing is at the inflection of a tight meander bend and the channel alignment has been constrained by the roadway embankment. The proposed replacement bridge has a free span of approximately 91 feet, while the existing bridge span is only 32 feet. The increased span is in-part intended to facilitate an improved alignment with the channel by decreasing the sharpness of the meander bend. A constraint to realigning the channel was the preservation of large established trees along the right bank upstream and downstream of the crossing, including an 8-foot diameter heritage oak tree close to the existing right bank of the channel near station 29+60.

The proposed alignment moves the approach channel further to the right (looking downstream) and has a sinuosity of 1.2 (valley length to channel length).

The outside of the bends will need to be protected from scour. Additionally, local toe scour along the outside of the bends must be considered as part of the design.

3.2 Design Profile

The design profile for the stream channel was developed based on the current overall channel profile. Figure 6 show the proposed channel profile with a slope of 1.4%, which is slightly steeper than the overall profile of 1.19%. This is due to the shortening of the channel length by approximately 28 feet by reducing the sharpness of the meander bends. The steeper profile allows for the channel slope to relax as it releases the stored sediment from upstream.

3.3 Release of Upstream Aggraded Sediments

At the upstream limits of the project, upstream of the crossing, the graded channel will steepen to match the existing streambed. At this location the channel has aggraded as much as 1.8 feet due to the failed retaining wall across the channel and the flow constrictions created by the bridge. An estimated 220 cubic yards of sediment is anticipated to be released during the adjustment period. During the adjustment period these sediments will be released during high flows and may temporarily deposit within the project reach or within the channel bend downstream of the bridge.

3.4 Design Cross Sections

Nearly the entire project reach is on one of two bends. The design channel cross section shape and dimensions were based on the reference reach, which includes cross section XS3 on a bend. A narrower bottom width of 11.5 feet and an anticipated actively scoured channel width of 15 feet is proposed to accommodate a point bar and bench on the inside of the bend (Figure 12). Although bench width will vary and is expected to adjust with time, for design purposes a bench height of 3.8 feet and a side slope of 5:1 (H:V) was selected based on reference reach observations. Bank side slopes between 1.5:1 and 2:1 are proposed for the outside of the bends and for the slope at the back of the benches.

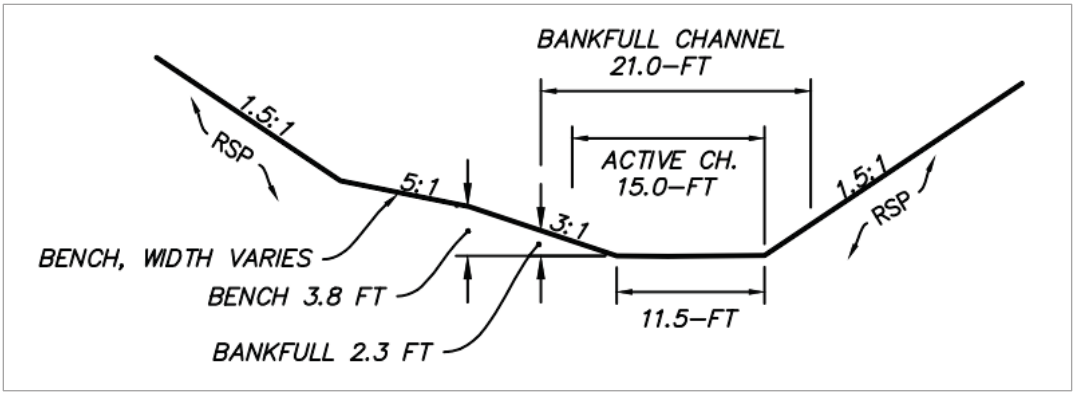


Figure 12. Typical channel geometry under the bridge for Robinson Creek at Lambert Lane Bridge replacement.

3.5 Streambed Material

The existing channel bed upstream and downstream of the culvert's influence is composed of cobbles, gravels, and fines. It is expected that native stream bed material would be stockpiled and reused in reconstruction of the channel bed and point bars. The coarser material within the project reach that more closely matches the gradation of PC3 in Figure 9 should be high-graded for this use. Finer sediments salvaged during excavation should be used for forming the point bars above bankfull elevation that are slated for planting.

3.6 Proposed Channel Grading

The approximate 350-foot long proposed channel was graded as a surface in AutoCAD Civil 3D. The final grading was developed through an iterative process guided in part by results from both the 1D and 2D steady state hydraulic models of proposed conditions. The grading is shown in Appendix A.

Channel grading upstream of the proposed bridge involved maintaining the existing mature trees along the right bank while minimizing the sharpness of the meander bend. The proposed point bar on the right side of the channel blends with the existing bench that supports these large trees between 29+60 and 31+40. The left bank downstream of 30+90 will be a vegetated riprap revetment intended to protect the roadway embankment from scour and erosion while guiding the flow around the sweeping bend.

As the channel approaches the bridge the channel bends towards the left. At the cross-over near station 29+60 the point bar transitions from the right bank to the left bank. Grading in the cross-over focused on maintaining flow conveyance areas similar to upstream and downstream to avoid a channel constriction. Downstream of the cross-over a vegetated riprap revetment will be required along both banks upstream of the bridge.

A point bar is maintained along the left bank as the channel bends to the left under the bridge between station 28+00 and 29+60. Riprap revetments will be placed against the bridge abutments. The riprap along the right bank is on the outside of the bend, and subject to high velocities and local scour.

Downstream of the bridge the left bank grading transitions to match the existing steep ground. Along the right bank the grading ties-out immediately upstream of an existing exposed root mass from a large oak tree along the bank.

4 HYDRAULIC ANALYSIS OF DESIGN CHANNEL

4.1 HEC-RAS One-Dimensional Hydraulic Analyses

The one-dimensional steady-state hydraulic model developed by WRECO (2018) using the HEC-RAS software (USACE, 2010) was updated for existing conditions. A separate HEC-RAS model was developed for the proposed channel grading associated with the bridge replacement. The model was used to evaluate existing hydraulic geometry of cross sections within the reference reach (see section 2.9.3) and proposed hydraulic conveyance associated with the 100-year flow for sizing riprap as part of rock slope protection (RSP) revetments.

4.1.1 Existing Conditions HEC-RAS Model Development

The WRECO (2018) existing conditions HEC-RAS model for the Lambert Lane bridge replacement project was derived from the project topographic surface provided by SHN. The model reach was 673 feet with 19 cross sections. The bridge routine was utilized for the existing crossing and an inline weir was used to simulate the collapsed concrete wall that is currently obstructing flow. Table 3 lists the Manning's roughness coefficients used in the existing and proposed conditions model.

Table 3. Roughness coefficients used for existing and proposed condition hydraulic modelling. Adapted from WRECO (2018).

Channel Description	Manning's Roughness Coefficient (n)
Concrete Retaining Wall	0.020
Low Flow Channel, Downstream of Existing/ Proposed Bridge Structure	0.040
Low Flow Channel	0.045
Channel Bank with Rock Slope Protection (no vegetation)	0.050
Channel Bank Hybrid Rock Slope Protection with Mature Vegetation (willow)*	0.100
Overbank Area with Modest Vegetation	0.050 to 0.080
Overbank Area with Dense Vegetation	0.100

MLA utilized the HEC-RAS model leaving it unchanged with the exception of extending the model length upstream and downstream by adding the nine MLA surveyed cross sections, all of which were located beyond of the existing model boundaries. Additionally, channel river stationing was adjusting to correspond to match the distance from the confluence with Anderson Creek, and therefore match the geomorphic analyses presented in Section 2. The updated existing conditions model extends a length of 1,564 feet.

The model was executed in mixed mode. Existing conditions HEC-RAS results are provided in Appendix D.

4.1.2 Proposed Conditions HEC-RAS Model Development

The proposed model domain extends 1,536 feet along Robinson Creek through the project area. A total of 26 cross sections were used to create the model. Eight of the cross sections were derived from the geomorphic channel sections surveyed by MLA, and the remaining cross sections were sampled from the proposed condition surface developed by MLA for the channel restoration design as shown in Appendix A

Model geometry was developed for as-built conditions. The proposed riprap revetments upstream and downstream of the bridge crossing are to be vegetated with live willow cuttings following Caltrans "hybrid revetment" design. Initially, the riprap revetment will have a relatively low Manning's roughness of 0.050. This value was determined based on the additive Manning's n method, as recommended in Caltrans (2014) *Hybrid Streambank Revetments: Vegetated Rock Slope Protection* manual. This will result in the highest water velocities impinging on the riprap, and should be used for sizing the riprap. Mature vegetation conditions following growth of the willow plantings was evaluated using the two-dimensional model and a Manning's n of 0.100, as presented in Section 4.2.

Based on observed conditions and using the additive Manning's n method, the Manning's roughness coefficient for the channel was set at 0.045 for the main channel between the specified bank markers. For overbank areas, the Manning's roughness coefficient of 0.07 was assigned to simulate the hydraulic obstructions created by brush and moderately dense vegetation along the channel and 0.05 for areas with vegetated RSP. Calculation of Manning's n is provided in Appendix D. Bank markers were placed to provide average channel velocity within the main channel, including all proposed RSP bank treatments. The proposed bridge was not included in the model for channel design, as the clearance and freeboard are well above the proposed design water surface and the concrete abutments do not encroach on the channel area.

The model was run for the 50- and 100-year return flows of 1,320 and 1,760 cfs respectively. To account for potential channel aggradation and to check the design height of RSP, the high VAP condition was also modeled. This was done by applying a fixed sediment elevation by adding 2 feet to the proposed channel bed elevations.

Proposed conditions HEC-RAS was executed in mixed mode. Results are presented in Appendix D.

4.1.3 Results for Existing Conditions

The existing conditions model results were primarily used to evaluate hydraulic geometry, channel capacity, and channel shear stresses within the reference reach. This is discussed in section 2.9.3.

4.1.4 Results for Proposed Conditions

The HEC-RAS water surface profiles for the proposed condition is provided in Figure 13. The 100-year water surface at the bridge face is at elevation 374.67, which is greater than 9 feet below the bottom of the proposed bridge deck. Average channel velocities at the 100-year flow are generally between 7 and 9 ft/s in the channel at the bridge crossing, but spike to 11.6 ft/s at the downstream limit of the project (Figure 14). This is located immediately upstream of an expansion in the channel cross section associated with the downstream bank failure. The expansion causes a local drawdown in the water surface and spike in water velocities at 28+06.

4.1.5 Results for High VAP Profile Conditions

Flow conveyance for the high VAP profile condition was evaluated with the proposed conditions HEC-RAS model. This was accomplished by adding two feet of "sediment fill" to the bottom of each channel cross section. Results from this analysis were used to estimate water surfaces associated with the 50- and 100-year flows with high VAP profile conditions (Figure 15). The high VAP 100-year water surface at the bridge face is at elevation 375.50, which is 0.83 feet higher than under design conditions.

4.2 SRH Two-Dimensional Hydraulic Analysis

A two-dimensional model of existing and proposed conditions was developed using the USBR/FHWA Sedimentation River Hydraulics (SRH-2D) model (Bureau of Reclamation, 2008). The SRH-2D model is widely used for applications similar to this project. It provides good flexibility in creating and editing the two-dimensional mesh and provides good computational stability.

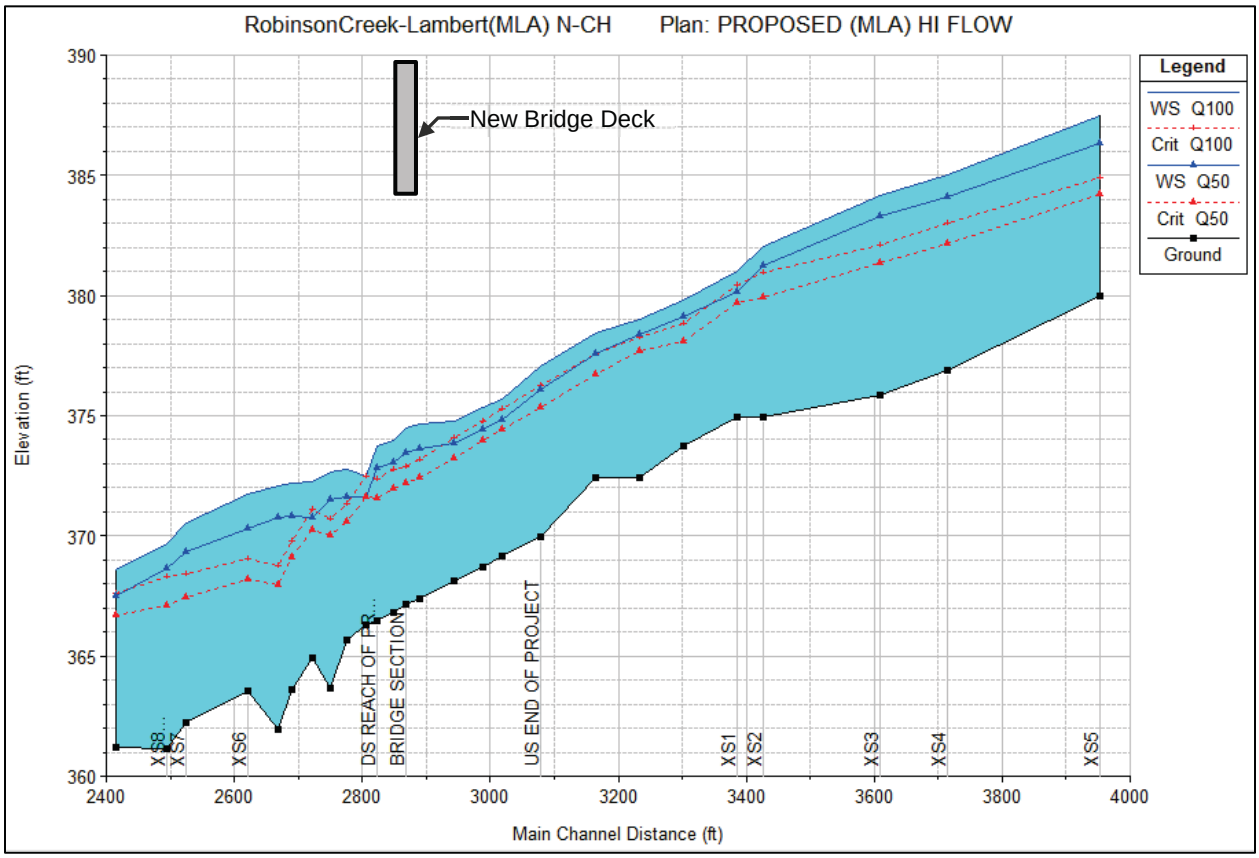


Figure 13. HEC-RAS proposed conditions water surface profiles of the 50- and 100-year flows in Robinson Creek at Lambert Lane Crossing.

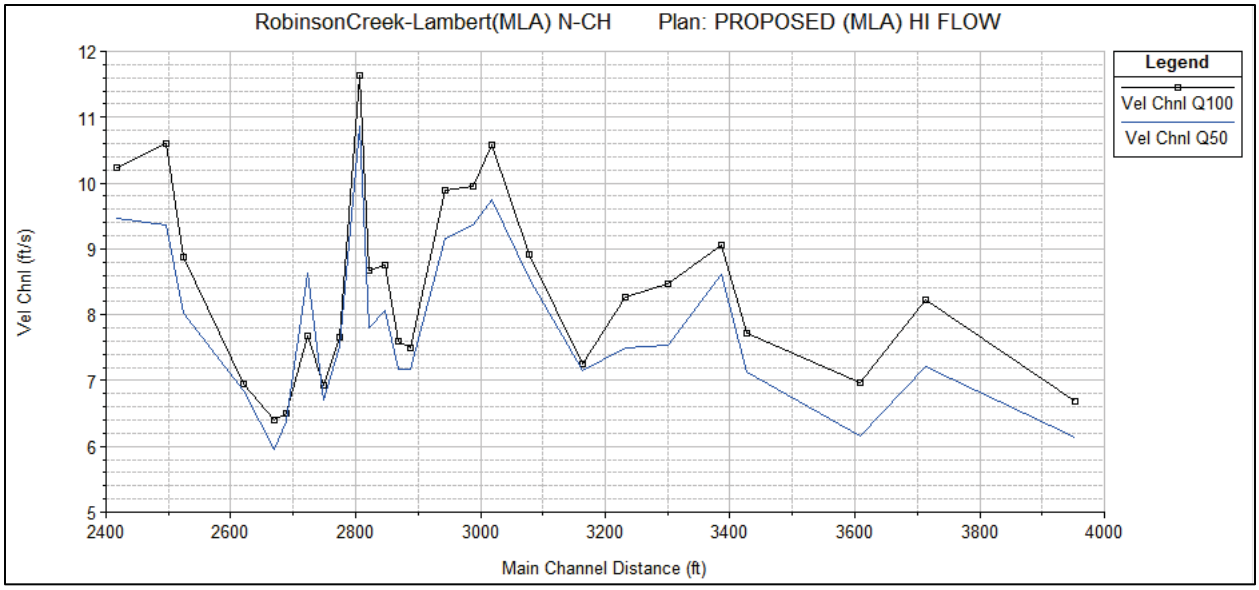


Figure 14. HEC-RAS proposed conditions channel velocity profiles for the 50- and 100-year flows in Robinson Creek at Lambert Lane Crossing.

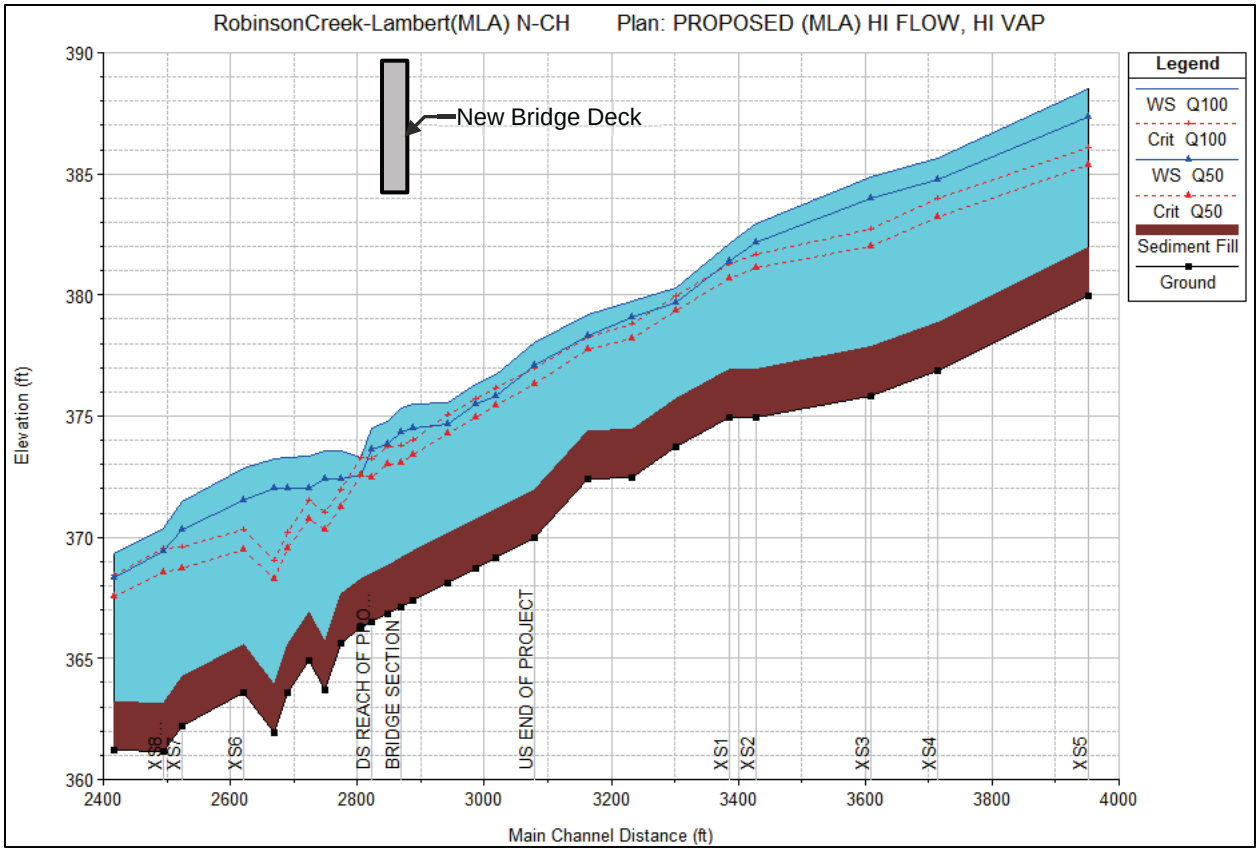


Figure 15. HEC-RAS high VAP conditions (2 feet of aggradation) with water surface profiles for the 50- and 100-year flows in Robinson Creek at Lambert Lane Crossing.

This analysis using SRH-2D focused on both bankfull flows and 100-year flow conditions, and was used to identify areas with high shear stress and velocities. These results were used to refine the channel grading to minimize abrupt hydraulic constrictions and areas of focused high velocities. The results were also used to set the top elevation for the RSP revetments. This was selected rather than the one-dimensional HEC-RAS model because of SRH-2D's ability to calculate super-elevation of flows along the outside of channel bends.

SRH-2D is a mesh-based model that solves the standard St. Venant's equations for gradually varying flow using finite-volume methods. The flexible mesh elements can be a combination of rectangular and triangular elements that vary in shape and size to accurately reflect the topography of the model domain. The model outputs include depth of flow, depth averaged velocity vectors (x and y direction), and shear stress for each wetted element in the mesh.

4.2.1 SRH2-D Model Development

The model domain for the Lambert Lane bridge replacement project included the 720 feet of surveyed channel that encompasses the project area as shown in Appendix E. The model domain extended on both sides of the channel up to the top of banks. The channel was modeled with flexible triangular elements with 3-foot sides, except where additional detail was necessary. The elevations of the element nodes were derived from the project's digital terrain model (DTM). For existing conditions, the DTM developed from the topographic surveys by SHN was used. For the existing and proposed conditions model, the SHN DTM was extend further downstream based on MLA survey points to include the entire bend in the channel and associated bank failure behind the Booneville Hotel. For proposed conditions the design surface was merged with the existing conditions DTM.

Manning's roughness coefficients were assigned to each mesh element. SRH-2D does not use contraction and expansion or eddy viscosity coefficients as part of the computations. Therefore, contraction and expansion losses need to be incorporated into the Manning's roughness values. Manning's roughness values were taken from Table 3. This includes a value of 0.100 for the hybrid RSP with mature vegetation and 0.08 for the riparian planting areas on the inside of the meander bends. These roughness values were calculated using methods recommended in Caltrans (2014), and as provided in Appendix E.

The downstream boundary condition was set based on HEC-RAS water surface elevations for cross section XS6, which is located at the downstream end of the SHR-2D model domain for both existing and proposed conditions.

4.2.2 SRH-2D Results

The SRH-2D results are provide in Appendix E. Figure 16 compares the water velocities and vectors for existing and proposed conditions. Existing condition results illustrate the channel constriction created by the existing bridge opening, with water velocity under the existing bridge exceeding 11 ft/s. The constriction raises water levels upstream of the bridge, creating slower velocities and widening the area of inundation during the 100-year flow.

In comparison, the proposed condition velocities are reduced under the bridge and the flow area remains relatively constant throughout the project reach. The highest velocities are at the upstream limit of the project grading, near station 31+50. This is the location that a small headcut is expected to occur as upstream stored sediments are released and transported downstream.

Downstream of the bridge crossing the proposed condition velocity distribution against the existing bank failure remain effectively unchanged from existing conditions. There is an area of high velocities at station 28+00, immediately downstream of the project grading. This is caused by an existing large oak tree on the bank, with its root mass protruding into the channel. Under existing conditions this is masked by the extremely high velocities discharging from under the bridge.

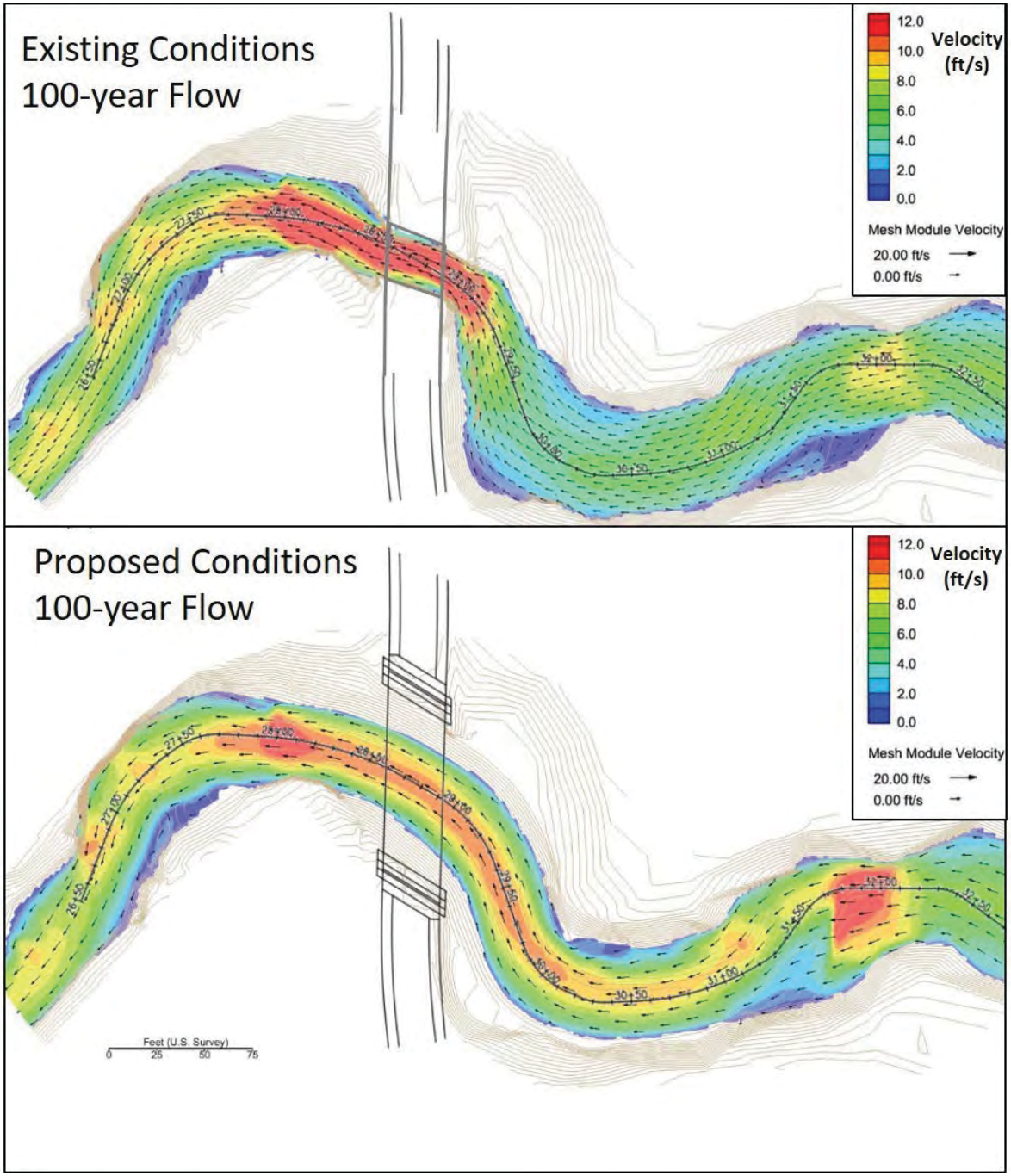


Figure 16. SRH-2D predicted water velocities associated with the 100-year flow of 1,750 cfs for existing and proposed.

5 DESIGN OF CHANNEL BANK REVETMENTS

Due to high water velocities within the channel and the steep side slopes required for the streambanks in the vicinity of the roadway and bridge, rock slope protection (RSP) will be necessary to form a stable streambank revetment. To provide channel shade and additional roughness along the streambanks to slow velocities, a *hybrid revetment* design consisting of vegetated RSP will be used following design guidance given in Caltrans Design Information Bulletin No. 87-01 (Caltrans, 2014). This uses standard guidelines for RSP sizing, thickness, and layering as described in the California Bank and Shore Rock Slope Protection Design manual (Caltrans, 2000).

5.1 RSP Sizing

RSP was sized for the 100-year flow condition of 1,760 cfs with as-built vegetation conditions. Three methods were used and results were compared: California Bank and Shore Protection Design, equation 1(Caltrans, 2000), and USACE (1994) equation 3-3 and equation 3-5. The three methods yield a wide range in size class for RSP and are summarized in Appendix F. The USACE equation 3-3 resulted in the most conservative (i.e. largest rock class) and was selected based on professional judgement.

The USACE equation 3-3 for determining RSP size for channel bottom and side slopes uses depth averaged channel velocity. Velocity and depth for key locations in the project site were derived from the proposed conditions HEC-RAS model (post construction "as-built" conditions). This method is applicable to side slopes of 1.5H:1V or flatter. RSP placed along the outside of channel bends will experience increased forces from impinging flows. This method accounts for bendways using the ratio of the centerline radius of the bend to wetted width of the channel. In addition to velocity and side slope, this method is sensitive to the unit weight of stone, which generally varies from 150 to 175 pounds per cubic foot. For this application a unit weight (γ_s) of 165 pounds per cubic foot was used.

A minimum safety factor of 1.1 is recommended by USACE. For the Robinson Creek channel design, a safety factor of 2.0 has been applied due to the sharp meander, potential for impact from large floating debris, and risk to vital infrastructure.

Equation 3-3 yields a representative stone size for the D_{30}, for which 30 percent of the gradation is finer by weight and length. To determine the D_{50}, a relationship is presented that is based on the ratio of D_{84} to D_{15} that defines the gradation of material. Standardized gradations range from 1.4 to 2.2, where a higher ratio indicates a wider range of material size. A ratio of D_{84}/D_{15} of 1.6 was used for this analysis, which is consistent with Caltrans specifications for larger rock size classes.

Calculated stable rock sizes for streambank revetments in the project reach are provided in Table 4. Weights are calculated assuming a spherical shape for the rock and a unit weight of 165 lbs/ft^3. Caltrans RSP classes are named by the D_{50} (median rock diameter). Table 4 lists the Caltrans RSP size classes and the corresponding FHWA classification that are closest to the stable D_{50} rock size for the specified location.

Computations for RSP sizing are presented in Appendix F.

Table 4. Calculated stable rock sizes for RSP along channel banks and applicable Caltrans and FHWA RSP size class. Sizing based on USACE (1994) equation 3-3.

Station	Location	Side Slope (H:V)	Stable Rock Size (D_{50})		
			Diameter (ft)	Weight (lbs)	Size Class FHWA (Caltrans)
30+78	Left Bank Approaching Bend	1.5:1	1.7	424	V (¼ Ton)
30+18	Left Bank Approaching Bend	1.5:1	2.6	1,518	VIII (1 Ton)
29+87	Lower Left Bank at Bend Apex	1.5:1	2.9	2,107	VIII (1 Ton)
	Upper Left Bank at Bend Apex	2:1	2.2	920	VII (½ Ton)
29+42	Both Banks at Bridge Approach	1.5:1	2.2	920	VII (½ Ton)
28+89	Right Bank, Upstream Bridge Face	1.5:1	1.3	190	IV (Light)
28+68	Right Bank Under Bridge	1.5:1	1.4	237	IV (Light)
28+48	Both Banks, Downstream Bridge Face	1.5:1	1.6	354	V (¼ Ton)

5.2 RSP Layers and Thickness

RSP should be placed in a layer with a thickness sufficient to remain stable and provide maximum protection against erosive forces. Rock that interlocks and minimizes voids will help ensure the stability of the RSP layer. Design equations are based on a minimum thickness of $1*D_{100}$, the maximum size in the size class. Caltrans methods for RSP design call for use of "California Layered RSP" (Caltrans, 2000), where up to three layers of rock make up the total RSP thickness. The design follows filtration theory where, from the inside to the outside, each layer is progressively larger so an inner layer will not pass through the voids of the next layer. The total RSP thickness is made up of a backing, inner and outside layer. In some cases, an inner layer is not required.

Caltrans standard RSP size classes are divided into two construction methods. Method "A" is for larger rock that is individually placed and Method "B" is for smaller rock where dumping is acceptable. Using the stable rock sizes calculated for locations given in Table 4, the RSP size class layers and thickness were developed following Caltrans (2000), and are provided in Table 5.

Standard Caltrans design includes RSP fabric at the interface of the native slope and the backing class. However in lieu of RSP fabric, the hybrid revetment uses a gravel filter to better support vegetation plantings. A Universal Gravel Filter Gradation is appropriate for the proposed RSP revetments. It consists of 6-inch minus gravel. For slopes steeper than 2.5H:1V rounded river-run material is not recommended for the gravel filter layer.

Table 5. RSP size class and thickness by station and location.

Station and Location	Side Slope (H:V)	Outer Layer		Backing Layer	
		RSP Class	Thickness (ft)	RSP Class	Thickness (ft)
28+15 to 29+60 Under Bridge Both Banks	1.5:1	½ TON	3.4	Backing No. 1	1.8
29+60 to 30+30 Outside Bend Lower Left Bank	1.5:1	1 TON	4.3	Light	2.5
Outside Bend Upper Left Bank	2:1	½ TON	3.4	Backing No. 1	1.8
30+30 to 30+90 Upstream Approach Left Bank	1.5:1	¼ TON	3.3	Backing No.1	1.8

5.3 Toe Scour Analysis

Toe scour and undermining of RSP along streambanks is a common cause of failure. The proposed channel within the project reach will have a natural substrate bottom and includes two substantial meander bends. In meandering channels flow is impinged along the outside bend, increasing velocities and scour forces. In high flows the channel bed scours and then refills during the receding limb of the hydrograph. Toe protection can be provided by extending the toe of the RSP to a depth below the expected scour depth.

Caltrans (2014) and USACE (1998) reference methods developed in *Toe Scour Estimation in Stabilized Bendways* (Maynord 1996) as a way of predicting potential scour depth. The empirical equations were developed by synthesizing laboratory and field data for scour at bank toes around stream bends. The primary variables are the average depth in the main channel upstream of the bend, depth at the bend and centerline radius of the main channel bend. The depth of scour is the difference of the computed depth in the bend and the maximum depth as predicted by Equation 16.

Based on the radius of the channel bends a factor of safety of 1.19 was used, implying that 2% of measured scour could be 5% deeper (approximately 0.5 feet) than the predicted scour depth.

The scour analysis indicated that the toe of the RSP should be placed to a minimum depth of 3.0 feet below the channel bed. This scour depth is added to the depth the channel may degrade based on the low vertical adjustment potential (VAP) profile, which is approximately 4 feet lower than the design channel bed. This places the toe of the RSP a minimum of 7 feet below the design channel bed.

5.4 Design Height of RSP

Caltrans recommends the water depth during 50-year return flow for the design height of the RSP. Additional freeboard can be added to the design height based on site conditions and professional judgment. Additional consideration should be given to the potential for super-elevation at bends and the possibility of channel aggradation. In this case, results from the 2D model at the 100-year flow, which represents the matured vegetation condition of the hybrid RSP revetment was used to define the design water surface with super elevation at the bends. The final design height of the RSP was

then modified by adding the difference of the proposed water surface and the high VAP water surface as predicted by the HEC RAS model to account for potential aggradation.

Cross sections 30+78, 29+87 and 28+88 are on the straight section approaching the bend, on the right bend, and on the left bend at the bridge face. These locations represent the highest potential for scour and super elevation and were used to determine the design height of the RSP design. Table 6 lists the SHR-2D water surface at the hybrid riprap banks on the outside of the bends. The increase in water surface elevation at the high VAP conditions as compared to design conditions is based on the HEC-RAS results. This difference is added to the SRH-2D water surface elevation to arrive at the design elevation for the top of the RSP.

Table 6. Summary RSP top elevation based on 100-year water surface elevations (WSE) for proposed conditions with mature vegetation from 2D modelling plus increase in WSE due at high VAP profile due to potential aggradation.

Station and Location	SRH-2D WSE along Bank (feet)	Increase in WSE at High VAP	Design Elevation for RSP Top (feet)
28+88 Upstream Bridge Face	375.5	0.8 feet	**376.3**
29+87 Outside of Left Bend	377.3	1.0 feet	**378.3**
30+78 Straight Section Upstream of Bends	378.0	1.0 feet	**379.0**

5.5 Hybrid Revetment Design- Vegetated RSP

Incorporating vegetation into the streambank revetment has the beneficial effects of improving stream ecology, increasing soil strength and providing flow resistance, although it can be unpredictable over the long term (Caltrans 2014). Established vegetation will provide cover, shade the channel and provide nutrients to the stream. As root systems establish, they can support the banks by providing resistance to scour and bind the soils and rock placed along the bank.

Caltrans has developed recommendations for the use of a "hybrid revetment" that incorporates vegetation into rock slope protection to provide the benefits of stream side vegetation while managing its uncertainties. The intent is to balance the engineering benefit of armoring a bank while promoting ecological processes.

The hybrid RSP design consists of the standard RSP design as described above, with the addition of live willow staking that penetrates the rock layers and allows rooting into the native bank soils. Species most commonly used as live stakes are native willow and cottonwood trees. Plantings are placed either vertical or perpendicular to the slope face and must be long enough to extend through to the subbase and into most soil. Placement of live stakes is done in conjunction with rock placement. To provide protection to the live stakes during rock placement, cuttings should be placed into perforated cardboard tubes that are embedded into the subgrade and extend through the layered RSP (Figure 17). Cardboard is preferred as it can degrade over time and not hinder the growth of the cuttings. Growing medium is placed within the cardboard tubes to provide direct soil

contact. Additionally, voids within the placed riprap should be filled with salvaged soil to further promote root growth within the layered RSP.

For Robinson Creek, it is assumed cutting shall be made from native willow species. Stakes may need to be as long as 12 feet and should be placed vertically to maximize their rooting depth, with the butt of the live stake at or near summer groundwater levels. The willow plantings will start at bankfull, 2.3 feet above the finished channel bed, and extend up the RSP revetment. To ensure good establishment, the live stakes should be irrigated for a minimum of two seasons.

Preliminary spacing of live willow stakes is assumed to be 5 feet on-center. Prior to final design a qualified landscape architect or botanist should be retained to provide recommendations for lateral spacing, live willow stake diameter range, embedment depths into subgrade and type of soil backfill for the tubes. They should also provide provisions for harvesting and storage of cutting stock and irrigation design.

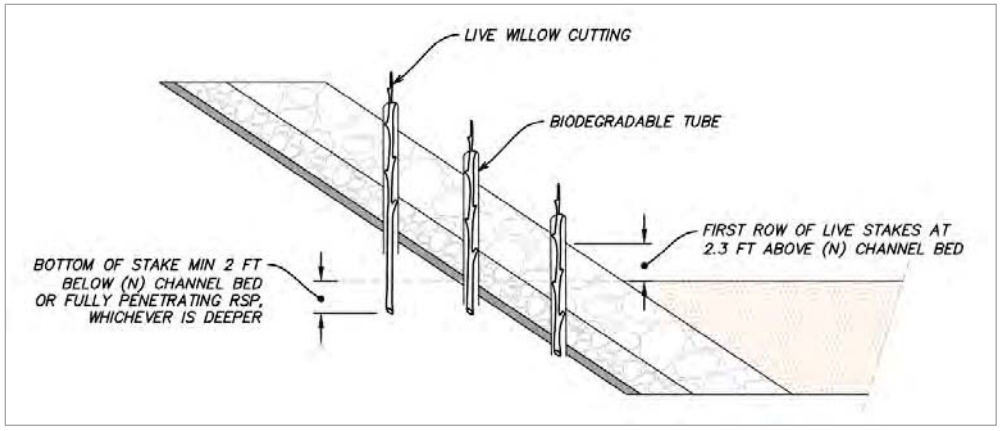


Figure 17. Typical live stake placement for hybrid RSP revetment.

5.6 RSP Design Sections

Three typical design sections were developed for the RSP bankline protection for the project (Figure 18):

1. Under the Bridge (Station 28+15 to 28+60)
2. Apex of the bend and along the roadway and bridge approach (Station 28+60 to 30+30)
3. Upstream edge of project at approach to bend Station (30+30 to 30+90)

Section 1 has 1.5:1 side slope and is located along the bend under the bridge. This reach has ½ Ton RSP (Class VII) application on both banks. The right bank is the outside bend and the left bank is the inside bend where a bench is expected to form in the wider channel. Roughly half of the RSP on the right bank will be outside the cover of the bridge deck and should utilize the Hybrid RSP discussed above.

Section 2 is located at the apex of the bend along the bridge approach currently protected by the retaining wall and RSP. The left bank will have 1-Ton RSP (Class VIII) application with a 1.5:1 slope at the toe and ½-ton RSP (Class VII) at a 2:1 slope along the upper bank. This reach should utilize Hybrid RSP. Compacted native backfill behind the RSP layers will be required where the new bank is pulled away from the existing road embankment. Above the RSP application backfill and planting should be applied to meet the existing ground.

Section 3 is located at the upstream end of the project reach and is the approach to the first bend. ¼-ton RSP (Class V) will be applied to the left bank at a 1.5:1 side slope and blend into the native bank. Hybrid RSP should be utilized. Existing RSP along this reach should be reused as practical.

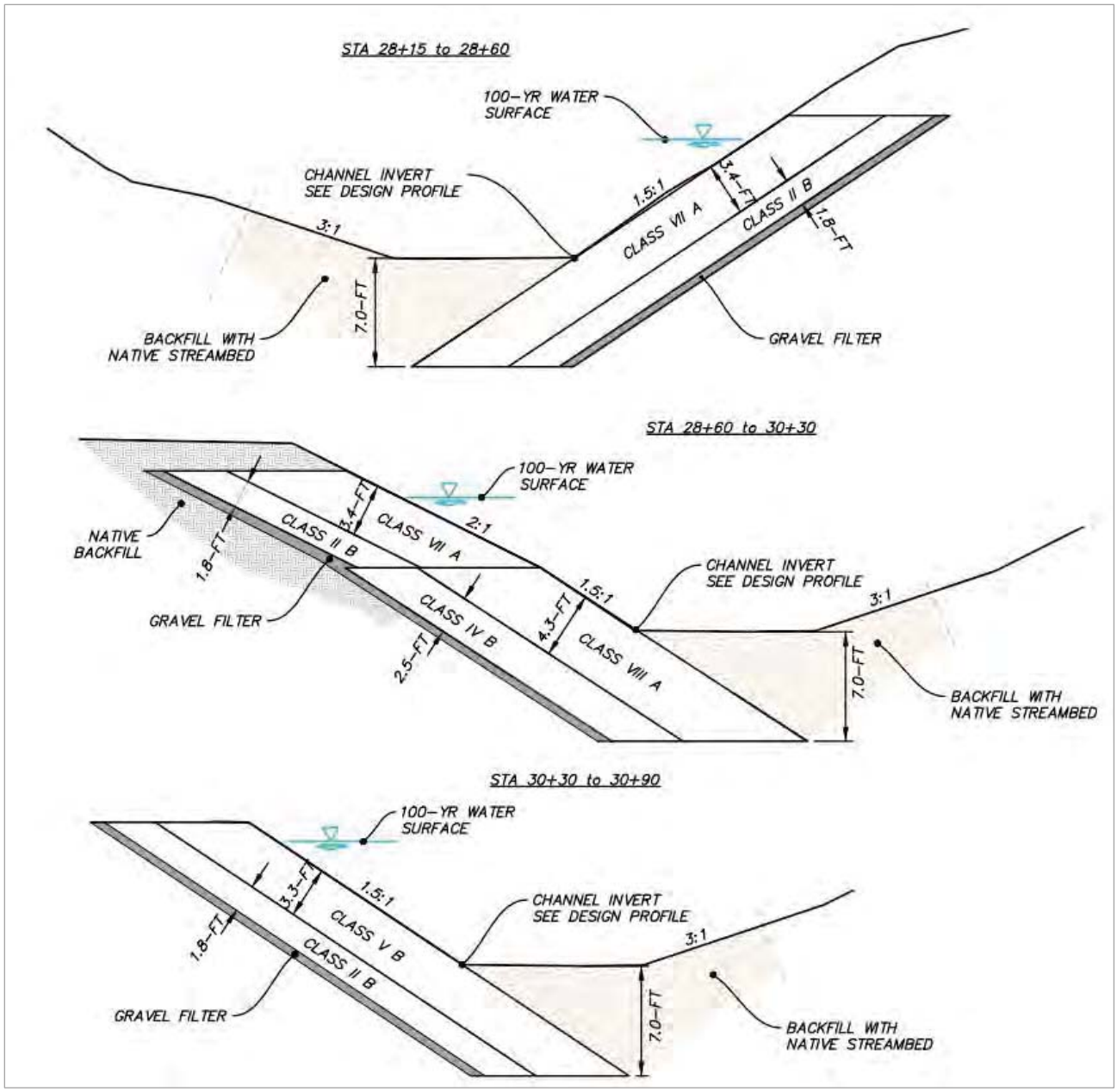


Figure 18. Typical sections for RSP placement along design channel on Robinson Creek at Lambert Lane.

5.7 Tree Removal and Additional Streamside Planting Areas

Based on the proposed channel grading shown in Appendix A, several trees will be removed. This includes a 30-inch tree (DBH) close to the bridge face, a 16-inch tree near the existing retaining wall, and an 8-inch and two 4-inch trees on the right bank. The species of these trees is not known, but if any are willows, they should be considered for use as live stakes for the hybrid revetment.

In addition to the plantings contained within the hybrid RSP revetment, native vegetation would be planted on the graded point bars on the inside of the channel bends. This includes on the right bank between station 29+50 and 31+10, and on the left bank immediately upstream and downstream of the bridge crossing. This vegetation should include native riparian tree species, as well as understory plants. Irrigation will likely be required for a minimum of two years to ensure survival.

In addition to the planting areas close to the channel, the project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace could be used to plant upland tree species, such as native oak trees. Prior to final design a qualified landscape architect or botanist should be retained to develop a planting plan.

5.8 Recommendation for Treatment of the downstream Bank Failure

The stream channel design allows for release of the stored sediments from the upstream channel. In total, approximately 220 cubic yards of streambed sediments may be released and transport downstream during this channel adjustment period. This is a relatively small amount of sediment for this stream. However, this released sediment has the potential to deposit between high flow events within the project reach and immediately downstream. Deposition could exacerbate the existing bank erosion downstream of the bridge, behind the Boonville Hotel. Given the condition of this failing bank, proximity of structures on top of this bank, and potential for channel adjustments associated with this project, efforts should be made to treat the bank failure using standard bioengineering bank revetment practices prior to, or in conjunction with, the Lambert Lane bridge replacement. The Mendocino County Resource Conservation District (RCD) has lead bank repairs using similar approaches in other location in lower Robinson Creek, and should be engaged about the potential to lead repair efforts for this bank failure.

6 REFERENCES

Bureau of Reclamation. 2008. SRH-2D Theory and User's Manual version 2.0, Lai, Y.G. Technical Service Center, Denver, CO.

CDFG. 2009. Parts IX-XII: Fish passage design and implementation. In the California Salmonid Stream Habitat Restoration Manual. California Department of Fish and Game.

CDFG. 2002. Culvert criteria for fish passage. Appendix A in California Salmonid Stream Habitat Restoration Manual 3rd edition. California Department of Fish and Game. CALTRANS. 2000. California Bank and Shoreline Protection Design. State of California Department of Transportation Final Report No. FHWA-CA-TL-95-10. Third Edition.

Caltrans. 2014. Hybrid Streambank Revetments: Vegetated Rock Slope Protection. State of California Department of Transportation Design Information Bulletin. DIB 87-0.1

Entrix, Inc. 1998. Navarro Watershed Restoration Plan.

Florsheim, J., A. Chin, K., Gaffney, D., Slota. 2013. Thresholds of stability in incised "Anthropocene" landscapes. J. of Anthropocene. Vol. 2., P27-41.

Florsheim, J. 2008. RE: Robinson Creek Survey Update. Memorandum to Mendocino County Water Agency and Mendocino Count y Resource Conservation District.

Florsheim, J. and Circuit Rider Productions, Inc. 2006. Baseline bio-geomorphic assessment of Robinson Creek, Mendocino County, California. Prepared for Mendocino County Resource Conservation District. 404 pages.

Gotvald, A. J., Barth, N. A., Veilleux, A.G., and Parrett, Charles. 2012. Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 pp.

Julien, P.Y. 1998. Erosion and Sedimentation. Cambridge University Press, Cambridge, UK.

Leopold. L. 2005. A View of the River. The President and Fellows of Harvard College. 298 pp.

Maynord, S.T. (1996). Toe-Scour Estimation in Stabilized Bendways. ASCE Journal of Hydraulic Engineering, August 1996.

NMFS. 2001. Guidelines for salmonid passage at stream crossings. NOAA Fisheries, NMFS SW Region.

Quincy Engineering (2018). Project Report. Lambert Lane Bridge at Robinson Creek Center of town in Boonville, CA. Prepared for County of Mendocino Department of Public Works.

Schumm, S.A.; Harvey, M.; Watson, C. 1984. Incised Channels: Morphology, Dynamics, and Control; Water Resources Publications: Littleton, CO, USA.

Taylor, R. 2001. Final Report: Coastal Mendocino County Culvert Inventory and Fish Passage Evaluation. 73 pages.

USACE. 1994. Hydraulic Design of Flood Control Channels 1110-2-1601. U.S. Army Corps of Engineers, Washington D.C.

USACE 1998. User's Manual for CHANLPRO, PC Program for Channel Protection Design. Technical Report CHL-98-20.

USACE. 2010. HEC-RAS, River Analysis System User's Manual. Hydraulic Reference Manual: Version 4.1, U.S. Army Corps of Engineers, Hydrologic Engineering Center.

USFS. 2008. Stream simulation: An Ecological Approach to Road Stream Crossings. USDA United States Forest Service National Technology and Development Program, San Dimas, CA.

USGS. 2012. The StreamStats Program. http://water.usgs.gov/osw/streamstats/california.html. Data accessed December, 2017.

WRECO. 2018. Draft Bridge Design Hydraulic Study Report. Robinson Creek Bridge Replacement on Lambert Lane, Mendocino County, California. Federal Aid Project No. BRLO-5910(099), Mendocino County Project No. B1302, Existing Bridge No. 10C0146

Wolman, M. G., and Miller, J. P. (1960. Magnitude and frequency of forces in geomorphic processes. Journal of Geology 68, 54-7 4.

Appendix A – Design Drawings

Appendix B - Geomorphic Field Data

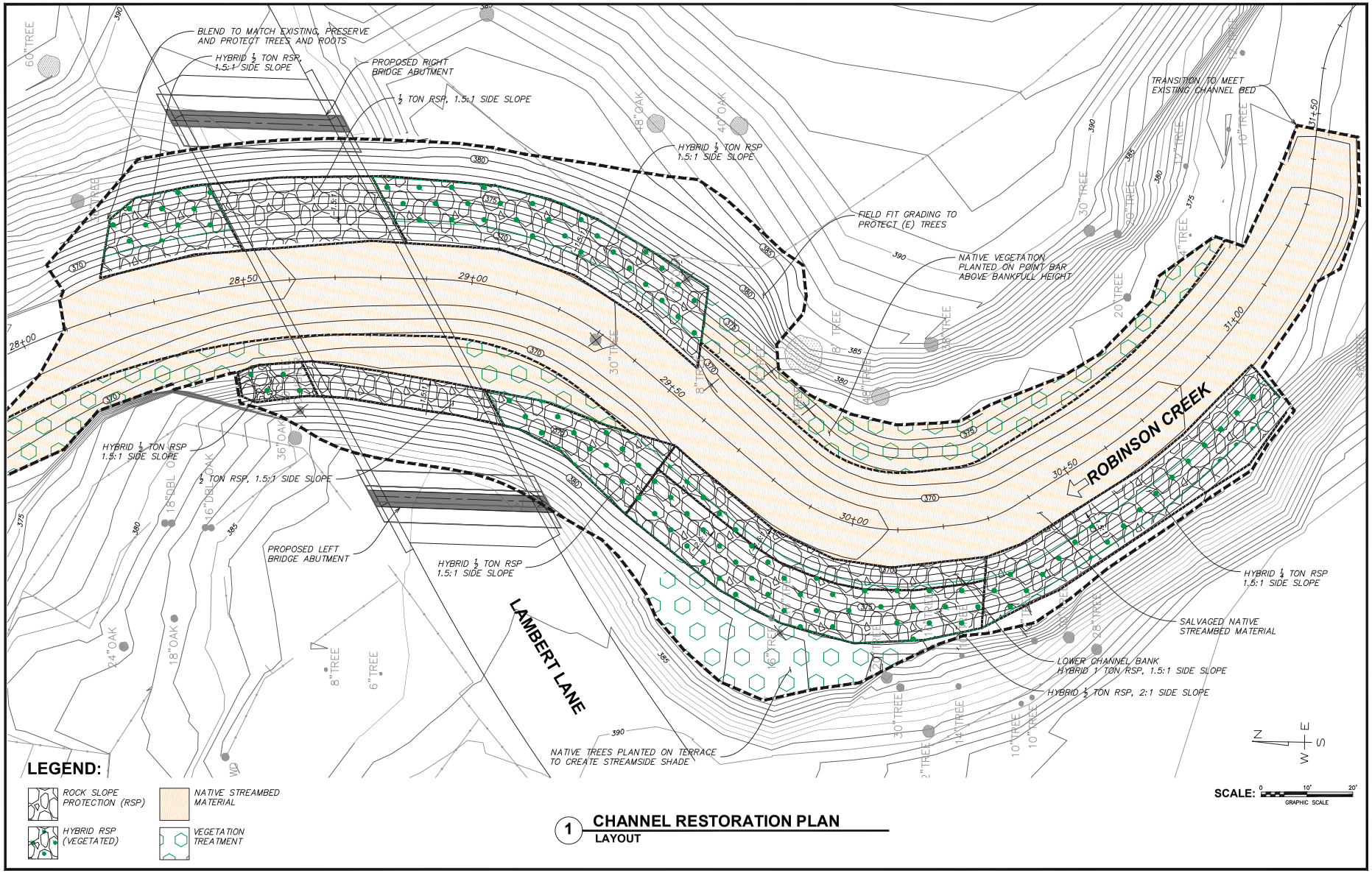
Appendix C – Hydrology

Appendix D - HEC RAS Results

Appendix E - SMS Results

Appendix F – Rock Slope Protection Design

Appendix A – Design Drawings



1 **CHANNEL RESTORATION PLAN**
LAYOUT

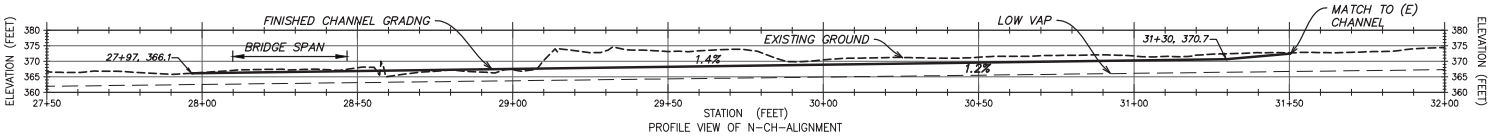
Michael Love & Associates, Inc.
PO Box 4477● Arcata, CA 95518 ● (707) 822-2411

DRAFT
30% DESIGN SUBMITTAL

VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

MENDOCINO COUNTY DEPARTMENT OF TRANSPORTATION
ROBINSON CREEK AT LAMBERT LANE
BOONEVILLE, CA
CHANNEL RESTORATION PLAN

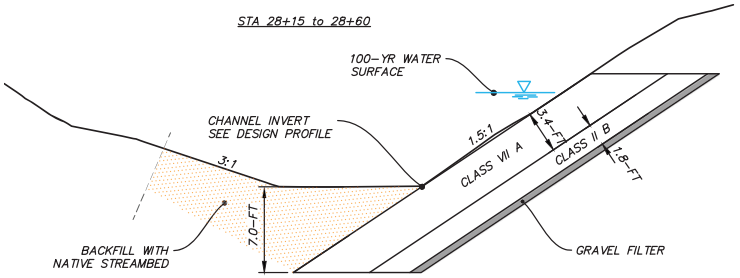
DATE	OCT. 2018
SUBMITTAL	30% DESIGN
DESIGN	AL, ML
DRAWN	LLANOS
SHEET	1 of 2



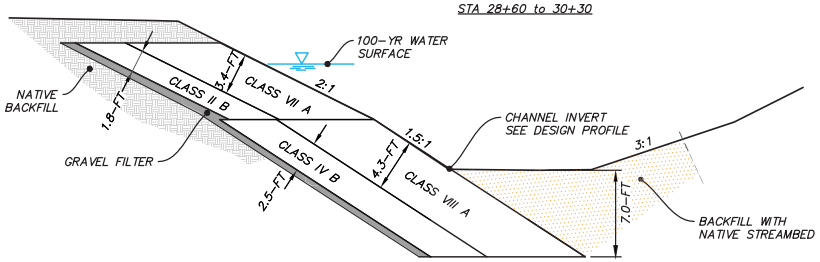
2 CHANNEL PROFILE

HORIZONTAL AND VERTICAL SCALE 0 20' 40' GRAPHIC SCALE

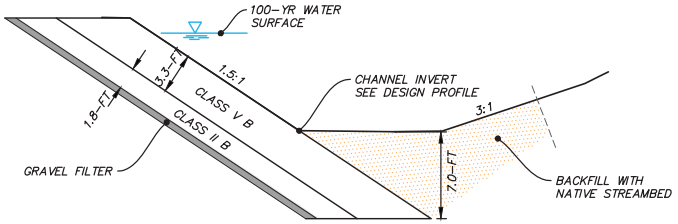
STA 28+15 to 28+60



STA 28+60 to 30+30

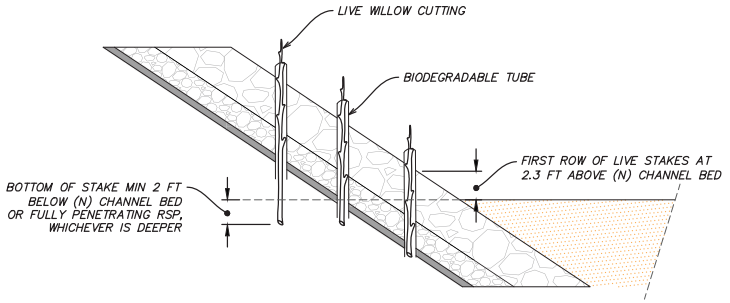


STA 30+30 to 30+90



3 TYPICAL RSP SECTIONS

0 5' 10' GRAPHIC SCALE



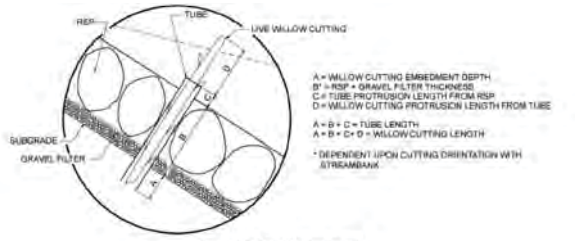
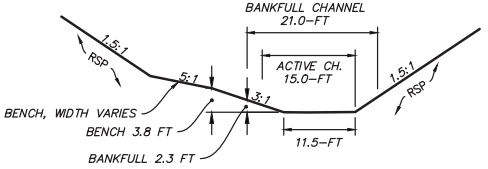


Figure 21- Live Cutting Detail

4 HYBRID RSP DETAIL

NTS



5 TYPICAL SECTION UNDER BRIDGE

NTS

Michael Love & Associates, Inc.
PO Box 4477● Arcata, CA 95518 ● (707) 822-2411

DRAFT
30% DESIGN SUBMITTAL

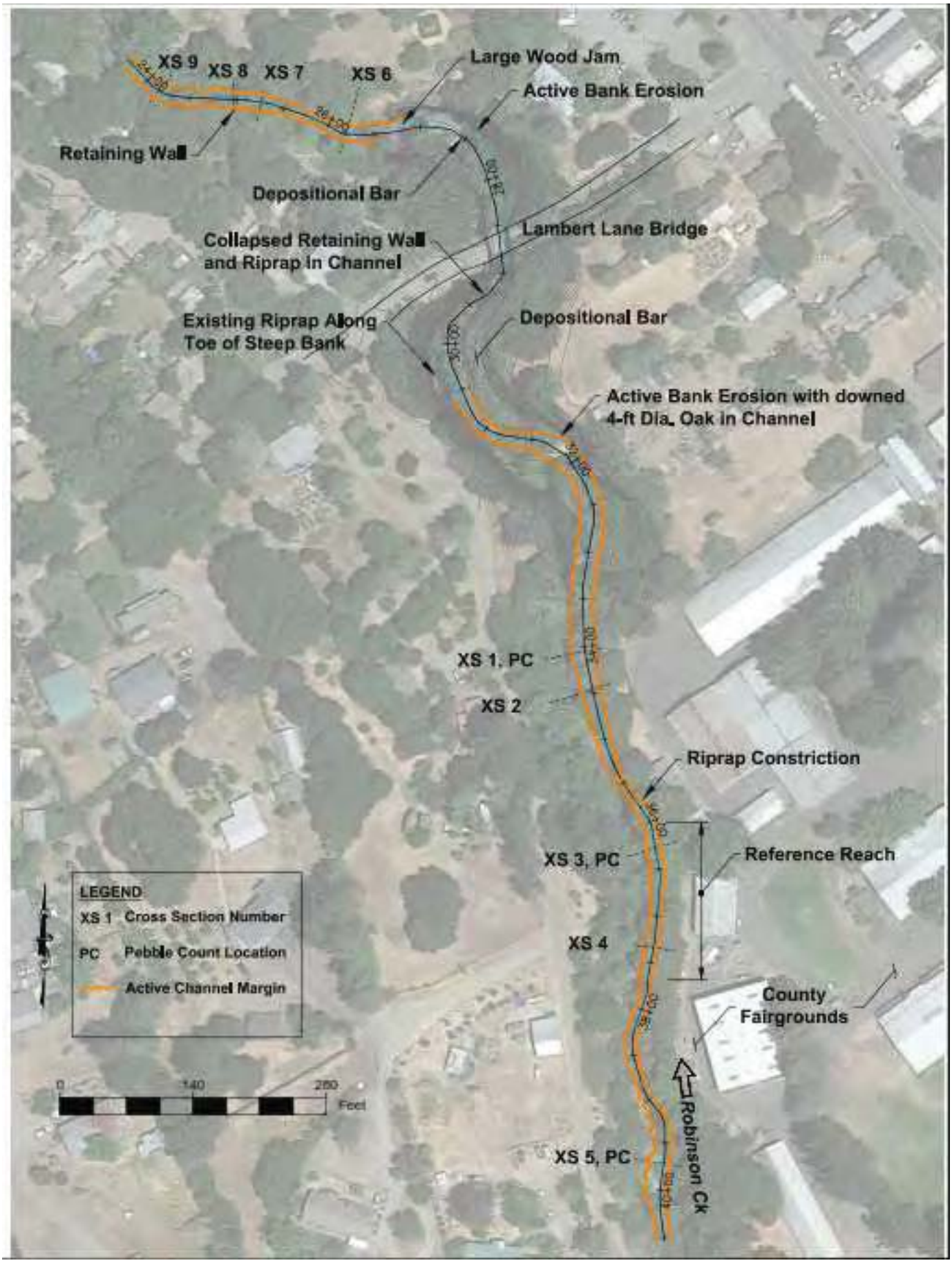
VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

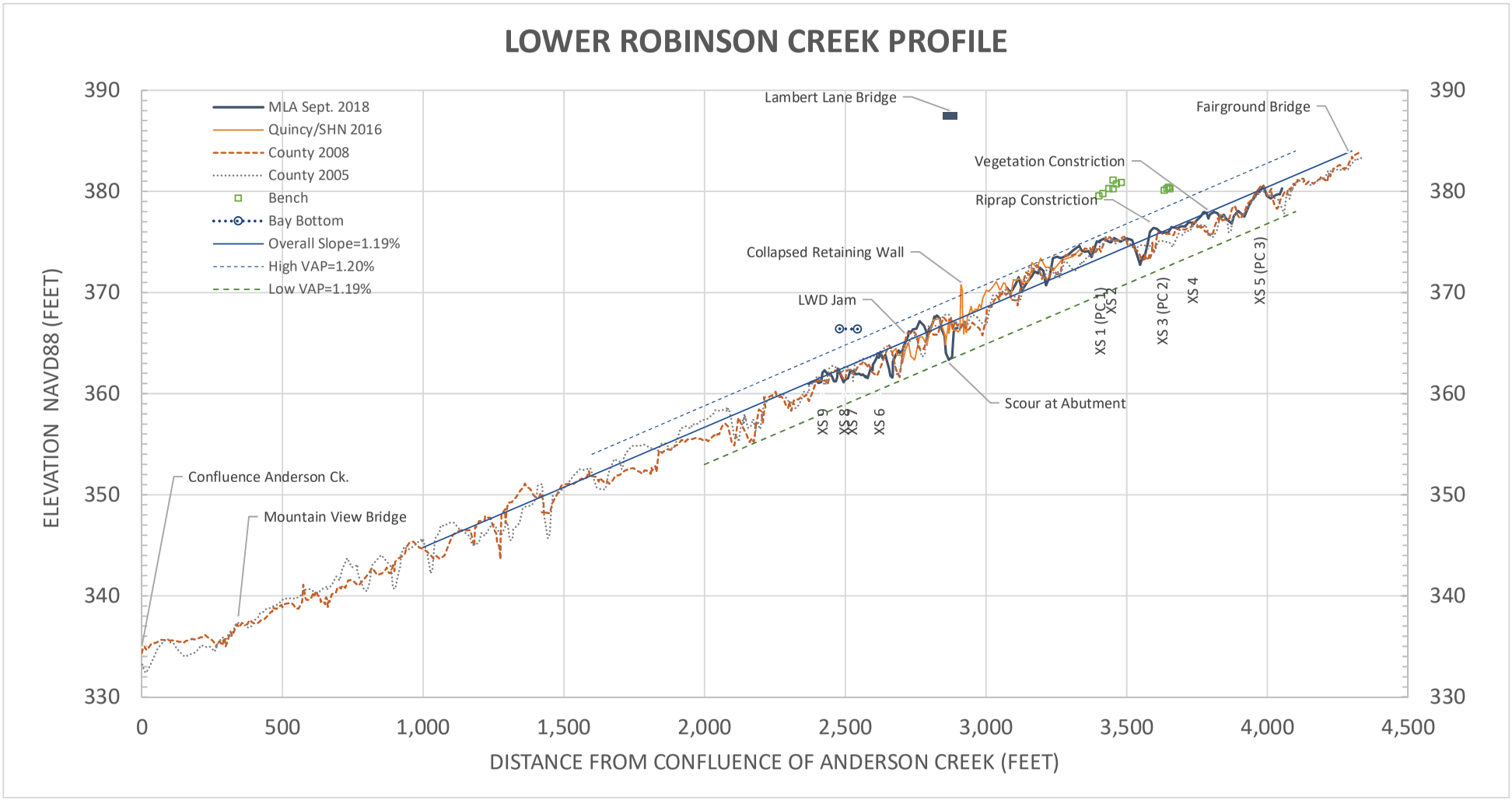
MENDOCINO COUNTY DEPARTMENT OF TRANSPORTATION
ROBINSON CREEK AT LAMBERT LANE
BOONEVILLE, CA

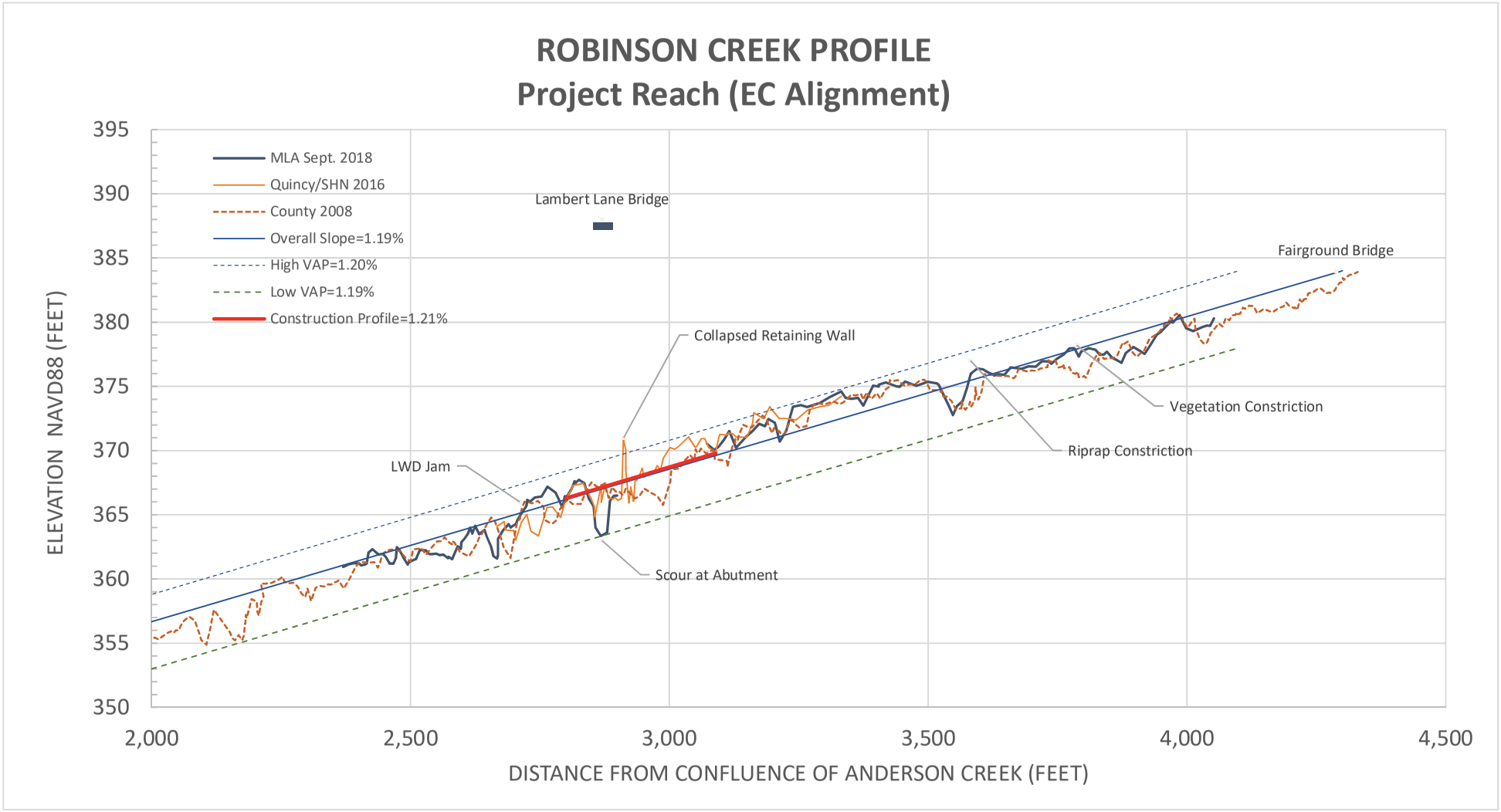
CHANNEL PROFILE AND TYPICAL RSP REVETMENT

DATE	OCT. 2018
SUBMITTAL	30% DESIGN
DESIGN	AL, ML
DRAWN	LLANOS
SHEET	2 of 2

Appendix B - Geomorphic Field Data


XS 9
XS 8
XS 7
XS 6
Large Wood Jam
Active Bank Erosion
Retaining Wall
Depositional Bar
Lambert Lane Bridge
Collapsed Retaining Wall and Riprap in Channel
Existing Riprap Along Toe of Steep Bank
Depositional Bar
Active Bank Erosion with downed 4-ft Dia. Oak in Channel
XS 1, PC
XS 2
Riprap Constriction
XS 3, PC
Reference Reach
XS 4
County Fairgrounds
XS 5, PC
Robinson Ck
LEGEND
XS 1 Cross Section Number
PC Pebble Count Location
Active Channel Margin
0
140
280
Feet


LOWER ROBINSON CREEK PROFILE
ELEVATION NAVD88 (FEET)
DISTANCE FROM CONFLUENCE OF ANDERSON CREEK (FEET)
MLA Sept. 2018
Quincy/SHN 2016
County 2008
County 2005
Bench
Bay Bottom
Overall Slope=1.19%
High VAP=1.20%
Low VAP=1.19%
Lambert Lane Bridge
Fairground Bridge
Vegetation Constriction
Riprap Constriction
Collapsed Retaining Wall
LWD Jam
Scour at Abutment
Confluence Anderson Ck.
Mountain View Bridge
XS 9
XS 8
XS 7
XS 6
XS 1 (PC 1)
XS 2
XS 3 (PC 2)
XS 4
XS 5 (PC 3)
390
380
370
360
350
340
330
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500


ROBINSON CREEK PROFILE
Project Reach (EC Alignment)
MLA Sept. 2018
Quincy/SHN 2016
County 2008
Overall Slope=1.19%
High VAP=1.20%
Low VAP=1.19%
Construction Profile=1.21%
Lambert Lane Bridge
Collapsed Retaining Wall
LWD Jam
Scour at Abutment
Riprap Constriction
Vegetation Constriction
Fairground Bridge
ELEVATION NAVD88 (FEET)
395
390
385
380
375
370
365
360
355
350
2,000
2,500
3,000
3,500
4,000
4,500
DISTANCE FROM CONFLUENCE OF ANDERSON CREEK (FEET)

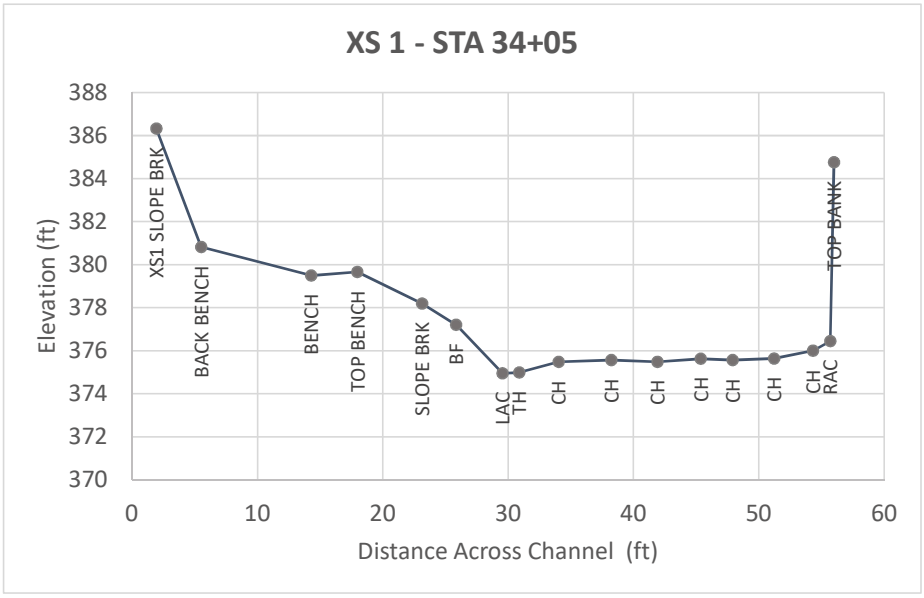
Robinson Creek Geomorphic Survey

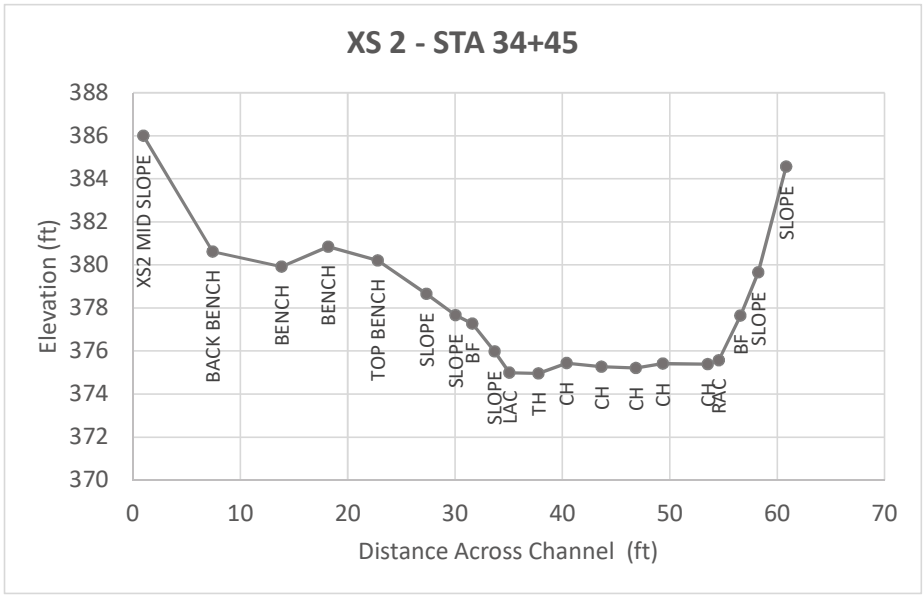
Spetember 12, 2018

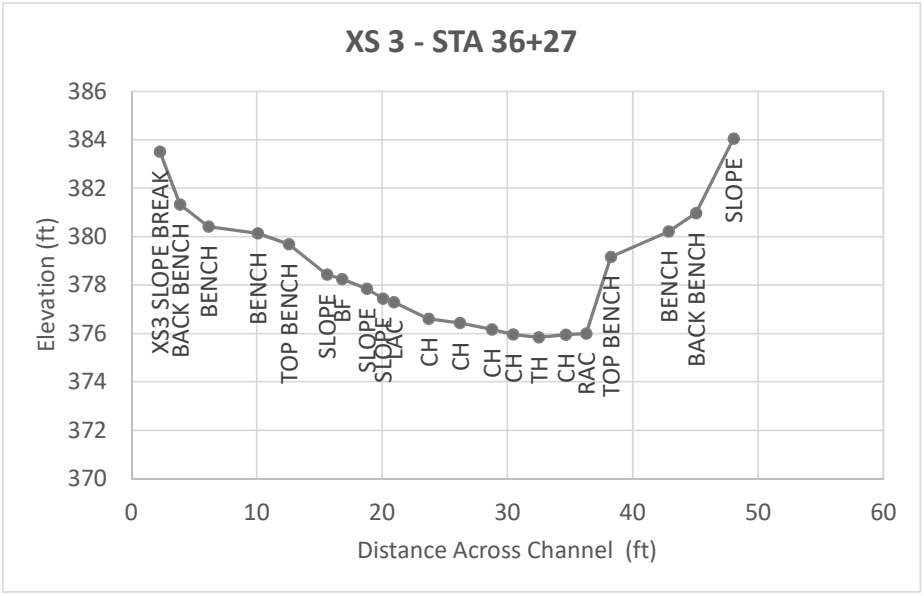
Cross Section Data

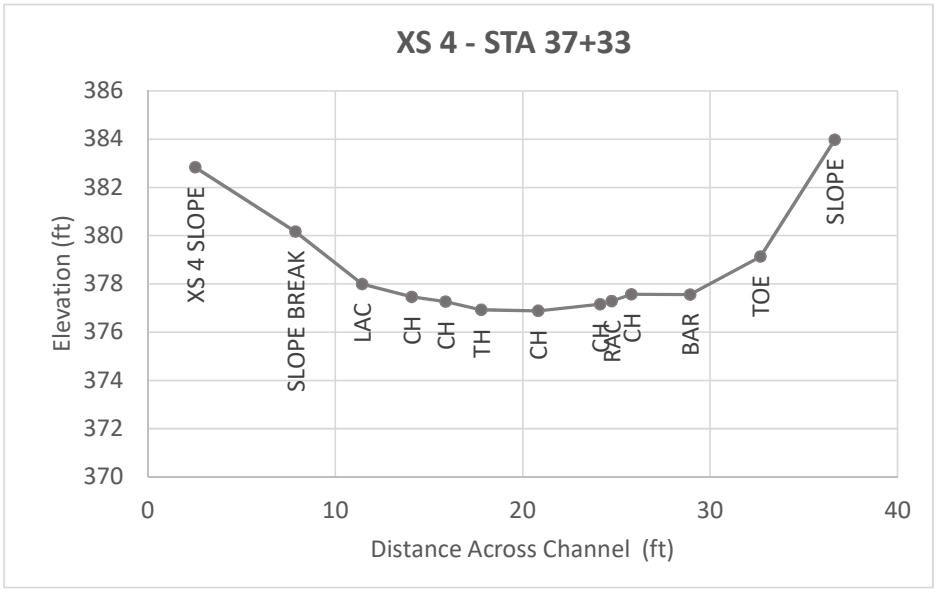
Upstream of Lambert Lane					
Cross Section	**Location**	**BF Width (ft)**	**BF Depth (ft)**		**AC Width (ft)**
XS 1	STA 34+05	29.9	2.2		26.2
XS 2	STA 34+45	25.0	2.7	2.3	19.5
XS 3	STA 36+27	21.4	2.4		15.4
XS 4	STA 37+33	24.8	2.2		13.3
XS 5	STA 39+72	31.7	2.1		24.8
	Average:	**26.6**	**2.3**		**19.8**

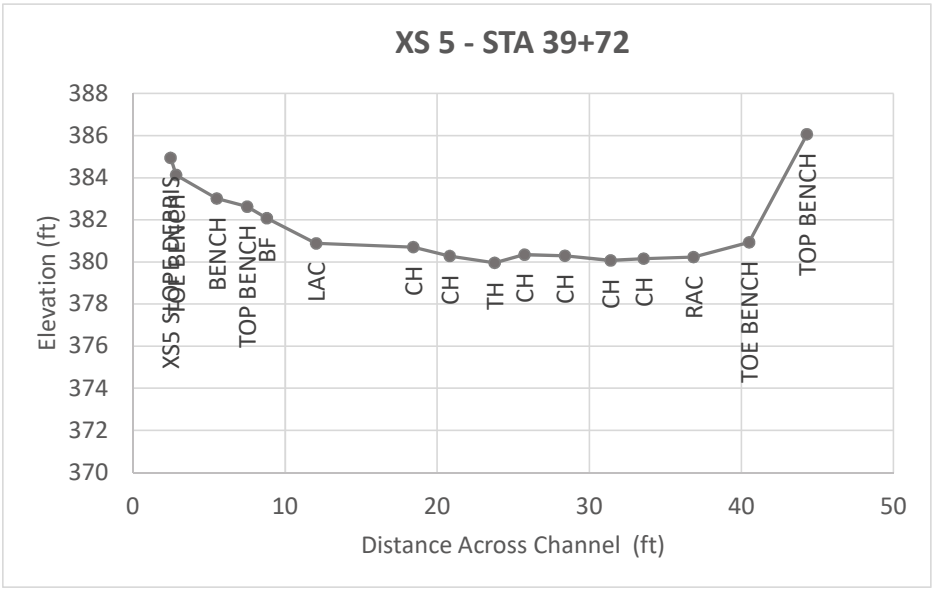
Downstream of Lambert Lane					
Cross Section	**Location**	**BF Width (ft)**	**BF Depth (ft)**		**AC Width (ft)**
XS 9	STA 24+20	23.7	1.8	2.1	17.0
XS 8	STA 24+95	19.6			18.1
XS 7	STA25+25	25.0	2.3		19.7
XS 6	STA 26+20	28.8	2.6		19.6
	Average:	**24.3**	**2.2**		**18.6**

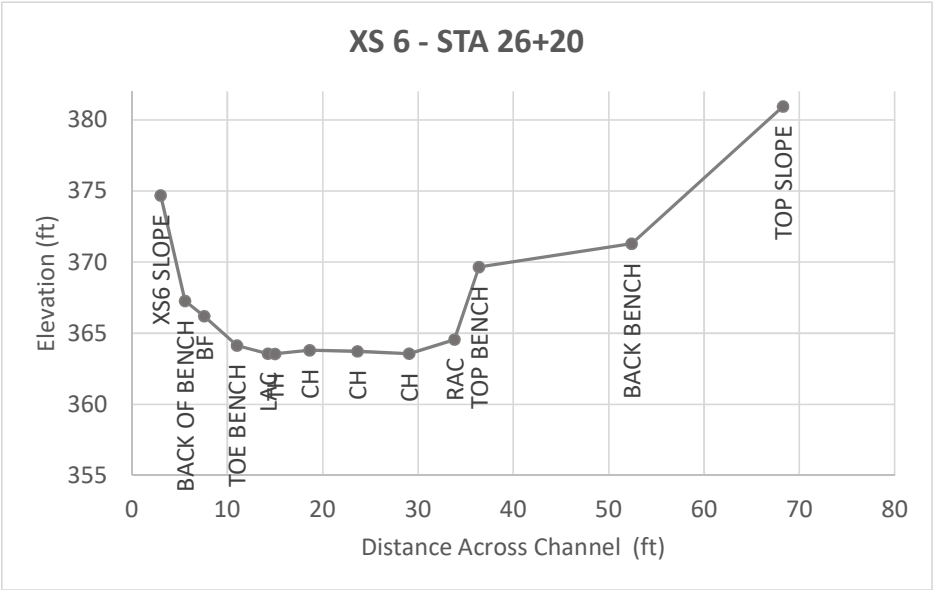

XS 1 - STA 34+05
Elevation (ft)
388
386
384
382
380
378
376
374
372
370
0
10
20
30
40
50
60
Distance Across Channel (ft)
XS1 SLOPE BRK
BACK BENCH
BENCH
TOP BENCH
SLOPE BRK
BF
LAC
TH
CH
CH
CH
CH
CH
CH
CH
RAC
TOP BANK

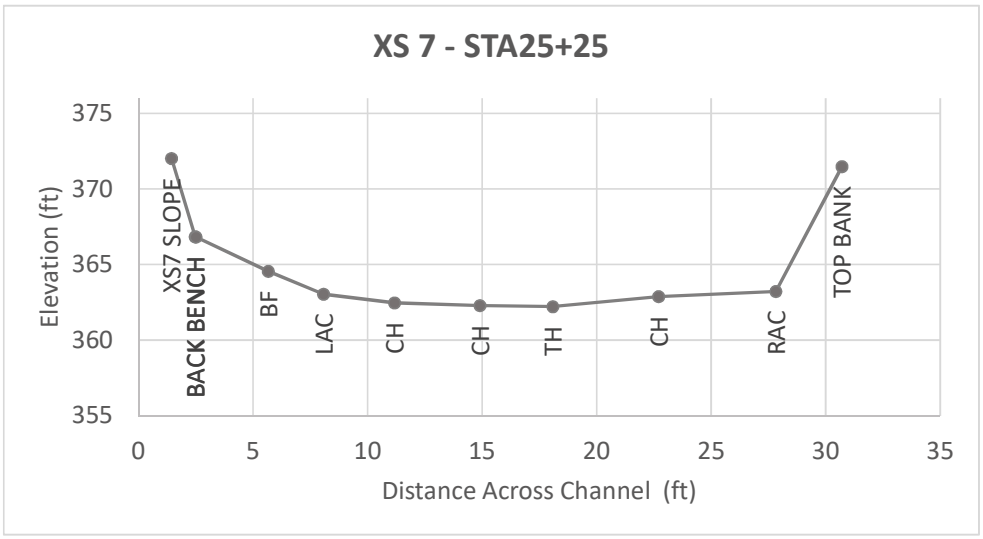

XS 2 - STA 34+45
Elevation (ft)
388
386
384
382
380
378
376
374
372
370
0
10
20
30
40
50
60
70
Distance Across Channel (ft)
XS2 MID SLOPE
BACK BENCH
BENCH
BENCH
TOP BENCH
SLOPE
SLOPE
BF
SLOPE
LAC
TH
CH
CH
CH
CH
CH
RAC
BF
SLOPE
SLOPE

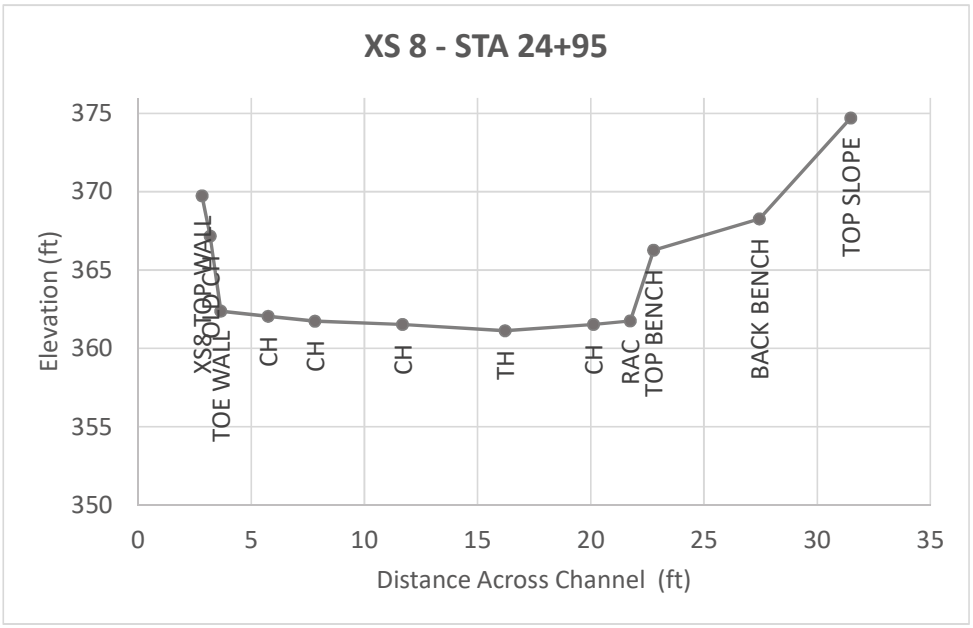

XS 3 - STA 36+27
Elevation (ft)
386
384
382
380
378
376
374
372
370
0
10
20
30
40
50
60
Distance Across Channel (ft)
XS3 SLOPE BREAK
BACK BENCH
BENCH
BENCH
TOP BENCH
SLOPE
BF
SLOPE
SLOPE
LAC
CH
CH
CH
CH
TH
CH
RAC
TOP BENCH
BENCH
BACK BENCH
SLOPE

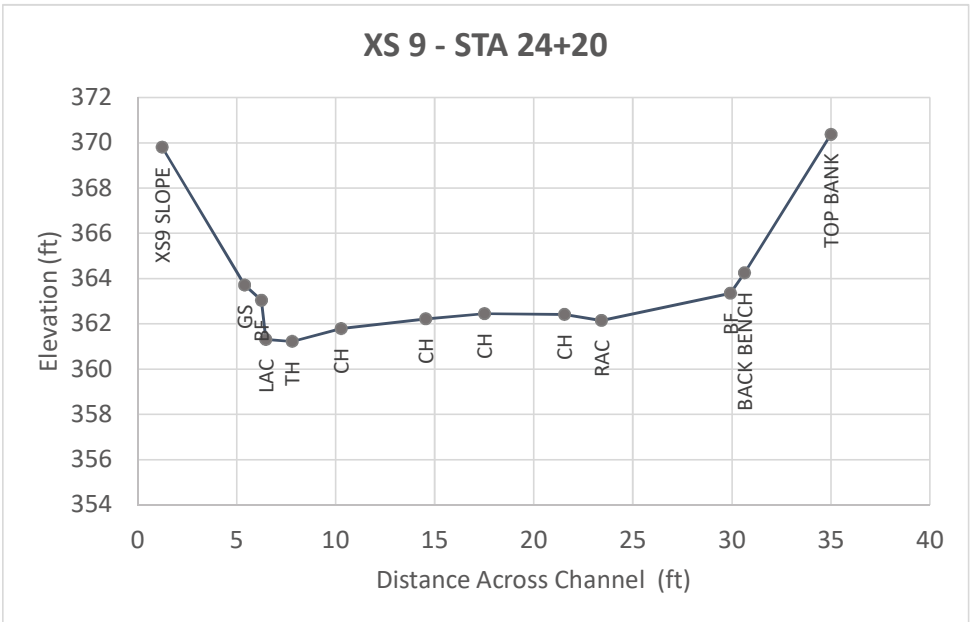

XS 4 - STA 37+33
Elevation (ft)
386
384
382
380
378
376
374
372
370
0
10
20
30
40
Distance Across Channel (ft)
XS 4 SLOPE
SLOPE BREAK
LAC
CH
CH
TH
CH
CH
RAC
CH
BAR
TOE
SLOPE

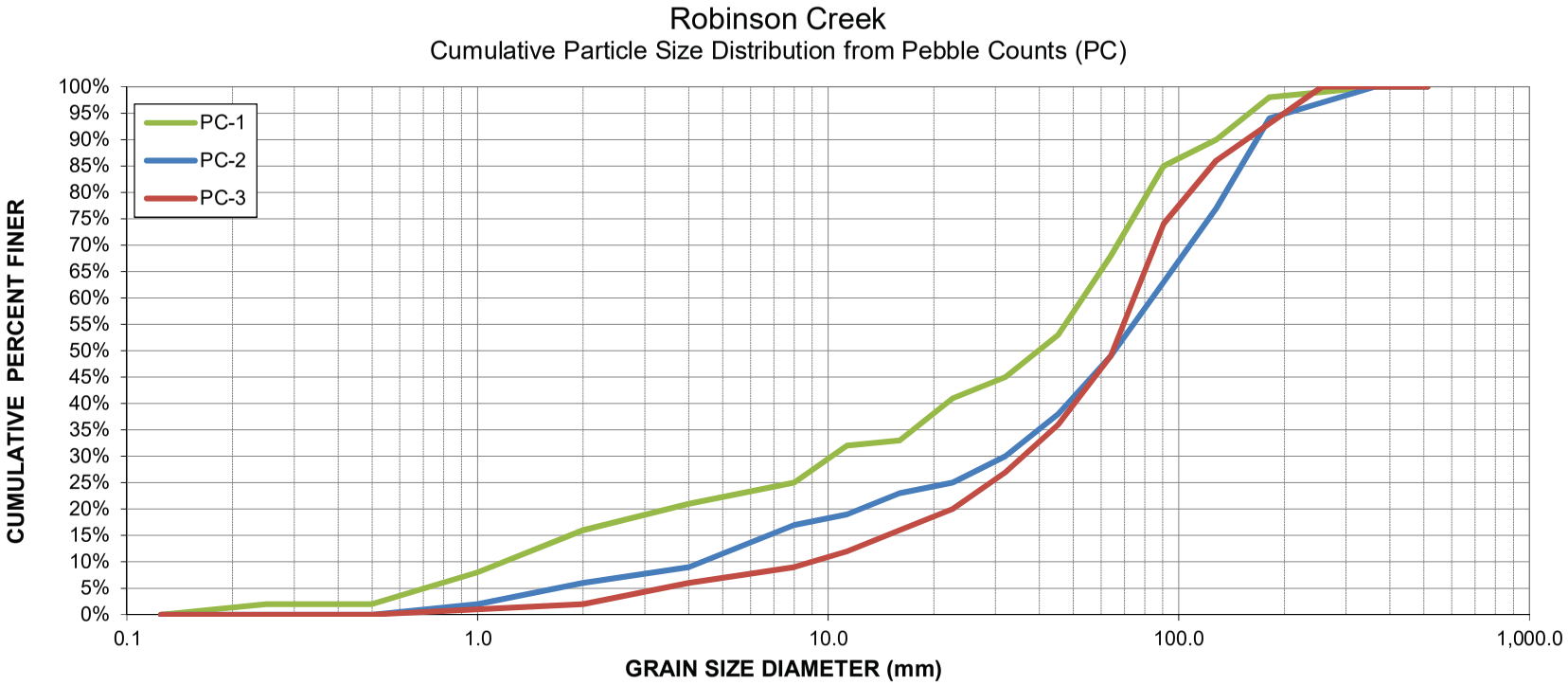

XS 5 - STA 39+72
Elevation (ft)
388
386
384
382
380
378
376
374
372
370
0
10
20
30
40
50
Distance Across Channel (ft)
BENCH
TOP BENCH
BF
LAC
CH
CH
TH
CH
CH
CH
CH
RAC
TOE BENCH
TOP BENCH

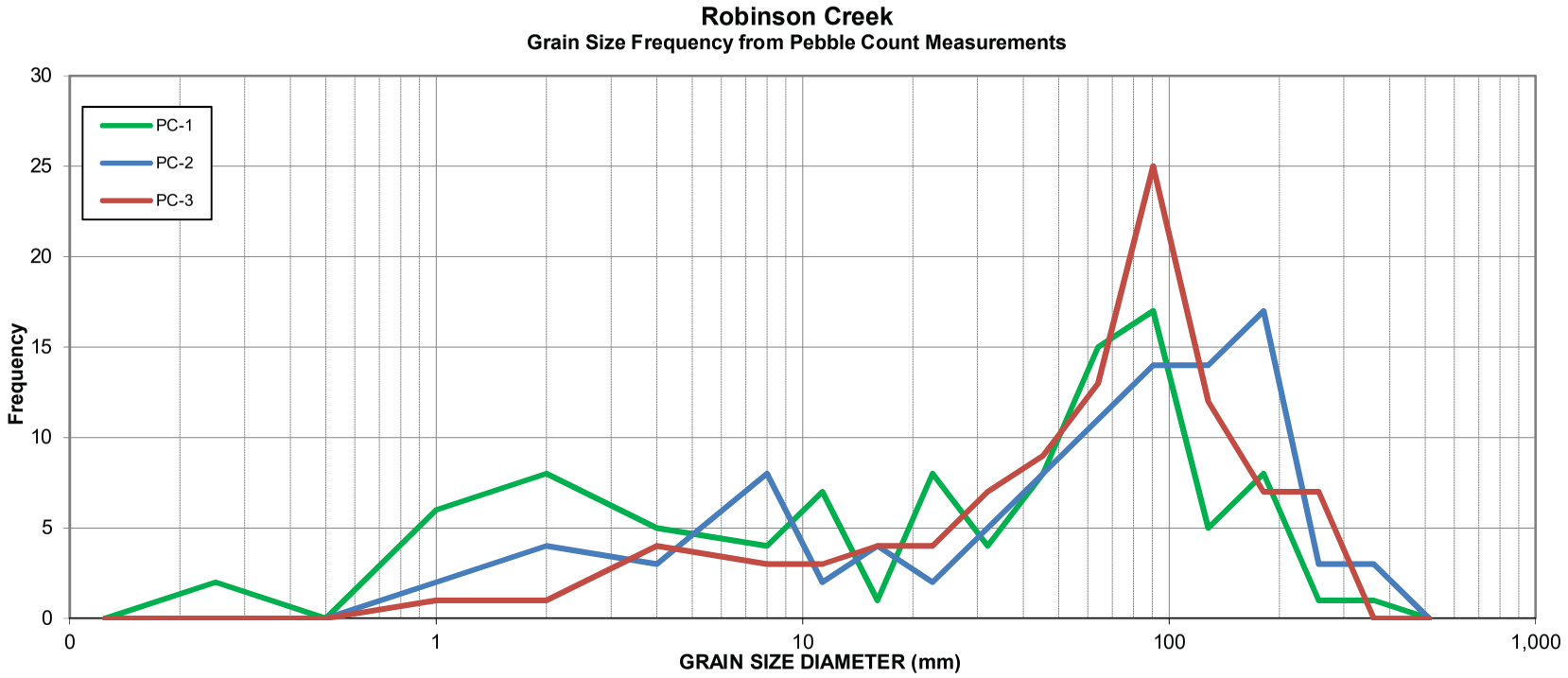

XS 6 - STA 26+20
Elevation (ft)
380
375
370
365
360
355
0
10
20
30
40
50
60
70
80
Distance Across Channel (ft)
XS6 SLOPE
BACK OF BENCH
BF
TOE BENCH
LAC
CH
CH
CH
RAC
TOP BENCH
BACK BENCH
TOP SLOPE


XS 7 - STA25+25
Elevation (ft)
375
370
365
360
355
0
5
10
15
20
25
30
35
Distance Across Channel (ft)
XS7 SLOPE
BACK BENCH
BF
LAC
CH
CH
TH
CH
RAC
TOP BANK


XS 8 - STA 24+95
Elevation (ft)
375
370
365
360
355
350
0
5
10
15
20
25
30
35
Distance Across Channel (ft)
XS8 TOP WALL
TOE WALL
CH
CH
CH
TH
CH
RAC
TOP BENCH
BACK BENCH
TOP SLOPE


XS 9 - STA 24+20
Elevation (ft)
372
370
368
366
364
362
360
358
356
354
0
5
10
15
20
25
30
35
40
Distance Across Channel (ft)
XS9 SLOPE
GS
BF
LAC
TH
CH
CH
CH
CH
RAC
BF
BACK BENCH
TOP BANK

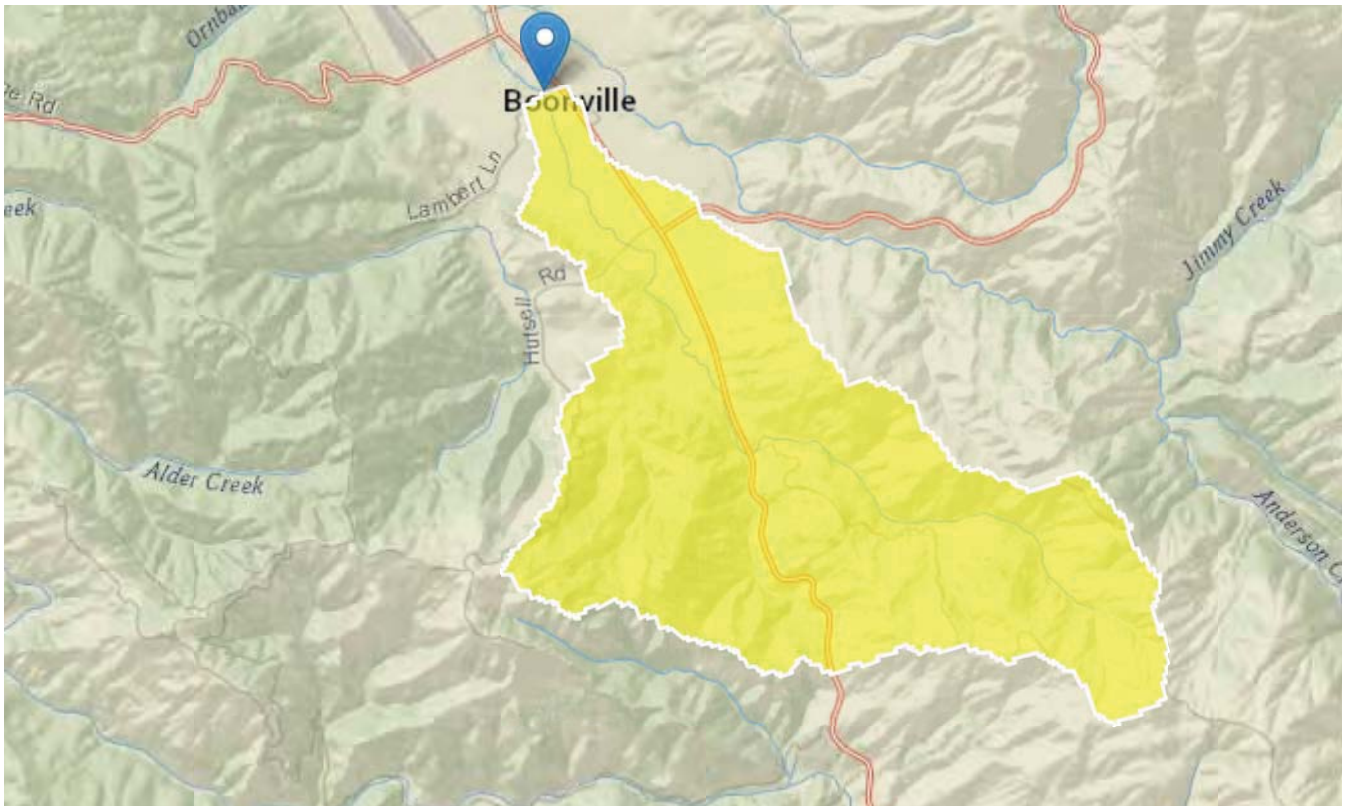

Robinson Creek
Cumulative Particle Size Distribution from Pebble Counts (PC)
CUMULATIVE PERCENT FINER
100%
95%
90%
85%
80%
75%
70%
65%
60%
55%
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
PC-1
PC-2
PC-3
0.1
1.0
10.0
100.0
1,000.0
GRAIN SIZE DIAMETER (mm)


Robinson Creek
Grain Size Frequency from Pebble Count Measurements
PC-1
PC-2
PC-3
Frequency
30
25
20
15
10
5
0
0
1
10
100
1,000
GRAIN SIZE DIAMETER (mm)

Appendix C – Hydrology

Robinson Creek at Lambert Lane Boonville, CA

Region ID: CA
Workspace ID: CA20180907194531373000
Clicked Point (Latitude, Longitude): 39.00833, -123.36844
Time: 2018-09-07 12:45:47 -0700



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BASINPERIM	Perimeter of the drainage basin as defined in SIR 2004-5262	14.2	thousand feet
BSLDEM30M	Mean basin slope computed from 30 m DEM	23.2	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	-2314707.3	feet
CENTROIDY	Basin centroid vertical (y) location in state plane units	2108387.3	feet

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	4	square miles
EL6000	Percent of area above 6000 ft		percent
ELEV	Mean Basin Elevation	881	feet
ELEVMAX	Maximum basin elevation		feet
FOREST	Percentage of area covered by forest	18.5	percent
JANMAXTMP	Mean Maximum January Temperature	56.41	degrees F
JANMINTMP	Mean Minimum January Temperature	37.58	degrees F
LAKEAREA	Percentage of Lakes and Ponds		percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24		percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset		percent
LFPLENGTH	Length of longest flow path		miles
MINBELEV	Minimum basin elevation		feet
OUTLETELEV	Elevation of the stream outlet in thousands of feet above NAVD88.	375	feet
PRECIP	Mean Annual Precipitation	44.2	inches
RELIEF	Maximum - minimum elevation		feet
RELRELF	Basin relief divided by basin perimeter		feet per mi

Peak-Flow Statistics Parameters [2012 5113 Region 1 North Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4	square miles	0.04	3200
PRECIP	Mean Annual Precipitation	44.2	inches	20	125

Peak-Flow Statistics Flow Report [2012 5113 Region 1 North Coast]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SEp

Statistic	Value	Unit	PII	PIu	SEp
2 Year Peak Flood	264	ft^3/s	108	645	58.6
5 Year Peak Flood	517	ft^3/s	247	1080	47.4
10 Year Peak Flood	700	ft^3/s	347	1410	44.2
25 Year Peak Flood	943	ft^3/s	482	1850	42.7
50 Year Peak Flood	1130	ft^3/s	576	2220	42.7
100 Year Peak Flood	1320	ft^3/s	659	2660	44.3
200 Year Peak Flood	1510	ft^3/s	748	3040	44.4
500 Year Peak Flood	1760	ft^3/s	851	3630	46

Peak-Flow Statistics Citations

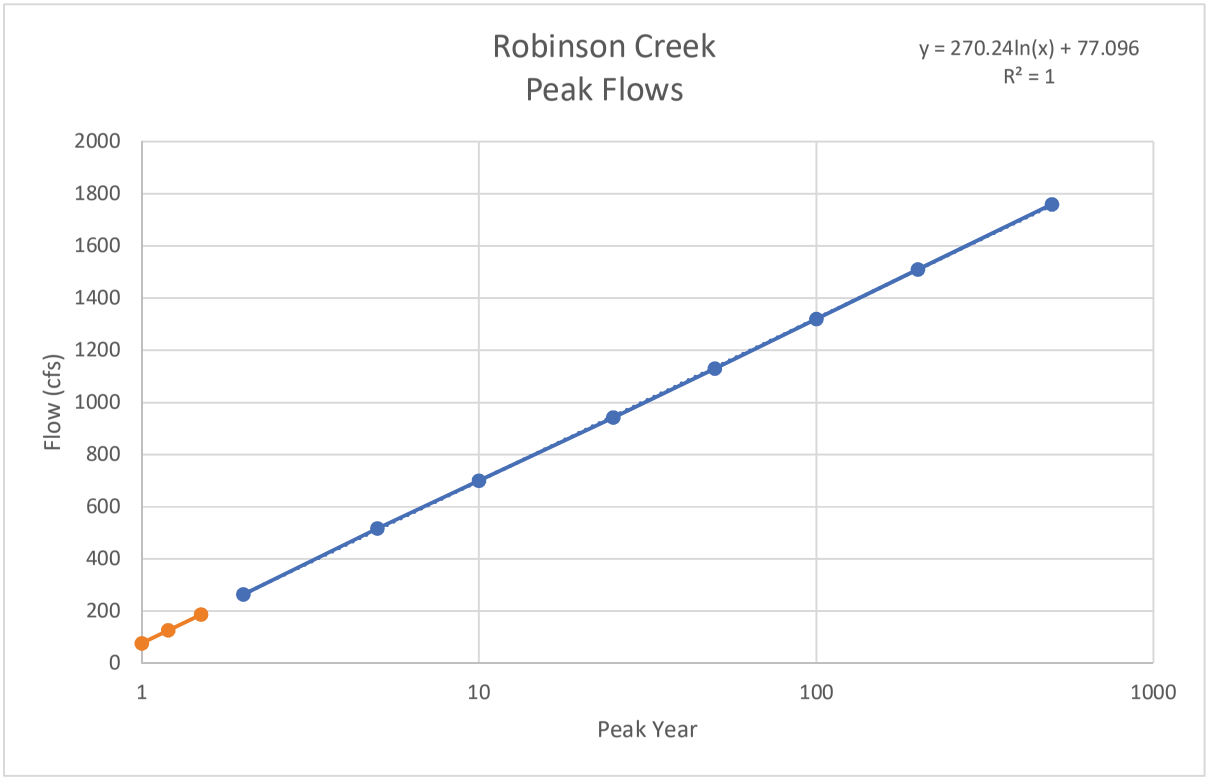
Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

Application Version: 4.2.1

Flood Frequency

Robinson Creek at Lambert Lane

	DA (sq mi)=	4
	PK (year)	Q (cfs)
Extrapolated	1	77
	1.2	126
	1.5	187
Streamstats	2	264
	5	517
	10	700
	25	943
	50	1130
	100	1320
	200	1510
	500	1760



Appendix D - HEC RAS Results

Manning's Roughness Calculations

Robinson Creek at Lambert Lane

CALTRANS. 2014. Hybrid Streambank Revetments: Vegetated Rock Slope Protection. State of California Department of Transportation Design Information Bulletin. DIB 87-0.1

$$n_c = (n_0+n_1+n_2+n_3+n_4)\, m_5$$

n_c= main channel effective roughness value

Post Project "As-Built Conditon"

Hybrid RSP revetment after construction with newly planted vegetation

Main Channnel Bed and Bank Surface Material	Reevaluated n_o=	0.028	Coarse Rock
Channel Degree of Irregularity	Reevaluated n_1=	0.005	Slightly Eroded banks or bed
Channel Cross Section Variation	n_2=	0.005	Thalweg Alternates sides
Main Channel Relative Effect of Obstructions	n_3=	0.000	No obstructions
Main Channel Vegetation Density	Reevaluated n_4=	0.005	Low vegetation Denisty
Channel Degree of Meandering	m_5=	1.000	Sinuosity of 1.2

n_c=	**0.043**

Post Project "Full Grow Out Conditon"

Hybrid RSP revetment with mature vegetation

Main Channnel Bed and Bank Surface Material	Reevaluated n_o=	0.028	Coarse Rock
Channel Degree of Irregularity	Reevaluated n_1=	0.000	SmoothBanks
Channel Cross Section Variation	n_2=	0.005	Thalweg Alternates sides
Main Channel Relative Effect of Obstructions	n_3=	0.010	Obstruction <15% of XS from debris
Main Channel Vegetation Density	Reevaluated n_4=	0.065	Dense Willows
Channel Degree of Meandering	m_5=	1.000	Sinuosity of 1.2

n_c=	**0.108**

Channel Bed

Main Channnel Bed and Bank Surface Material	Reevaluated n_o=	0.028	Coarse Rock
Channel Degree of Irregularity	Reevaluated n_1=	0.000	SmoothBanks
Channel Cross Section Variation	n_2=	0.005	Thalweg Alternates sides
Main Channel Relative Effect of Obstructions	n_3=	0.010	Obstruction <15% of XS from debris
Main Channel Vegetation Density	Reevaluated n_4=	0.000	No vegetationin Channel
Channel Degree of Meandering	m_5=	1.000	Sinuosity of 1.2

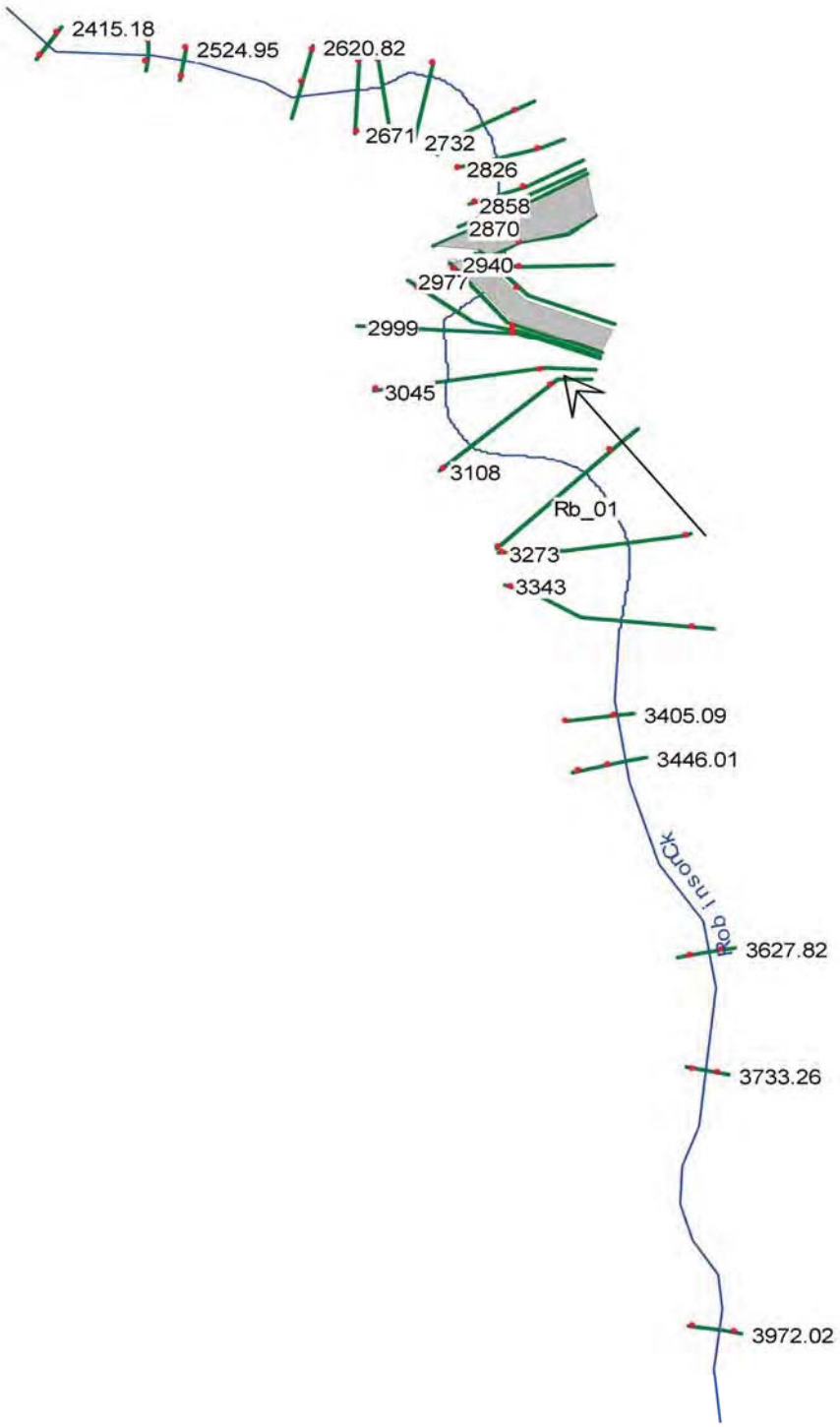
n_c=	**0.043**

Native Planting Areas

Main Channnel Bed and Bank Surface Material	Reevaluated n_o=	0.02	Earth and sand
Channel Degree of Irregularity	Reevaluated n_1=	0.005	Slightly eroded banks
Channel Cross Section Variation	n_2=	0.005	Thalweg Alternates sides
Main Channel Relative Effect of Obstructions	n_3=	0.010	Obstruction <15% of XS from debris
Main Channel Vegetation Density	Reevaluated n_4=	0.040	Native Trees with wide spacing
Channel Degree of Meandering	m_5=	1.000	Sinuosity of 1.2

n_c=	**0.08**

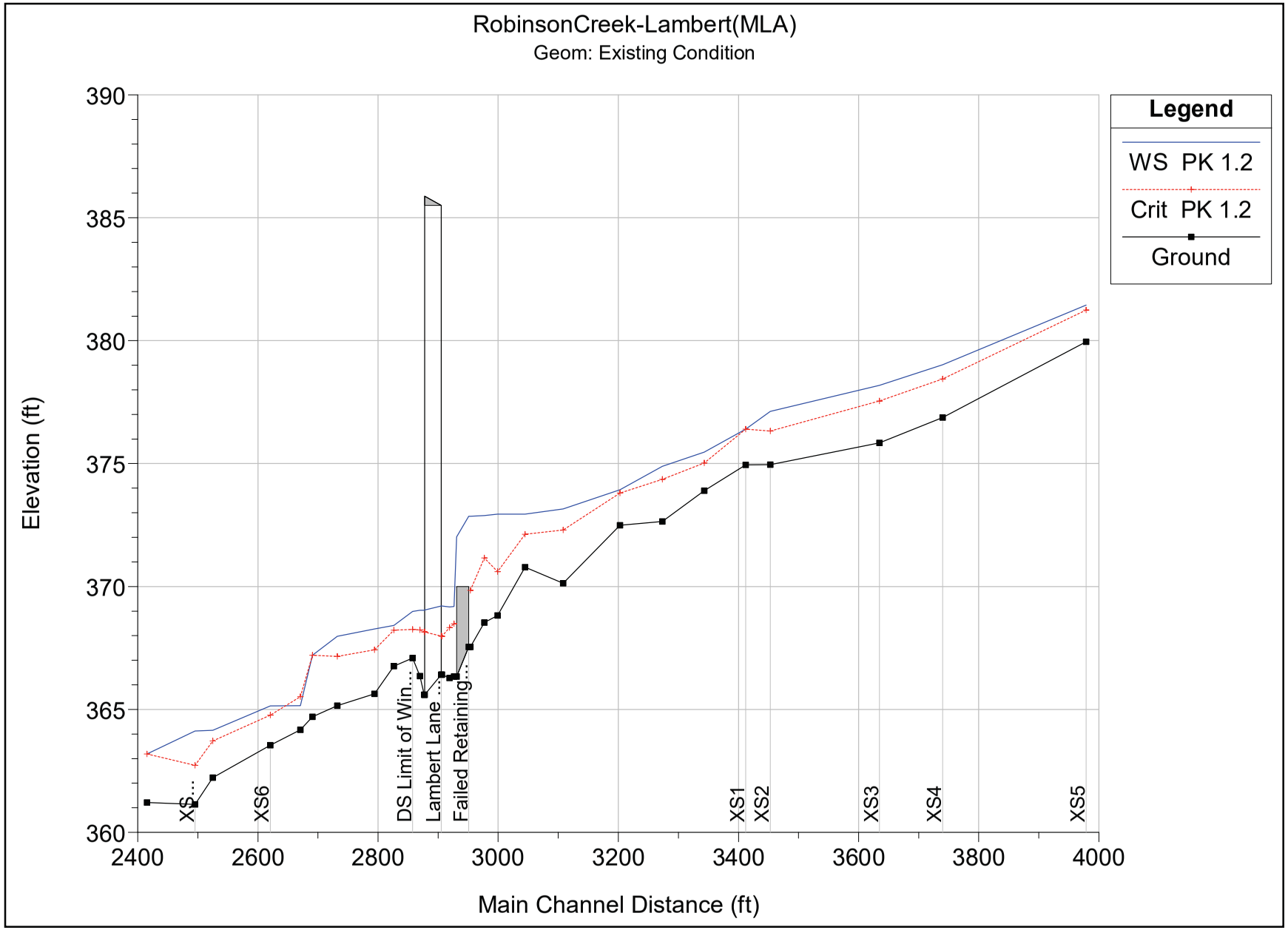
Robinson Creek at Lambert Lane Bridge
HEC-RAS Reults for Existing Channel

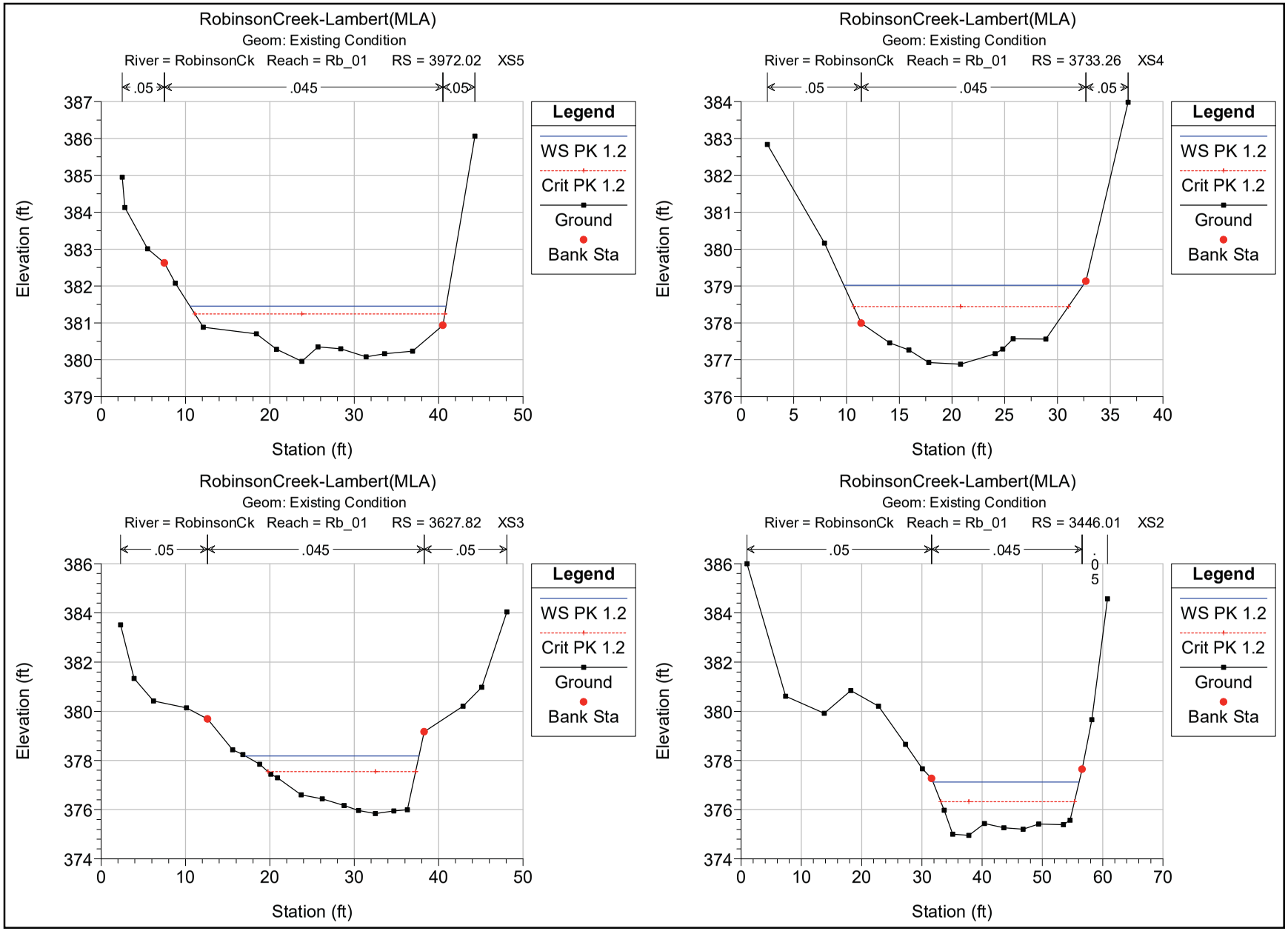


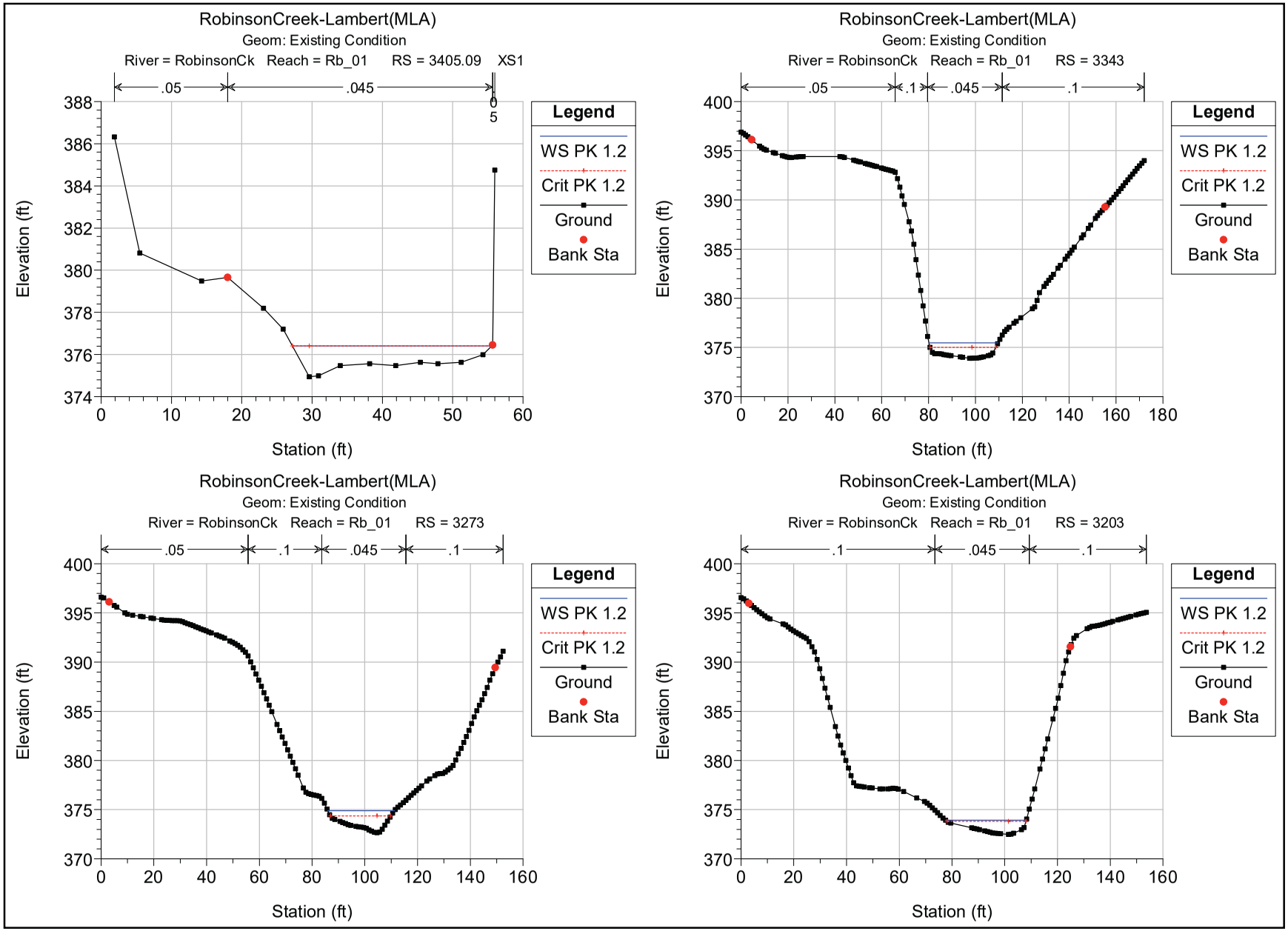
Robinson Creek at Lambert Lane Bridge
HEC-RAS Reults for Existing Channel

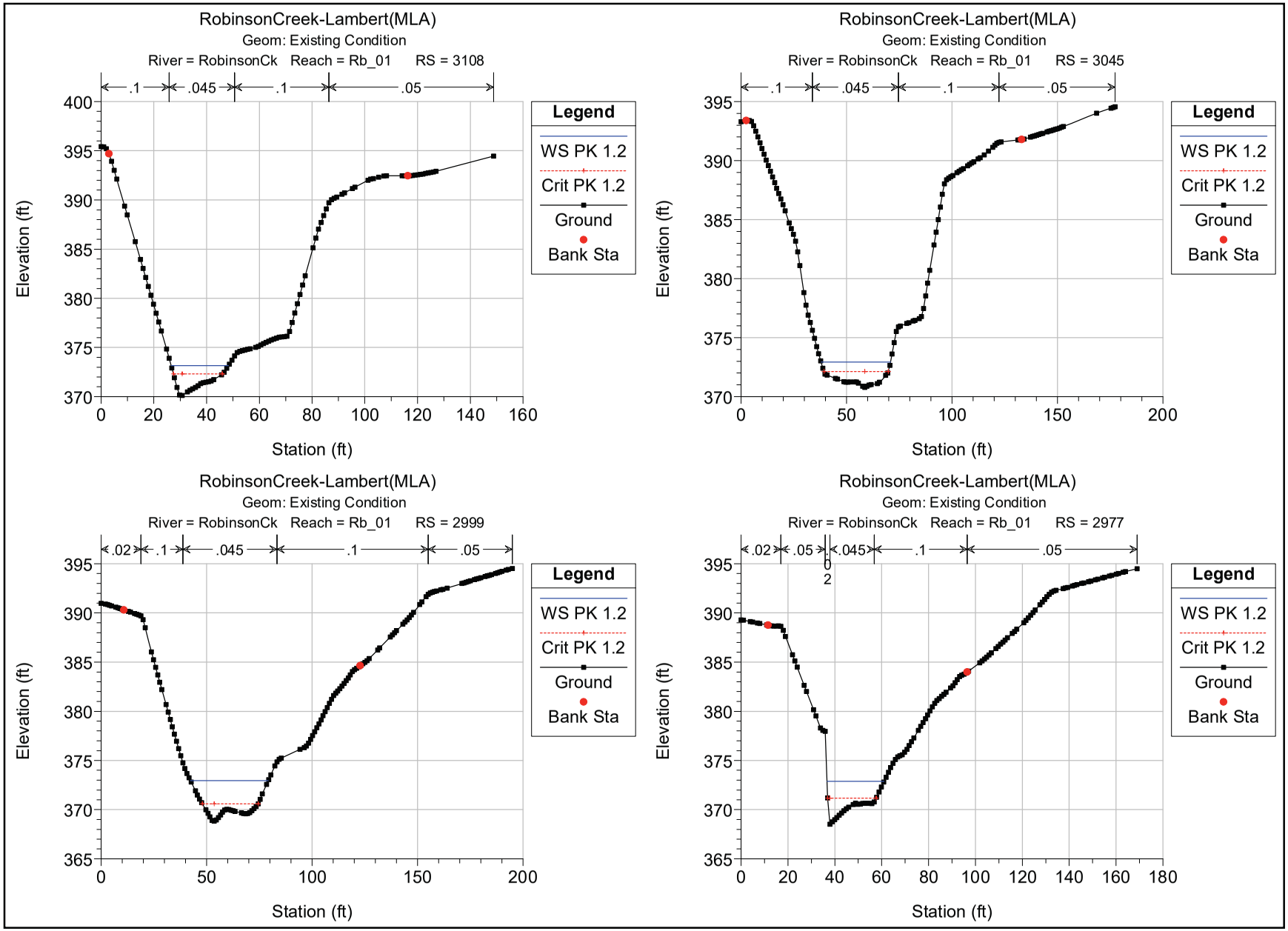
Profile = Q1.2
Q Total (cfs) = 126

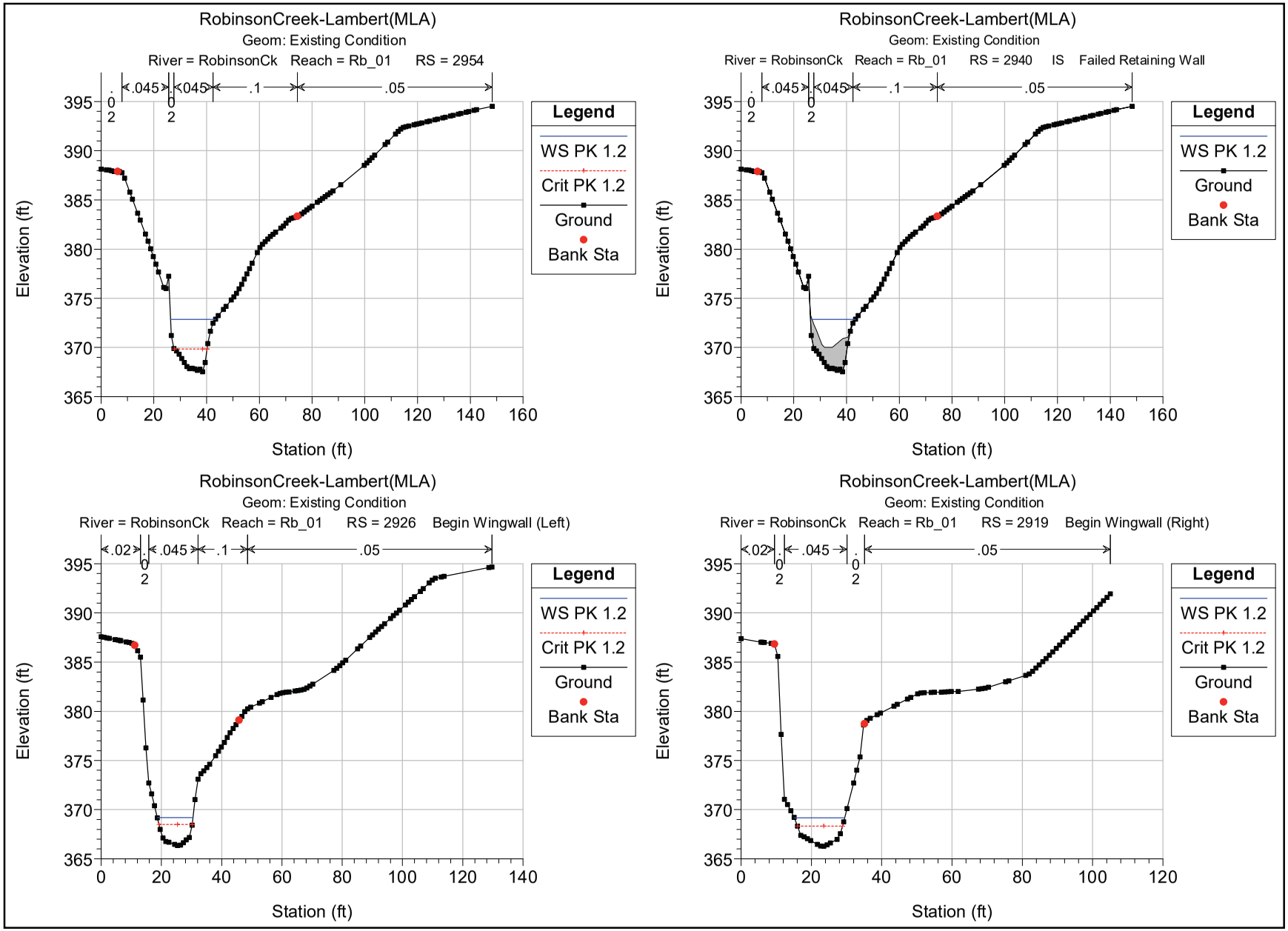
River Sta	Description	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Depth of Flow (ft)
3972.02		379.96	381.45	381.24	381.72	0.015676	4.15	30.47	30.36	0.73	1.49
3733.26		376.88	379.02	378.44	379.24	0.007335	3.77	33.94	22.7	0.53	2.14
3627.82		375.85	378.19	377.55	378.42	0.008272	3.89	32.43	20.59	0.55	2.34
3446.01		374.96	377.12	376.33	377.27	0.004788	3.1	40.59	24.26	0.42	2.16
3405.09		374.95	376.4	376.4	376.83	0.032602	5.26	23.95	28.35	1.01	1.45
3343.00		373.90	375.46	375.02	375.65	0.008308	3.44	36.65	29.42	0.54	1.56
3273.00		372.65	374.89	374.36	375.09	0.007769	3.57	35.3	25.33	0.53	2.24
3203.00		372.49	373.93	373.8	374.24	0.020368	4.43	28.41	30.74	0.81	1.44
3108.00		370.13	373.15	372.3	373.32	0.005267	3.32	37.92	21.7	0.44	3.02
3045.00		370.79	372.94	372.13	373.04	0.003381	2.51	50.25	32.94	0.36	2.15
2999.00		368.82	372.95	370.6	372.97	0.000435	1.29	98.02	36.87	0.14	4.13
2977.00		368.53	372.88	371.16	372.95	0.001988	2.08	60.5	24.36	0.23	4.35
2954.00		367.54	372.85	369.84	372.92	0.000951	2.03	62.09	17.01	0.19	5.31
2940.00	Inl Struct										0.00
2926.00		366.34	369.19	368.48	369.56	0.010128	4.94	25.53	11.87	0.59	2.85
2919.00		366.28	369.17	368.33	369.45	0.007328	4.24	29.71	14.3	0.52	2.89
2906.00		366.41	369.21	367.98	369.32	0.002047	2.68	47.01	21.23	0.32	2.80
2891.00	Bridge										0.00
2877.00		365.60	369.04	368.16	369.21	0.003938	3.38	37.3	20.63	0.44	3.44
2870.00		366.36	369.03	368.24	369.16	0.004169	2.88	43.78	26.39	0.39	2.67
2858.00		367.09	368.98	368.25	369.11	0.004583	2.79	45.1	31.55	0.41	1.89
2826.00		366.76	368.42	368.23	368.78	0.018333	4.79	26.28	22.98	0.79	1.66
2794.00		365.63	368.27	367.43	368.39	0.006085	2.78	45.28	31.93	0.41	2.64
2732.00		365.15	367.97	367.16	368.09	0.004037	2.69	46.82	30.13	0.38	2.82
2691.00		364.70	367.21	367.21	367.68	0.034574	5.5	22.9	25.35	1.02	2.51
2671.00		364.17	365.15	365.52	366.35	0.149476	8.78	14.36	24.97	2.04	0.98
2620.82		363.55	365.15	364.77	365.39	0.010655	3.95	31.91	24.78	0.61	
2524.95		362.23	364.15	363.71	364.41	0.009677	4.08	30.98	21.79	0.6	
2495.47		361.13	364.12	362.73	364.23	0.002547	2.72	46.38	18.76	0.3	
2415.18		361.22	363.19	363.19	363.69	0.034012	5.69	22.14	22.91	1.02	

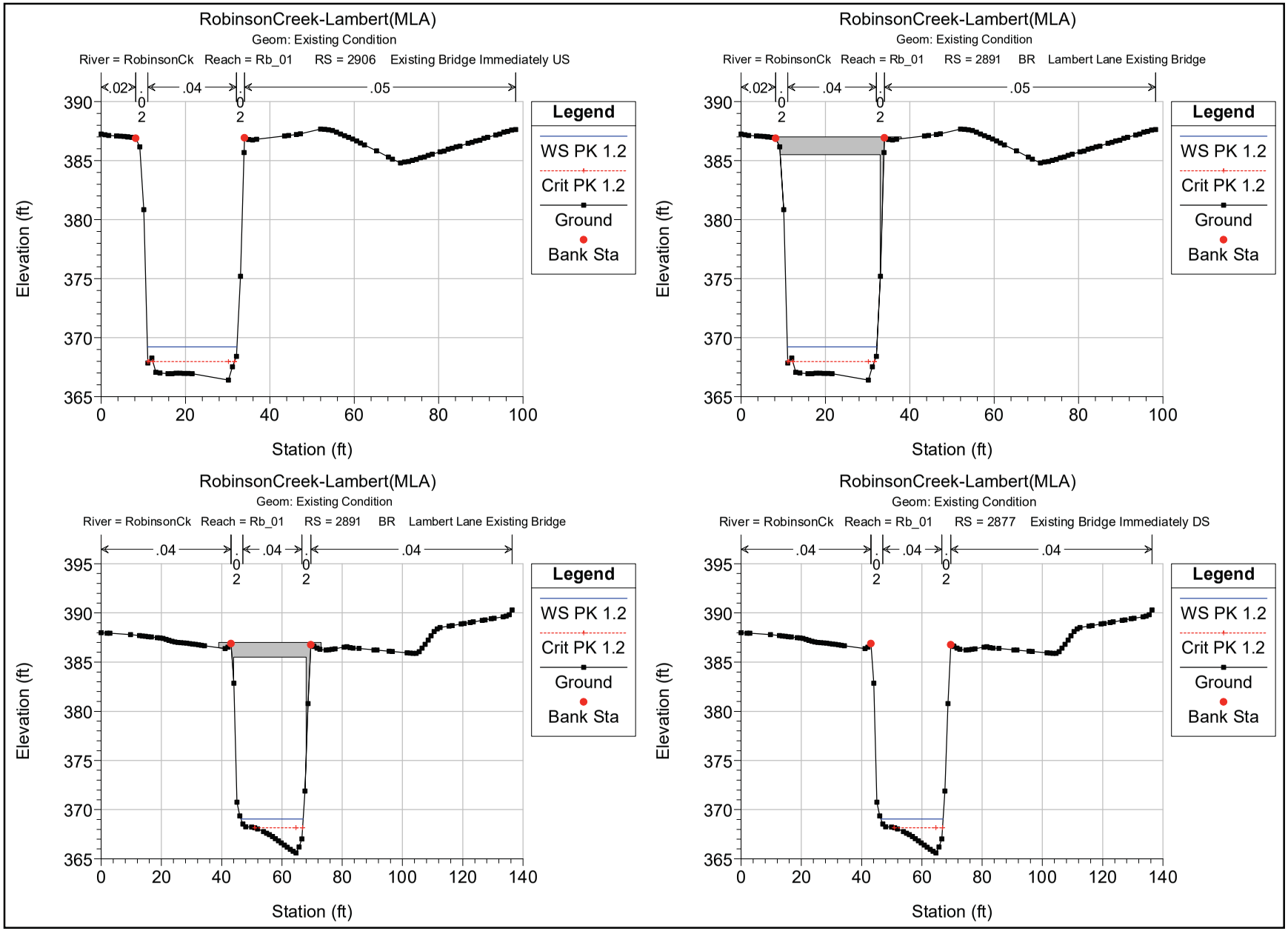

RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
Legend
WS PK 1.2
Crit PK 1.2
Ground
Elevation (ft)
Main Channel Distance (ft)
390
385
380
375
370
365
360
2400
2600
2800
3000
3200
3400
3600
3800
4000
XS...
XS6
DS Limit of Win...
Lambert Lane ...
Failed Retaining...
XS1
XS2
XS3
XS4
XS5

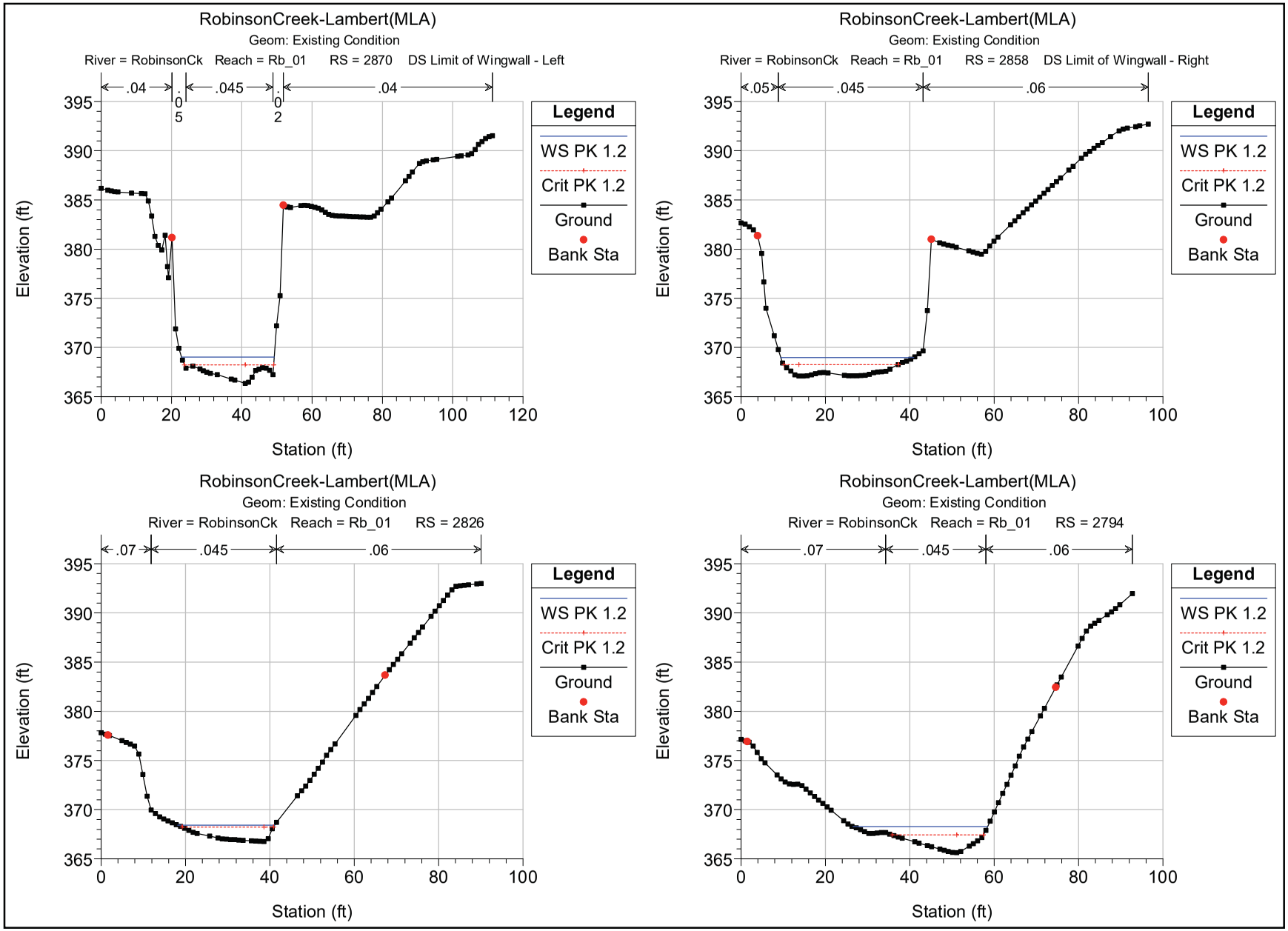

RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3972.02 XS5
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3733.26 XS4
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3627.82 XS3
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3446.01 XS2
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta

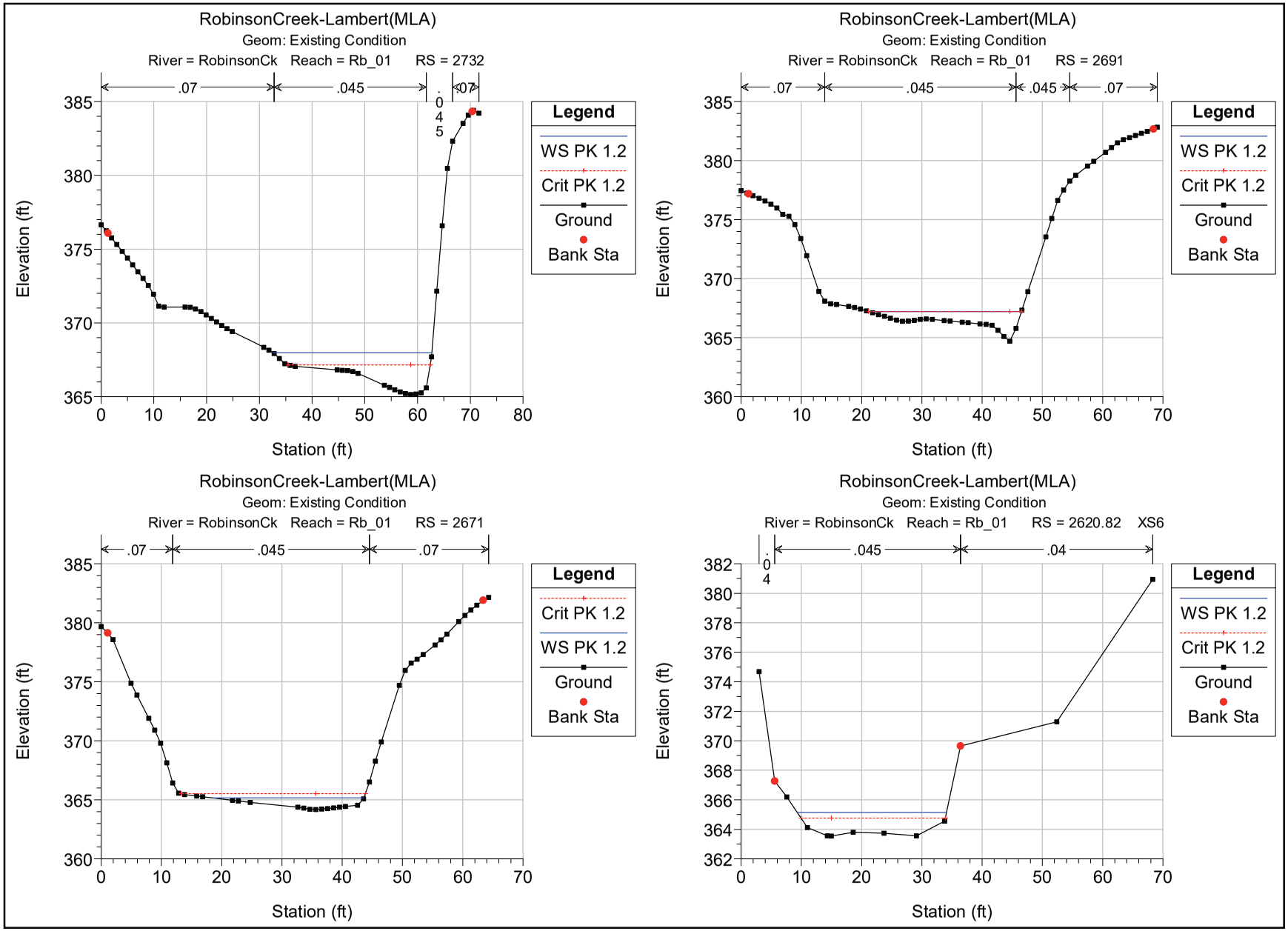

RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3405.09 XS1
.05
.045
0
5
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3343
.05
.1
.045
.1
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3273
.05
.1
.045
.1
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3203
.1
.045
.1
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)

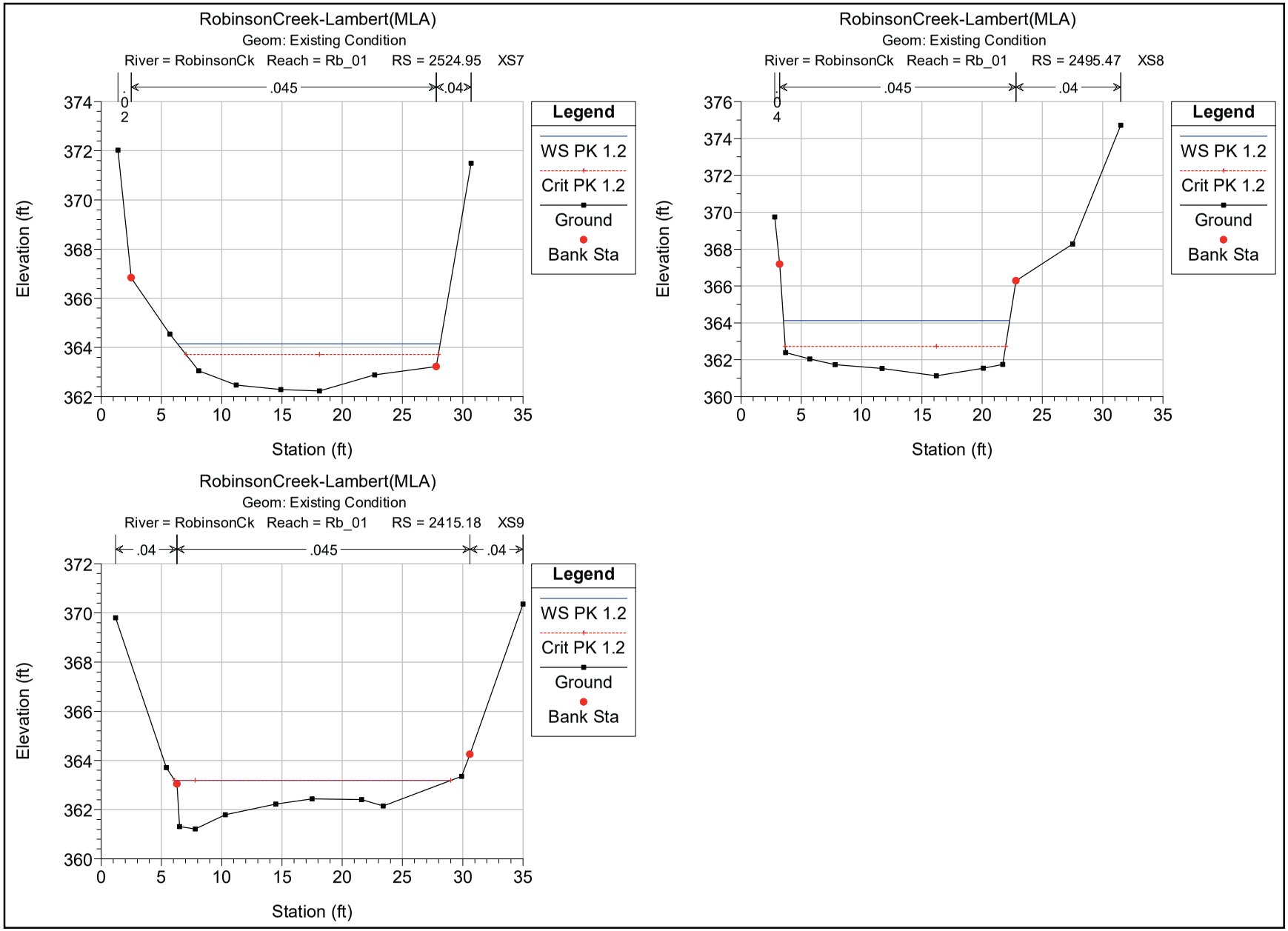

RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3108
.1
.045
.1
.05
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 3045
.1
.045
.1
.05
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2999
.02
.1
.045
.1
.05
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2977
.02
.05
.045
.1
.05
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta


RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2954
.045
.045
.1
.05
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2940 IS Failed Retaining Wall
.045
.045
.1
.05
Legend
WS PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2926 Begin Wingwall (Left)
.02
.045
.1
.05
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2919 Begin Wingwall (Right)
.02
.045
.05
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)


RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2906 Existing Bridge Immediately US
.02
.04
.05
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2891 BR Lambert Lane Existing Bridge
.02
.04
.05
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2891 BR Lambert Lane Existing Bridge
.04
.04
.04
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2877 Existing Bridge Immediately DS
.04
.04
.04
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)


RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2870 DS Limit of Wingwall - Left
.04
.05
.045
.02
.04
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2858 DS Limit of Wingwall - Right
.05
.045
.06
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2826
.07
.045
.06
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2794
.07
.045
.06
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)


RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2732
.07
.045
.07
.045
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2691
.07
.045
.045
.07
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2671
.07
.045
.07
Legend
Crit PK 1.2
WS PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2620.82 XS6
.045
.04
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
Elevation (ft)
Station (ft)


RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2524.95 XS7
.02
.045
.04
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2495.47 XS8
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition
River = RobinsonCk Reach = Rb_01 RS = 2415.18 XS9
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
WS PK 1.2
Crit PK 1.2
Ground
Bank Sta

Michael Love & Associates, Inc.
PO Box 4477 • Arcata, CA 95518 • (707) 822-2411

VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

MENDOCINO COUNTY DEPARTMENT OF TRANSPORTATION
ROBINSON CREEK AT LAMBERT LANE
BOONEVILLE, CA

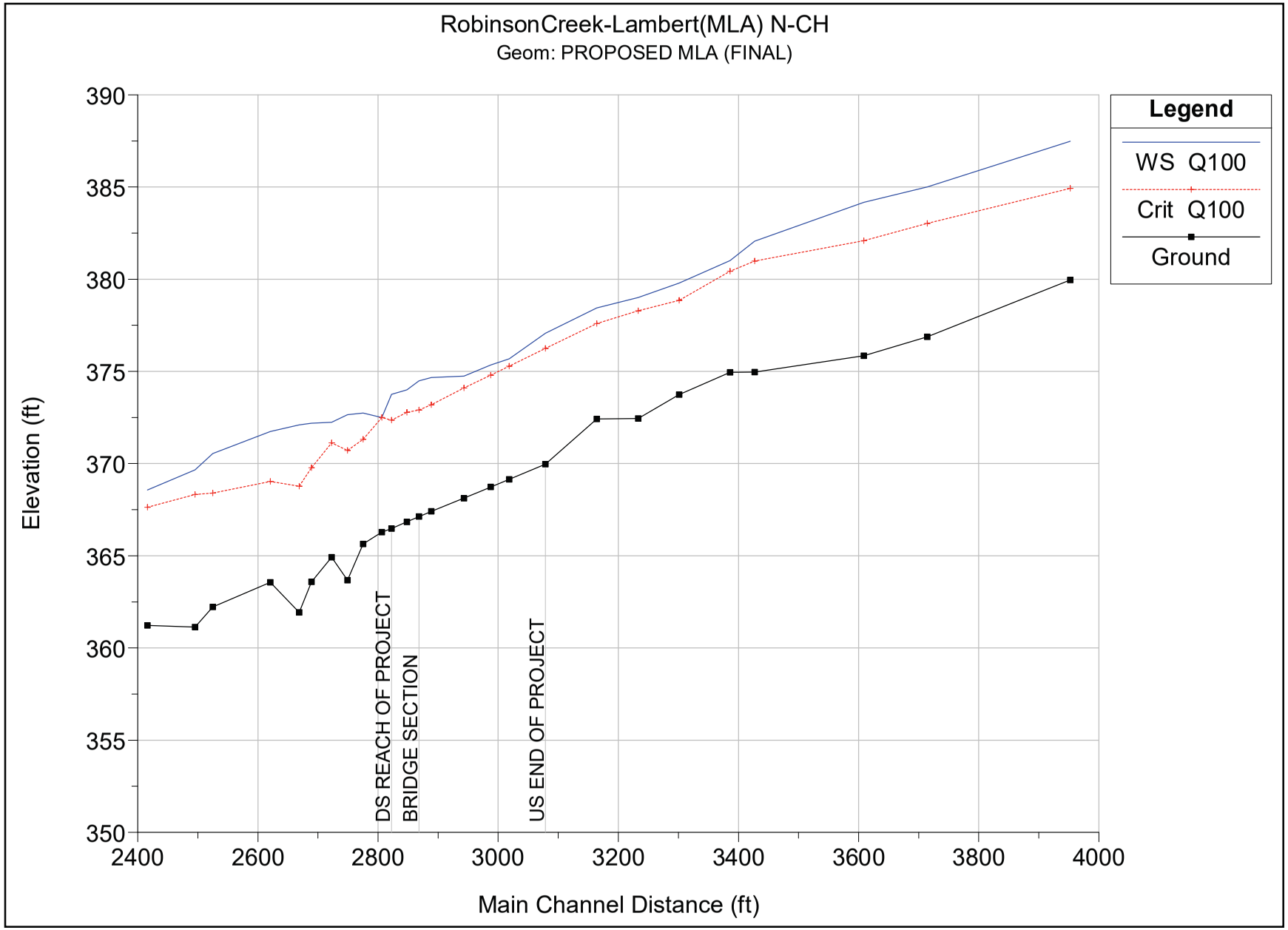
HEC-RAS LAYOUT ROBINSON CREEK AT LAMBERT LANE

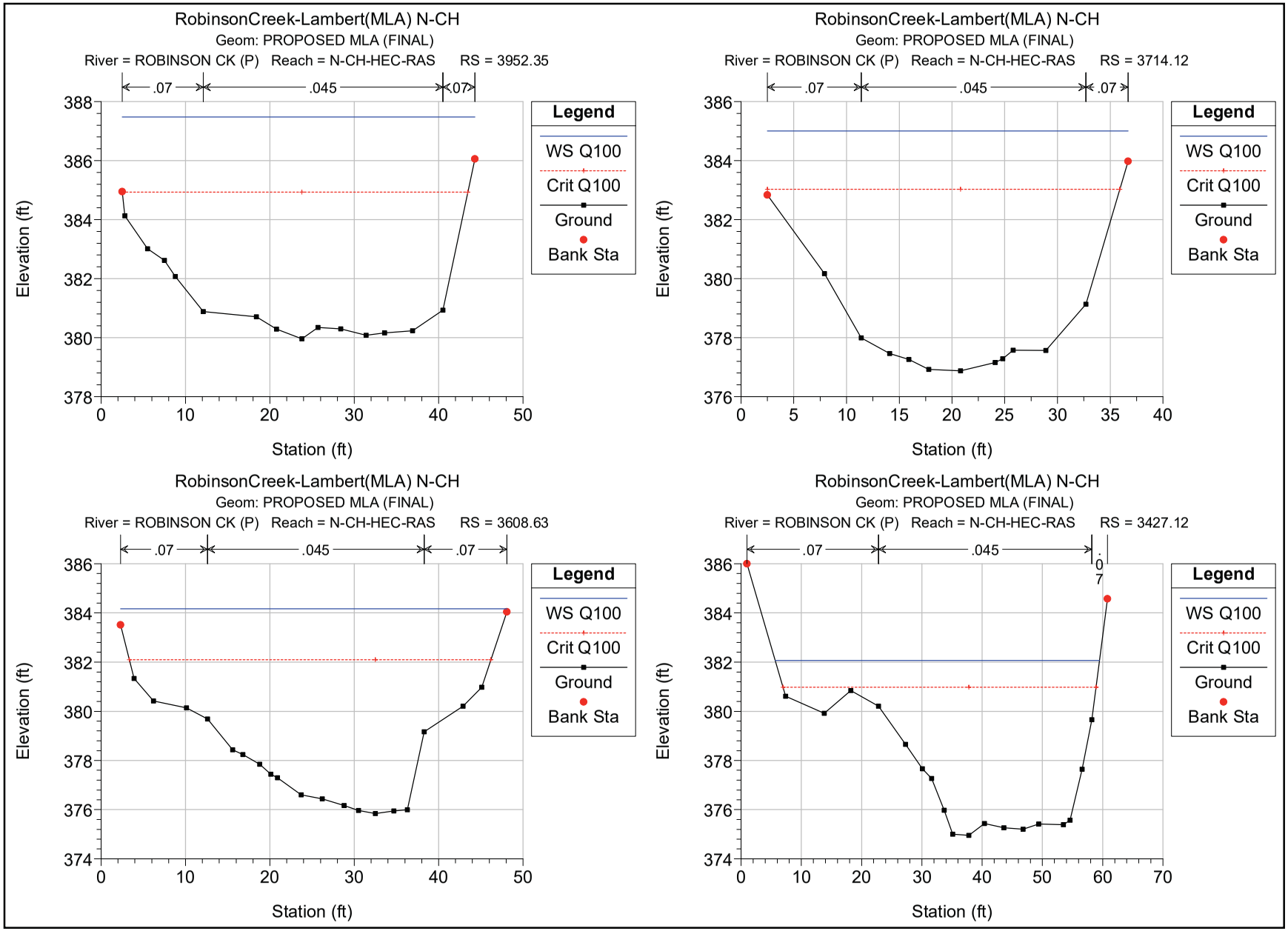
DATE	OCT. 2018
SUBMITTAL	30% DESIGN
DESIGN	AL, ML
DRAWN	LLANOS
SHEET	1

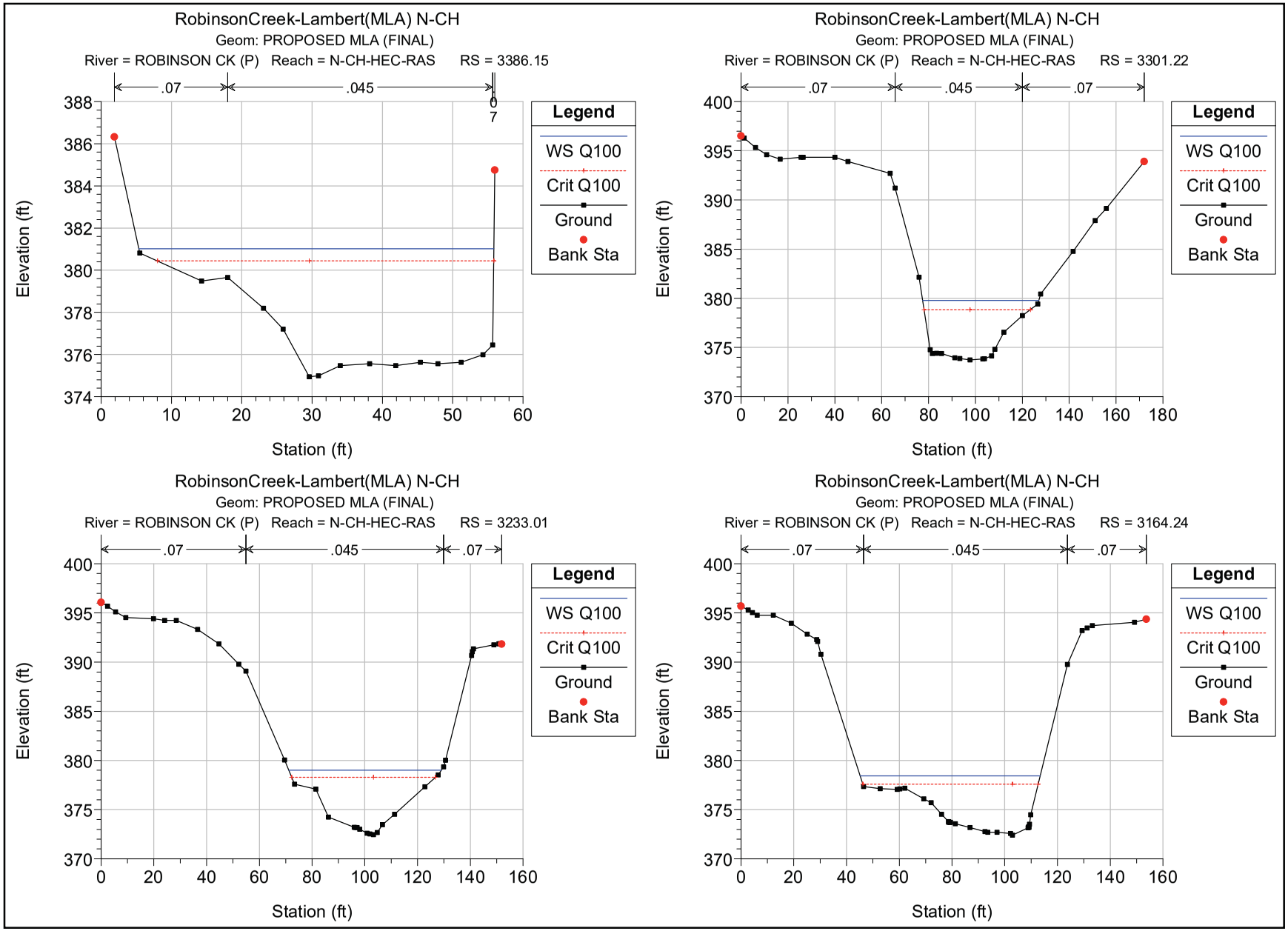
Robinson Creek at Lambert Lane Bridge
HEC-RAS Reults for Design Channel (Proposed As-Built Condition)

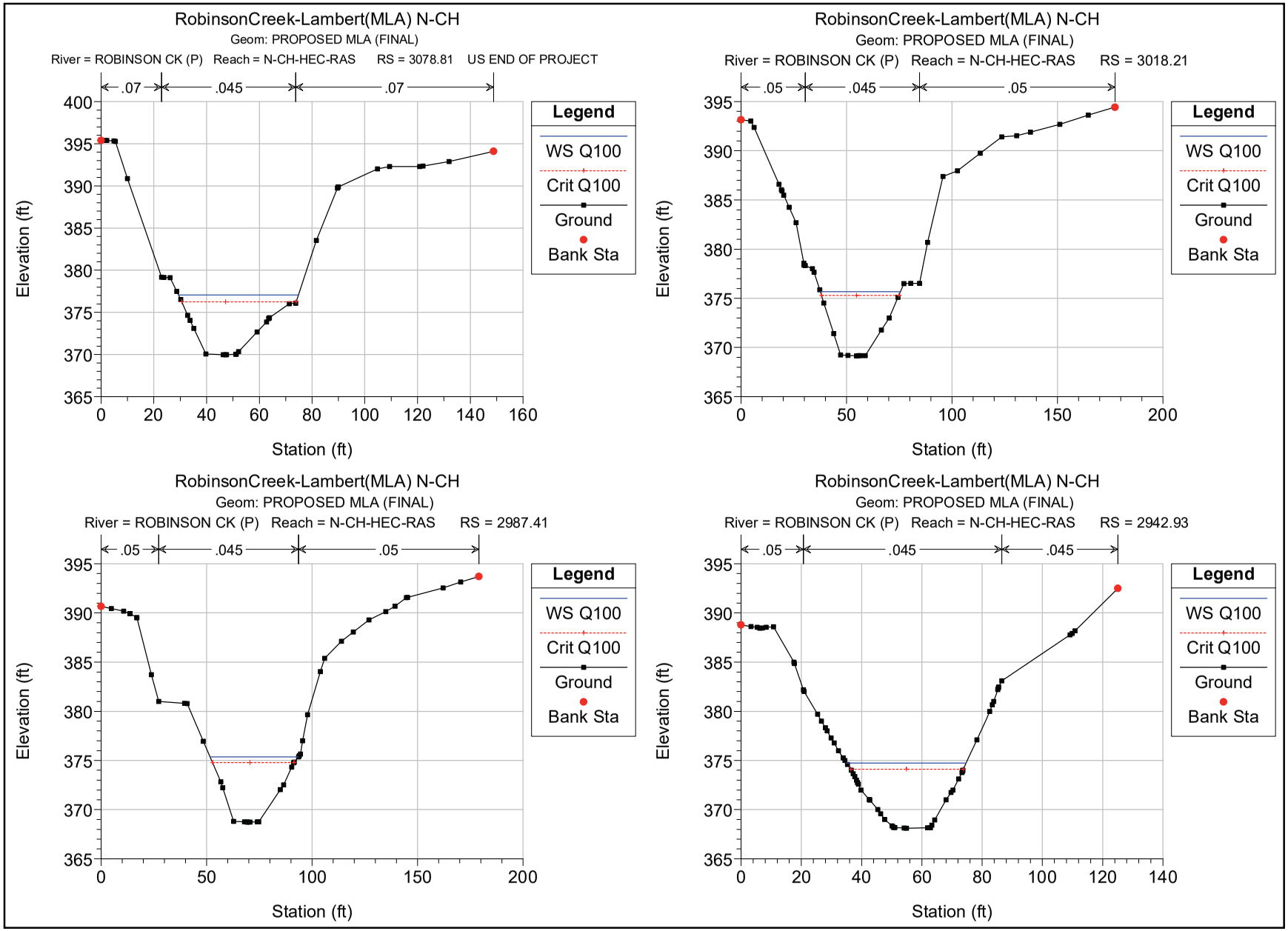
Profile = Q100
Q Total (cfs) = 1,760

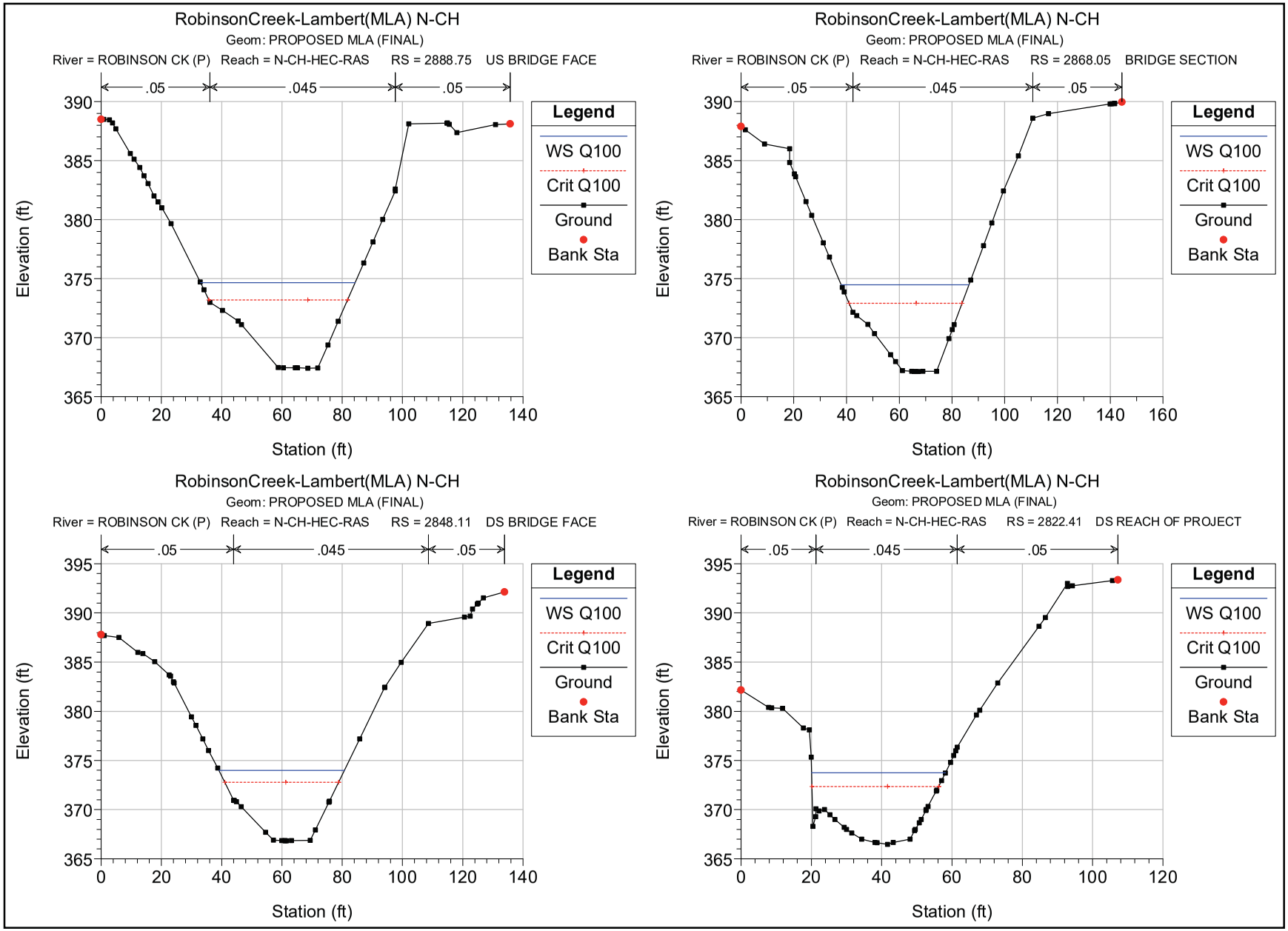
River Sta	Description	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Depth of Flow (ft)
3952.35		379.96	387.48	384.93	388.17	0.006924	6.68	263.43	41.80	0.47	7.52
3714.12		376.88	385.00	383.03	386.05	0.011365	8.23	213.86	34.20	0.58	8.12
3608.63		375.85	384.17	382.09	384.92	0.008643	6.96	252.81	45.80	0.52	8.32
3427.12		374.96	382.06	380.98	382.99	0.013182	7.72	227.87	53.80	0.66	7.10
3386.15		374.95	381.02	380.44	382.29	0.020321	9.07	194.13	50.49	0.81	6.07
3301.22		373.74	379.79	378.85	380.91	0.012553	8.46	208.02	49.57	0.73	6.05
3233.01		372.45	379.00	378.29	380.07	0.011627	8.28	212.65	57.82	0.76	6.55
3164.24		372.42	378.44	377.59	379.26	0.009792	7.25	242.67	68.26	0.68	6.02
3078.81	US end of project	369.97	377.07	376.24	378.30	0.011808	8.92	197.40	45.57	0.75	7.10
3018.21		369.15	375.68	375.29	377.42	0.016042	10.59	166.23	38.06	0.89	6.53
2987.41		368.73	375.35	374.79	376.89	0.01461	9.96	176.73	41.87	0.85	6.62
2942.93		368.12	374.75	374.10	376.26	0.013406	9.88	178.11	39.73	0.82	6.63
2888.75	Bridge Face (US)	367.41	374.67	373.20	375.54	0.007424	7.49	235.09	51.38	0.62	7.26
2868.05	Bridge Section	367.13	374.48	372.91	375.38	0.00736	7.60	231.43	48.48	0.61	7.35
2848.11	Bridge Face (DS)	366.84	374.00	372.78	375.18	0.009867	8.75	201.23	41.70	0.70	7.16
2822.41		366.48	373.76	372.36	374.92	0.010132	8.66	203.13	38.14	0.66	7.28
2806.19	DS end of Project	366.28	372.50	372.50	374.60	0.021263	11.64	151.19	36.45	1.01	6.22
2775.13		365.64	372.74	371.31	373.66	0.008911	7.67	229.61	52.66	0.65	7.10
2749.18		363.68	372.65	370.72	373.40	0.00719	6.92	254.23	56.57	0.58	8.97
2722.84		364.92	372.24	371.12	373.15	0.010407	7.68	229.21	54.22	0.66	7.32
2689.3		363.59	372.19	369.78	372.84	0.005003	6.50	270.60	46.42	0.47	8.60
2668.74		361.93	372.11	368.78	372.74	0.004179	6.41	274.74	39.96	0.43	10.18
2620.59		363.56	371.74	369.03	372.49	0.006006	6.95	253.14	47.14	0.53	8.18
2524.84		362.23	370.54	368.40	371.77	0.008566	8.87	198.38	28.65	0.59	8.31
2495.34		361.13	369.66	368.32	371.40	0.013519	10.60	166.07	25.55	0.73	8.53
2416.06		361.22	368.57	367.63	370.20	0.016003	10.23	172.02	31.66	0.77	7.35

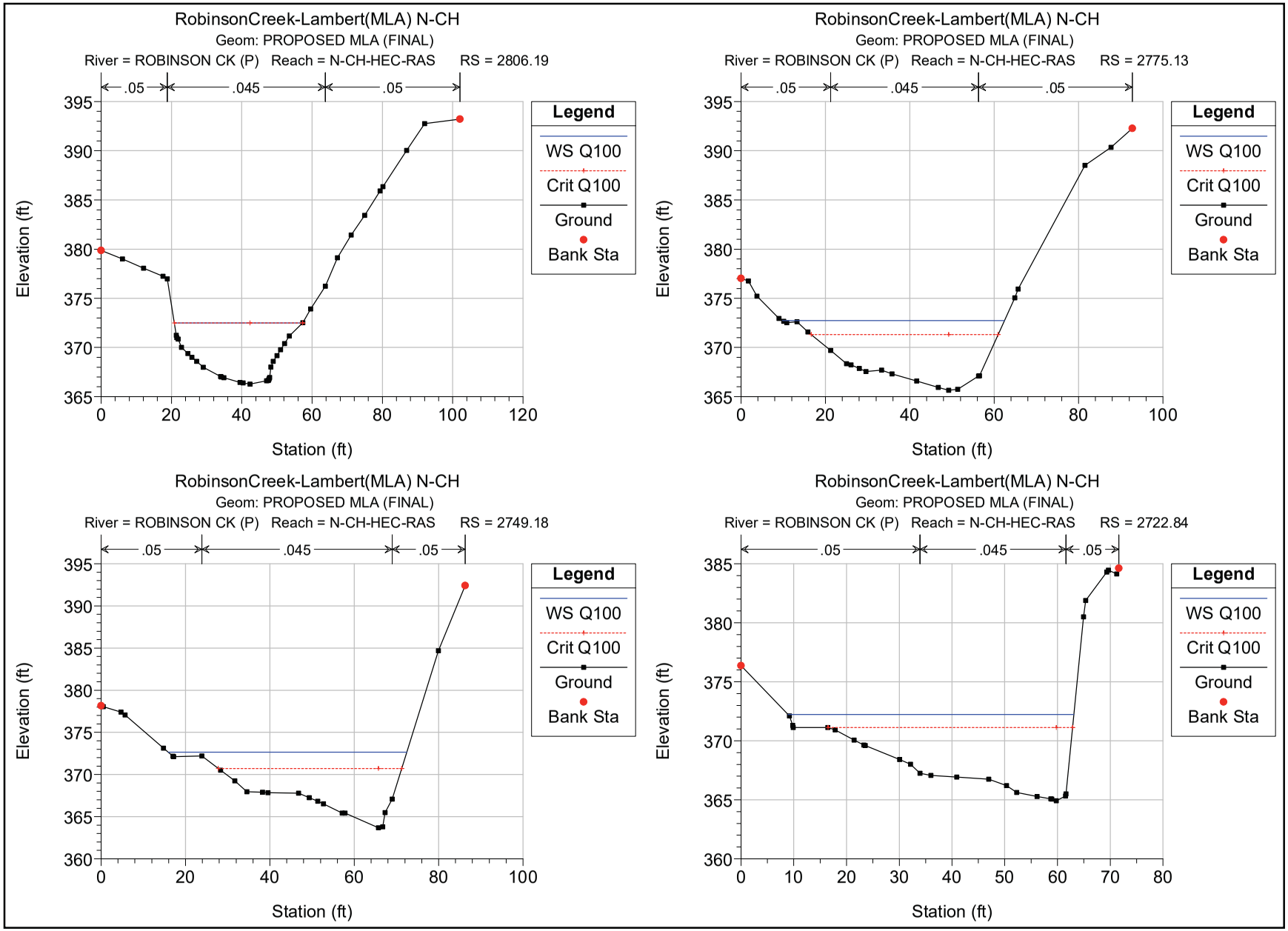

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
Legend
WS Q100
Crit Q100
Ground
Elevation (ft)
390
385
380
375
370
365
360
355
350
2400
2600
2800
3000
3200
3400
3600
3800
4000
Main Channel Distance (ft)
DS REACH OF PROJECT
BRIDGE SECTION
US END OF PROJECT

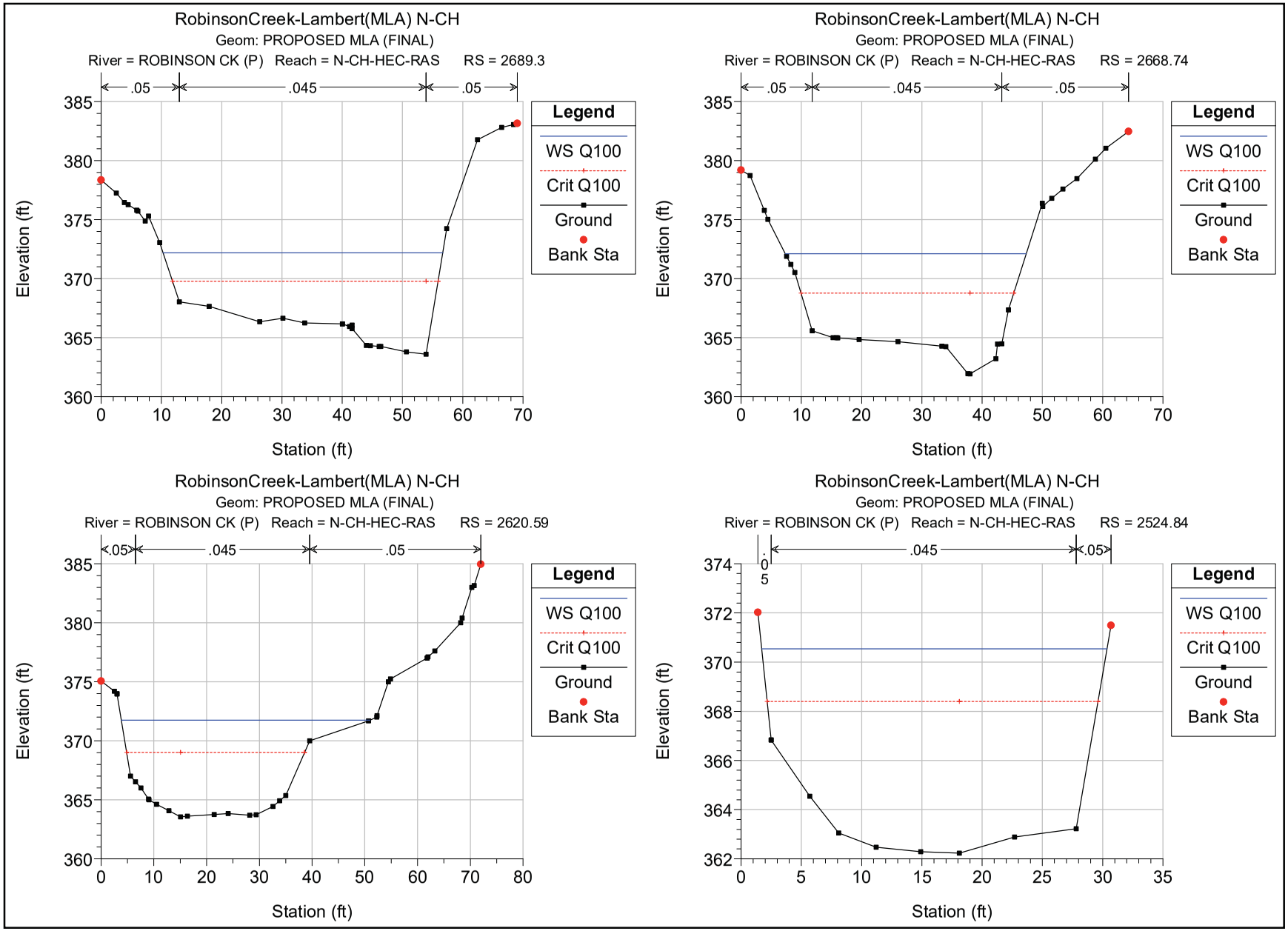

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3952.35
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3714.12
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3608.63
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3427.12
.07
.045
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta

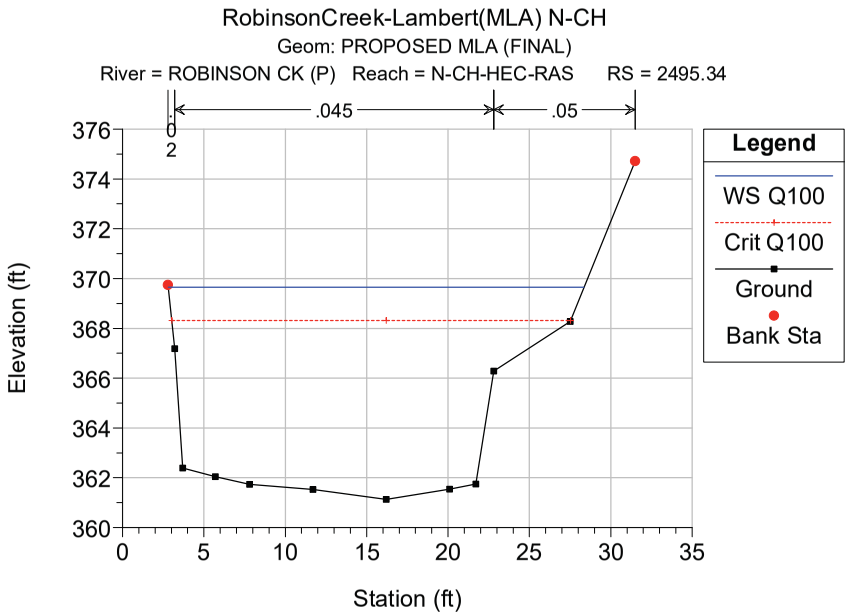

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3386.15
.07
.045
0
7
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3301.22
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3233.01
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3164.24
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta

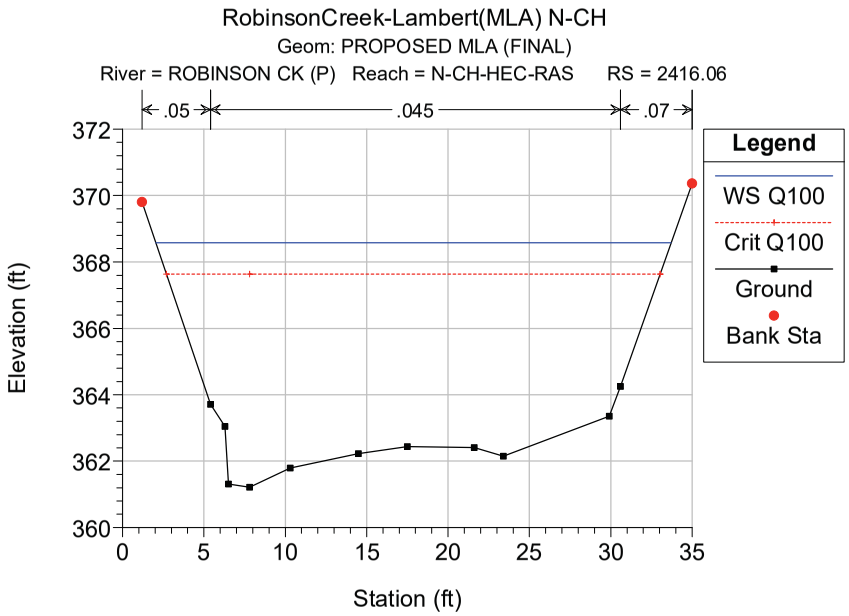

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3078.81 US END OF PROJECT
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3018.21
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2987.41
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2942.93
.05
.045
.045
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta


RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2888.75 US BRIDGE FACE
.05
.045
.05
Legend
WS Q100
Crit Q100
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2868.05 BRIDGE SECTION
.05
.045
.05
Legend
WS Q100
Crit Q100
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2848.11 DS BRIDGE FACE
.05
.045
.05
Legend
WS Q100
Crit Q100
Ground
Bank Sta
Elevation (ft)
Station (ft)
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2822.41 DS REACH OF PROJECT
.05
.045
.05
Legend
WS Q100
Crit Q100
Ground
Bank Sta
Elevation (ft)
Station (ft)


RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2806.19
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2775.13
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2749.18
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2722.84
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta


RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2689.3
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2668.74
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2620.59
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2524.84
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta

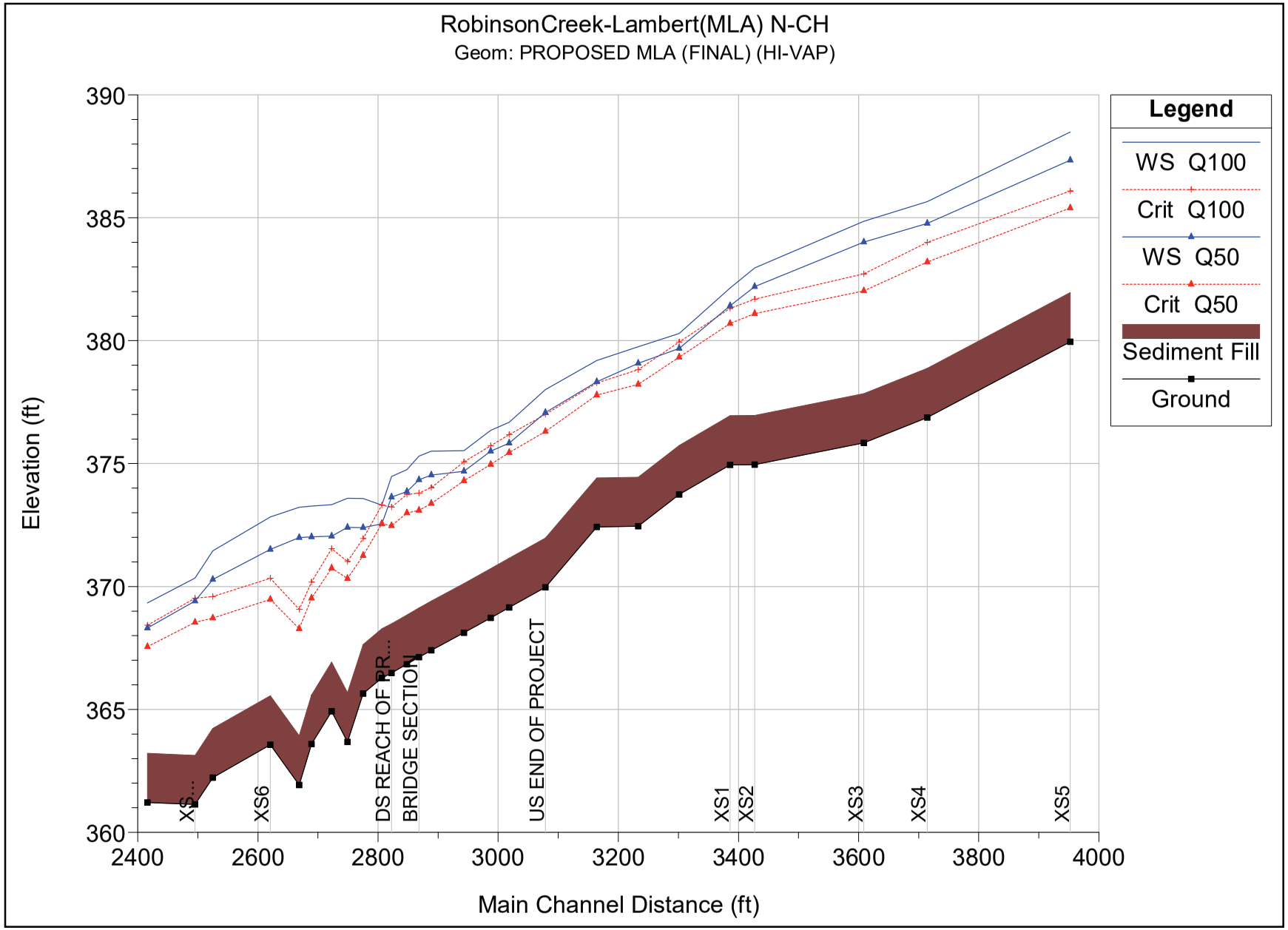

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2495.34
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta

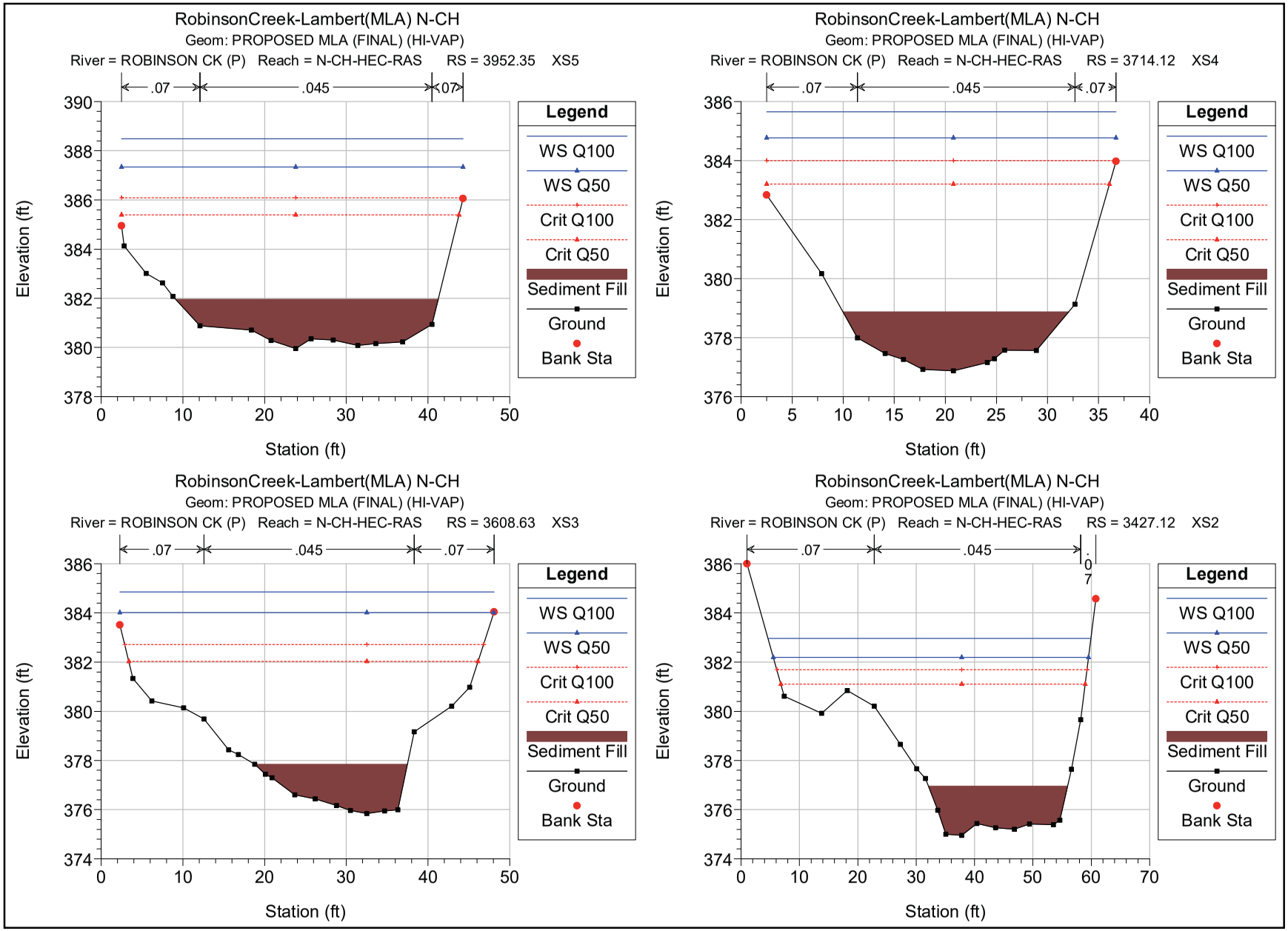

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2416.06
.05
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
Ground
Bank Sta

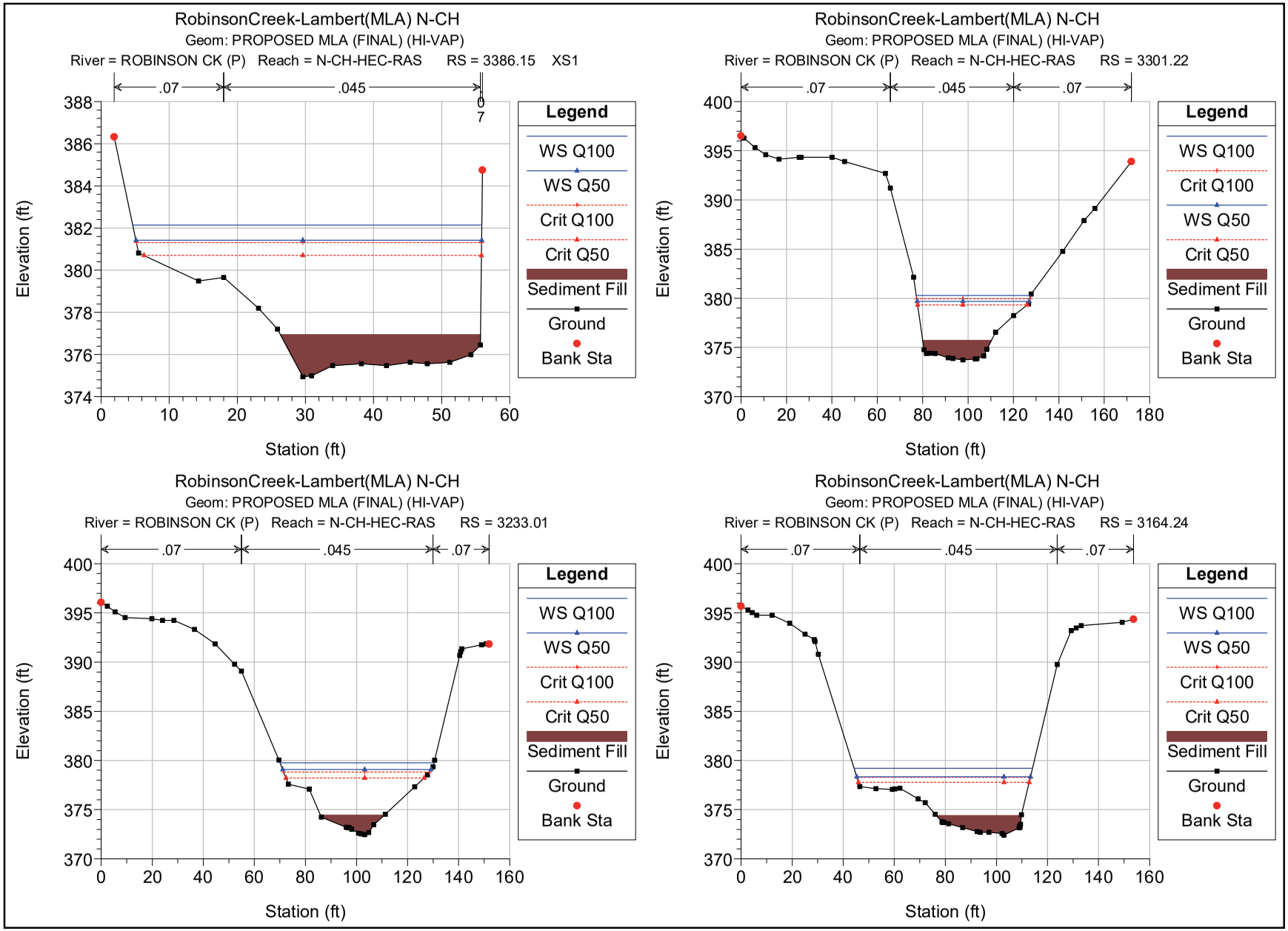
Robinson Creek at Lambert Lane Bridge
HEC-RAS Reults fo High VAP Channel (Proposed As-Built Condition)

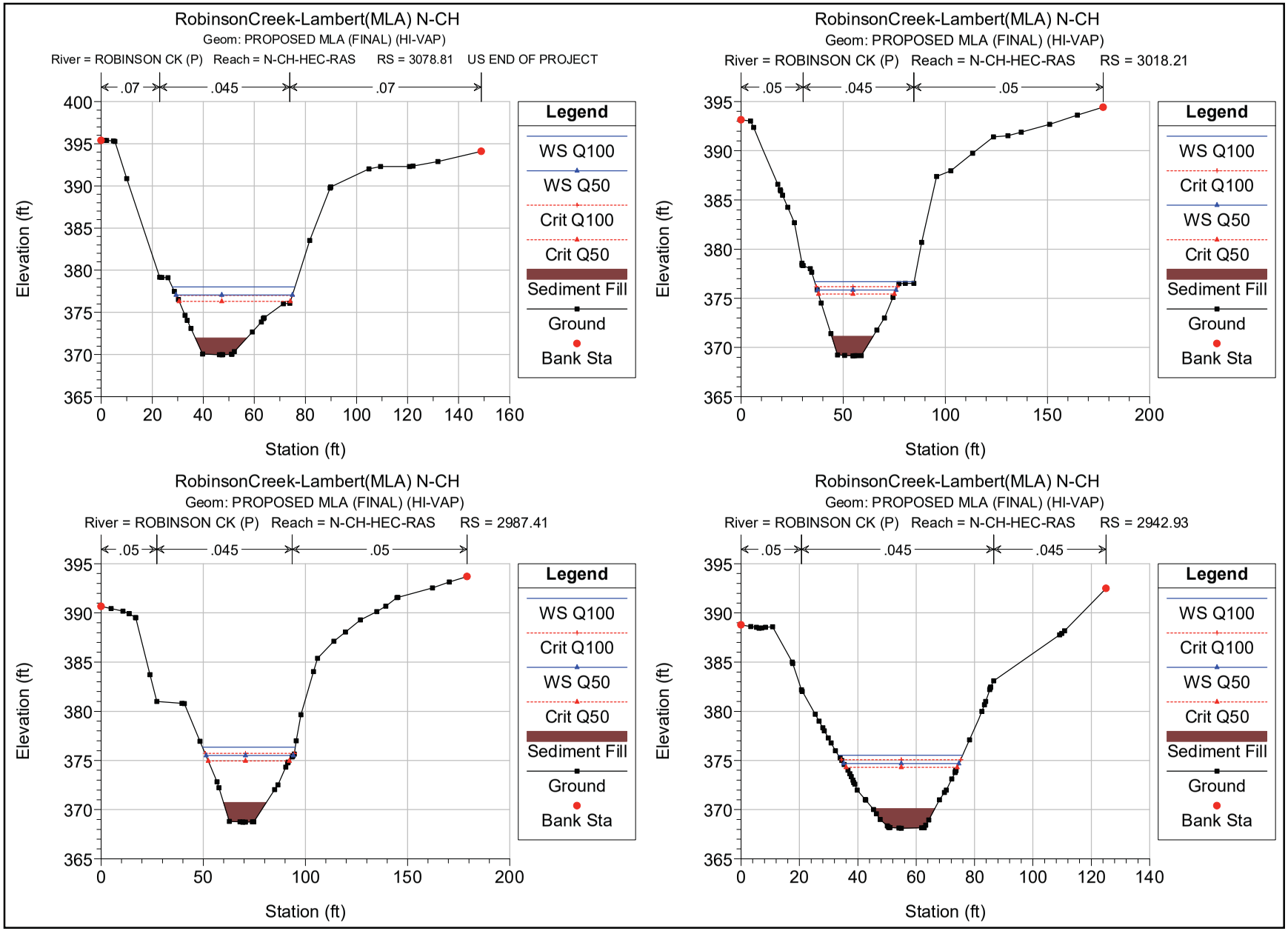
Profile = Q100
Q Total (cfs) = 1,760

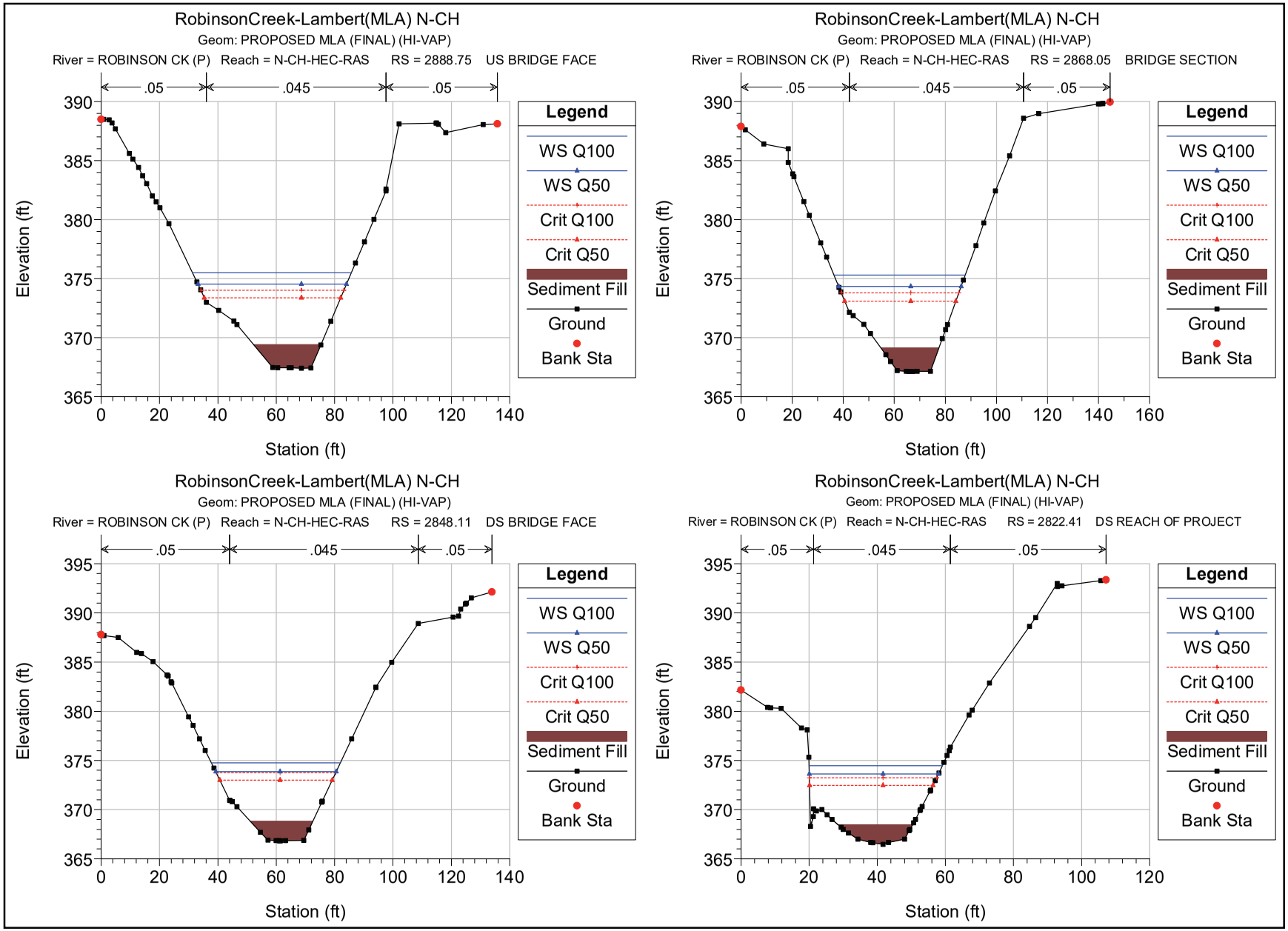
River Sta	Description	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Depth of Flow (ft)
3952.35		381.96	388.49	386.09	389.2	0.01	6.79	259.35	41.80	0.48	6.53
3714.12		378.88	385.66	384.00	386.8	0.01	8.56	205.54	34.20	0.62	6.78
3608.63		377.85	384.85	382.72	385.58	0.01	6.81	258.36	45.80	0.51	7.00
3427.12		376.96	382.96	381.69	383.8	0.01	7.32	240.44	55.34	0.62	6.00
3386.15		376.95	382.14	381.31	383.21	0.02	8.32	211.61	51.27	0.72	5.19
3301.22		375.74	380.29	379.95	381.7	0.02	9.51	185.15	50.46	0.87	4.55
3233.01		374.45	379.75	378.82	380.66	0.01	7.64	230.44	60.27	0.69	5.30
3164.24		374.42	379.20	378.28	379.97	0.01	7.07	248.91	69.86	0.66	4.78
3078.81	US end of project	371.97	378.01	377.00	379.1	0.01	8.36	210.51	48.04	0.70	6.04
3018.21		371.15	376.68	376.18	378.24	0.02	10.01	175.85	48.70	0.93	5.53
2987.41		370.73	376.35	375.73	377.71	0.01	9.35	188.20	45.39	0.81	5.62
2942.93		370.12	375.53	375.07	377.07	0.01	9.96	176.78	42.57	0.86	5.41
2888.75	Bridge Face (US)	369.41	375.50	374.02	376.31	0.01	7.23	243.53	54.44	0.60	6.09
2868.05	Bridge Section	369.13	375.30	373.80	376.16	0.01	7.42	237.23	51.39	0.61	6.17
2848.11	Bridge Face (DS)	368.84	374.76	373.75	375.95	0.01	8.77	200.61	44.18	0.73	5.92
2822.41		368.48	374.48	373.24	375.67	0.01	8.77	200.60	39.16	0.68	6.00
2806.19	DS end of Project	368.28	373.31	373.31	375.35	0.02	11.46	153.61	38.17	1.01	5.03
2775.13		367.64	373.58	371.95	374.36	0.01	7.08	248.52	55.79	0.59	5.94
2749.18		365.68	373.59	371.02	374.14	0.00	5.93	296.81	59.33	0.47	7.91
2722.84		366.92	373.33	371.53	373.99	0.01	6.52	269.97	56.81	0.53	6.41
2689.3		365.59	373.27	370.18	373.79	0.00	5.80	303.69	47.52	0.40	7.68
2668.74		363.93	373.22	369.07	373.72	0.00	5.67	310.66	41.77	0.37	9.29
2620.59		365.56	372.83	370.33	373.51	0.01	6.63	265.45	49.42	0.50	7.27
2524.84		364.23	371.46	369.60	372.76	0.01	9.16	192.09	29.17	0.63	7.23
2495.34		363.13	370.34	369.53	372.33	0.02	11.30	155.76	25.99	0.81	7.21
2416.06		363.22	369.33	368.43	370.93	0.02	10.14	173.58	32.73	0.78	6.11

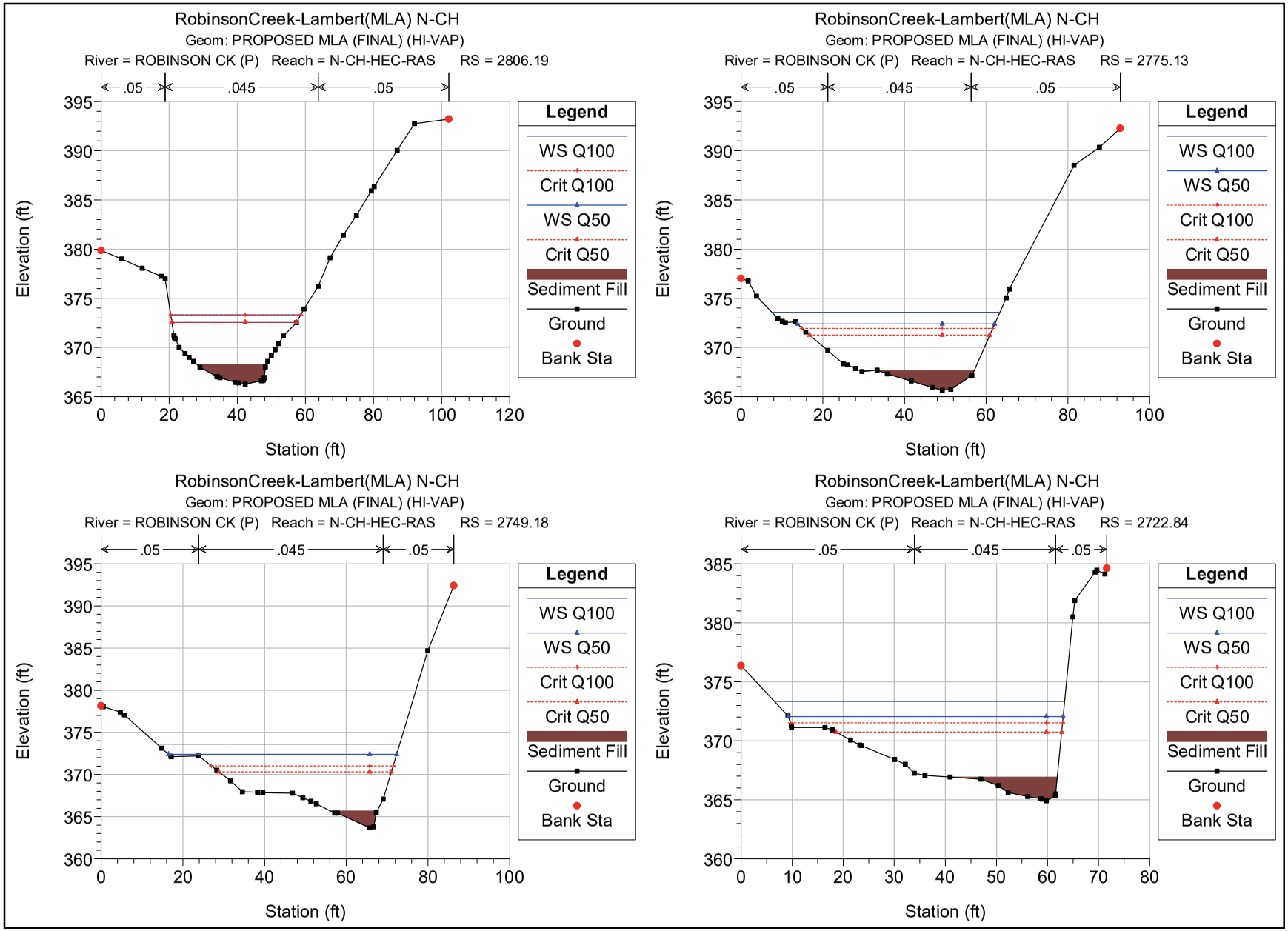

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
Legend
WS Q100
Crit Q100
WS Q50
Crit Q50
Sediment Fill
Ground
Elevation (ft)
Main Channel Distance (ft)
390
385
380
375
370
365
360
2400
2600
2800
3000
3200
3400
3600
3800
4000
XS....
XS6
DS REACH OF BR....
BRIDGE SECTION
US END OF PROJECT
XS1
XS2
XS3
XS4
XS5

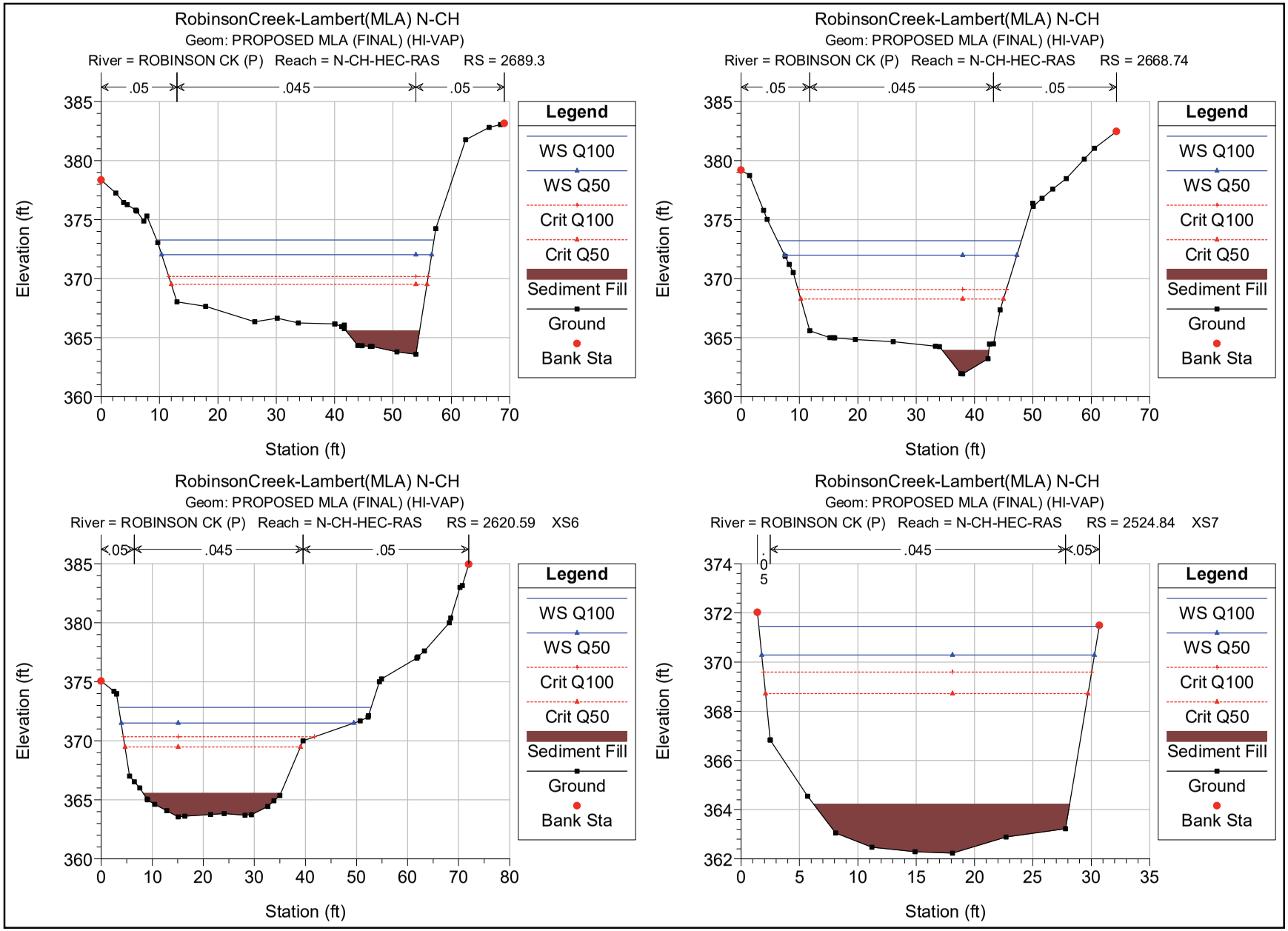

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3952.35 XS5
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3714.12 XS4
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3608.63 XS3
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3427.12 XS2
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta

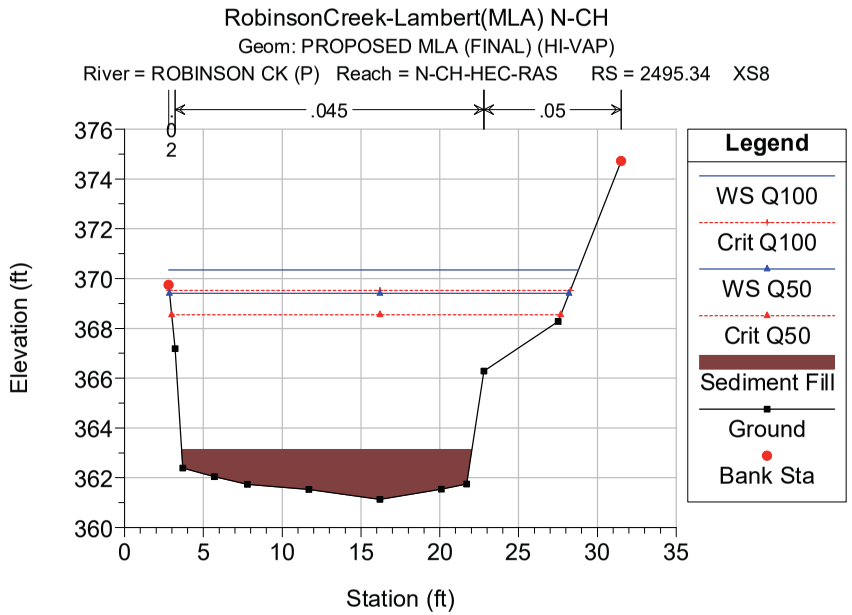

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3386.15 XS1
.07
.045
0
7
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3301.22
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q50
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3233.01
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3164.24
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta

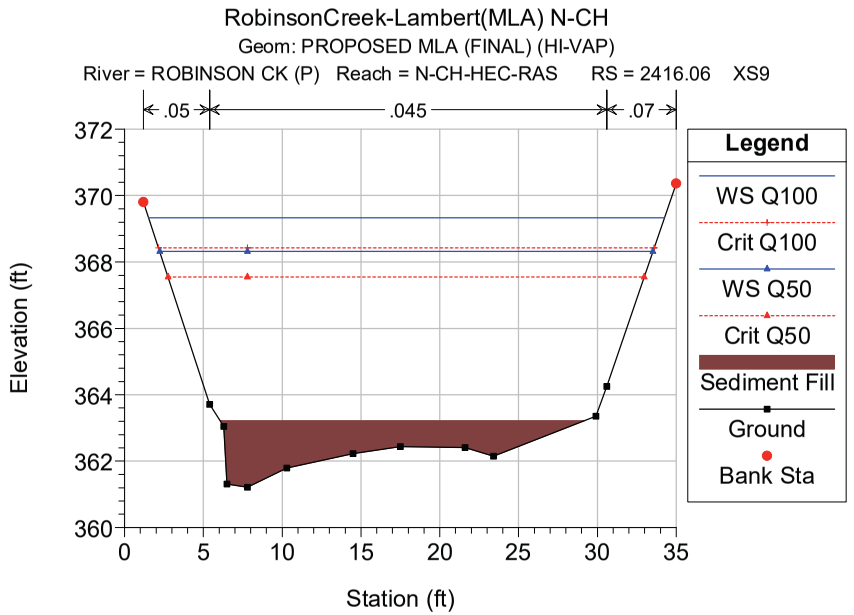

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3078.81 US END OF PROJECT
.07
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 3018.21
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q50
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2987.41
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q50
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2942.93
.05
.045
.045
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q50
Crit Q50
Sediment Fill
Ground
Bank Sta


RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2888.75 US BRIDGE FACE
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2868.05 BRIDGE SECTION
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2848.11 DS BRIDGE FACE
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2822.41 DS REACH OF PROJECT
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta


RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2806.19
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q50
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2775.13
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2749.18
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2722.84
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta

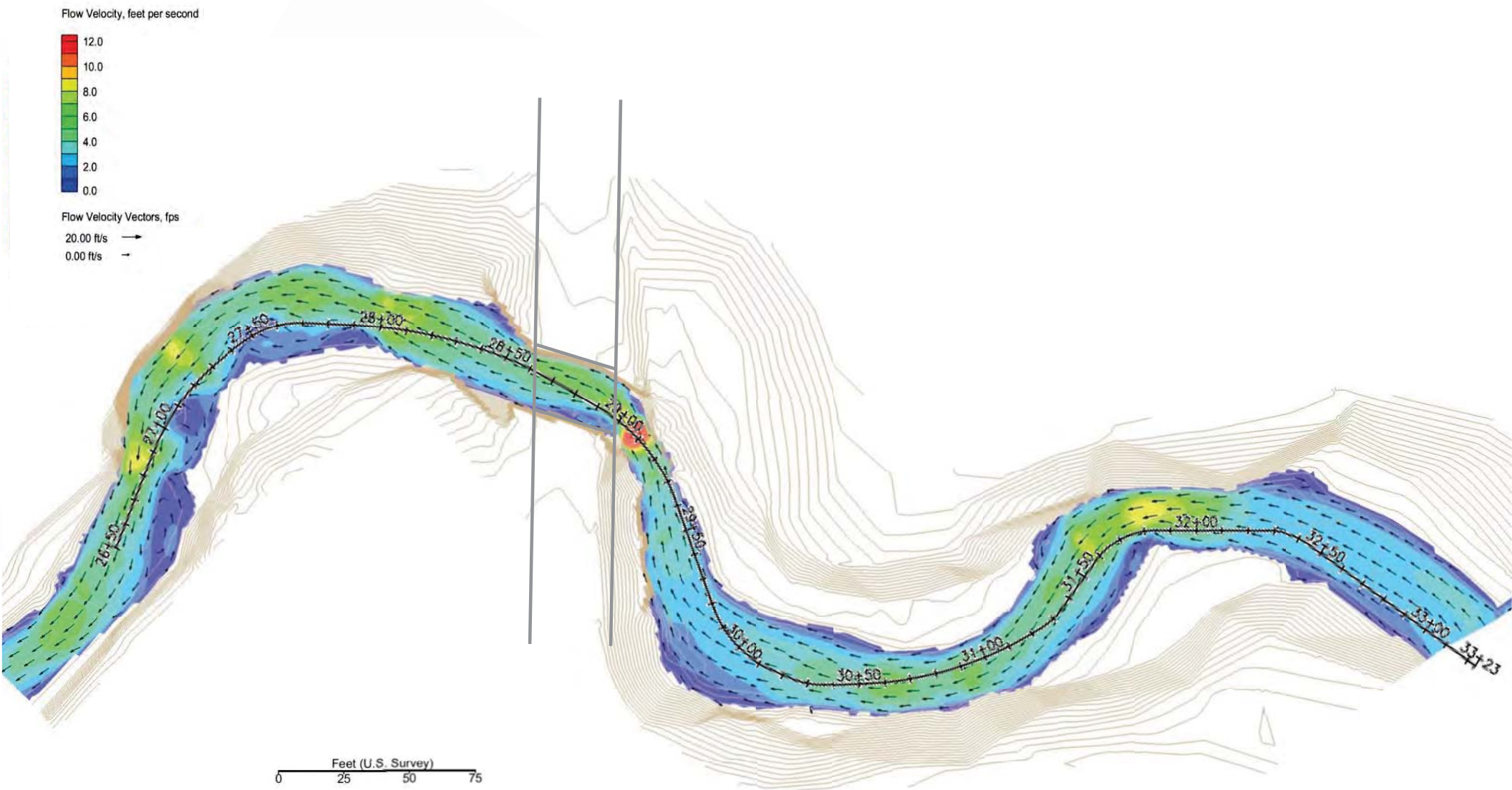

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2689.3
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2668.74
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2620.59 XS6
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta
RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2524.84 XS7
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q50
Crit Q100
Crit Q50
Sediment Fill
Ground
Bank Sta


RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2495.34 XS8
.045
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q50
Crit Q50
Sediment Fill
Ground
Bank Sta

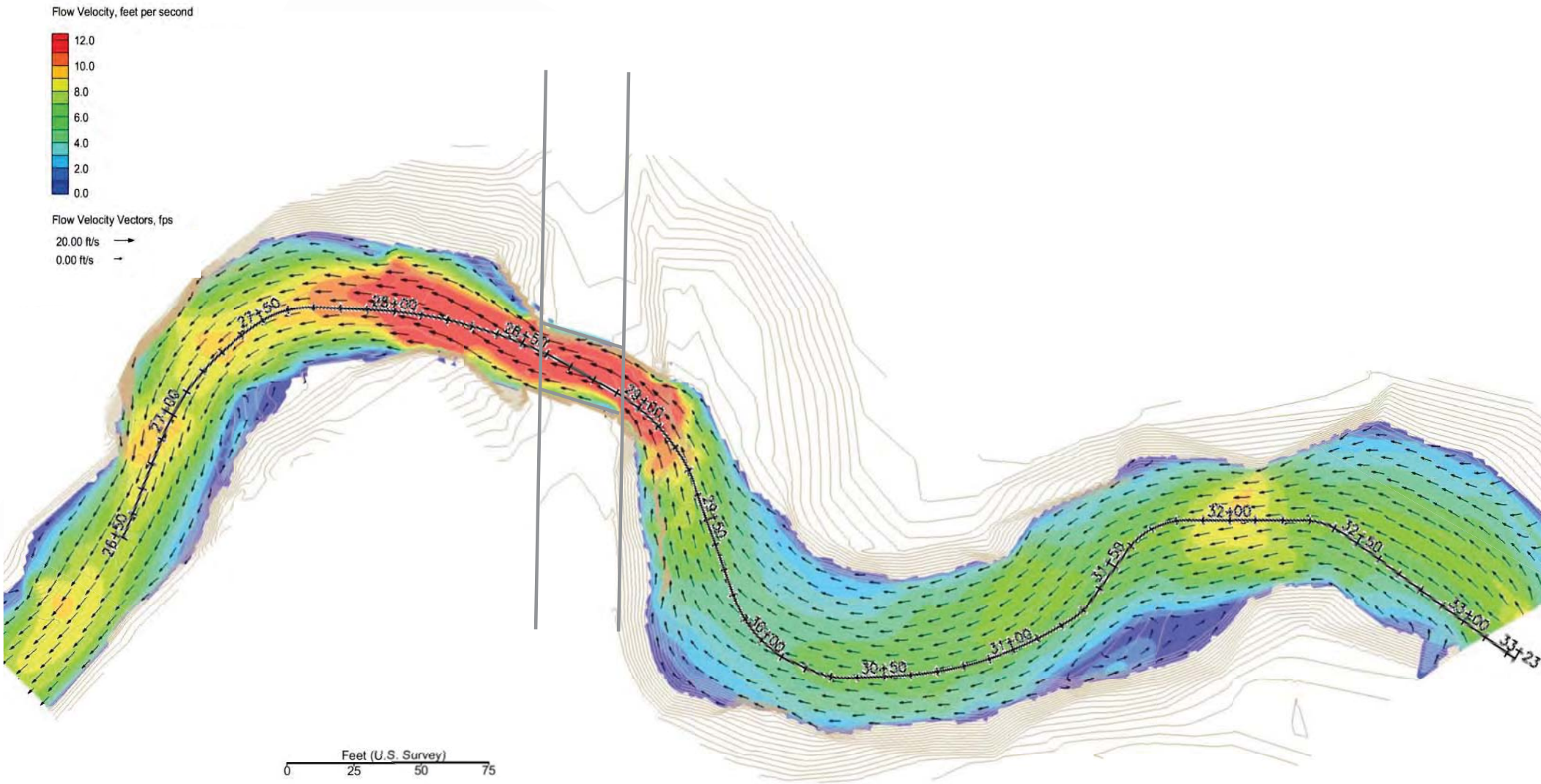

RobinsonCreek-Lambert(MLA) N-CH
Geom: PROPOSED MLA (FINAL) (HI-VAP)
River = ROBINSON CK (P) Reach = N-CH-HEC-RAS RS = 2416.06 XS9
.05
.045
.07
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q50
Crit Q50
Sediment Fill
Ground
Bank Sta

Appendix E - SMS Results

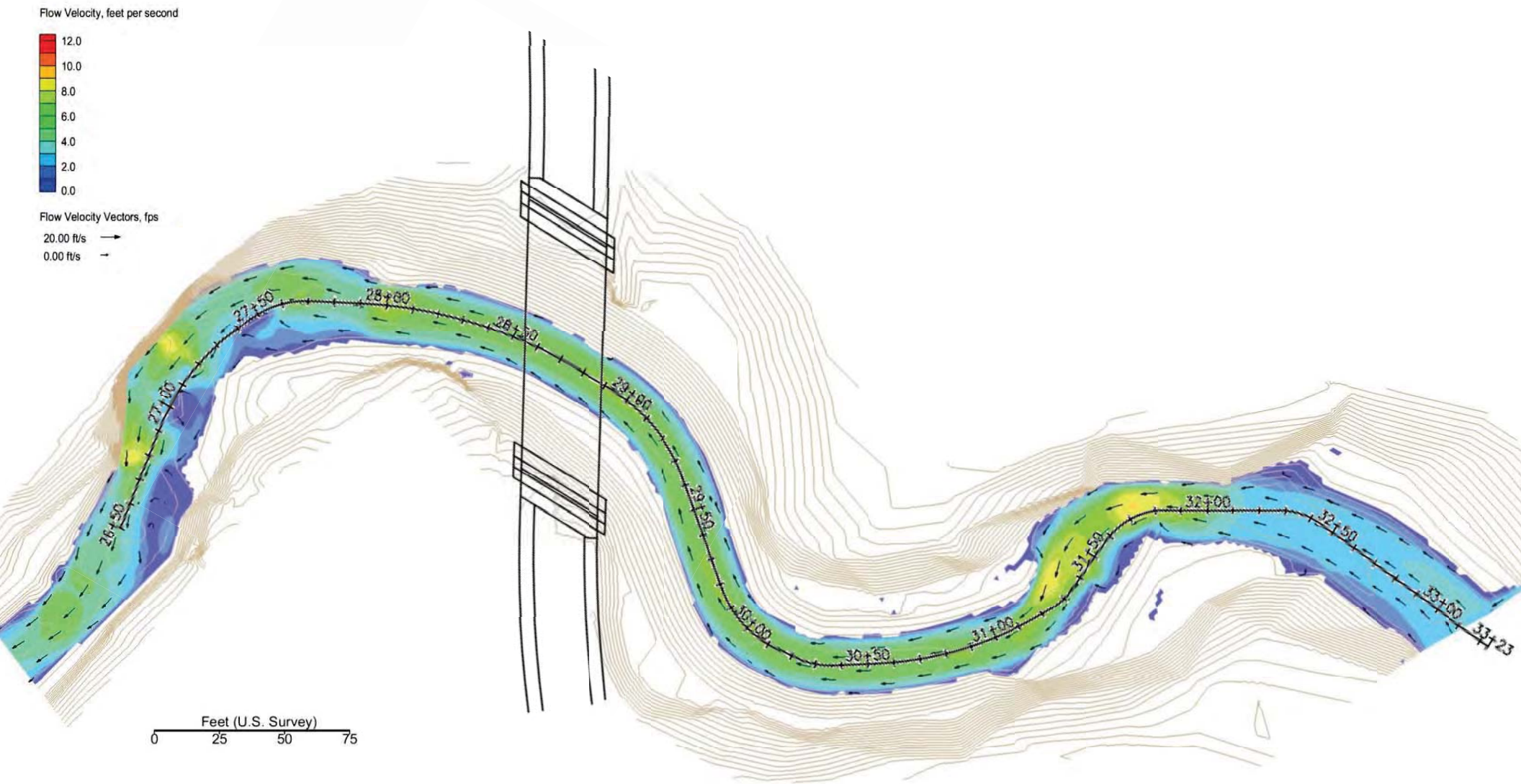
EC 1.5-Year Velocity



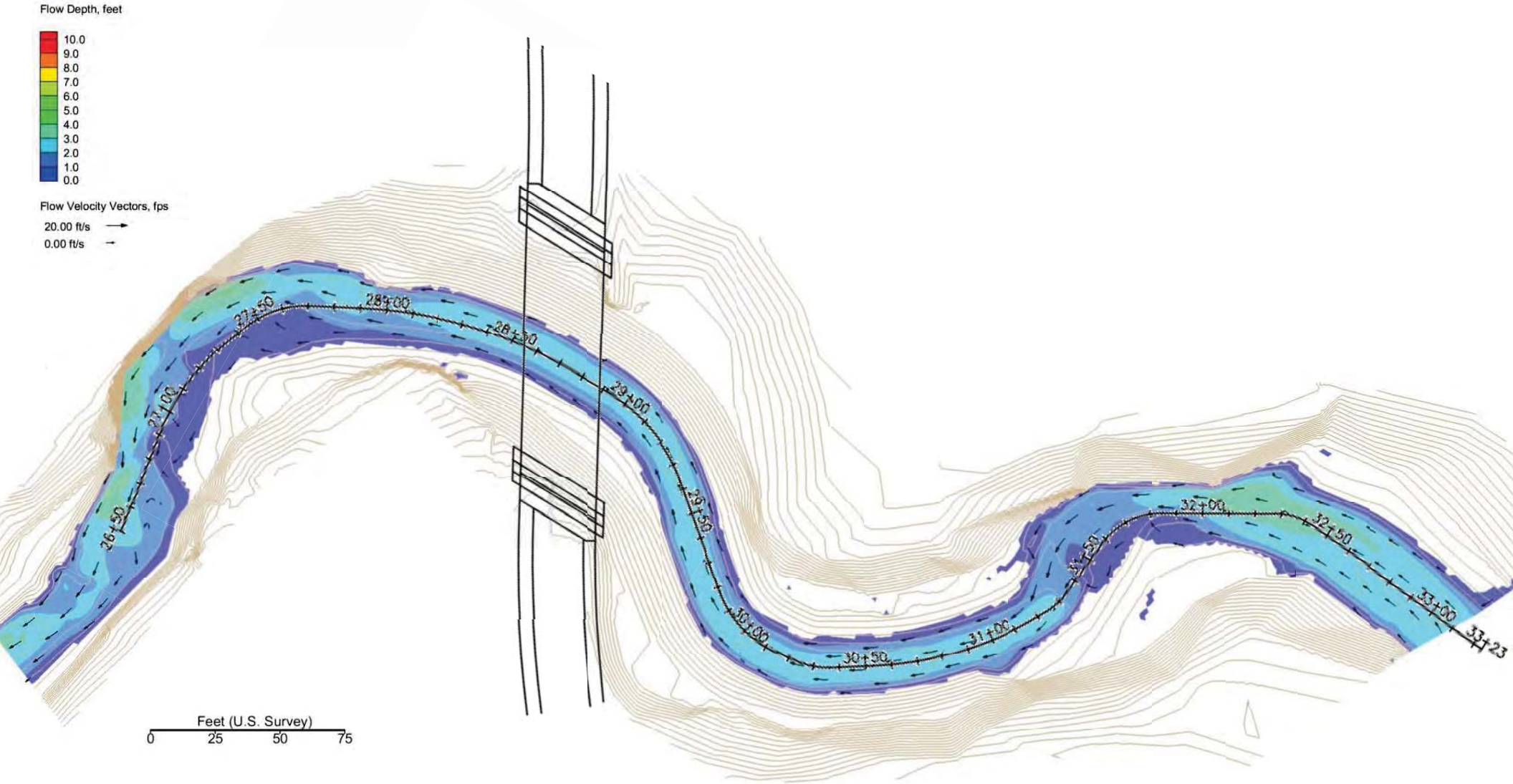
EC 100-year Velocity



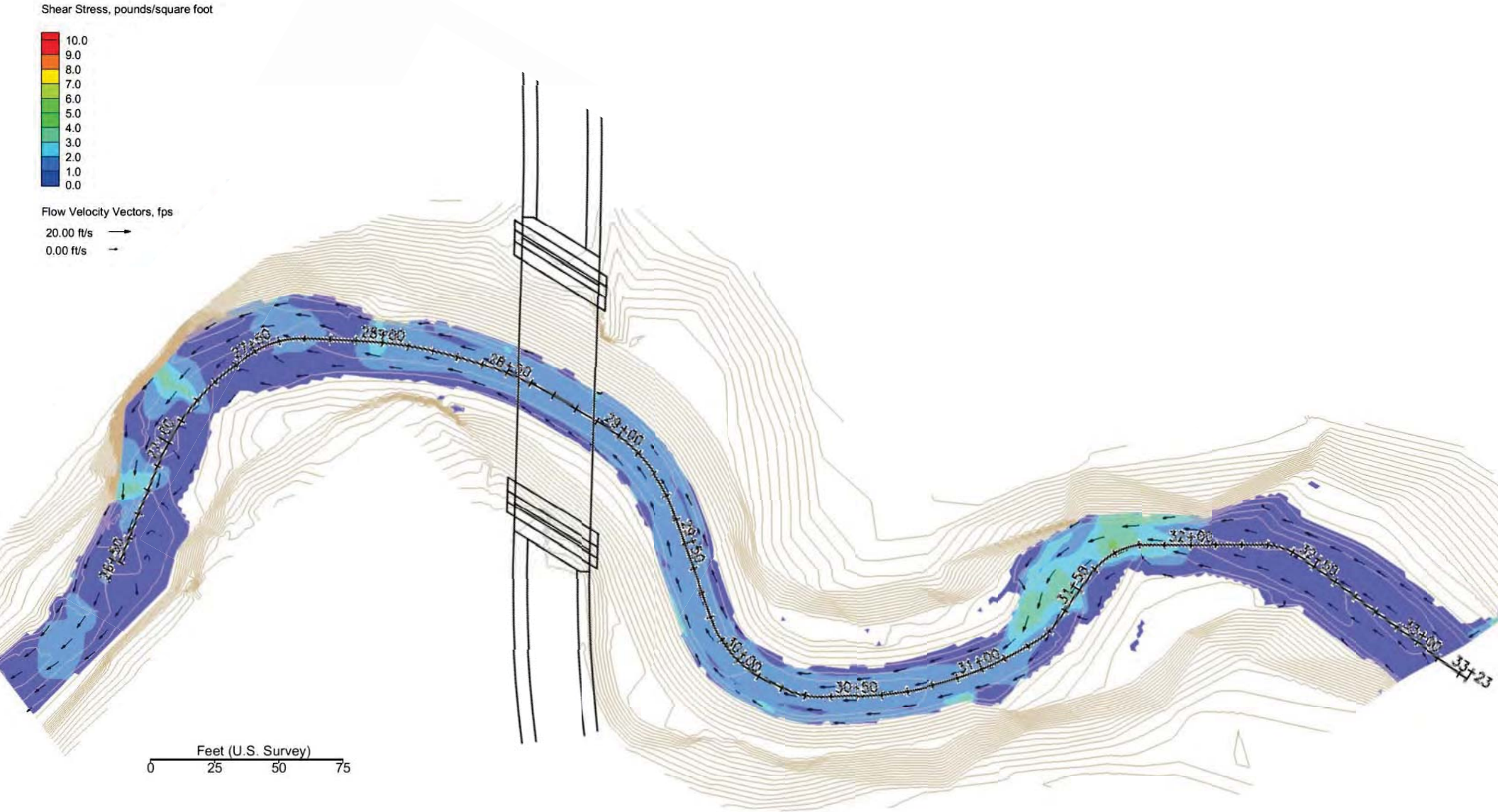
Proposed Conditions 1.5-Year Flow Velocity



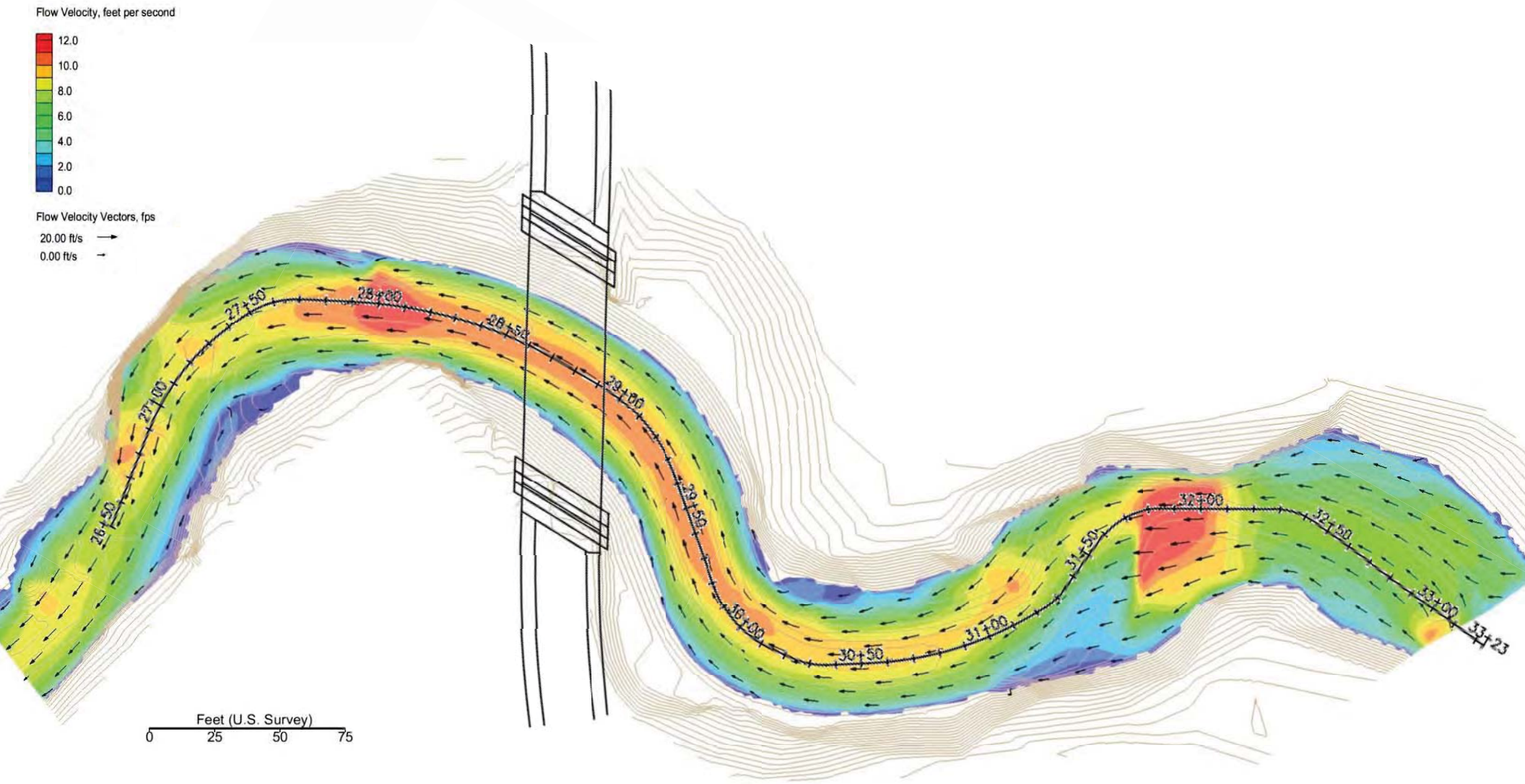
Proposed Conditions 1.5-Year Flow Depth



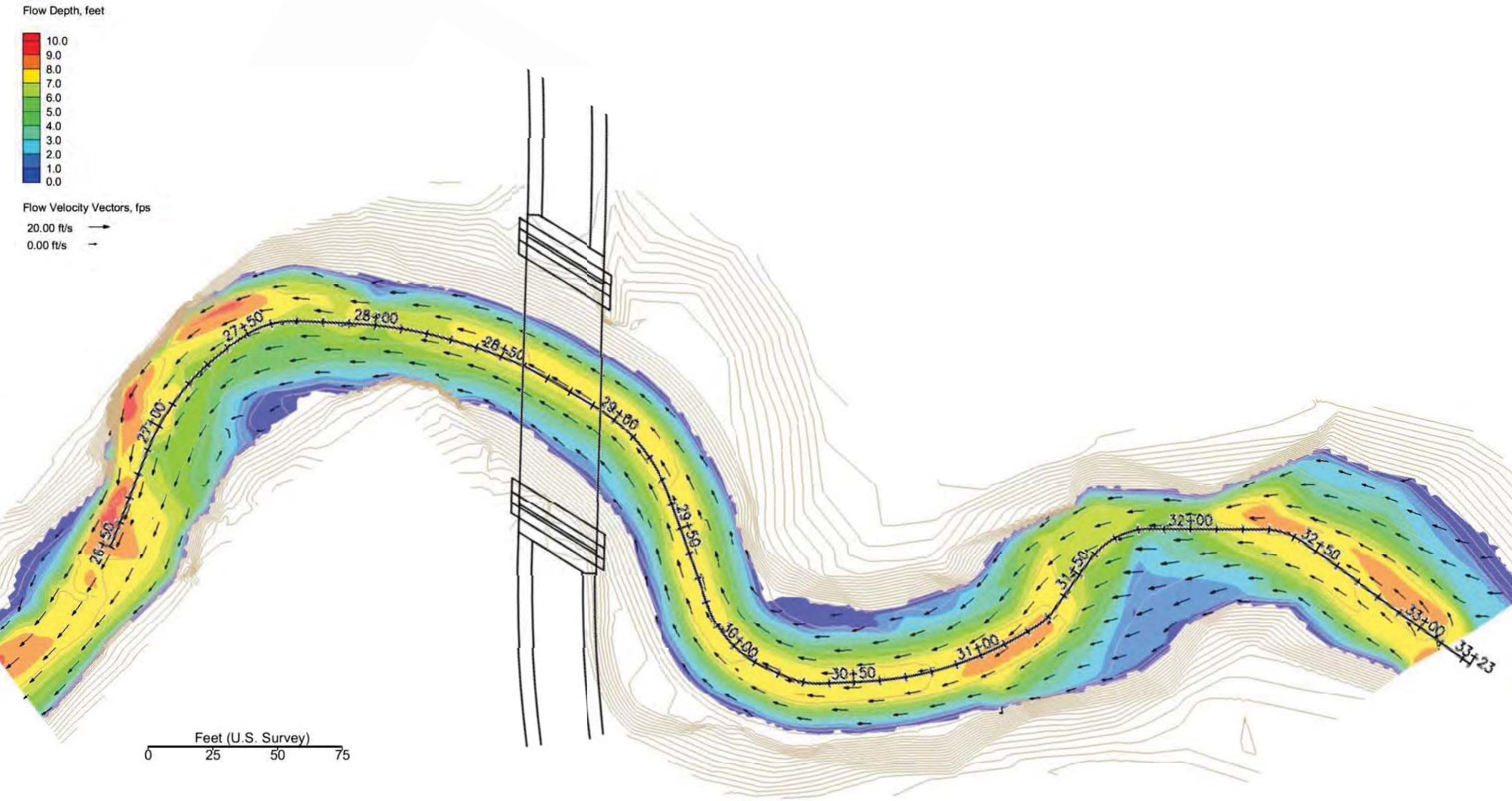
Proposed Conditions 1.5-Year Shear



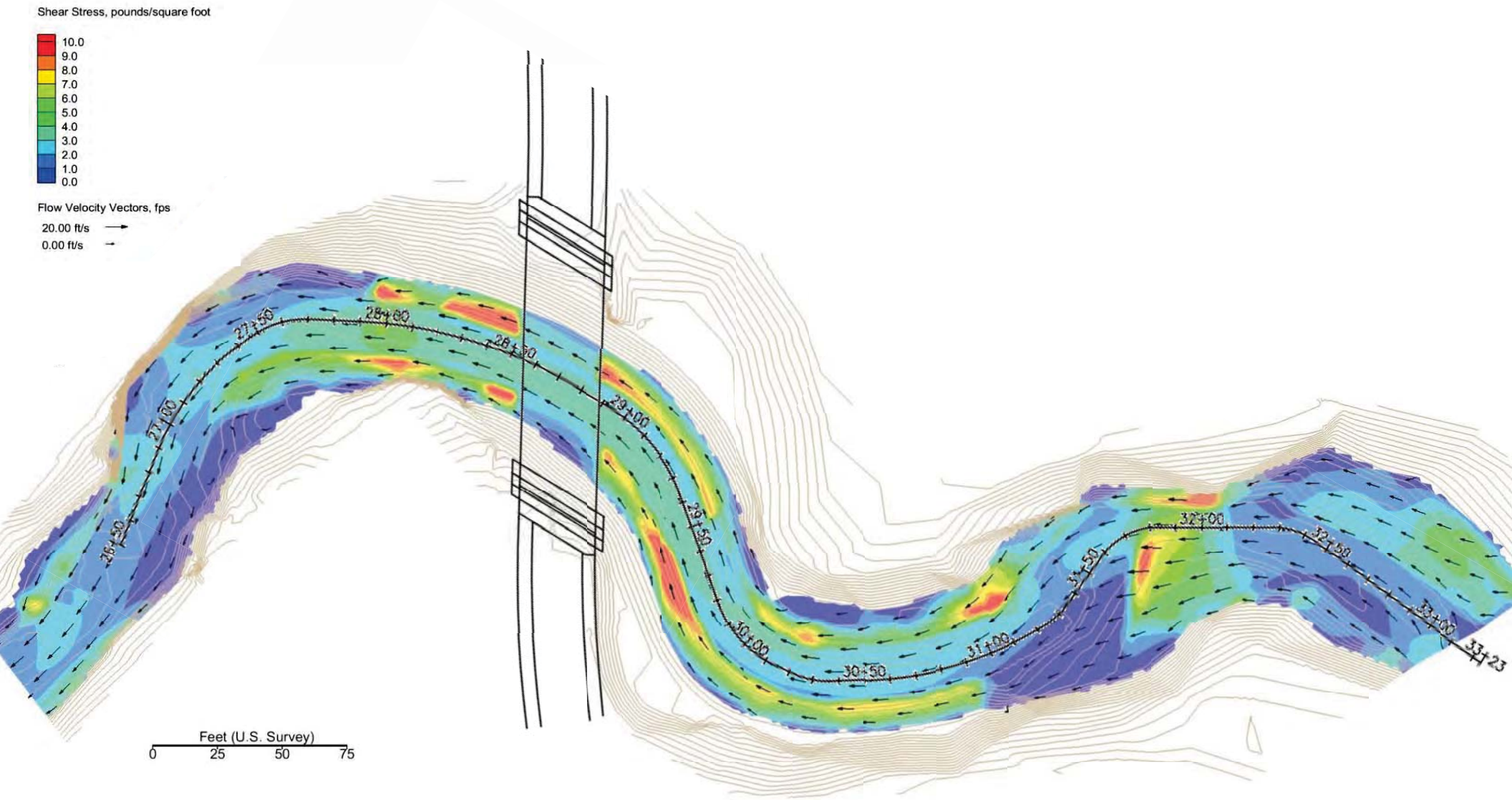
Proposed Conditions 100-Year Flow Velocity



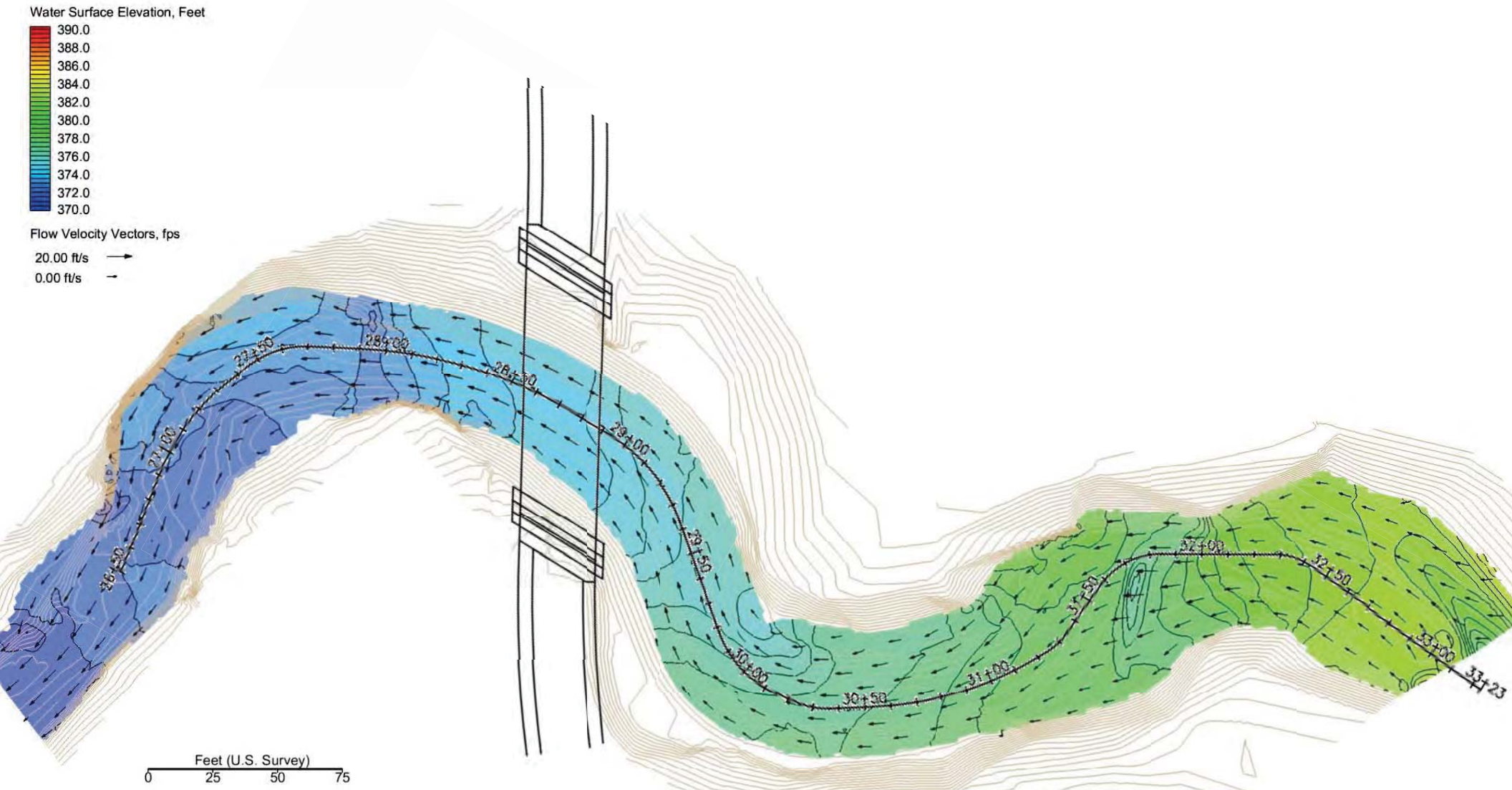
Proposed Conditions 100-Year Flow Depth

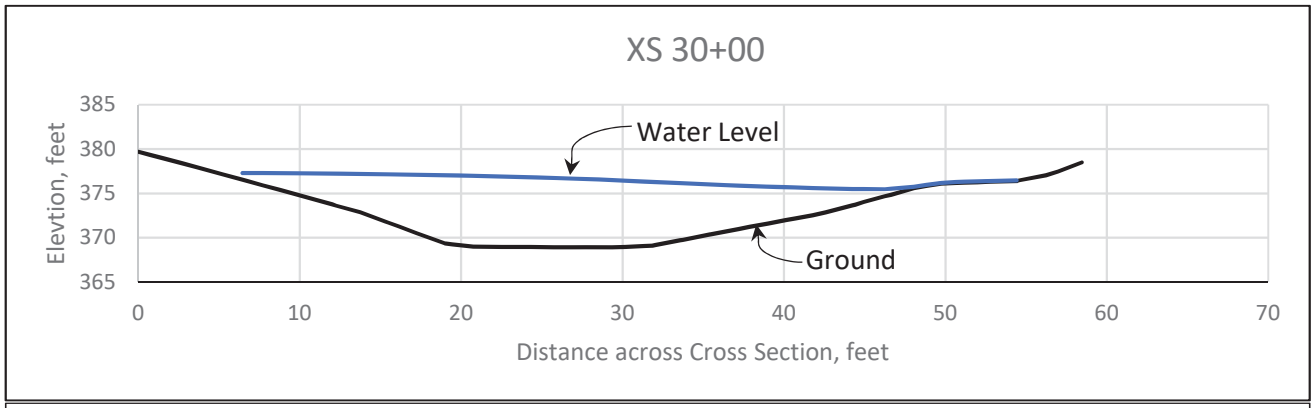


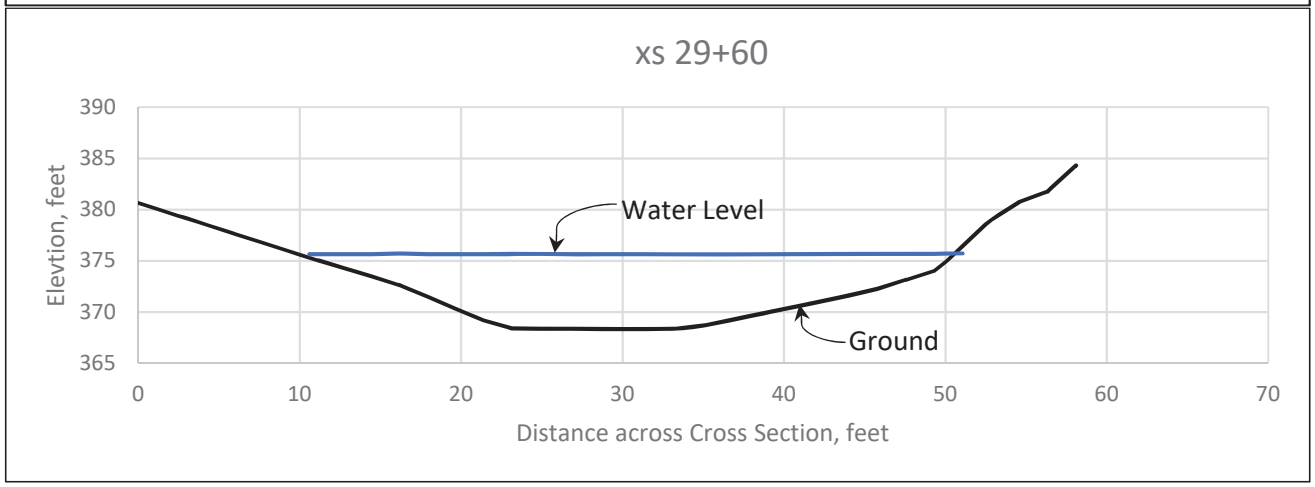
Proposed Conditions 100-Year Shear

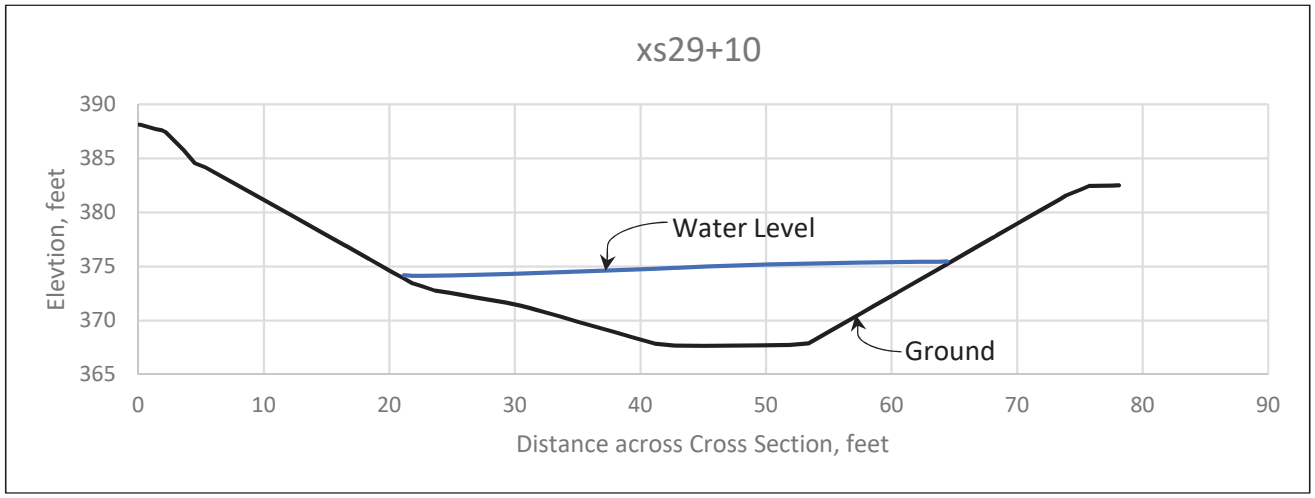


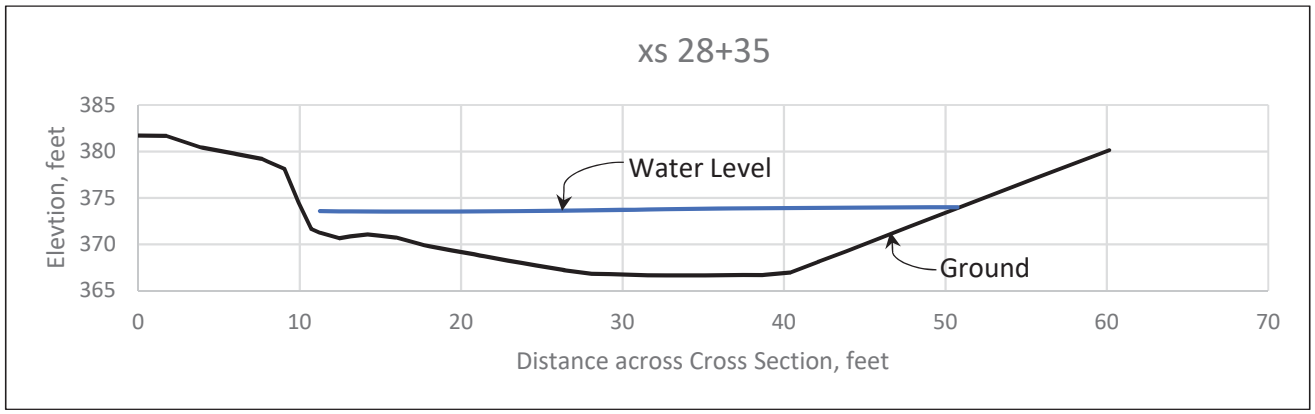
Proposed Conditions 100-Year WSE











100-year water surface elevations predicted by the proposed-condition 2-D modeling at select cross sections.

Appendix F – Rock Slope Protection Design

California Bank and Shore Rock Slope Protection Design

Methods from: CA Dept. of Transportation, Final Report No. FHWA-CA-TL-95-10, Caltrans Study No. F90TL03

$$W = \frac{0.00002}{(SG - 1)^3} \frac{V^6}{SIN^3 (r - a)} SG$$

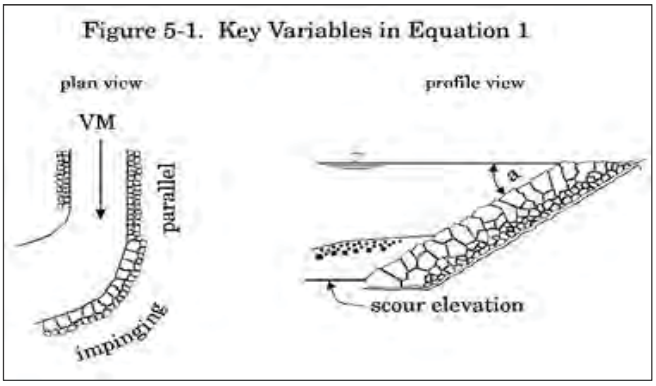
Solve for:
W = Minimum rock weight which resists forces of flowing water and remains stable on slope of stream or river bank, Pounds

CONSTANTS

Specific Gravity of the rock	SG	2.65
r = 70 Degrees (for randomly placed rubble) [1.22 Rad]	r	1.22
Velocity Multiplier: for Parallel flow =0.67 (2/3), for Impinging flow = 1.33 (4/3)	$V_{Multiplier}$	--

HEC-RAS RIVER STATION:		30+78	30+18	29+87		29+42	28+89	28+68	28+48
ROCK PLACEMENT LOCATION:		Approach to Bend Left Bank	Approach to Bend Left Bank	Apex Bend Left Bank		Bridge Approach Both Banks	US Bridge Face Right Bank	Under Bridge Right Bank	DS Bridge Face, Both Banks
INPUT VARIABLES									
Side Slope Correction Factor									
Side Slope	**(h:1v)**	**1.5**	**1.5**	**1.5**	**2.0**	**1.5**	**1.5**	**1.5**	**1.5**
Slope (radians)	a	0.59	0.59	0.59	0.46	0.59	0.59	0.59	0.59
Design Variables									
Velocity to which bank is exposed, (fps)	**V**	**8.92**	**10.59**	**9.96**	**10.59**	**9.88**	**7.49**	**7.60**	**8.75**
Velocity Multiplier	$V_{Multiplier}$	**0.67**	**0.67**	**1.33**	**1.33**	**0.67**	**1.33**	**1.33**	**0.67**
RESULTS									
Rock Size									
Min stable rock size (lbs)	**W**	**3**	**7**	**309**	**285**	**5**	**56**	**61**	**2**

NOTES:
Slope (radians) [1.5:1 =0.59, 2:1=0.46, 3:1 =0.32]



Stone Stability Calculation

USACE 1110-2-1601 , 1994. Hydraulic Design of Flood Control Channels, Equation 3-3

Equation for sizing riprap for channel bottom and side slopes

$$D_{30} = S_f C_s C_t C_v d \left[\left(\frac{\gamma_w}{\gamma_s - \gamma_w} \right)^{1/2} \frac{V}{\sqrt{K_1 g d}} \right]^{2.5} \qquad (3\text{-}3)$$

$$K_1 = \sqrt{1 - \frac{\sin^2 \theta}{\sin^2 \phi}}$$

and

$D_{50} = D_{30}(D_{85}/D_{15})^{(1/3)}$

CONSTANTS		
Stability Coef. for Incipient Failure (D85/D15 = 1.7 to 5.2) *0.30 = Angular Rock; 0.375 = Rounded Rock*	Cs	0.30
Vertical Velocity Distribution Coefficient *1.0 = Straight Chnls* *1.283-.2log(R/W) = Outside of Bends* *1.25 = Downstream of Conc. Channels & End of Dikes*	Cv	--
Thickness of Coefficient 1.0 = thickness of 1D100 or 1.5D50 (whichever greater)	Ct	1.0
Gravitational Constant (ft/s^2)	g	32.2
Unit Weight of Water (lb/cf)	γw	62.4
Unit Weight of Sediment or Rock (lb/cf)	γs	165

HEC-RAS RIVER STATION:		30+78	30+18	29+87		29+42	28+89	28+68	28+48
ROCK PLACEMENT LOCATION:		Approach to Bend	Approach to Bend	Apex Bend		Bridge Approach	US Bridge Face	Under Bridge	DS Bridge Face
BANK SIDE:		Left Bank	Left Bank	Left Bank		Both Banks	Right Bank	Right Bank	Both Banks
INPUT VARIABLES									
Side Slope Correction Factor									
Angle of Repose of Riprap (deg) *Normally 40 deg*	ϕ	40	40	40	40	40	40	40	40
Side Slope	(h:1v)	1.5	1.5	1.5	2.0	1.5	1.5	1.5	1.5
Angle of Side Slope with Horizontal (deg) [1.5:1 = 33.7, 2:1=26.6]	Θ	33.7	33.7	33.7	26.6	33.7	33.7	33.7	33.7
Side Slope Correction Factor	K1	0.51	0.51	0.51	0.72	0.51	0.51	0.51	0.51
Design Variables									
Depth-Averaged Local Velocity[1] (ft/s)	V	8.92	10.59	9.96	10.59	9.88	7.49	7.60	8.75
Centerline Radius of Bend	R			46.7	46.7		67.0	67.0	
Water Surface Width	W			49.4	49.4		40.4	40.4	
Velocity Distrubution Coefficient[2]	Cv	1.00	1.00	1.29	1.288	1.00	1.239	1.24	1.00
Local Depth of Flow (ft)	d	7.10	6.53	6.62	6.53	6.63	7.26	7.35	7.16
Safety Factor	Sf	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Rock Gradation									
Gradation Ratio (for Calculating D50)	D84/D15	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
RESULTS									
D30 Rock									
Rock Diameter (ft)	D30	1.4	2.3	2.5	1.9	1.9	1.1	1.2	1.4
Weight (lb) [dia. rounded to tenths]	W30	237	1,051	1,350	593	593	115	149	237
D50 Rock									
Rock Diameter (ft)	D50	1.7	2.6	2.9	2.2	2.2	1.3	1.4	1.6
Weight (lb) [dia. rounded to tenths]	W50	424	1,518	2,107	920	920	190	237	354

NOTES:

1. *In straight reaches, V = Vave.*

2. *C_V Velocity Distribution Coefficient*

Cv = 1.283-0.2*LOG(R/W)

Cv = 1.0 for straight reaches

Stone Stability Calculation

USACE 1110-2-1601 , 1994. Hydraulic Design of Flood Control Channels, Equation 3-5

Equation for Sizing Riprap in Steeper Channels for Channel Bottom and Side Slopes

Q100yr:	**1,760**	cfs	
Slope of Bed	**0.013**	ft/ft	
Water Surface Slope:	0.012	ft/ft	*(from HEC RAS)*

$$D_{30} = \frac{1.95\ S^{0.555}\ q^{2/3}}{g^{1/3}}$$

HEC-RAS RIVER STATION:		**30+18**	**29+87**
INPUT VARIABLES			
Unit Discharge:			
Design Flow (cfs):	**Q100yr**	**1,760**	**1,760**
Active Channel Bed (Bottom) Width (ft):	***W***	**11.5**	**11.5**
Unit Discharge of Active Bed (cfs/ft):	***q***	153.04	153.04
Flow Concentration Factor (1.25 or greater for skewed approach flow)		**1**	**1.25**
Gradation Ratio (for Calculating D50)	D84/D15	1.6	1.6
RESULTS			
D30 Rock			
Rock Diameter (ft)	**D30**	**1.6**	**1.8**
Weight (lb) [dia. rounded to tenths]	**W30**	**354**	**504**
D50 Rock			
Rock Diameter (ft)	**D50**	**1.8**	**2.1**
Weight (lb) [dia. rounded to tenths]	**W50**	**504**	**800**

Scour Depth Calculation

USACE CHL-98-20 , 1998. Users's Manual for CHANLPRO, Equation (2)

Equation for estimating scour depth at riprap toe

Ref: Toe-Scour Estimation in Stablized Bendways Maynord (1996a) Equation 16

SF = Safety Factor (see Table 1) **1.19**

Flow Condition 1760 cfs

Return Interval Q100

		US Bend		Bridge Face
HEC-RAS RIVER STATION:		**30+18**	**29+87**	**28+88**
ROCK PLACEMENT LOCATION:		Left Bank	Left Bank	Right Bank
INPUT VARIABLES				
Section Upstream of Bend				
Main Channel Area (sf)	**A**	**197.4**	**197.4**	**178.1**
Main Channel Width (ft)	**W**	**45.5**	**45.5**	**39.7**
Avg depth in crossing upstream of bend (ft)	**D_{mnc}**	4.3	4.3	4.5
Section at Bend				
Existing water depth in Bend (ft)	**D**	**6.5**	**6.6**	**7.3**
Centerline radius of bend main channel (ft)	**R**	**46.7**	**46.7**	**67.0**
R/W Should be limited from 1.5 to 10. (For R/W< 1.5, use 1.5)	**R/W**	1.03	1.03	1.69
Aspect ratio W/D_{mnc} from 20 to 125 (For W/D_{MNC} < 20, use 20)	**W/D_{mnc}**	10.47	10.47	8.86
RESULTS				
Max water Depth in Bend (ft)	**D_{mxb}**	9.48	9.48	9.54
Scour Depth (ft)	**D_{scr}**	**2.95**	**2.86**	**2.28**
ALTERNATIVE for R/W =1.5, and W/Dmnc=20	***D_{mxb}***	*9.8*	*9.8*	*10.1*
Scour Depth (ft)	*D_{scr}*	*3.24*	*3.15*	*2.83*

Notes:

Based on flows with 1 to 5 year return interval or overbank depth less than 20% of channel depth

D_{mnc} should be based on flow in main channel only

SF of 1.14 is recommended by USACE. For 1.14, 5% of the observed data will have a scour depth deeper than the predicted depth. A threshold of 5 percent difference between predicted and observed is used (D/D = 0.95).

Appendix B:
Farmlands Study for the Robinson Creek Bridge Replacement on Lambert Lane Project

gallaway ENTERPRISES

117 Meyers Street • Suite 120 • Chico CA 95928 • 530-332-9909

August 18, 2020

Caltrans District 1 – Environmental Stewardship Branch
ATTN: Brandon Larsen, Senior Environmental Planner
1656 Union Street
Eureka CA 95501

RE: Farmlands Study for the Robinson Creek Bridge Replacement on Lambert Lane Project

Mr. Larsen;

The Mendocino County Department of Transportation (County) has reviewed the Robinson Creek Bridge Replacement on Lambert Lane Project (Project) to determine if there is potential for impact to adjacent agricultural lands from the Project's proposed construction activity. Specifically, this study focused on farmland of prime, unique, and local important farmland within the proposed project.

The purpose of the project is to replace the existing, functionally obsolete and scour critical single span bridge over Robinson Creek. The Project site is located in the town of Boonville as is surrounded by homes and commercial development, riparian woodland, and grazing land. Robinson Creek is an intermittent drainage that flows through the site. The project will not result in permanent or temporary impacts to prime, unique, or locally important farmland; therefore, a Form AD 1006 is not required. The Project's offsite staging area, located at the County Fairgrounds, is designated as grazing land and will be temporarily impacted during construction (**Figure 1**).

Additionally, none of the parcels within the Project boundary are enrolled under the Williamson Act; therefore, there will be no effect on the eligibility for the Williamson Act program (**Figure 2**).

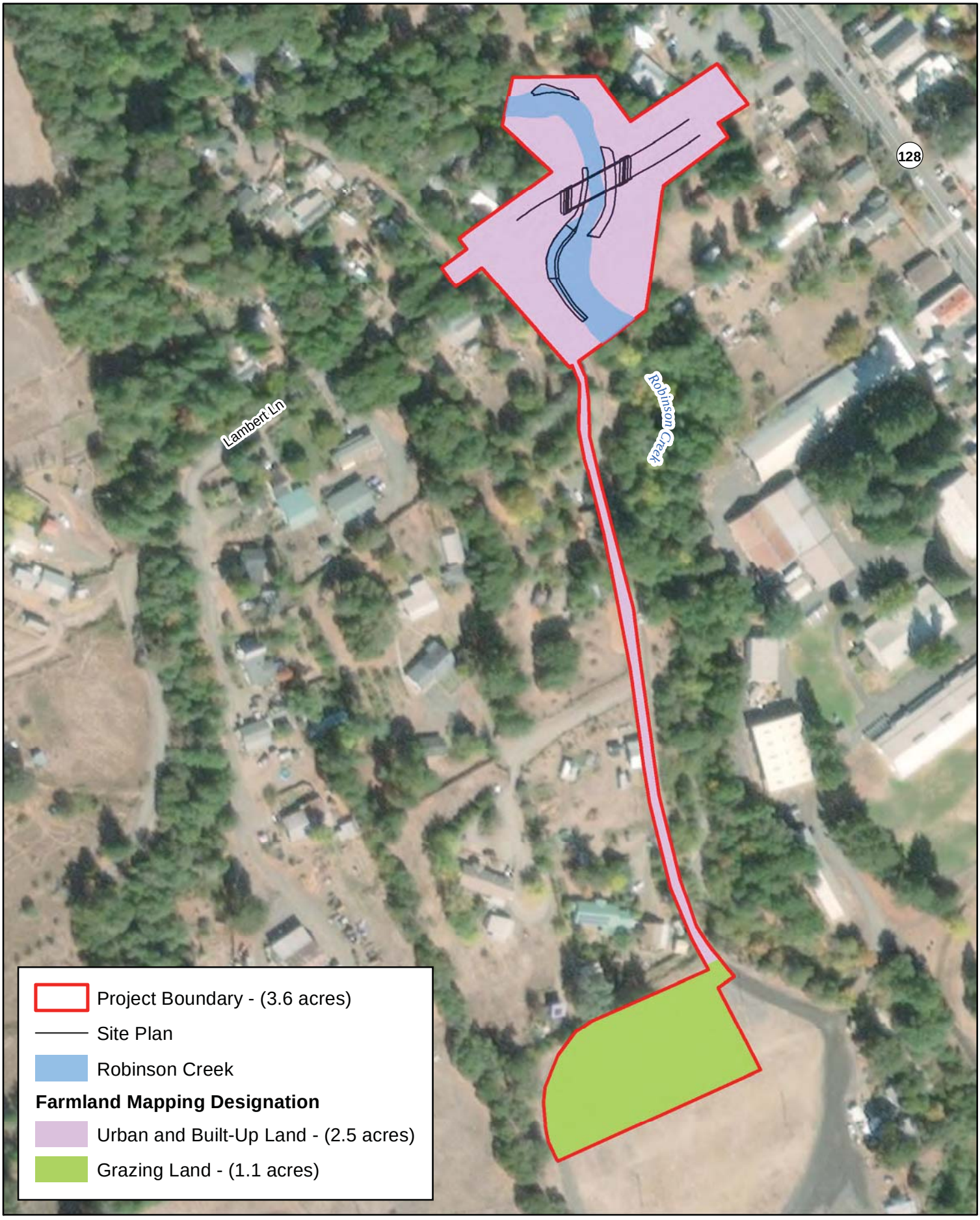
The Project will have no effect on farmland or lands under Williamson Act Contracts.

Regards,

Melissa Murphy

Melissa Murphy
Senior Biologist
melissa@gallawayenterprises.com

Enclosed: Figure 1: Farmland Designations
Figure 2: Williamson Act Lands 2012-2013



1:2,200

0 150 300 Feet

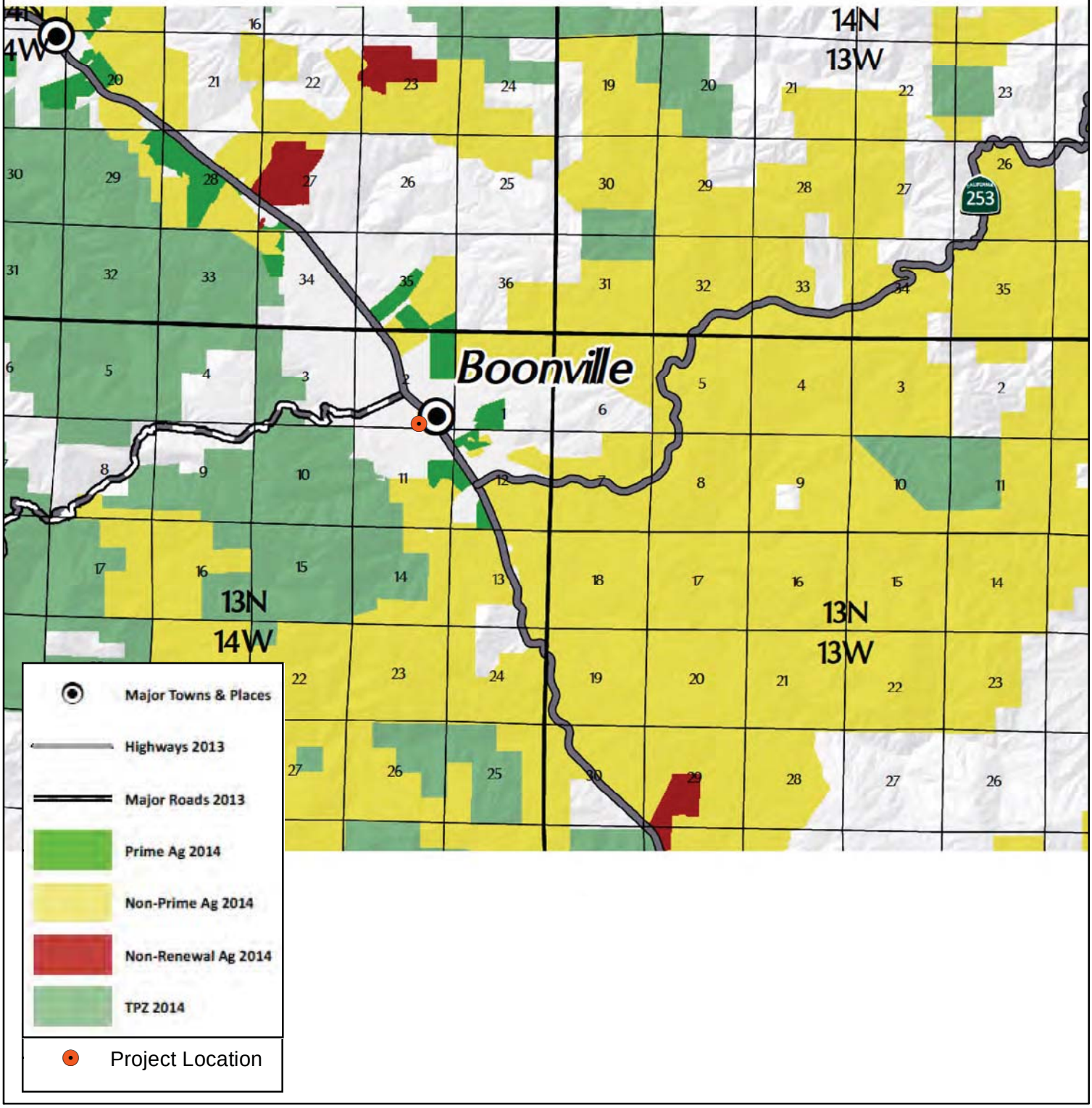
NORTH

Data Sources: ESRI, Quincy Engineering, California Department of Conservation, Maxar 10/21/2019

Robinson Creek Bridge Replacement Project
Farmland Impacts Assessment
Figure 1

gallaway ENTERPRISES

GE: #15-130 Map Date: 08/18/2020



1:9,000

0 200 400 Feet

NORTH

Data Sources: ESRI, Mendocino County

Robinson Creek Bridge Replacement Project
Williamson Act Map
Figure 2

gallaway ENTERPRISES

GE: #15-130 Map Date: 08/19/2020

Appendix C:
Natural Environment Study Robinson Creek Bridge Replacement on Lambert Lane

ROBINSON CREEK BRIDGE REPLACEMENT ON LAMBERT LANE

Natural Environment Study

Boonville, Mendocino County, California

Section 2, Township 13N, Range 14W

Boonville, CA Quadrangle

District 1

Bridge No. 10C0146

BRLO-5910(099)

March 2019

Revised December 2020

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Natural Environment Study

Section 2, Township 13N, Range 14W
Boonville, CA Quadrangle
Caltrans District 1

Federal Project Number BLO-5910(099)

Prepared By: Melissa Murphy Date: 12/8/20

Melissa Murphy, Senior Biologist
(530) 332-9909
Gallaway Enterprises
117 Meyers Street, Suite 120
Chico CA 95938

Approved By: _____ Date: 1/28/21

Howard Dashiell, Director of Transportation
(707) 463-4363
County of Mendocino Department of Transportation
340 Lake Mendocino Drive
Ukiah, CA 95482

Approved By: Christa Unger Date: 01/28/21

Christa Unger, Environmental Planner/Biologist
California Department of Transportation
District 1

Approved By: Darrell Cardiff Date: 01/28/2021

Darrell Cardiff, Sr. Environmental Planner
Caltrans Office of Local Assistance
District 1

For individuals with sensory disabilities, this document can be made available in Braille, in large print, on audiocassette, or on computer disk. To obtain a copy in one of these alternate formats, please call or write to Department of Transportation, Attn: Larry E. Planner, Environmental Planning, 50 Higuera Street, San Luis Obispo, CA 93401; (805) xxx-xxxx (Voice), or use the California Relay Service (800) 735-2929 (TTY to Voice), (800) 735-2922 (Voice to TTY) or 711.

Summary

Mendocino County (County) and the California Department of Transportation (Caltrans) are proposing to replace the Robinson Creek Bridge on Lambert Lane. The Robinson Creek Bridge Replacement on Lambert Lane Project (Bridge No. 10C0146) (Project) is located in the town of Boonville, California on the western edge of the Anderson Valley. Lambert Lane is the only public road access in and out of a residential and agricultural area. The existing bridge has been designated as functionally obsolete and scour critical by Caltrans, qualifying it for rehabilitation or replacement under the federal Highway Bridge Program (HBP). In winter of 2015, a retaining wall on the upstream side of the west approach washed out and collapsed into the creek causing the County to place revetment to prevent continued scouring and erosion. During the winter of 2016/2017 scour further undermined the eastern abutment footing. Under current conditions, the failed retaining wall and associated riprap creates a 3-foot water surface drop, which classifies the current conditions as a barrier to adult and juvenile steelhead based on California Department of Fish and Wildlife (CDFW) fish passage assessment guidelines (CDFG, 2002). The purpose of the Project is to replace the deficient bridge with a reliable structure to provide a safe crossing that meets current standards. Channel restoration will also take place as part of the Project and will include removing the collapsed retaining wall which will restore fish passage to the upstream reaches of Robinson Creek, protecting portions of the embankment slopes from erosion with hybrid rock slope protection revetment, channel grading to remove abrupt hydraulic changes, adding point bars along portions of the creek banks, and mitigating for the removal of riparian trees with like-kind plantings to be included as part of bank protection and restoration (Michael Love & Associates, Inc. 2018). Construction will take place from June 15 through October 15. If water is present within the project area, then fish relocation will be performed by a qualified biologist. Installation of a clear water diversion may be required. There is no pile driving proposed as part of this project; therefore, acoustical impacts to northern California (NC) steelhead Distinct Population Segment (DPS) (*Oncorhynchus mykiss irideus*) were not analyzed as part of this Natural Environment Study.

Land within the Biological Study Area (BSA) is characterized as barren, urban, riverine, annual grassland, valley-foothill riparian and valley oak woodland habitats. Special-status species that have the potential to occur within the BSA include the state Species of Special Concern (SSC) western pond turtle (*Actinemys marmorata*), Navarro roach (*Lavinia symmetricus navarroensis*), and foothill yellow-legged frog northwest/north coast clade

(FYLF, *Rana boylii*), the federally threatened NC steelhead DPS, tree roosting bat species protected by the California Fish and Game Code (CFGC), and a variety of bird and raptor species protected by the Migratory Bird Treaty Act. In addition, Robinson Creek is designated as critical habitat for the NC steelhead DPS and for the Central California Coast Coho salmon Evolutionary Significant Unit (ESU) (*Oncorhynchus kisutch*). The Project site falls within an area mapped by the National Marine Fisheries Service (NMFS) as potentially containing Essential Fish Habitat (EFH) for California Coastal Chinook salmon ESU (*Oncorhynchus tshawytscha*) and Central California Coast Coho salmon ESU; however, these species are not known to occur in Robinson Creek.

With the implementation of avoidance and minimization measures including construction timing, impacts to western pond turtle, Navarro roach, FYLF, roosting bats, or nesting birds will be minimal. This Project may affect and is likely to adversely affect the NC steelhead DPS through potential relocation efforts conducted by the qualified biologist. California Coastal Chinook salmon ESU and Central California Coast Coho salmon ESU are not known to occur within Robinson Creek; therefore, the Project will have no effect on these species. This Project is not likely to adversely modify critical habitat or EFH. The Project will result in a net benefit and be self-mitigating for impacts to critical habitat and EFH through onsite restoration and restored access to the upper reaches of Robinson Creek. Approximately 201.6 linear feet (0.14 acres) of temporary impacts and 93.1 linear feet (0.01 acres) of permanent impacts to NC steelhead DPS and Central California Coast Coho salmon ESU critical habitat within the BSA are proposed; however, the removal of the existing fish barrier upstream of the bridge will restore fish passage to 0.25 acres of critical habitat within the BSA.

The Project will result in 0.28 acres of temporary and 0.06 acres of permanent impacts to jurisdictional waters of the U.S. (WOTUS). This Project is self-mitigating as both temporary and permanent impacts will have a net benefit to WOTUS; therefore, the purchase of credits at a U.S. Army Corps of Engineers (Corps) approved mitigation bank or payment to a Corps approved in-lieu fund, will not be required. Impacts will be the result of restoration activities including removing the failed retaining wall and associated rock slope protection (RSP) from the creek, streambank stabilization through hybrid RSP revetment, vegetation of created point bars, and habitat enhancement. A Regional Water Quality Control Board (RWQCB) §401 Water Quality Certification permit, a California Department of Fish and

Wildlife (CDFW) §1602 Streambed Alteration Agreement, and a Corps Nationwide §404 permit shall be obtained for the project.

Table of Contents

List of Figures

List of Tables

List of Appendices

List of Abbreviated Terms

BSA	Biological Study Area
BMP	Best Management Practices
CC	California Coastal
CCC	Central California Coast
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CIDH	Cast-In-Drilled-Hole
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	United States Army Corps of Engineers
County	Mendocino County
CRPR	California Rare Plant Rank
CWA	Clean Water Act
DBH	Diameter at Breast Height
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
GIS	Geographic Information System
HBP	Highway Bridge Program
IPaC	Information for Planning and Conservation
LWD	Large Woody Debris

MBTA	Migratory Bird Treaty Act
MLA	Michael Love & Associates, Inc.
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NC	Northern California
NEPA	National Environmental Quality Act
NES	Natural Environmental Study
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
OHWM	Ordinary High Water Mark
RPW	Relatively Permanent Water
RSP	Rock Slope Protection
RWQCB	Regional Water Quality Control Board
SR	State Route
SSC	State Species of Special Concern
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WOTUS	Waters of the United States

1 Introduction

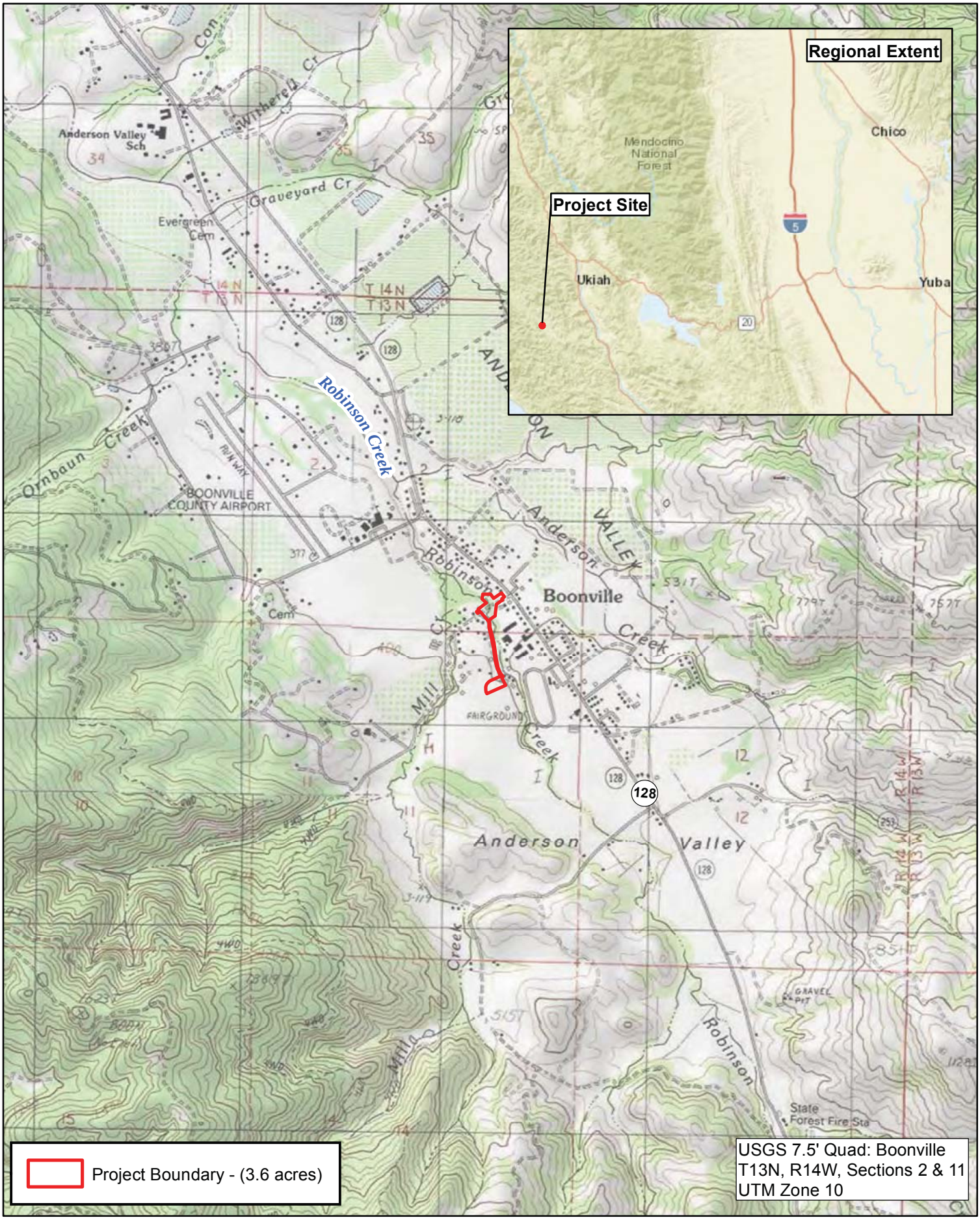
The purpose of the Robinson Creek Bridge Replacement on Lambert Lane Project (Bridge No. 10C0146) (Project) is to replace the existing Robinson Creek Bridge on Lambert Lane to provide the public with a safe, reliable crossing and improve traffic operations (**Figure 1: Regional Location Map, Figure 2: Project Location Map**). This Project is needed because the existing bridge has been designated as functionally obsolete and scour critical by the California Department of Transportation (Caltrans), due to the undermining of the spread footing foundations and collapse of a retaining wall. The purpose of this Natural Environment Study (NES) is to evaluate potential Project impacts to special-status species and their habitats within the Project vicinity.

Project History

The Project is located in the town of Boonville, California on the western edge of the Anderson Valley (**Figure 1**). The existing bridge was constructed on Lambert Lane over Robinson Creek in 1954. Lambert Lane is the only public access road in and out of a residential and agricultural area. The existing 32-foot long single span bridge is comprised of a concrete deck slab supported on tall closed strutted abutments founded on spread footings. The existing bridge has been designated as functionally obsolete and scour critical by Caltrans, qualifying it for rehabilitation or replacement under the federal Highway Bridge Program (HBP). In winter of 2015, a retaining wall on the upstream side of the west approach washed out and collapsed into the creek causing Mendocino County (County) to place revetment to prevent continued scouring and erosion. In the winter of 2016/2017, scour further undermined the eastern abutment footing along its entire length and reinforcing steel is exposed. The purpose of the Project is to replace the deficient, unstable bridge with a reliable structure to provide a safe crossing that meets current standards. The Project is funded through the HBP with matching funds from Federal Toll Credits. Caltrans will be the lead agency for National Environmental Policy Act (NEPA) compliance through delegation from the Federal Highway Administration (FHWA) and the County, the owner of the Project, will be the lead agency for California Environmental Quality Act (CEQA) compliance.

FISH PASSAGE

A fish passage assessment of stream crossings was conducted by Ross Taylor and Associates (Taylor 2001). Because the Lambert Lane bridge is a channel spanning crossing, it was considered to provide unimpeded fish passage and was not included in the assessment. However, under current conditions, the failed retaining wall and associated riprap creates a



1:24,000
0 1,000 2,000 Feet
NORTH
Data Sources: ESRI, USGS, Quincy Engineering

Robinson Creek Bridge Replacement Project
Regional Location
Figure 1

gallaway ENTERPRISES

GE: #15-130 Map Date: 01/31/19

NORTH

1:2,200
0 50 100 Feet

Data Sources: ESRI, DigitalGLobe
10/31/17, USGS, Quincy Engineering

Robinson Creek Bridge Replacement Project
Project Location
Figure 2

gallaway ENTERPRISES

GE: #15-130 Map Date: 01/30/19

3-foot water surface drop, which classifies the current conditions as a barrier to adult and juvenile steelhead based on California Department of Fish and Wildlife fish passage assessment guidelines (CDFG, 2002). Channel restoration designs for the site should satisfy current fish passage standards, as described in CDFG (2009) and NMFS (2001) guidelines.

GEOMORPHIC CHANNEL CONDITIONS

Changing geomorphic conditions within Robinson Creek and downstream Anderson Creek have been noted for decades. Channel incision (lowering of the channel bed) and channel bank erosion along Robinson Creek was noted as a significant source of sediment production within the 1998 Navarro River Watershed Restoration Plan. Incision has caused scour and undermining of bridge foundations, leading to the replacement of the State Route (SR) 128 crossing of Anderson Creek immediately upstream of the confluence of Robinson Creek and replacement of the Mountain View Road bridge crossing over Robinson Creek, downstream of Lambert Lane. Also, channel widening associated with incision processes has caused severe bank erosion threatening adjoining structures and resulting in loss of mature riparian vegetation throughout lower Robinson Creek.

The Mendocino County Resource Conservation District (RCD) and the Mendocino County Water Agency conducted studies of channel conditions to characterize the ongoing channel adjustments in Robinson Creek, focusing on the reach from the confluence with Anderson Creek to the Mendocino County Fair Grounds upstream of Lambert Lane. This included conducting profile surveys of the channel thalweg and surveys of channel cross sections in 2005 to document the channel morphology. Florsheim (2006) prepared a baseline assessment of bio-geomorphic conditions within lower Robison Creek for the RCD and identified channel incision as the dominant process causing the observed channel instabilities. Follow-up monitoring surveys of the lower Robinson Creek channel thalweg were conducted in 2008, which found the channel showed signs of aggradation near the confluence with Anderson Creek, but also showed signs of incision within a reach between Mountain View Road and Lambert Lane bridge crossings (Florsheim, 2008). These findings were further described in a 2013 peer-reviewed publication (Florsheim et al., 2013). The RCD provided the original data from the 2005 and 2008 county surveys to MLA to compare to current channel conditions at the Lambert Lane bridge replacement Project.

Project Description

BIOLOGICAL STUDY AREA

The Biological Study Area (BSA) is the area in which biological surveys are conducted and where all construction and staging will occur (**Figure 3: Biological Study Area**). The BSA for this Project encompasses the bridge construction and stream restoration zone as well as the potential off-site staging area located at the County Fairgrounds. The BSA is a total of 3.6 acres.

PROPOSED PROJECT

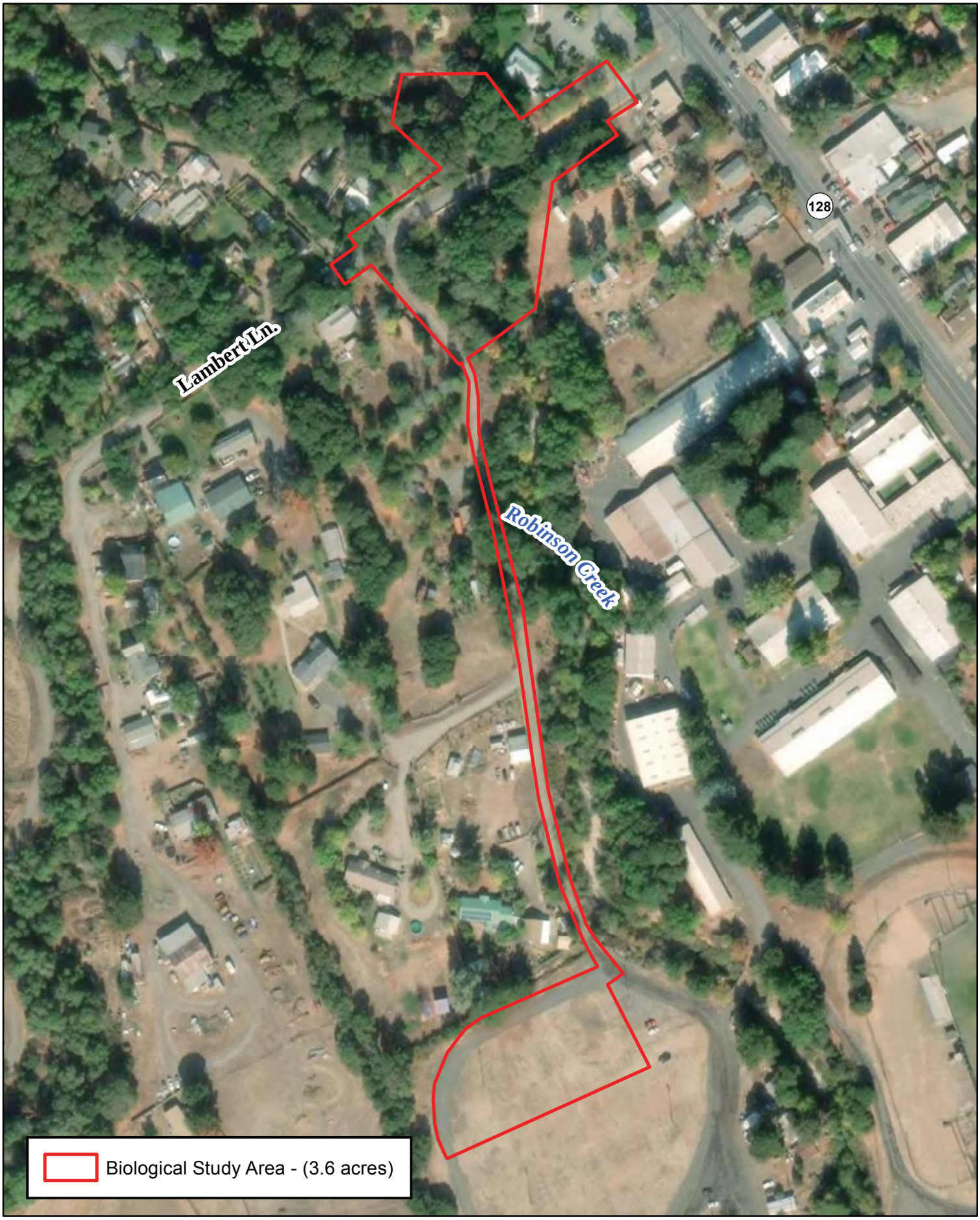
The proposed Project will replace the existing Robinson Creek Bridge on Lambert Lane, approximately 400 feet west of SR 128 (**Figure 2**). The existing structure is 32 feet long and 26 feet wide with closed strutted abutments founded on spread footings on erodible alluvial material. This bridge has a history of scour issues and a scour hole that has undermined the integrity of the easterly bridge abutment. There are deficiencies in the bridge width, superstructure and substructure conditions. The replacement bridge will have 9-foot lanes and 5-foot shoulders in each direction resulting in a wider structure which meets safety standards.

In addition to the bridge replacement, portions of the stream channel upstream and downstream of the bridge, as well as a localized downstream streambank scour area adjacent to the Boonville Hotel, will be stabilized according to the Robinson Creek Channel Design for the Lambert Lane Bridge Replacement Project prepared by Michael Love & Associates, Inc. (MLA). The channel restoration is intended to provide geomorphically stable channel geometry while protecting the roadway embankment and vulnerable streambanks with hybrid rock slope protection (RSP) revetments where required due to risk of scour and lateral channel migration.

CONSTRUCTION METHODS AND ACCESS

The preferred construction method will be to build a replacement bridge on the existing alignment and provide a temporary detour. Based on Lambert Lane being the only public road access to approximately 30 parcels, it is necessary to keep at least one lane of traffic open during construction. Due to the instability of the existing bridge, a temporary bridge is proposed to be erected offset from the existing bridge to pass traffic around bridge construction operations within the Project site and avoid a road closure. This temporary bridge will either be a Bailey Bridge sourced from Mendocino County or a Contractor furnished temporary bridge structure.

A long span steel plate girder bridge will be constructed within the existing bridge alignment and can be fabricated in shorter lengths to facilitate transport and then assembled on-site



NORTH

1:2,200
0 100 200 Feet

Data Sources: ESRI, Quincy Engineering, DigitalGlobe 10/31/17

Robinson Creek Bridge Replacement Project
Biological Study Area
Figure 3

gallaway ENTERPRISES

GE: #15-130 Map Date: 01/31/19

(**Figure 4**). This bridge option will have a shorter construction time and will minimize impacts to the creek since it does not require falsework in the creek. Additionally, this long span bridge option provides the ability to improve the alignment of the creek to minimize future potential scour issues by increasing the channel opening and providing a softer and more gradual turn of the creek. Weathering steel will be utilized to minimize future maintenance efforts and costs. Significant changes to the vertical profile are not anticipated as the existing and replacement bridge option provide adequate hydraulic freeboard. The structure depth will be 4 feet 9 inches.

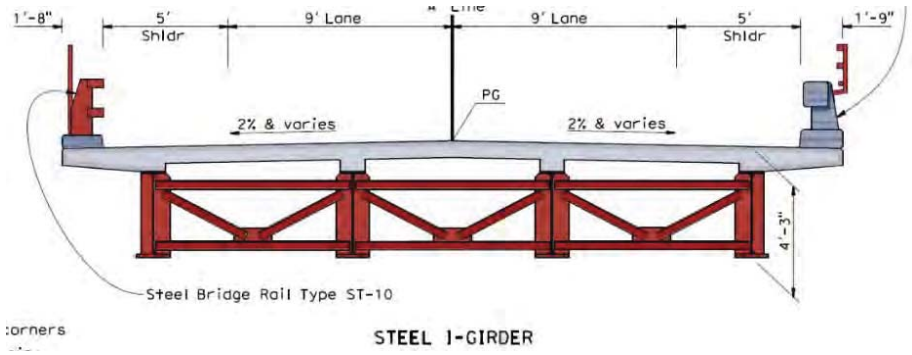


Figure 4. Long Span Prefabricated Steel Plate Girder Bridge Design Cross-Section

Deep foundation systems, drilled piles, will be required due to the presence of unconsolidated channel alluvium substrate. Pile type is Cast-In-Drilled-Hole (CIDH) piles. The foundation type for the retaining walls will be the same as for bridge abutments. It is anticipated that temporary shoring will be required during bridge construction.

The installation of a clear water diversion may be necessary. If required, the clear water diversion will be constructed of one appropriately sized culvert and cofferdam constructed of visqueen plastic, clean river gravel, and sandbags (**Appendix G**)

Geomorphic Channel Conditions Within the Project Area and the Proposed Bridge Structure

Lambert Lane crosses Robinson Creek approximately 2,860 linear feet upstream of the confluence with Anderson Creek and 400 feet west of SR 128. The existing bridge crossing is at the inflection of a tight meander bend and the channel alignment has been constrained by the roadway embankment. The proposed replacement bridge has a free span of approximately 91 feet, while the existing bridge span is only 32 feet. The increased span is in-part intended to facilitate an improved alignment with the channel by decreasing the sharpness of the meander bend. A constraint to realigning the channel was the preservation

of large established trees along the right bank upstream and downstream of the crossing, including an 8-foot diameter heritage oak tree close to the existing right bank of the channel upstream of the bridge. The proposed alignment moves the approach channel further to the right (looking downstream) and has a sinuosity of 1.2 (valley length to channel length).

Stream Channel Restoration Geomorphic Characterization

It is proposed that portions of the embankment slopes will be protected from erosion with RSP and that willow plantings will also be included as part of bank protection and restoration. Channel grading will minimize abrupt hydraulic constrictions and areas of focused high velocities (**Figure 5**). The proposed riprap revetments upstream and downstream of the bridge crossing and downstream by the Boonville Hotel are to be vegetated with live willow cuttings following Caltrans "hybrid revetment" design. Further, this Project will include removing the rubble and reconfiguring the RSP that covers the creek bottom, restoring the channel to a more natural condition and restoring fish passage to sections of Robinson Creek above the failed retaining wall. Channel restoration designs for the site will satisfy current fish passage standards, as described in CDFG (2009) and NMFS (2001) guidelines (**Appendix A: Robinson Creek Channel Design Report**).

The channel configuration and extent of grading was influenced by the goal of preserving trees. The first design consideration was to minimize the removal of larger oak and bay trees. Planting the RSP with willow stakes and site revegetation is intended to offset temporary loses, as willows grow quickly. Large woody debris (LWD) will be placed along the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00. Removed trees to be used as LWD will be a minimum of 15 feet long and have a 16-inch diameter at breast height (DBH). A plan sheet showing the location of LWD placement in the restored stream will be included in the final design. Anchoring details will be included on the LWD plan sheet and at a minimum will include the construction details shown on the example plan sheet provided as **Appendix F.**

The stream channel component of the Project was designed using the stream simulation approach outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFG, 2009) and by the United States Forest Service (USFS) (2008). The stream simulation approach is a geomorphically-based approach that requires a channel-spanning crossing structure with adequate capacity to convey the 100-year flow. The channel grading should

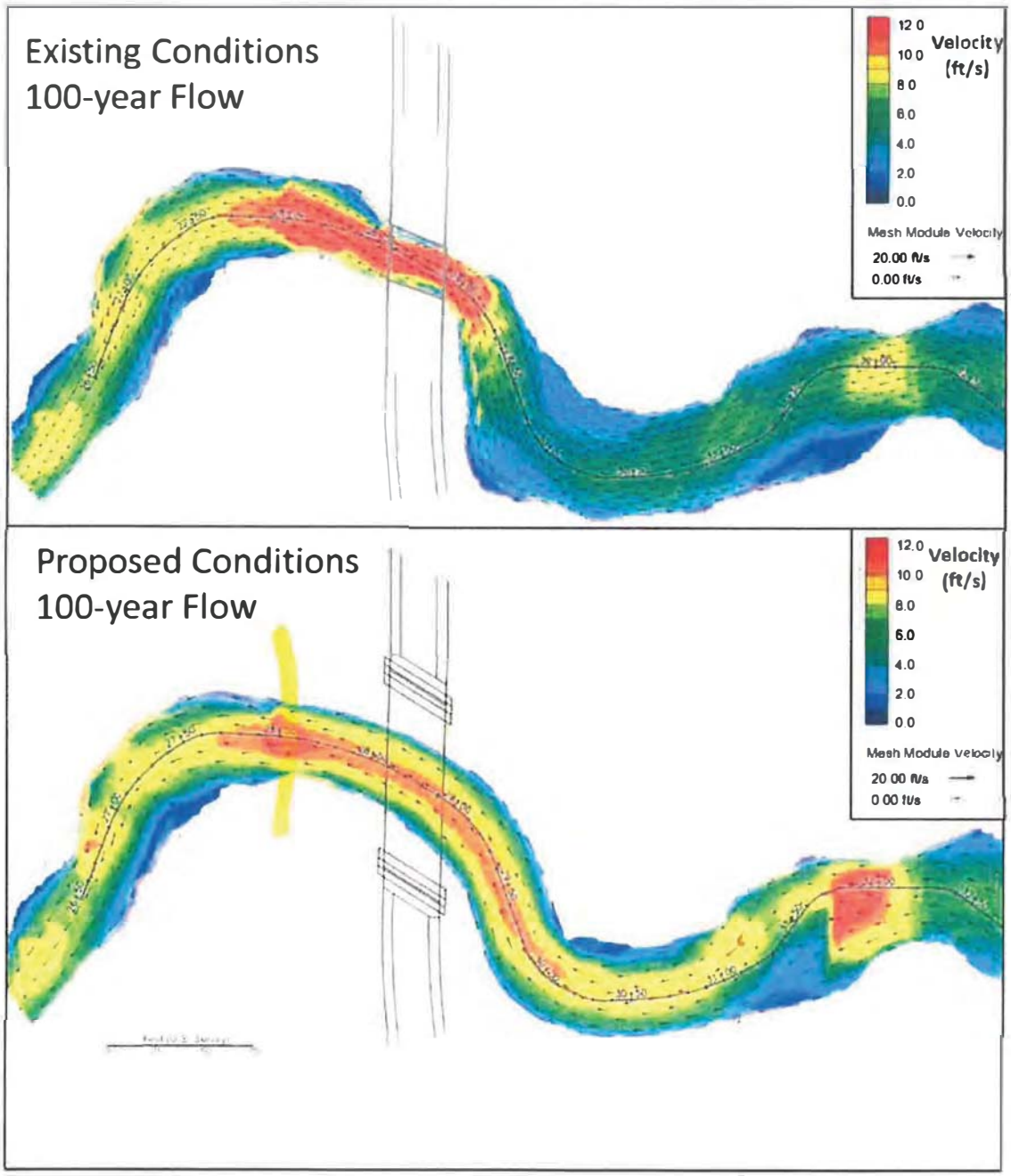


Figure 5. Predicted water velocities associated with the 100-year flow of 1,750 cfs for existing and proposed.

seamlessly connect with the upstream and downstream channel profiles and the streambed should be composed of native material that is as mobile as bed material within the adjacent channel reaches. The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing and channel bed. The approximate volume of streambed material to be stockpiled and placed back in the channel is 1,200 cubic yards. All this material will be salvaged streambed material from the project stream reach. No imported material will be brought in for this use.

Hybrid Revetment Design

Incorporating vegetation into the streambank revetment has the beneficial effects of improving stream ecology, increasing soil strength and providing flow resistance, although it can be unpredictable over the long term (Caltrans 2014). Established vegetation will provide cover, shade the channel and provide nutrients to the stream. As root systems establish, they can support the banks by providing resistance to scour and bind the soils and rock placed along the bank.

Caltrans has developed recommendations for the use of a "hybrid revetment" that incorporates vegetation into RSP to provide the benefits of stream side vegetation while managing its uncertainties. The intent is to balance the engineering benefit of armoring a bank while promoting ecological processes. The hybrid RSP design consists of the standard RSP design as described above, with the addition of live willow staking that penetrates the rock layers and allows rooting into the native bank soils.

Species most commonly used as live stakes are native willow and cottonwood trees. Plantings are placed either vertical or perpendicular to the slope face and must be long enough to extend through to the subbase and into moist soil. Placement of live stakes is done in conjunction with rock placement. To provide protection to the live stakes during rock placement, cuttings should be placed into perforated cardboard tubes that are embedded into the subgrade and extend through the layered RSP. Cardboard is preferred as it can degrade over time and not hinder the growth of the cuttings. Growing medium is placed within the cardboard tubes to provide direct soil contact. Additionally, voids within the placed riprap should be filled with salvaged soil to further promote root growth within the layered RSP.

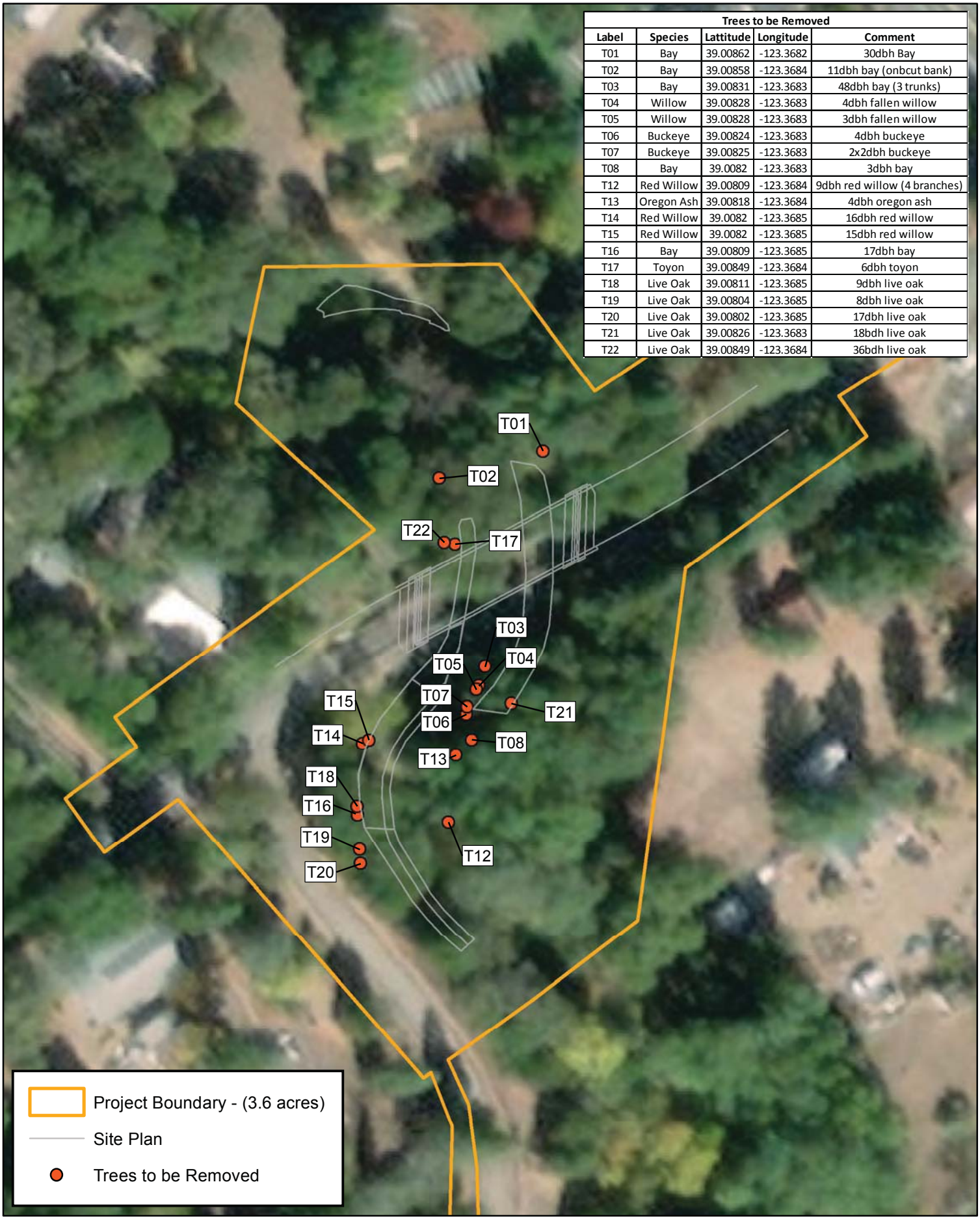
For Robinson Creek, it is assumed cutting shall be made from native willow species. Stakes may need to be as long as 12 feet and should be placed vertically to maximize their rooting depth, with the butt of the live stake at or near summer groundwater levels. The willow

plantings will start at bankfull, 2.3 feet above the finished channel bed, and extend up the RSP revetment. To ensure good establishment, the live stakes should be irrigated for a minimum of two seasons.

Based on the proposed channel grading, 19 trees will be removed (**Figure 6**). In addition to the plantings contained within the hybrid RSP revetment, native vegetation would be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants. In addition to the planting areas close to the channel, the Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks.

Channel incision, channel bank erosion, and channel widening associated with incision processes has caused severe bank erosion, resulting in loss of mature riparian vegetation throughout lower Robinson Creek. Though the riparian trees to be removed as a result of the Project are likely important components of northern California (NC) steelhead Distinct Population Segment (DPS) and Central California Coast (CCC) Coho salmon Evolutionary Significant Unit (ESU) critical habitat, current conditions have degraded the overall quality of the critical habitat. The Project proponent proposes to replant up to 355 trees, at a 18:1 ratio, in an effort to restore the creek and mitigate potential impacts to Essential Fish Habitat (EFH) critical habitat. Robinson Creek and its associated riparian vegetation will be restored to a net benefit to NC steelhead and the critical habitat present. The following are the preliminary estimates of trees to be replanted. Upon final design, a qualified landscape architect or botanist should be consulted to determine spacing and placement, species types, and any other factors appropriate to the site. The landscape architect or botanist shall provide provisions for harvesting and storage of cutting stock and irrigation design. A landscape architect or botanist shall be retained to ensure revegetation has a high potential for success.

Planted RSP (3,010 sf):
Willow/cottonwood at 5 feet on center = 125 trees
Channel bank and low terrace (1,823 sf):
Native riparian and understory at 3 feet on center = 220 trees
Upper Terrace (725 sf)
Native upland trees, such as oaks = 5-10 trees



Trees to be Removed				
Label	Species	Lattitude	Longitude	Comment
T01	Bay	39.00862	-123.3682	30dbh Bay
T02	Bay	39.00858	-123.3684	11dbh bay (onbcut bank)
T03	Bay	39.00831	-123.3683	48dbh bay (3 trunks)
T04	Willow	39.00828	-123.3683	4dbh fallen willow
T05	Willow	39.00828	-123.3683	3dbh fallen willow
T06	Buckeye	39.00824	-123.3683	4dbh buckeye
T07	Buckeye	39.00825	-123.3683	2x2dbh buckeye
T08	Bay	39.0082	-123.3683	3dbh bay
T12	Red Willow	39.00809	-123.3684	9dbh red willow (4 branches)
T13	Oregon Ash	39.00818	-123.3684	4dbh oregon ash
T14	Red Willow	39.0082	-123.3685	16dbh red willow
T15	Red Willow	39.0082	-123.3685	15dbh red willow
T16	Bay	39.00809	-123.3685	17dbh bay
T17	Toyon	39.00849	-123.3684	6dbh toyon
T18	Live Oak	39.00811	-123.3685	9dbh live oak
T19	Live Oak	39.00804	-123.3685	8dbh live oak
T20	Live Oak	39.00802	-123.3685	17dbh live oak
T21	Live Oak	39.00826	-123.3683	18bdh live oak
T22	Live Oak	39.00849	-123.3684	36bdh live oak

1:787
0 50 100 Feet
Data Sources: ESRI, Quincy Engineering
NORTH Maxar 10/21/2019

Robinson Creek Bridge Replacement Project
Trees to be Removed
Figure 6

gallaway ENTERPRISES
GE: #15-130 Map Date: 08/05/2020

A quantity estimate of both temporary fill materials and permanent features required for construction within Robinson Creek in the BSA is presented in **Table 1**.

Table 1. Impacts to Waters of the United States

Type of impact	Acreage of impact
Temporary Impacts – Access and Bridge Demolition/Construction	0.28 acres
Permanent Impacts – Hybrid RSP Revetment and Stream Restoration	0.06 acres

STAGING AREAS, RIGHTS OF WAY, AND UTILITIES

The Project staging areas will include portions of the closed roadway at each end of the bridge and the area just southeast of the bridge. If this area is unavailable or not sufficient in size, there is an alternative area off-site at the County Fairgrounds that can also serve as a staging area. Right-of-Way including slope easements, temporary construction easements, permanent maintenance easements, and permanent acquisitions will be required. There are existing overhead electrical and telephone utilities that will need to be relocated. Additionally, there is a storm water concrete pipe that outfalls into the creek that will need to be relocated. Coordination will begin early with PG&E.

CONSTRUCTION EQUIPMENT AND SCHEDULE

It is anticipated that excavators, dozers, cranes, pavers, dump trucks, concrete trucks, concrete pumps, and pile drilling equipment will be required. Construction within Robinson Creek is anticipated to begin in June 15, 2021 and continue through October 15, 2021.

2 Study Methods

The biological and botanical surveys were conducted by Gallaway Enterprises after consulting the United States Fish and Wildlife Services (USFWS) Information for Planning and Conservation (IPaC) species list, National Oceanic and Atmospheric Administration (NOAA) NMFS species list, NOAA NMFS EFH mapper database, California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CNDDB) search and the California Native Plant Societies (CNPS) list of rare and endangered plants gathered for the BSA (**Appendix B: Species Lists**). Additionally, a map was obtained from the CNDDB Geographic Information System (GIS) database, which provided general locations of species that had recorded CNDDB occurrences within a five-mile radius of the Project location (**Figure 7: CNDDB Occurrences**). Based on the results of the species lists and CNDDB map, appropriate biological and botanical surveys were conducted.

Regulatory Requirements

The following describes federal, state, and local environmental laws and policies that are relevant to the CEQA review process and to this NES.

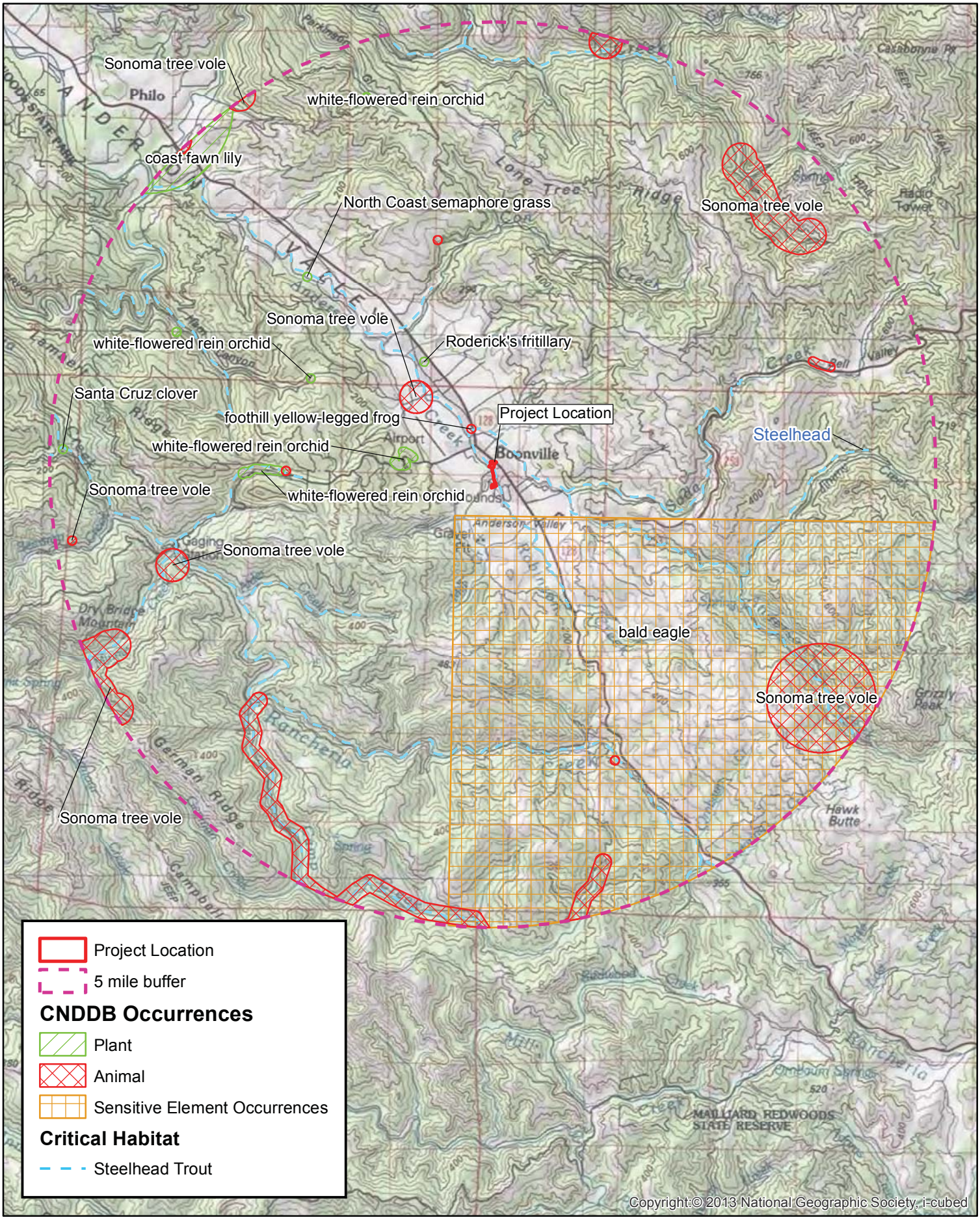
Federal

Federal Endangered Species Act

The United States Congress passed the Federal Endangered Species Act (ESA) in 1973 to protect species that are endangered or threatened with extinction. The ESA is intended to operate in conjunction with the NEPA to help protect the ecosystems upon which endangered and threatened species depend. The ESA makes it unlawful to "take" a listed animal without a permit. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Through regulations, the term "harm" is defined as "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Migratory Bird Treaty Act

The MBTA (16 USC §703) prohibits the killing of migratory birds or the destruction of their occupied nests and eggs except in accordance with regulations prescribed by the USFWS. The bird species covered by the MBTA includes nearly all of those that breed in North



NORTH

1:90,000
0 2,500 5,000 Feet

Data Sources: ESRI, USGS, USFWS
CNDDB, Quincy Engineering

Robinson Creek Bridge Replacement Project
CNDDB and Critical Habitat
Figure 7

gallaway ENTERPRISES

GE: #15-130 Map Date: 01/31/19

America, excluding introduced (i.e. exotic) species (50 Code of Federal Regulations §10.13). Activities that involve the removal of vegetation including trees, shrubs, grasses, and forbs or ground disturbance has the potential to affect bird species protected by the MBTA.

Waters of the United States, Clean Water Act, Section 404

The Corps and the U.S. Environmental Protection Agency (EPA) regulate the discharge of dredged or fill material into jurisdictional waters of the United States, under the Clean Water Act (CWA, §404). The term "waters of the United States" (WOTUS) is an encompassing term that includes "wetlands" and "other waters." Wetlands have been defined for regulatory purposes as follows: "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3, 40 CFR 230.3). Wetlands generally include swamps, marshes, bogs, and similar areas." other waters of the United States are seasonal or perennial water bodies, including lakes, stream channels, drainages, ponds, and other surface water features, that exhibit an ordinary high-water mark but lack positive indicators for one or more of the three wetland parameters (i.e., hydrophytic vegetation, hydric soil, and wetland hydrology) (33 CFR 328.4).

The Corps may issue either individual permits on a case-by-case basis or general permits on a program level. General permits are pre-authorized and are issued to cover similar activities that are expected to cause only minimal adverse environmental effects. Nationwide permits are general permits issued to cover particular fill activities. All nationwide permits have general conditions that must be met for the permits to apply to a particular Project, as well as specific conditions that apply to each nationwide permit.

Executive Orders 13112; Prevention and Control of Invasive Species

On February 3, 1999, Executive Order 13112 was signed establishing the National Invasive Species Council. Executive Order 11312 directs all federal agencies to prevent and control introductions of invasive nonnative species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. Executive Order 11312 established a national Invasive Species Council made up of federal agencies and departments and a supporting Invasive Species Advisory Committee composed of state, local, and private entities. The Invasive Species Council and Advisory Committee oversees and facilitates implementation of the Executive Order, including preparation of a National Invasive Species Management Plan.

Section two (2) of the Executive Order states:

(a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law, (1) identify such actions; (2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

(b) Federal agencies shall pursue the duties set forth in this section in consultation with the Invasive Species Council, consistent with the Invasive Species Management Plan and in cooperation with stakeholders, as appropriate, and, as approved by the Department of State, when Federal agencies are working with international organizations and foreign nations.

The Magnuson-Stevens Act

The Magnuson-Stevens Act (MSA) was signed in 1996 and mandates the use of annual catch limits and accountability measures to end overfishing, provide widespread market-based fishery management through limited access privilege programs, and calls for increased international cooperation. The fish off the coasts of the United States, the highly migratory species of the high seas, the species which dwell on or in the Continental Shelf appertaining to the United States, and the anadromous species which spawn in United States Rivers or estuaries, constitute valuable and renewable natural resources and they and their habitats are protected under the MSA. A national program for the conservation and management of the fishery resources of the United States is necessary to prevent overfishing, to rebuild

overfished stocks, to insure conservation, to facilitate long-term protection of EFH, and to realize the full potential of the Nation's fishery resources.

Congress defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The EFH guidelines further interpret the EFH definition as:

- “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate.
- “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities.
- “necessary” means the habitat required to support a sustainable fishery and the managed species contribution to a healthy ecosystem.
- and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Activities proposed to occur in EFH areas do not automatically require consultation. Consultations are triggered only when the proposed action may adversely affect EFH, and then, only Federal actions require consultation. States are not required to consult. However, if NOAAs National Marine Fisheries Service (NMFS) receives information on a State action that may adversely affect EFH, NMFS is required to provide EFH conservation recommendations to the State agency. States are not required to initiate consultation with NMFS nor respond to its recommendations (NOAAs National Marine Fisheries Service 2011).

State of California

California Endangered Species Act

The California Endangered Species Act (CESA) is similar to the ESA, but pertains to state-listed endangered and threatened species. The CESA requires state agencies to consult with the California Department of Fish and Wildlife (CDFW) when preparing documents to comply with the CEQA. The purpose is to ensure that the actions of the lead agency do not jeopardize the continued existence of a listed species or result in the destruction, or adverse modification of habitat essential to the continued existence of those species. In

addition to formal listing under the federal and state endangered species acts, "species of special concern" receive consideration by CDFW. Species of special concern are those whose numbers, reproductive success, or habitat may be threatened.

California Environmental Quality Act Guidelines §15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines §15380(d) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled based on the definition in the ESA and the section of the California Fish and Game Code (CFGC) dealing with rare, threatened, and endangered plants and animals. The CEQA Guidelines (§15380) allows a public agency to undertake a review to determine if a significant effect on species that have not yet been listed by either the USFWS or CDFW (e.g. candidate species, species of concern) would occur. Thus, CEQA provides an agency with the ability to protect a species from a Project's potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

Clean Water Act, Section 401

The CWA (§401) requires water quality certification and authorization for placement of dredged or fill material in wetlands and other waters of the United States. In accordance with the CWA (§401), criteria for allowable discharges into surface waters have been developed by the State Water Resources Control Board, Division of Water Quality. The resulting requirements are used as criteria in granting National Pollutant Discharge Elimination System (NPDES) permits or waivers, which are obtained through the Regional Water Quality Control Board (RWQCB) per the CWA (§402). Any activity or facility that will discharge waste (such as soils from construction) into surface waters, or from which waste may be discharged, must obtain an NPDES permit or waiver from the RWQCB. The RWQCB evaluates an NPDES permit application to determine whether the proposed discharge is consistent with the adopted water quality objectives of the basin plan.

California Fish and Game Code

The CFGC (§3503.5) states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes (hawks, eagles, and falcons) or Strigiformes or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Take includes the disturbance of an active nest resulting in the abandonment or loss of young. The CFGC (§3503) also states that "it is

unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto."

Rare and Endangered Plants

The CNPS maintains a list of plant species native to California with low population numbers, limited distribution, or otherwise threatened with extinction. This information is published in the Inventory of Rare and Endangered Vascular Plants of California. Potential impacts to populations of CNPS-ranked plants receive consideration under CEQA review. The CNPS California Rare Plant Rank (CRPR) categorizes plants as the following:

- Rank 1A: Plants presumed extinct in California;
- Rank 1B: Plants rare, threatened, or endangered in California or elsewhere;
- Rank 2: Plants rare, threatened, or endangered in California, but more numerous elsewhere;
- Rank 3: Plants about which we need more information; and
- Rank 4: Plants of limited distribution.

The California Native Plant Protection Act (CFGC §1900-1913) prohibits the taking, possessing, or sale within the state of any plants with a state designation of rare, threatened, or endangered as defined by CDFW. An exception to this prohibition allows landowners, under specific circumstances, to take listed plant species, provided that the owners first notify CDFW and give the agency at least 10 days to retrieve (and presumably replant) the plants before they are destroyed. Fish and Game Code §1913 exempts from the 'take' prohibition 'the removal of endangered or rare native plants from a canal, lateral ditch, building site, or road, or other right of way.'

Studies Required

Gallaway Enterprises conducted biological and botanical habitat assessments and a protocol-level rare plant survey within the BSA. Biological and botanical surveys were conducted following review of the USFWS IPaC report, CNDDB Rarefind 5 report, CNPS list, and the CNDDB occurrence map (**Figure 7**). The United States Geological Survey (USGS) "Boonville" 7.5 minute quadrangle in which the Project is located were used to derive the agency species lists **(Appendix B: Species Lists)**. Based on the results of the species lists, Gallaway Enterprises conducted a general habitat assessment and protocol level rare plant botanical survey to identify any rare, endangered, threatened, or sensitive species and their habitats that may have the potential to occur within the BSA.

Personnel and Survey Dates

The biological evaluation and rare plant botanical survey was conducted on June 29, 2018 by Gallaway Enterprises biologist, Melissa Murphy, and senior botanist and certified arborist, Elena Gregg. The purpose of the biological evaluation and rare plant botanical survey is to determine if suitable habitat occurs within the property for special-status species and if special-status species are present. Methods for each survey are described below.

Ms. Murphy has over eight years of experience surveying at the protocol and general level for listed reptiles and amphibians including foothill yellow-legged frog, giant garter snake (GGS), and California red-legged frog. Ms. Murphy has experience surveying for yellow billed cuckoo, foothill yellow-legged frog, PIT tagging reptiles, assisting in de-watering activities including fish relocation, surveying for nesting birds and raptors, capturing and banding waterfowl, and conducting habitat assessments for listed species. Ms. Murphy has installed bird and bat exclusion at a myriad of projects and works under Gallaway Enterprises' CDFW Scientific Collecting Permit as a Principal Investigator.

Mrs. Gregg has over twelve years of professional experience conducting rare plant surveys, wetland delineations, and habitat assessments in California. She has a working knowledge of CNPS, CDFW, and USFWS survey protocols and holds a CDFW collection permit for listed plant species. Through her extensive field experience in a wide array of habitats and eco-regions in northern California, Mrs. Gregg has gained knowledge of locally invasive plants species and noxious weeds.

BIOLOGICAL HABITAT ASSESSMENT

The biological evaluation was conducted by walking the entire BSA and identifying specific habitat types and elements. If habitat was observed for special-status species it was then evaluated for quality based on vegetation composition and structure, physical features (e.g. water, soils), micro-climate, surrounding area, presence of predatory species and available resources (e.g. prey items, nesting substrates). Biological species observed within the BSA are listed in **Appendix C**.

BOTANICAL HABITAT ASSESSMENT

A botanical habitat assessment was conducted on June 29, 2018 by senior botanist Elena Gregg to assess potential for special-status plant species to occur within the BSA. The assessment was conducted by walking in all accessible areas of the BSA and noting the habitat elements present (e.g. soils, geology, hydrology, topography, aspect, elevation, etc.)

and vegetation communities present. If present, natural and man-made disturbance patches were noted as well as the successional stage of vegetation within the BSA. Botanical species observed within the BSA during this field visit are listed in **Appendix C**.

PROTOCOL-LEVEL RARE PLANT SURVEY

The protocol-level rare plant survey was conducted on June 29, 2018 by senior botanist Elena Gregg following the initial botanical habitat assessment during the appropriate blooming period for the four (4) special-status plant species that were identified as having potential to occur within the BSA. The survey was conducted in accordance with the CDFW March 2018, *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. All accessible areas within the Project site were surveyed on foot. A Trimble Geo Explorer 6000 Series GPS Receiver was on hand to record any special-status plant occurrences observed. A list of plant species observed during the protocol-level survey is included as **Appendix C**.

Agency Coordination and Professional Contacts

Consultation to date has included emails, phone calls, and site visits with CDFW Environmental Scientist and Fisheries Specialist, Scott Harris. A Project focus meeting was held on July 9, 2020 with Caltrans Environmental, Gallaway Enterprises, Quincy Engineering Inc, Mendocino County Department of Transportation, and NMFS in attendance. The purpose of the meeting was to discuss the incorporation of fish relocation into the BA and changes in the Project impacts resulting from the Extended Phase 2 Cultural Review. A Biological Assessment (BA) has also been prepared for this Project.

The USFWS IPaC and CNDDB Rarefind 5 species lists and the CNPS inventory of rare and endangered plants lists were reviewed in March 2019 for documentation of special-status species likely to occur within either the BSA or the USGS Bailey Ridge, Orrs Springs, Ukiah, Philo, Boonville, Elledge Peak, Zeni Ridge, Ornbaun Valley, and Yorkville 7.5 minute quadrangles (**Appendix B**). These lists were updated in December 2020. In addition to the species lists, a map was obtained from the CNDDB GIS database, which provided general locations of species that had recorded CNDDB occurrences within a five-mile radius of the Project location (**Figure 7**).

Limitations That May Influence Results

There were no limitations that may influence results of the habitat assessment and site assessment.

3 Results: Environmental Setting

Description of the Existing Biological and Physical Conditions

The Project site is positioned within the narrow Anderson Valley in the northern California coastal mountain range. The BSA consists of an approximately 3.6-acre survey area including the area surrounding the Lambert Lane bridge over Robinson Creek within the town of Boonville, Mendocino County, CA. The BSA is surrounded by a mix of rural residential homes and urban habitats. The Project is located within the Boonville USGS quadrangle, Section 2, Township 13N, Range 14W.

Study Area

Within the BSA, vegetation communities are highly disturbed. All construction related activities will be restricted to the limits of the BSA; therefore, habitat assessments and surveys were restricted to the area within the BSA.

Physical Conditions

The survey area ranges in elevation from 382 to 405 feet above sea level and is sloped between 0-9 percent. Soils within the survey area are loams and sandy loams with a deep restrictive layer located more than 80 inches deep. The average annual precipitation is 37.88 inches and the average temperature is 58.55° F (WRCC 2019) in the region where the survey area is located. Based on the current CWA definition of WOTUS, there is one tributary feature that meets the criteria to be considered a jurisdictional WOTUS within the BSA (**Appendix D**).

Biological Conditions in the Biological Study Area

The BSA consists of existing asphalt roadway, concrete bridge, gravel road shoulder, a mixed species tree canopy and patches of disturbed annual grassland. The existing roadway, concrete bridge and gravel road shoulder are characterized as barren habitat and are not considered habitat for any special-status species. Habitat types present within the BSA are described below based on Mayer and Laudenslayer's *A Guide to Wildlife Habitats of California* (1988).

VALLEY OAK WOODLAND

Along the tops of the banks of Robinson Creek, the majority of the vegetation was dominated by a dense tree canopy consisting of valley oaks (*Quercus lobata*) and live oak (*Quercus wislizeni*), a shrub layer of California bay-laurel (*Umbellularia californica*) and an understory dominated by Himalayan blackberry, periwinkle (*Vinca major*), English ivy (*Hedera helix*), poison oak (*Toxicodendron diversilobum*) and upland herbaceous species.

VALLEY FOOTHILL RIPARIAN

Below the ordinary high water mark (OHWM) of Robinson Creek, there is a narrow corridor of valley foothill riparian habitat. Vegetation along the edges of the creek bed and on the steep banks of the creek include arroyo willow (Salix lasiolepis), Himalayan blackberry, and the occasional Oregon ash (Fraxinus latifolia). The strip of valley foothill riparian habitat that occurs within the limits of Robinson Creek and the transition from this habitat type to adjacent valley oak woodland and urban habitat is abrupt. Valley foothill riparian habitats provide food, water, migration, and dispersal corridors for fish species and escape, nesting, and thermal cover for an abundance of other wildlife species. Within the BSA, this habitat type is extremely narrow and occurs in close proximity to residential homes, which greatly reduces the potential habitat benefits it can provide.

RIVERINE

Riverine habitat occurs within Robinson Creek in the BSA. Robinson Creek exhibits intermittent flow patterns and typically has a dry period starting in the early summer through fall. The channel morphology is characterized as gravel/cobble bedded pool and riffle with fairly shallow residual pool depths under the bridge. The banks of the creek were generally steep and channelized. Robinson Creek meanders tightly through the BSA with a series of s-curves causing an extensive bank failure and resulting large wood jam from mature trees sloughing into the creek. Upstream of the Robinson Creek bridge the partially failed retaining walls and road embankment is on the outside of a right bend within the channel. On the inside of the bend there is a depositional bar that appears to have formed relatively recently (since construction of the bridge), likely in-part due to backwater affects from the abrupt turn in the channel as it approaches the bridge. The bar appears to have sharpened the radius of the channel bend and pushed the channel thalweg up against the retaining wall along the road embankment and against the nearly vertical bank upstream of the retaining wall, where riprap has been placed, creating a 3-foot water surface drop which classifies the current conditions as a barrier to adult and juvenile steelhead based on the

CDFW fish passage assessment guidelines (CDFG, 2002). Western toad (*Anaxyrus boreas*) tadpoles and juveniles were observed in areas where small isolated pools remained in the channel during the June field visit.

ANNUAL GRASSLAND

Disturbed annual grassland habitat occurs as small patches of openings amongst the tree canopy within the area around the bridge and is the dominant habitat type in the proposed offsite staging area. Vegetation within these annual grassland portions of the survey area was primarily composed of perennial rye-grass (*Festuca perennis*), wall hare barley (*Hordeum murinum*), hawkbit (*Leontodon saxatilis*), smooth cat's-ear (*Hypochaeris glabra*), English plantain (*Plantago lanceolata*), and yellow star-thistle (*Centaurea solstitialis*). Wildlife species use grassland habitat for foraging but require some other habitat characteristic such as rocky out crops, cliffs, caves or ponds in order to find shelter and cover for escapement. Common species that are found breeding in this habitat when it is healthy include a variety of ground nesting avian species and small mammals (Mayer and Laudenslayer 1988).

URBAN

Urban habitat is present adjacent to the bridge site which is composed of residential homes and associated landscaping. This environment can present a mosaic of vegetation including primarily ornamental landscaping but can incorporate native tree species. Generalist and invasive species often occupy urban habitat such as common raven (*Corvus corax*), house sparrow (*Passer domesticus*), scrub jays (*Aphelocoma californica*) and brewers blackbirds (*Euphagus cyanocephalus*) as well as small to medium mammals (e.g., raccoon, opossum, striped skunk) (Mayer and Laudenslayer 1988).

BARREN

Within the BSA, the roadways and bridge structure present are characterized as barren habitat. Barren habitat is defined by the absence of vegetation. The barren habitat within the Project consists primarily of asphalt, concrete and gravel. Barren habitat types generally provide low quality of habitat for wildlife.

Regional Species and Habitats and Natural Communities of Concern

The following special-status species were identified under the USFWS IPaC, CNDDB, NMFS and the CNPS species lists (**Appendix B: Species Lists**) as having potential to occur within

the USGS "Boonville" 7.5 minute and surrounding quadrangles. Species that have the potential to occur within the BSA are based on suitable habitat within the BSA, including elevation thresholds, CNDDB occurrences within a five-mile radius of the BSA, and observations made during biological surveys and habitat assessment, thus not all species listed within the various species lists in **Appendix B** are included in **Table 2**. A summary of special-status species and their potential to occur within the BSA is provided in **Table 2**.

Table 2. Federal and State Listed and Candidate Species Potentially Occurring or Known to Occur in the Robinson Creek at Lambert Lane BSA.

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/ Absent	Potential to Occur/Rationale
PLANTS					
Burke's goldfields	*Lasthenia burkei*	FE/CNPS 1B.1	Vernal pools and swales. (April-Jun)	A	No vernal pools or swales present in the BSA and not observed during the field survey. The Project will have no effect on this species.
Coast fawn lily	*Erythronium revolutum*	CNPS 2B.2	Bogs, fens, and mesic streambanks. (Mar-Jul)	A	Not observed within the BSA during the field survey.
Contra Costa goldfields	*Lasthenia conjugens*	FE	Vernal pools. (Mar-Jun)	A	No suitable habitat present in the BSA. The Project will have no effect on this species.
Great burnet	*Sangisorba officinalis*	CNPS 2B.2	Rocky serpentine seeps, bogs, seasonal wetlands, sometimes stream banks. (Jul-Oct)	A	No suitable rocky or seep habitat present in the BSA.
North Coast semaphore grass	*Pleuropogon hooverianus*	CNPS 1B.1	Shady, wet grassy areas and freshwater marshes on forest floor. (Apr-Jun)	A	No suitable wet habitat present and not observed within the BSA during the field survey.
Roderick's fritillary	*Fritillaria roderickii*	CNPS 1B.1	Coastal grassy slopes and mesas. (Mar-May)	A	No suitable habitat present within the BSA.

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/ Absent	Potential to Occur/Rationale
Santa Cruz clover	*Trifolium buckwestiorum*	CNPS 1B.1	Present in gravelly margins and moist grassland, sometimes in gravel roads and ditches. (Apr-Oct)	A	No suitable gravelly habitat present and not observed within the BSA during the field survey.
Showy Indian clover	*Trifolium amoenum*	FE/CNPS 1B.1	Usually occurs in wetlands within valley grassland and wetland-riparian communities. (Apr-June)	A	No suitable habitat present and not observed during protocol level survey. The Project will have no effect on this species.
White-flowered rein orchid	*Piperia candida*	CNPS 1B.2	Sometimes serpentinite soils, forest duff, mossy banks, rock outcrops. (May-Sep)	A	Not observed within the BSA during the field survey.
INVERTEBRATES					
There are no regulated invertebrates with the potential to occur in the BSA.					
FISH					
Central California Coast Coho salmon ESU	*Oncorhynchus kisutch*	FE/SE	Streams and small freshwater tributaries during juvenile stages, spawning habitat includes gravel substrate.	CH/A	Robinson Creek is designated as critical habitat for this species; however, within the BSA the creek is intermittent and dries completely during the summer months. CNDDB observations between 1990 and 2016 show that there have been no observations of CCC Coho in Robinson Creek (Christy 2016). In addition, an extensive review of peer reviewed literature and citizen sightings conducted by CDFW showed

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/ Absent	Potential to Occur/Rationale
					only one equivocal record of CCC Coho occurring within Robinson Creek within the last 50 years (pers. comm Scott Harris, CDFW Environmental Scientist.). The Project will have no effect on this species.
California Coastal Chinook salmon ESU	*Oncorhynchus tshawytscha*	FT	Freshwater rivers, streams, and tributaries during the juvenile stages, prefers deep, large streams.	A	Robinson Creek is intermittent and dries completely during the summer months. In addition, an extensive review of peer reviewed literature and citizen sightings conducted by CDFW showed no occurrences of CC Chinook salmon occurring within Robinson Creek within the last 50 years (pers. comm Scott Harris, CDFW Environmental Scientist, Gavette 2014). The Project will have no effect on this species.
Navarro roach	*Lavinia symmetricus navarroensis*	SSC	Predominately found in small warm streams but are capable of thriving in larger colder streams with diverse conditions.	HP	Robinson Creek provides suitable habitat when water is present.

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/ Absent	Potential to Occur/Rationale
Northern California steelhead DPS	*Oncorhynchus mykiss iridius*	FT	Wintering habitat includes streams with deep low-velocity pools while spawning habitat includes gravel substrates free of excessive silt.	CH/HP	Robinson Creek is designated critical habitat for this species, but only provides habitat when water is present during winter and spring. In addition, the current site conditions of the failed retaining wall and associated riprap immediately upstream of the bridge are considered a barrier to adult and juvenile steelhead. The Project may affect, but is not likely to adversely affect through potential relocation efforts.
Tidewater goby	*Eucyclogobius newberryi*	FE	Shallow water bodies characterized by brackish water with low to moderate salinity.	A	The creek present has no tidal influence and does not provide suitable habitat. The Project will have no effect on this species.
REPTILES & AMPHIBIANS					
California red-legged frog	*Rana draytonii*	FT/ SSC	Inhabits quiet pools of streams, marshes, and occasionally ponds.	A	There were no California red-legged frogs observed during the site visit. There is no suitable breeding habitat. There are no CNDDB occurrences within 5 miles of the BSA, and no hydrologic connection to known populations. The Project will have no effect on this

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/ Absent	Potential to Occur/Rationale
					species.
Foothill yellow-legged frog – Northwest/ North Coast Clade	*Rana boylii*	SSC	Frequents rocky streams and rivers with rocky substrate and open, sunny banks, in forests, chaparral, and woodlands. Sometimes found in isolated pools, vegetated backwaters, and deep, shaded, spring-fed pools	HP	Creek only provides habitat when water is present during winter and spring.
Western pond turtle	*Emys marmorata*	SSC	Inhabits permanent streams, marshes, and ponds.	HP	Creek only provides habitat when water is present during winter and spring.
BIRDS					
Bald eagle	*Haliaeetus leucocphealus*	FP	Coast, large lakes and river systems, with open forests with large trees and snags.	A	No nesting habitat within or adjacent to the BSA.
Northern goshawk	*Accipiter gentillis*	SSC	Continuous stands of deciduous or coniferous trees generally above 3000 feet.	A	Nesting habitat is not expected within ¼ mile of the roadway.
Osprey	*Pandion haliaetus*	WL	Associated strictly with large fish-bearing waters, needs large trees, snags, and dead-topped trees in open forests for cover and nesting.	A	Robinson Creek is not a large fish-bearing waterway. There are no known occurrences in the vicinity of the BSA.
Mammals					
Pallid Bat	*Antrozous pallidus*	SSC	Open dry habitats at lower elevations	HP	Mature trees with sloughing bark and/or cavities provide suitable day roosting habitat

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/ Absent	Potential to Occur/Rationale
					within the BSA.
Sonoma tree vole	*Arborimus pomo*	SSC	Old-growth Douglas-fir forest and dense forests with Douglas fir, grand fir, hemlock or spruce.	A	Only a few small Douglas fir trees present, BSA is in a highly populated area and is in a valley with open grassland/ agricultural land.
Townsend's big-eared bat	*Corynorhinus townsendii*	SSC	Roosts in mines and open caverns.	A	There are no mines or open caverns within the BSA; therefore, no suitable day roosting habitat present.
Code Designations					
Absent [A] - no habitat present and no further work needed. Habitat Present [HP] -habitat is, or may be present. The species may be present. Present [P] - the species is present. Critical Habitat [CH] - project footprint is located within a designated critical habitat unit, but does not necessarily mean that appropriate habitat is present. Status: Federal Endangered (FE); Federal Threatened (FT); Federal Candidate (FC), Federal Species of Concern (FSC); State Endangered (SE); State Threatened (ST); Fully Protected (FP); State Rare (SR); State Candidate (SC), State Species of Special Concern (SSC); State Watch List (WL); California Native Plant Society (CNPS); Sensitive Natural Community (SNC)					

4 Results: Biological Resources, Discussion of Impacts and Mitigation

Habitats and Natural Communities of Special Concern

There are no CDFW designated natural communities of special concern within or adjacent to the BSA.

There is one feature that qualifies as jurisdictional WOTUS within the BSA; Robinson Creek. Project activities will result in permanent impacts to 0.06 acres and temporary impacts to 0.28 acres of WOTUS. Impacts will be the result of channel restoration activities including removing the failed retaining wall and associated RSP from the creek, streambank stabilization through hybrid RSP revetment, vegetation of created point bars, and habitat enhancement. All impacts will have a positive benefit to Robinson Creek and water quality in general. A Draft Delineation of WOTUS Map is included as **Appendix D**.

Special-Status Plant Species

A protocol-level botanical survey was conducted on June 29, 2018 for a total of 13 of the special-status plant species identified on the USFWS, CNPS, and CNDDB lists which have a blooming period that overlapped with the survey date. No special-status plant species were observed during the protocol-level survey. Further, a habitat assessment was conducted within the BSA on June 29, 2018 for all remaining special-status plant species identified on the CNPS and CNDDB lists. Due to the lack of vernal, marsh or seep wetland habitat and volcanic, rocky or serpentine soils, none of these special-status plant species were determined to have potential to occur within the BSA. As such, the Project is not expected to have any effect on special-status plant species.

Special-Status Animal Species Occurrences

NORTHERN CALIFORNIA STEELHEAD

The NC steelhead DPS is considered threatened under the federal ESA. They rely on streams, rivers, estuaries and marine habitat during their lifecycle. Because young steelhead spend a significant portion of their lives in rivers and streams, they are particularly susceptible to human induced changes to water quality and habitat threats. Steelhead spawn in streams and rivers, steelhead rear in freshwater for 1 to 4 years before migrating downstream through estuaries to the open ocean. Steelhead spend 1 to 5 years at sea

before returning to natal streams or rivers. Steelhead do not always die after spawning, but will again migrate through estuaries to the ocean.

Survey Results

The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for steelhead when water is present during winter and spring months. Additionally, Robinson Creek has been designated as critical habitat for NC steelhead DPS (**Figure 8: NC Steelhead and CCC Coho Salmon Critical Habitat**). During the June site visit, Robinson Creek was dry with the exception of a few small shallow pools. Although there is no spawning habitat present, the BSA does offer suitable steelhead migration/emigration and non-natal rearing habitat during the late fall through late spring months (i.e. November 1 – May 31) when water levels are high and water temperatures are cool. When winter flows are adequate, the BSA provides suitable migration/emigration habitat for juvenile and adult steelhead. During the summer months (i.e. June 1 – October 31), the intermittent hydrology, still water, and warm temperatures make Robinson Creek within the BSA unsuitable habitat for any lifestage of salmonid including steelhead. Therefore, if the BSA contains water between June 1 and October 31 then there is a potential for non-natal juveniles to be present. There is potential for NC steelhead to become stranded within the BSA in isolated pools like the ones observed during the site visit.

Project Impacts

Construction activities will occur in Robinson Creek between June 15 and October 15. If water is present within the BSA, fish relocation will be conducted by a qualified biologist prior to the start of construction activities in the streambed. A clear water diversion shall be installed if needed. Therefore, the Project may affect, and is likely to adversely affect the NC steelhead DPS through potential relocation.

Avoidance and Minimization Efforts

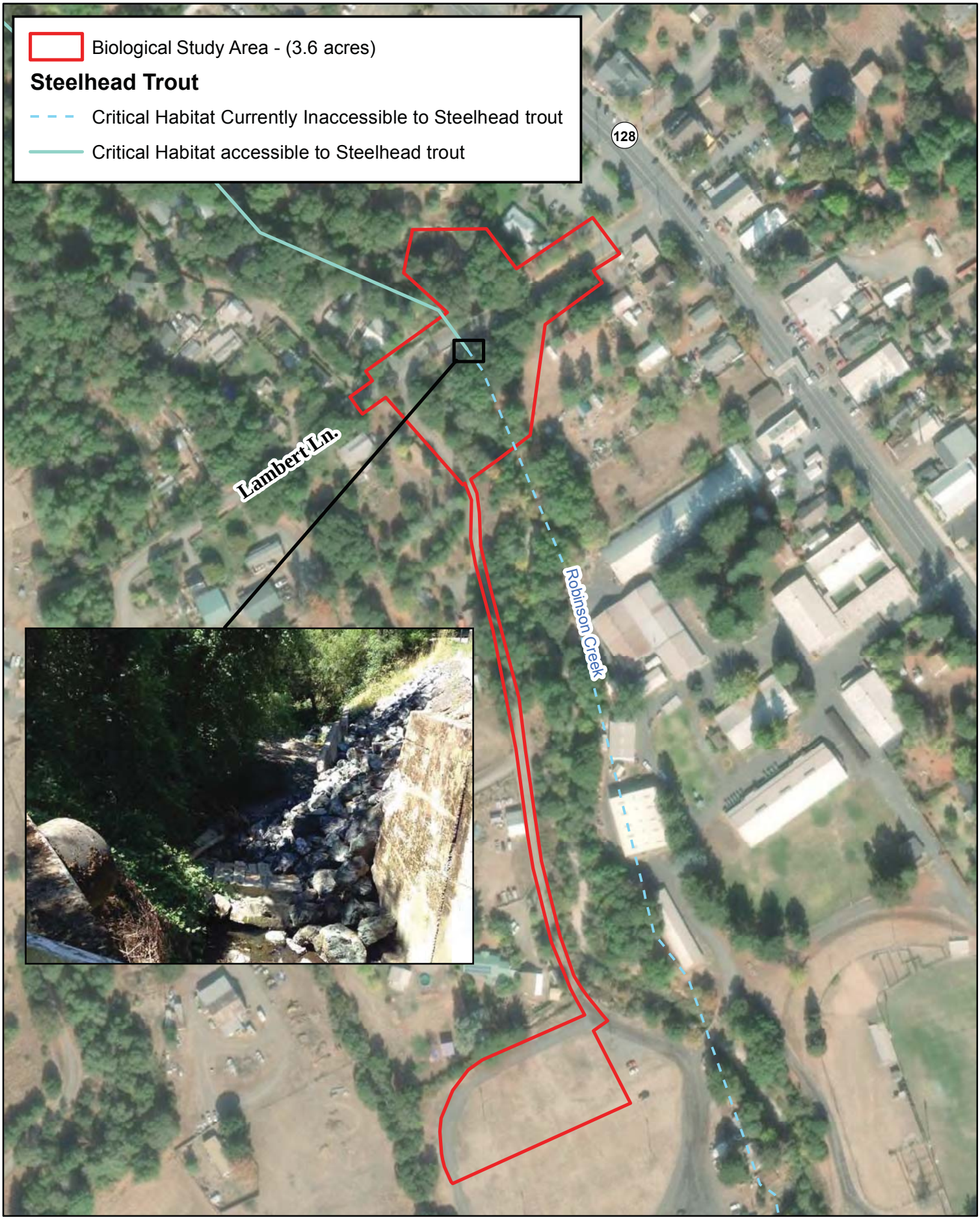
The following recommendations, when implemented, will avoid and minimize impact to this species:

- Construction within Robinson Creek will be limited to June 15 through October 15.
- If flowing water is present within the BSA between June 15 and October 15 then a clear water diversion using an appropriately sized culvert and sandbags will be installed. A qualified biologist shall monitor the construction site during placement and removal of stream diversions to ensure that any harm or loss of salmonids is minimized and documented.

- If water is present within the Project site between June 15 and October 15, then a qualified biologist will perform fish relocation prior to the start of construction activities.
  - The qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid habitat relationships; and biological monitoring shall perform fish relocation. Fish relocation will be performed in a manner which minimizes all potential risks to NC steelhead.
  - Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the *NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act.*
- Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat.
- Removal of the existing rubble and reconfiguring of the RSP that covers the creek bottom and restoring the channel to a more natural condition to promote fish passage. This will involve removing a current barrier to steelhead at the existing failed retaining wall, thereby restoring access to habitat for steelhead upstream of the bridge.

Compensatory Mitigation

No additional compensatory mitigation will be required, as the implementation of the avoidance and minimization measures discussed above will result in a net benefit to NC steelhead and their habitat. The Project will restore access to 0.25 acres of critical habitat within the BSA and the proposed stream restoration will have a beneficial effect on critical habitat.



NORTH

1:2,500
0 150 300 Feet

Data Sources: ESRI, USFWS, DigitalGlobe
10/31/2017, Quincy Engineering

Robinson Creek Bridge Replacement Project
Steelhead Critical Habitat
Figure 8

gallaway ENTERPRISES

GE: #15-130 Map Date: 03/07/19

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten steelhead within the BSA or contribute to cumulative effects on steelhead.

NORTHERN CALIFORNIA STEELHEAD AND CENTERAL CALIFORNIA COAST COHO SALMOND CRITICAL HABITAT

Survey Results

Robinson Creek within the BSA is designated as critical habitat for NC steelhead and CCC Coho salmon ESU (**Figure 8**). When water is present in Robinson Creek, the following Primary Constituent Elements (PCEs) are present within the BSA:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
- Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Project Impacts

The Project is not likely to adversely modify salmonid critical habitat. Critical habitat for salmonids will be affected by the proposed action through stream restoration activities and the placement of RSP within the creek with live willow staking that penetrates the rock layers and allows rooting into the native bank soils. The intent of the hybrid RSP revetment is to balance the engineering benefit of armoring a bank while promoting ecological processes. Proposed hybrid RSP revetment within the portions of Robinson Creek currently accessible to salmonids will result in approximately 93.1 linear feet (0.01 acres) of permanent impacts and temporary impacts of 201.6 linear feet (0.14 acres) to the stream (**Figure 9: Impacts to Critical Habitat**).